### Plenary 1: The Message and the Mission: Narrowing the Gap
Jeremy Pitt

**Boundaries without Borders: A Call for Resiliency Technology in a World of Veillances**
Christine Peraklis

### Plenary 2: The Story of the Internet and How it Broke Bad: A Call for Public-Interest Technologists
Bruce Schneier

**Design Lessons From AI’s Two Grand Goals: Human Emulation and Useful Applications**
Ben Shneiderman

### Plenary 3: Designing Without the -Isms: How Tech Inclusion Benefits Society
Chancey Fleet, Nikki Stevens, Berhan Taye and Mark A. Vásquez

**Creating the Public Interest Technologies of the Future - Learning to Love the “Wicked Problem”**
Jamie Winterton

### Plenary 4: Social Impact of Intelligence Amplification
Joseph Carvalho

---

## IEEE SSIT ISTAS20: Program-At-A-Glance

### Thursday, November 12, 2020

<table>
<thead>
<tr>
<th>Time/Venue</th>
<th>Sydney</th>
<th>Gong</th>
<th>Phoenix</th>
<th>Temple Radio</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00am AZ</td>
<td><strong>Plenary 1:</strong> The Message and the Mission: Narrowing the Gap</td>
<td>Jeremy Pitt</td>
<td><strong>Plenary 2:</strong> The Story of the Internet and How it Broke Bad: A Call for Public-Interest Technologists</td>
<td>Christine Peraklis</td>
</tr>
<tr>
<td>10:30am AZ</td>
<td><strong>Design Lessons From AI’s Two Grand Goals: Human Emulation and Useful Applications</strong></td>
<td>Ben Shneiderman</td>
<td><strong>Creating the Public Interest Technologies of the Future - Learning to Love the “Wicked Problem”</strong></td>
<td>Jamie Winterton</td>
</tr>
<tr>
<td>12:30pm AZ</td>
<td><strong>Plenary 3:</strong> Designing Without the -Isms: How Tech Inclusion Benefits Society</td>
<td>Chancey Fleet, Nikki Stevens, Berhan Taye and Mark A. Vásquez</td>
<td><strong>Creating the Public Interest Technologies of the Future - Learning to Love the “Wicked Problem”</strong></td>
<td>Jamie Winterton</td>
</tr>
</tbody>
</table>

### Session 1:
- Track 1 - Invited Speakers
- Track 2 - Author Track

### Session 2:
- Track 2 - Author Track

### Session 3:
- Track 3 - Author Track

### Time/Venue

<table>
<thead>
<tr>
<th>Time/Venue</th>
<th>Sydney</th>
<th>Gong</th>
<th>Phoenix</th>
<th>Temple Radio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30pm AZ</td>
<td>Session 1: Track 1 - Invited Speakers</td>
<td>Session 2: Track 2 - Author Track</td>
<td>Session 3: Track 3 - Author Track</td>
<td></td>
</tr>
<tr>
<td>3:30pm AZ</td>
<td>Session 4: Track 1 - Invited Speakers</td>
<td>Session 5: Track 2 - Author Track</td>
<td>Session 6: Track 3 - Author Track</td>
<td></td>
</tr>
<tr>
<td>7:00pm AZ</td>
<td>Session 7: Track 1 - Invited Speakers</td>
<td>Session 8: Track 2 - Author Track</td>
<td>Session 9: Track 3 - Author Track</td>
<td></td>
</tr>
<tr>
<td>9:00pm AZ</td>
<td>Session 10: Track 1 - Invited Speakers</td>
<td>Session 11: Track 2 - Author Track</td>
<td>Session 12: Track 3 - Author Track</td>
<td></td>
</tr>
<tr>
<td>7:00am AZ</td>
<td><strong>Plenary 4:</strong> Social Impact of Intelligence Amplification</td>
<td>Joseph Carvalho</td>
<td><strong>Plenary 5:</strong> “Killing Two Birds with One Stone”* A Case Study of Development Use of Drones for Medical Delivery</td>
<td>Ning Wang</td>
</tr>
</tbody>
</table>

### Plenary 5:
- **Plenary 5:** “Killing Two Birds with One Stone”* A Case Study of Development Use of Drones for Medical Delivery
- Ning Wang

### Saturday, November 14, 2020

<table>
<thead>
<tr>
<th>Time/Venue</th>
<th>Sydney</th>
<th>Gong</th>
<th>Phoenix</th>
<th>Temple Radio</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00am AZ</td>
<td>Session 13: Track 1 - Invited Speakers</td>
<td>Session 14: Track 2 - Author Track</td>
<td>Session 15: Track 3 - Author Track</td>
<td>Track 4 - PodCasts</td>
</tr>
<tr>
<td>1:30pm AZ</td>
<td>Session 19: Track 1 - Invited Speakers</td>
<td>Session 20: Track 2 - Author Track</td>
<td>Session 21: Track 3 - Author Track</td>
<td>Track 4 - PodCasts</td>
</tr>
<tr>
<td>4:30pm AZ</td>
<td>Session 22: Track 1 - Invited Speakers</td>
<td>Session 23: Track 2 - Author Track</td>
<td>Session 24: Track 3 - Author Track</td>
<td>Track 4 - PodCasts</td>
</tr>
</tbody>
</table>

### Sunday, November 15, 2020

<table>
<thead>
<tr>
<th>Time/Venue</th>
<th>Sydney</th>
<th>Gong</th>
<th>Phoenix</th>
<th>Temple Radio</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00am AZ</td>
<td>Session 25: Track 1 - Invited Speakers</td>
<td>Session 26: Track 2 - Author Track</td>
<td>Session 27: Track 3 - Author Track</td>
<td>Track 4 - PodCasts</td>
</tr>
<tr>
<td>12:00am AZ</td>
<td>Session 28: Track 1 - Invited Speakers</td>
<td>Session 29: Track 2 - Author Track</td>
<td>Session 30: Track 3 - Author Track</td>
<td>Track 4 - PodCasts</td>
</tr>
<tr>
<td>2:00pm AZ</td>
<td>Session 31: Track 1 - Invited Speakers</td>
<td>Session 32: Track 2 - Author Track</td>
<td>Session 33: Track 3 - Author Track</td>
<td>Track 4 - PodCasts</td>
</tr>
<tr>
<td>5:30pm AZ</td>
<td>Session 34: Track 1 - Invited Speakers</td>
<td>Session 35: Track 2 - Author Track</td>
<td>Session 36: Track 3 - Author Track</td>
<td>Track 4 - PodCasts</td>
</tr>
</tbody>
</table>

**END OF CONFERENCE**
Brief Contents

About IST AS 20

Welcome Messages

From IEEE SSIT President
From IEEE SSIT President-Elect
From IEEE IST AS 20 General Chairs
From IEEE IST AS 20 Organizing Co-Chairs
From Local Host of IEEE IST AS 20
From IEEE IST AS 20 Technical Program Chair

Local Hosts

Committees

Committee Chairs
Organising Committee
Technical Program Committee
Panel of Reviewers

Speakers

Pioneers and Keynote Speakers
Invited Speakers and Local Speakers
Plenary Speakers

Call for Papers

Public Interest Technology University Network

Co-convenors of PIT-UN / IEEE IST AS Day Two
7 PIT UN Day Two Program Plenary Session
PIT Colloquium Arizona State University

Technical Programme

Technical Programme-ISTAS 20
7 PIT UN Day Two Program

Abstracts

Abstracts ISTAS 20
7 PIT UN Day Two Program Abstracts
Snaps from Conference
IEEE HAC Final Report-ISTAS20
Author Index
An Overview

The IEEE International Symposium on Technology and Society was held 12–15th November 2020, hosted virtually by the School for the Future of Innovation in Society at Arizona State University. The General Chair of the meeting was Katina Michael, the Technical Program Chair was Roba Abbas, the Local Organizing Co-Chairs were Netra Chhetri and Nalini Chhetri, and our Publications Chair Salah Hamdoun. The program ran across four time zones, and spanned some 16 hours a day for four consecutive days. The full papers presented at ISTAS20 underwent rigorous peer review. There were 210 accepted abstracts, short papers and longer peer-reviewed papers accepted into the ISTAS Conference Proceedings, representing over 400 authors from 27 countries.

It was indeed the largest ever ISTAS held, with the greatest number of official registrations. We are grateful for the support of student registrations by IEEE’s Humanitarian Activities Committee (HAC) 2020 Grant, in addition to the scores of volunteers, keynotes, invited speakers, reviewers, committees over the 4 parallel tracks. We would particularly like to thank the students from the International Global Development PhD program at ASU, in addition to the student volunteers in the Society Policy Engineering Collective (SPEC) who gave up of their time to make the event what it was, a complete success.

There were two outstanding personnel who supported us over a weekend and we thank them especially for the Zoom logistics and preparation, Events Manager Cindy Dick and Events Administrator Melissa Waite. It was there spirit of kindness that made the event so professional. But we are also indebted to all who showed such grace by their presence, to chair, and ask questions of one another.

For us highlights included special panels on a variety of themes including collocated panels Designing Without the —isms: How Tech Inclusion Benefits Society (with IEEE TechEthics), and other panels on Humanistic Values in STEM, Social and Environmental Justice, Graduate Student-Led PIT, Best Practices in Public Interest Technology, Age Appropriate Published Terms for Children, and Embedding Humanistic Values in STEM Education, among many other memorable sessions on democracy by design, cybersecurity, global development, humanitarian challenges, on future technologies such as AI and brain implants, on professional practice in industry, a hands-on workshop on building a SolarSPELL.org, several live radio shows and interviews, field studies in development contexts, undergraduate case studies, autoethnographic life stories, socio-legal scholarship and more.

There were three special issues published stemming from collaborations at ISTAS20. The first was published in the IEEE Transactions on Technology and Society on the theme of “Socio-Technical Design for Public Interest Technology” (June 2021) by Abbas et al., then “Co-designing the Future with Public Interest Technology” (IEEE TSM September 2021) and the third special in IEEE TTS and “Anticipating Techno-Economic Fallout: Purpose-Driven Socio-technical Innovation” (September 2021). There are also numerous conference video proceedings that are available on www.technologyandsociety.org and ASU hosted Public Interest PIT Colloquia. We hope you also enjoy the post-conference experience of sitting down and reading about the nascent conceptualization of Public Interest Technology.

A special thank you to Dr Roba Abbas for her patience, kindness and care.

Katina Michael.
Welcome to the International Symposium on Technology and Society. My name is Bob Dent and I’m the President of the Society on Social Implications of Technology, better known as SSIT. Thank you all for attending our Symposium. A big thank you to Katina Michael and all the volunteers on the Technical Program Committee and Local Organizing Committee and all the volunteers that were able to make this Symposium a success. Arizona State University deserves our deep appreciation for all their support.

I know some of you are very familiar with SSIT and some of you are not. SSIT is a community of people interested in, and concerned about, the impact of technology upon our society – societies worldwide. It is a 48 year old organization within the IEEE, or Institute of Electrical and Electronics Engineers organization.

We produce a Magazine quarterly that has won awards. We also have a quarterly Transactions. We have standards that are being produced by our volunteers. We have this Symposium, ISTAS, as well as a Global Humanitarian Technology Conference. Both are annual conferences, and we have much more. If you’re interested in learning more about SSIT, visit our website www.technologyandsociety.org which you can do by entering “IEEESSIT” all letters into your browser.

I hope you will stay well and stay safe. Enjoy the conference.

Watch also on YouTube at: https://www.youtube.com/watch?v=YTWxCMGApw&t=2s
Hi folks.

This is Clint Andrews, I am President-Elect of the IEEE Society on Social Implications of Technology and I want to join the others in welcoming you to this very important and exciting conference.

I really look forward to hearing everything that you all have to say and write, and I think we're going to remember this for years to come. It's an important event.

I also encourage you to take a look at IEEE SSIT as a source of information and an intellectual community that addresses the kinds of issues that this conference focuses on.

I'll see you in the Zoom sessions.

Watch also on YouTube at: https://www.youtube.com/watch?v=EoGoCK_fnlk
Welcome Messages from IEEE ISTAS 20 / PITUN General Chairs

Katina Michael
Emerging Technologies
Andreen Soley
Director of the PIT-UN

This Welcome Message by Andreen Soley and Katina Michael was pre-recorded and used to open the jointly organized PIT-UN Conference (Day 2) event with IEEE ISTAS20 (Day 2) event.

Andreen Soley: Good morning, good morning everyone. My name is Andreen Soley. I’m the director of the Public Interest Technology Network here at New America. Welcome to the 2020 PIT-UN virtual convening. I’m happy to be co-locating this event with IEEE ISTAS, and my co-host is Katina Michael. Thank you so much for joining us Katina.

Katina Michael: Thank you so much, Andreen and welcome everyone, all the way from Australia.

Andreen Soley: So, one of the things I wanted to quickly let you all know about is the Public Interest Technology - University Network is currently a partnership of 36 colleges and universities working to build the field of public interest technology on their campuses and to nurture a new generation of civic minded technologists. The Network recently opened our Fall enrollment period, so you have an opportunity to learn more about the Network and join the Network, possibly in 2021.

One thing I wanted to draw your attention to today is that we’re going to be having an afternoon session on becoming a Public Interest Technology - University Network member. So please take a look at the schedule and if you’re interested in learning more about membership in the network, please do attend that session. But before we go too far, I wanted to talk to Katina about why this partnership made so much sense for us this year.

Katina Michael: This meant a lot to us Andreen. Your involvement has been a catalyst. IEEE’s Society on Social Implications of Technology is extremely happy. This is a Society that I’ve been a part of since my Ph.D. years, and basically the Society on Social Implications of Technology was started in 1972. Their interest in public interest technology is quite old. But what has piqued our attention is the timeliness of this discussion begun by New America, and also the bringing together of all these universities. If you are going to enact change, we have to do it together on a mass scale, and how you do that, you do that through different communities, and in this case with the university network, and today’s wonderful program that’s a mixture of IEEE members, non IEEE members, people from different disciplines and backgrounds like humanities and social sciences and also technologists and hardcore engineers. And that’s really what it’s about having a common language coming together in fluency and saying, well, you may be an anthropologist you may be training in the humanistic side. Tell us more about what you’re doing. Tell us more about the focus on the human side and how we can inject that in the design process and it’s really about, not designing for people, but with people. Working at the coalface and asking people, “what do you need”?

The International Symposium on Technology and Society is decades old – it began a long time ago. The emphasis of this particular symposium is Public Interest Tech and it runs through to the 15th of November. So, stay with us, even after the Public Interest Technology - University Network Conference is finished.
So with that, I just want to say we’ve got common goals, advancing humanity, IEEE’s tagline and, to be honest we’re trying to shift the emphasis purely on the technical theory and inject some humanistic values into the process at large. It’s about minimizing discrimination when we are talking about the adoption of new technologies. It’s about minimizing harm. It’s about taking responsibility in these fundamental concepts in society that seem to have been forgotten in a rush to digitize and perhaps somehow we’ve become enslaved to a degree by technology’s rapidity and change. So, we want to change this and say how can we build technologies that are stable, robust and will help our communities worldwide to feel empowered. Technology, not just for technology’s sake, but because people need it.

Andreen Soley: Thanks for that introduction. Out of the work that you’ve been doing for so long, it must be so gratifying for you to hear this language that you pursued in your Ph.D. program and now finding a sense of affirmation through this. This is meant for you particularly and also for many of our scholars that we hear often.

Katina Michael: Andreen, again, you’ve been a catalyst behind this change. I don’t know how you communicate to the communities that you do ‘at scale’. But it’s starting to create, what I’ll call a movement, a social change, not solely a technical change that we expect from technology per se. Technology will forever undergo change. And yes it’s gratifying, but I think what you’re doing is, making people that have felt alone in the past, actually feel that they’re the majority. Most of us feel like this is the time for change. Most of us have been saying this for decades, and to see the fulfillment of a hope that says society comes before technology; well it’s the very reason I call the research group I direct, the Society Policy Engineering Collective.

How are we going to institute soft rules, regulations, the historical element? Let’s think about what do we want our future to be like. And let’s visualize and build that future together where there’s tolerance, where there’s humanity. You know, going back to those first principles. And I know a lot of people are going to be talking about responsible innovation. We’re going to talk about social justice and environmental justice and human rights and building for accessibility and disability. Acknowledging gender diversity and inclusion in the workplace.

Andreen Soley: For many of our university partners, what this work has meant for members of the network, is that they get a chance to focus on curriculum development that is engaging, and cross disciplinary, and transdisciplinary – because our intention is to ensure that all courses that future public interest technologists take have a critical lens. To have the ability to think about the implications of all technological innovations and the communities that will be served, and potentially those that might be harmed. And so that’s been a really key feature for us in the network has been to encouraged course development.

The other piece that we’re really focused on is the experiential side. How do you connect what students are learning in the classroom to what this work is going to do ‘at scale’. But it’s starting to create, what I’ll call a movement, a social change, not solely a technical change that we expect from technology per se. Technology will forever undergo change. And yes it’s gratifying, but I think what you’re doing is, making people that have felt alone in the past, actually feel that they’re the majority. Most of us feel like this is the time for change. Most of us have been saying this for decades, and to see the fulfillment of a hope that says society comes before technology; well it’s the very reason I call the research group I direct, the Society Policy Engineering Collective.

Can you tell us a little bit about what’s going to be covered in those remaining days Katina?

viii
Katina Michael: We have three parallel tracks, and a fourth video track. We have keynote specialists in technology ethics, and addressing -isms, and how we smash those -isms together in the technology world. We’ve got people looking at how they will embed privacy and security by design-values by design, you know not leaving our values at the door when we enter our corporates, or not thinking about just solely the end goal of money. What else can we do to innovate, inspining new technologies that will help people, and how do we empower communities to actually build for themselves.

We’ve got people talking on behalf of Aboriginal Australians and public interest technology. How do we actually empower Aboriginal people who look at the environment and think ‘my environment around me it’s not just a sustainable thing, it’s a being to me. I actually look at it as an entity that’s equal to being human’. And so really starting to mix those understandings, this cultural awareness that has been so much lacking in our technological development – of respect, respect for one another, respect for the participants who are dealing with the design process together, working with community groups in society, not just observing them from afar. And then we must ask the question for the different communities, “what do you need”?

And you know Andreen, we’re talking about degrees here, and the Faculty involved in teaching it delivering these degrees, but nothing makes me happier than hearing a student who’s knocking on my door and saying: ‘I’m thinking of doing a degree in this public interest thing with this science and technology thing or this human and social dimension thing, or this responsible innovation or ethics and IT thing. Actually, I’ve been waiting decades to do a Master’s degree, and all of a sudden I’ve found my home.’ And what they’ve been telling me is, “I don’t want to do an MBA. The outcome of my work is not going to be financial”. And so does a PIT student, a public interest technology student have to be poor? Absolutely not. We’re going to create new business models. We’re going to, I think, convey principles with consent, with knowledge, with the right things in place; whether it’s via better security, encryption, whatever it is, whatever society requires of these community groups, we’re going to do that.

I’m asking our students at ASU and beyond, to think of a roadmap. This is not just the degree that you get a piece of paper at the end. This is a movement. You have to visualize in that roadmap that I want to finish this degree, and I think I want to start an NGO, I think I want to work for IBM. They were encouraging, actually, at the NICE 2019 conference in Phoenix Arizona, for humanities and social sciences scholars to engage with PIT. I heard IBM’s CISO, Shamla Naidoo, encourage public interest tech scholars, saying if you’re from the field of music, if you’re from the field of anthropology – we want you embedded in our security practice because by diversity, we’re going to challenge the people who are doing the majority programming, but you’re going to come and work with us together. So I think it’s a big message to big corporate, and I think they’re ready to make the move. They know this is the time. And also, to these other inspiring innovations that will help in the volunteering engineering sense, that will help the homeless, that will help the needy. I think we’ve got a great charter ahead of us and I’m very excited for the next ten years, Andreen.

Andreen Soley: Thank you so much for that Katina. I’m hoping that in the future we will be able to accept institutions, educational institutions from around the world, within our network. We’re just getting started with the Public Interest Technology - University Network, so stay tuned for opportunities for global partnerships. That’s exactly what we envision for our future, we’re thinking bigger and better as Katina has indicated.

And so I just hope you all have a wonderful day today. Please do continue on with IEEE ISTAS for the rest of the weekend and also continue to take advantage of all of the learnings that you have here because we’ll have recordings that are available and we’ll also be posting them on the www.newamerica.org website, as well as www.technologyandsociety.org?

Katina Michael: Yes, it’s IEEEISTAS20.

Andreen Soley: Fantastic. Thank you so much. Have a good rest of the day, everyone.

Katina Michael: Thank you, again.

Watch also on YouTube at:
https://www.youtube.com/watch?v=7zCkzDvtkR8&list=PLNeVelpaPYVoE5BjLrEE-KJ1x3dSfL3&index=22&t=14s
Welcome to the International Symposium on Technology and Society 2020, which is brought to you by the IEEE Society on Social Implications of Technology. My name is Netra Chhetri, and I am the Organizing Committee Co-Chair alongside my wife Nalini Chhetri, for this symposium which is on the theme of Public Interest Technology.

The program tracks across the board, ranging from presentations from emerging scholars and established members of academia, industry, and government, to not-for-profit organizations. We invite you to attend as many sessions as you can.

To engage with us throughout the sessions, I hope that at this ISTAS we are able to develop and foster community in which we can engage and collaborate on the topic area of Public Interest Technology.
Welcome Message from Local Host of IEEE ISTAS 2020

David Guston
Director of the School for the Future of Innovation in Society, Arizona State University

Thank you so much for today, and let me extend my thanks to all. Thank you on behalf of Arizona State University and the School for the Future of Innovation in Society.

I thank you for your role in bringing this meeting to the incredible audience that Katina has described, the School for the Future of Innovation in Society is a unique entity.

This is true not just within ASU but within a larger group of scholarly pursuits of these topics that are under discussion today. I want to emphasize a couple of things about the School and about the role of interdisciplinary work, as I understand it.

IEEE ISTAS is an interdisciplinary meeting, a place where scholars, who have their grounding in in the STEM fields can meet with scholars, who have their grounding outside of the STEM fields, and discuss a similar set of interests, a similar set of issues, about the role of technology in society, about how it is that society gets what it wants out of it, out of society’s investments in science, technology and innovation, and about how that role is conditioned historically and ethically. It’s about the innovations, the scientific and technological progress, which sometimes do, and sometimes don’t, go as planned. These concepts are captured in the organization of this meeting.

This is also interwoven on Friday with another meeting of similar disposition, the Public Interest Technology - University Network, which is a newer entity just a couple of years old. Friday’s meeting is organized by New America, in conjunction with a number of foundations. A goal is to think about how it is that technological skills, inventiveness, and technological expertise can be turned toward the public interest. I look forward to the explorations of that particular inquiry in the context of ISTAS. I know that we all have a lot of work to do over the coming days and I hope you look forward to it as much as I do.

At ISTAS I am really pleased to have this sort of robust celebration of interdisciplinary scholarship of examination of the public role of science, technology and innovation embraced by a large community and in conjunction with what we’re doing at ASU. Thank you.
Welcome Message from IEEE ISTAS 2020 Technical Program Chair

Hello and welcome to the IEEE International Symposium on Technology and Society for 2020, which is brought to you by the Society on Social Implications of Technology.

This year we are co-locating with New America’s Public Interest Technology University Network (PIT-UN), to bring you the 13th of November schedule and program. We are also collaborating with IEEE TechEthics to bring you a webinar on the 12th of November. The remainder of the program, across the four days spans four tracks, in which we will hear from pioneers, emerging scholars, established members of academia, not for profit organizations, and more.

So we invite you to attend as many sessions as you can, to engage with us throughout these sessions, and our hope is that beyond ISTAS we are able to develop and foster a community in which we can engage and collaborate on the topic of Public Interest Technology.

Welcome to ISTAS20, and we look forward to hearing from you.

Watch also on YouTube at: https://www.youtube.com/watch?v=bMZ3TFK1dqE
We sincerely thank Arizona State University for the preparation in January-March 2020 to support the conference at its Tempe campus.

Recognized by U.S. News & World Report as the country’s most innovative school, Arizona State University is where students and faculty work with NASA to develop, advance and lead innovations in space exploration.

This is where Nobel laureates and Pulitzer Prize winners teach master learners. This is where nationally ranked and internationally ranked programs prepare next-generation innovators to thrive while advancing pioneering research, strategic partnerships, entrepreneurship and economic development.

ASU’s nationally ranked programs inspire the top-qualified graduates and have positioned the university as a “top-tier” recruiting and hiring institution by more than 50 of the country’s top corporations, according to professional recruiters and rankings services around the world.

ASU graduates more than 27,000 thinkers, innovators and master learners every year. Take a deeper look at how ASU is building the next generation of leaders.
Committee Chairs

Katina Michael  
General Chair  
Emerging Technologies

Roba Abbas  
Technical Program Chair  
Codesign and Sociotechnical Systems

Neeta Chhetri  
Organising Committee Co-Chair  
Innovation in Global Development

Nalini Chhetri  
Organising Committee Co-Chair  
Sustainable Development

Salah Hamdoun  
Publications Chair  
FinTech in Global Development

Clark Miller  
Workshop and Tutorial Co-Chair  
Energy and Society

Elma Hajric  
Workshop and Tutorial Co-Chair  
Data Privacy in Emerging Technology

Martin Perez Comisso  
Social Media Co-Chair  
STS and Technology Appropriation

Ferhad Najar Arevalo  
Social Media Co-Chair  
Smart Cities and Infrastructure
Organizing Committee

Noa Bruhis
Water Resources & Science Communication

Jean Boucher
Sociologist

Michael Cardinale
Treasurer

Cindy Dick
Event Manager

Emma Frow
STS and Synthetic Biology

Laura Hosman
SolarSPELL.org

Faheem Hussain
ICT for Development & Digital Rights

Kirk Jalbert
Participatory Action Research

Darshan Karwat
Project Confluence

Thad Miller
Sustainable Futures

Rebecca Monteleone
Disability Studies

Mary Jane Parmantier
Political & Economic Sociotechnical Development
Technical Program Committee

Beaenna Pasik-Duncan
The University of Kansas

Brad Kjell
Central Connecticut State University

Heather Love
University of Waterloo

Greg Adamson
University of Melbourne

Joe Herkert
North Carolina State University

John Impagliazzo
Hofstra University
Panel of Reviewers

Anas Aloudat
University of Jordan, Jordan

Bozenna Pasik-Duncan
Kentucky University, USA

Brad Kjell
Central Connecticut State University, USA

Brent Jesiek
Purdue University, USA

Brittany McCall
Arizona State University, USA

Charmayne Hughes
San Francisco State University, USA

Chris Barton
Arizona State University, USA

Clinton Andrews
Rutgers University, USA

Damita Kaloostian
Arizona State University, USA

Daniel Susser
Penn State University, USA

Edgard Mimo
Arizona State University, USA

Elma Hajric
Arizona State University, USA

Eric Stribling
Arizona State University, USA

Eusebio Scornavacca
University of Baltimore, USA

Fahmida Chowdhury
National Science Foundation, USA

Farah Arevalo
Arizona State University, USA

Francis Mendoza
Arizona State University, USA

Fritz Smith
Arizona State University, USA

George Roussos
University of London, UK

Greg Adamson
University of Melbourne, Australia

Haowen Fan
Arizona State University, USA

Heather Love
University of Waterloo, Canada

Howard Wolfman
IEEE SSIT, USA

Jason Sargent
Swinburne University of Technology, Australia

Jay Pearlman
IEEE SSIT, USA

Joe Herbert
North Carolina State University, NCSU

John Impagliazzo
Hofstra University, USA

Karina Vold
Cambridge University, UK

Katina Michael
Arizona State University, USA

Ken Foster
IEEE SSIT, USA

Kevin Johnson
Arizona State University, IBM

Khanjan Mehta
Lehigh University, USA

Laura Edelson
New York University, USA

Leonard Bruce
Arizona State University, USA

Lew Terman
IEEE SSIT, USA

Lindsay Robertson
Massey University, NZ

Luis Kun
IEEE SSIT, USA

Lyria Bennett Moses
University of New South Wales, Australia

Mary Jane Parmentier
Arizona State University, USA

MG Michael
Independent Researcher, Australia

Michael Cardinale
IEEE SSIT, USA

Nalini Chhetri
Arizona State University, USA

Netra Chhetri
Arizona State University, USA

Nickolas Dodd
Arizona State University, USA
Pioneers

Roger Clarke
Dataveillance

Bruce Schneier
Public Interest Technologist

Jumana Abu-Ghazaleh
Pivot for Humanity

Wendell Wallach
Yale University

Jamie Winertoon
Arizona State University

Keynote Speakers

Christine Peraklis
Johnson and Wales University

Jeremy Pitt
Imperial College London

Isabel Pedersen
Ontario Tech University

Joseph Carvalko
Yale University
Invited Speakers

Fatima Chrifi Alaoui
San Francisco State University
Social Media, Social Change

Andreas Sjöström
Capgemini
Applied Innovation Exchange

Jennifer D. Oliva
Seton Hall
Health, FDA & Evidence Law

Susanne Tedrick
IBM Women of Color in Tech

Rebecca Monteleone
University of Toledo

Felicity Gerry
Human Rights Law

Local Speakers

Athena Aktipis
Human Generosity Project

Alex Halavais
Critical Data Studies

Karin Ellison
Life Science Ethics
Co-located PITUN Conference Speakers-Day 2

Anne-Marie Slaughter  
CEO, New America

Andreen Soley  
Director of Public Interest Technology  
University Network, New America

Margaret Little  
Director, Ethics Lab  
Georgetown University

Latanya Sweeney  
Professor of Harvard University

Larry Susskind  
Ford Professor of Urban and Environmental Planning, MIT

Elizabeth Garlow  
Deputy Director New Practice Lab  
New America

Benjamin Boudreaux  
Policy Researcher and Professor  
RAND

David Eaves  
Lecturer in Public Policy, Harvard Kennedy School

Kathleen M. Cumiskey  
Professor in the Psychology Department, CUNY

Susan Imberman  
Associate Professor  
CUNY

Erhardt Graeff  
Assistant Professor of Social and Computer Science, Olin College

Gregory Johnson  
Founding Executive Director, Code for South
Paul Ohm  
Professor of Law, Georgetown University

Lydia Chilton  
Assistant Professor of Computer Science, Columbia University

Kenneth Fleischmann  
Prof and Director of Undergraduate Studies, UT Austin

Christopher Goranson  
Distinguished Service Professor, Carnegie Mellon University

Mahmud Farooque  
Associate Director of the Consortium for Science, Policy and Outcomes, ASU

Leslie Garvin  
Senior Program Director, Cardinal Careers, Stanford

Elisabeth Graffy  
Professor of Practice, School for the Future of Innovation in Society, ASU

Erik Fisher  
Associate Professor, Consortium for Science, Policy & Outcomes, ASU

Mihir Kshirsagar  
Director, Technology Policy Clinic, Princeton University

Alexandrina Agloro  
Assistant Professor, School for the Future of Innovation in Society, ASU

Ellen Zegura  
Regents and Fleming Professor, Georgia Tech

Ashley Labosier  
Adjunct Faculty, Pepperdine School of Public Policy
Co-located PITUN Conference Speakers – Day 2

Robert Cook-Deegan
Professor at the School for the Future of Innovation in Society, ASU

Toby Shulruff
Senior Technology Safety Specialist

Farah Arevalo
Graduate Research Associate, Center for Smart Cities and Regions

Salah Hamdoun
Graduate Research Assistant, Future of Innovation in Society, ASU

Elma Hajric
NSF NRT Fellow: Citizen-Centered Smart Cities

Martin Comisso
Ph.D student in HSD Science and Technology School for the Future of Innovation in Society, ASU

Darshan Karwat
Assistant Professor, School for the Future of Innovation in Society, ASU

Kirk Jalbert
Assistant Professor, School for the Future of Innovation in Society, ASU

Traci Morris
Executive Director, American Indian Policy Institute (AIPI), ASU

Christopher Berry
William J. and Alicia Townsend Friedman Professor, University of Chicago

Ivy Li
Designer and Researcher, Impactful

Magali McDuffie
Film Department Coordinator & National Film Program Committee Chair, SAE Creative Institute
Robert C. Hampshire  
Associate Professor of  
Public Policy, University of Michigan

Jessica Simes  
Associate Director, Center for Antiracist Research,  
Boston University

Fallon Wilson  
Co-Founder of #Black  
TechFutures Research Institute

Mutale Nkonde  
CEO, AI for the People

Chris Kuang  
Co-Founder & Director of  
Operations, Coding it Forward

Devshi Mehrotra  
CEO, JusticeText

Yulikendy Valdez  
Co-Founder and  
CEO, Forefront

Bindi Nagda  
Founder of EarlyByrd

Vanessa Castañeda Gill  
CEO and Co-Founder,  
Social Cipher

Beeban Kidron  
Founder and Chair,  
5Rights

Rys Farthing  
Director, 5Rights

Alpesh Shah  
Senior Director of Global Business  
Strategy & Intelligence,  
IEEE Standards
Co-located PITUN Conference Speakers: Day 2

Jake Braun
Executive Director, University of Chicago Harris School of Public Policy

Eric T. Meyer
Dean, School of Information, University of Texas

Faheem Hussain
Clinical Asst Professor, School for the Future of Innovation in Society, ASU

Hana Schank
Director of Strategy for Public Interest Technology, New America

Karen Bannan
Director of Communications, Public Interest Technology, New America

Katina Michael
Professor, School for the Future of Innovation in Society, ASU

Deirdre K. Mulligan
Professor, School of Information, University of California, Berkeley

Jameson Wetmore
Associate Professor, School for the Future of Innovation in Society, ASU

Margaret Darin Hagan
Director Legal Design Lab and a lecturer at Stanford Institute of Design

Sylvester A. Johnson
Professor and Director of the Center for Humanities, Virginia Tech

José Olivarez
Author and Poet

Franny Choi
Author and Poet
Stacey Dogan  
Professor of Law, Boston University, School of Law

Susanne Tedrick  
Technical Specialist, IBM Cloud Platform

Robert Domanski  
Director of Higher Education-Tech Talent Pipeline, New York City Government

Michelle Amante  
VP of Federal Workforce Programs, Partnership for Public Service

Rick Kempinski  
Senior Manager, Federal Workforce Programs Partnership for Public Service

Jumana Abu-Ghazaleh  
President Pivot for Humanity

Samantha Coleman  
Software Engineer, Olin College of Engineering

Georgia Bullen  
Executive Director, Simply Secure

Arla Sutton  
Student, Olin College of Engineering

Umbreen Qureshi  
Designer, Civilla

Matt Morrison  
Executive Director, Working America

Monée Fields-White  
Journalist and former New Practice Lab fellow
Travis Moore
Founder and Director
TechCongress

Stephanie Rodriguez
Vice President, Policy & Engagement AnitaB.org

Leia Washington
Associate, Federal Workforce,
Partnership for Public Service

Brittany Moore
Manager, Federal Workforce,
Partnership for Public Service

Sujatha Raman
Associate Professor, The Australian & National University, Canberra

David Guston
School Director & Professor,
School for the Future of Innovation in Society, ASU
International Symposium on Technology and Society (ISTAS 2020)
https://attend.ieee.org/istas-2020/
November 12-15, 2020
ISTS Virtual Event (ZOOM)

Call for Papers on Main Theme of Public Interest Technology*
https://easychair.org/cfp/istas20
*looking for international perspectives

Paper/Abstract Deadlines
September 24 submission for full papers with peer review
October 24 deadline for abstract/long abstract presentations

First 200 students attend FREE but need to contact ieeeistas20@protonmail.com (tell your friends).
Discount rates for institutions with faculty of more than 10 attending: contact ieeeistas20@protonmail.com.

Participants and Authors Register here: https://attend.ieee.org/istas-2020/registration/
International submissions welcome to suit local time zone programming:
Conference Template: https://tinyurl.com/y8ale4v3
Questions: General Chair: katina.michael@asu.edu
Program Chair: roba@uow.edu.au
To receive the Conference Newsletter please email ieeeistas20@protonmail.com for inclusion.

Pioneer Presentations by: Bruce Schneier, Ben Shneiderman, Wendell Wallach and Jumana Abu-Ghazaleh
Keynote Presentations by: Christine Perakslis, Jeremy Pitt, Joseph Carvalko, Isabel Pedersen
Invited Speakers: Fatima Chiffi Alaoui, Andreas Sjöström, Jennifer D. Oliva, Rebecca Monteleone
Local ASU Speakers: Andrew Maynard, Traci Morris, Karen Mossberger, Troy McDaniel

Full Program Pending here: https://attend.ieee.org/istas-2020/program/
The International Symposium on Technology and Society (ISTS) is the flagship conference of the IEEE’s Society on the Social Implications of Technology-the oldest society and conference of its kind.
ISTS is a multi/inter-disciplinary forum for engineers, policy makers, entrepreneurs, philosophers, researchers, social scientists, technologists, and polymaths to collaborarte, exchange experiences, and discuss the social implications of technology.

ISTS’2O Theme: Public Interest Technology
Public Interest Technologies (PIT) serve to address social needs and challenges in society. Public Interest Technologies pertain to technologies that may aid not-for-profits and non-government organizations to achieve their goals. These technologies might leverage open source software for collaboration, and open data initiatives to overcome societal challenges, may exercise crowdsourcing and crowdsensing techniques toward collective awareness, and provide open workforce exchanges where Information and Communication Technologies and engineering volunteerism is encouraged towards satisfying the needs of under-resourced organizations and citizenry.

IEEE SSIT will be joining the Public Interest Technology Universities Network (PIT-UN) on Nov 13. Details TBA.
Sponsored by IEEE SSIT and Arizona State University
Developing public interest technology for the future

School for the Future of Innovation in Society faculty, students organize and host International Symposium on Science and Technology

December 7, 2020

Public interest technology is an emerging field. It serves to address social needs and challenges in society. So how should we develop this field that will be critical to our future? That was the theme at the IEEE International Symposium on Science and Technology (ISTAS 20), hosted by Arizona State University and the School for the Future of Innovation in Society.

“We were interested in the definitions of public interest technology,” said Professor Katina Michael, who was the general chair of the conference. “We were looking at emerging technologies, responsible innovation and the social implications of technology.”

ISTAS 20, the flagship conference for the IEEE’s Society on the Social Implications of Technology (https://technologyandsociety.org/), took place virtually Nov. 12-15. It was organized by several School for the Future of Innovation in Society faculty, students and staff, including Michael and local chairs Associate Professor Netra Chhetri (https://isearch.asu.edu/profile/844268) and Clinical Associate Professor Nalini Chhetri (https://isearch.asu.edu/profile/878954). Twenty-seven countries were represented at the conference, which featured more than 450 authors and 200 papers, and included presentations from ASU faculty and students.

“The goal of the conference was to convene with interdisciplinary scholars, experts, policymakers, engineers and many others working in this space,” said human and social dimensions of science and technology student Elma Hajric, who presented two papers at the conference. “It created a space for the exchanging of ideas around technologies and their societal implications.”

Sessions at the conference highlighted the role technology plays in societies and how people are impacted, including how technology can improve economic mobility, social inclusion and human development through processes, online access data and AI.
"There was much enthusiasm about ISTAS 20, especially because it provided the opportunity to look at technologies through a social science lens," said Salah Hamdoun, innovation in global development student and conference presenter. "Bringing together social science and engineering fields is a critical and emerging approach that has a tangible impact on people in our communities.

The conference included a joint event with the Public Interest Technology University Network (PIT-UN), which featured topics on data governance and social and environmental justice.

"The PIT-UN conference brought together a dynamic program," Michael said. "Beyond the topics overtly requiring addressing such as racial discrimination, addictive technology, inequities in access, the poor state of aboriginal peoples in diverse countries and social justice matters particularly of underrepresented minorities, we had complementary interventions by poets and teachers who came to read and share their work and bridge the gap between humanistic values and technology."

"These two dimensions are often incongruent because we innovate with the 'build and they will come' mentality instead of asking communities what they need and how we can better empower them to be innovators themselves. While we understand participation is important, we are struggling with creating new forms of data collection in a meaningful way that can orient our futures through collective awareness. Digital communities are quite splintered in their approach to the future, so how to make sense of this difference requires new methodologies, tools and approaches to business and governance."

The conference created a unique and inspiring environment where people from different backgrounds and disciplines could come together to share their thoughts and exchange new ideas.

"It wasn't a conference where people try to outdo each other or compete to see who had better quantitative metrics," Michael said. "It was about the essence of why we conduct research, who we are helping and what we can learn together. When we support each other, great things are possible through better coordination."

"It was a truly special experience creating an opportunity for a community of people vested in human-centered technologies to share, inspire and provide insights into important social issues," Hajric said. "I hope people left with the same feeling of support and hope that I experienced."


Ashley Richards
Communications Specialist, School for the Future of Innovation in Society
480-727-8828 | ashley.j.richards@asu.edu (mailto:ashley.j.richards@asu.edu)
IEEE ISTAS 20: IEEE International Symposium on Technology and Society 2020
Virtual Conference hosted by Arizona State University
Tempe (Virtual Conf.), AZ, United States, November 12 - 14, 2020

Call for Papers

**Conference website:** [https://www.istas.asu.edu](https://www.istas.asu.edu)

**Abstract submission deadline:** October 31, 2020

**Abstract submission:** October 31, 2020

**Topics:**
- Emerging technology
- Social implications of technology
- The role of citizens
- Social and institutional policy

IS10 is a multi-interdisciplinary forum for engineers, policy makers, entrepreneurs, philosophers, researchers, social scientists, technologists, and geeks; it is collaborative, exchange-oriented, and discursive. We welcome papers that address social implications of technology. In particular, we encourage papers that explore the social consequences of emerging technologies; consider the impact of technology on politics, society, and the environment; and examine the ethical, legal, and social issues associated with new technologies. We are particularly interested in applications, implementations, and reflections with respect to the following areas of Public Interest Technology:

**Public Interest Technology Sub-Forum & Panels**
- Defining public interest technology
- Engineering ethics
- Leadership, advocacy, activism, activism
- What is this "public interest?"
- Engineering volunteers
Call for Papers

IEEE SSIT ISTAS 20
International Symposium on Technology and Society
November 12 - 15, 2020
Public Interest Technology

1. Why do we need and value public interest technology (PIT)?
   - Professional support by corporations (e.g., public interest engineers)
   - Brokering the gap between community, corporations and communities
   - Public interest technologies, humanitarian activities and global challenges

2. Sustaining meaningful partnerships?
   - Long-term strategies not band-aid solutions for NGOs and other

3. STH inapplicability?
   - When do STH scholars fit in tech times?
   - What does a Pitt curriculum look like?
   - How does it differ to traditional STH?

4. Addressing tensions between engineers and social scientists
   - Respect and acknowledging both and soft skills are equal
   - Collectively aware and the governing of the commons
   - Strategies for sharing, redistribution and efficiency

5. Engineering and technology scholarship
   - Converging emerging technologies and the role of public interest

Submission Guidelines

All papers must be original and not simultaneously submitted to another journal or conference. The deadline for paper submission is 10 August 2020. All papers must be submitted through EasyChair. The following paper categories are evaluated:

- Full papers are those that are over 4 pages in length and no more than 12 pages in length. Full papers require the use of explicit methodology, and may be applied or theoretical in content. Comprehensive literature reviews will be considered for conference publication. If they clearly describe the uniqueness of their presentation in comparison to previous research. Papers that present a new or high-impact research papers, and even-structured communications are acceptable. Selected papers will be invited to be extended by authors and included in a special issue for 2020.

- Short papers are those that are between 2-4 pages using the IEEE Conference Template. They will undergo a desk review, and the presentation will be published with the conference with the highest ranking based on originality, novelty, and relevance.

- Abstract only contributions are those that use the IEEE Conference Template and do not exceed 1.5 pages. It may contain an abstract of about 50 words with additional text elaborating on the abstract. These long abstracts may be considered for publication in the space across STH. Technology and Society edited by Te-Shiang. They should have a clear message and fit of argumentation and may include to point or research in progress. Authors who submit in this category will be given an opportunity to present their points of view.
Call for Papers

List of ISTAS30 Thematic Topic

- Public Interest Technology and Engineering Education
  - Technology curricula, ITA sustainable, interdisciplinarity, social sciences, humanities, engineering, employability, teaching, ethics
  - Private corporations, government agencies, non-government organisations (NGOs), non-for-profit, public-private-partnerships
- Methodological Approaches to Systems
  - Sociotechnical systems, participatory design, co-design, human factors research, human-computer interaction, experimental, values
- Emerging Technologies and Responsible Innovation
  - Smart cities, drones, facial recognition, AI, machine learning, big data, IoT, 5G, cloud computing, brain-to-computer interfaces
- Social Implications of Technology, Social Impact, (Un)intended Consequences of Technology
  - Benefits, costs, (un)known, health, addiction, death, scenarios planning, trajectory, future, backcasting, forecasting
- Technologies
  - Surveillance, dataveillance, biometrics, facial, social credit system, predictive policing, ISA collective, LSB, voice-assistive
- Law, Regulation, Technology Standards and Guidelines, Principles, Governance, Policy, Ethics, Privacy and Security
  - Stay law, pacing problem of emerging technology, case law, enforceability, ethics boards, data privacy, data ownership, bi design
- Social Justice, Environmental Justice, Citizen Science, Humanitarian Technology, Risk Assessment
  - Under-represented populations, minorities, speculation, harm, environmental impact, risk, greed, preservation, sustainability

https://www.haymarket出版社/2020

- Universal Service Obligation, Discrimination, Access, Accessibility, Fairness, Openness, Transparency, Equity
  - Indigenous communities, displaced populations, women, mobility, affordability, speed, encryption, open data/systems, open access
- User/End-user/Employee Perspectives, Corporate Social Responsibility, Human Rights
  - Citizens, patients, participants, business users, rights of children, employability, cognitive impaired, humans, diversity, animals
- Other traditional topics discussed at IEEE SSIT Conferences including, but not limited to:
  - Social issue related to energy
  - Health and safety technology networks
  - Engineering ethics and professionalism responsibility
  - Engineering education and the social implications of technology
  - Public education in the social implications of technology
  - History of electrification
  - Technical expertise and public policy
  - Social issues related to information and communication technology
  - System analysis in public policy decisions
  - Economic issues related to technology
  - Peace technology
  - Future of work

Committees

General Chair – Katrina Michael, Arizona State University
Program Committee Chair – Rob Ablitt, University of Wurzburg

The 35th annual international technical program committee will be announced shortly

Organizing Committee Chair – Norita Oishi, Nihon Oishi, Arizona State University
Call for Papers

Keywords and Invited Speakers

- Professor Christopher Pendle - Johnson and Wales University (Keynote)
- Professor Jeremy Pit - Imperial College London (Keynote)
- Professor Isabel Peterson - Geoglas College University (Keynote)
- Dr. Patricia Arroyo-Wright Maas - San Francisco State University (Invited Speaker)
- Dr. Jennifer Glass - Boston University (Invited Speaker)
- Professor Dayshen He - University of Toronto (Invited Speaker)
- VP Michelle Sparling - Caprizes (Invited Speaker)

Publication

The SSIT symposium 2020 proceedings will be published in the IEEE Xplore database by IEEE. Abstracts and short papers under 2,500 words will be available from the conference website. Full papers can be downloaded from the conference website. Please visit https://www.ieee.org/publications/ for more information.

Venue

IEEE SSIT 2020 is a virtual SSITM conference. Venue details will be sent to delegates after registration as we near the conference. The virtual world opens up to many new opportunities to see a truly global conference, breaking down the borders between us. We are very much looking forward to the opportunity to support the conference at its Chicago campus. At the forefront of Internet Technology, Science, and Technology Policy, and Innovation and International Development Initiatives. We hope you will consider extending your stay with us in Chicago between the 9-13th November.

Contact

All questions regarding the conference should be emailed to ssit@ssit.org. An email to your question should be received within 48 hours.

Support Needed

We are presently looking for support from:
- Partners
- Contributors
- Patrons
- Supporters

This support can take the form of direct grants (e.g., research travel grants or club core grants), paid advertising in the event program, services provided in exchange for brand exposure, underwriting a specific activity (banquet, lecture, etc.), and providing keynote or other overseas gifts, among other ways. Each of these opportunities offer unique benefits. If you would like to be a supporter, please visit isast.org.

Corporate Gathering

Over the three days, members of the IEEE SSIT have been invited to attend panels at a variety of other acknowledged scientific conferences. We would like to highlight the opportunity for a gathering in Atlanta that is inclusive to
multidisciplinary areas of expertise, and is a natural fit for engineers. IEEE SSIT is the perfect venue for these exciting areas that require two or more areas of study. Among the faculties we look to for inspiration are:

- PET Life - https://www.azsternet.edu/public-interest-technology/epetlife/epetlife.php
- SS - Society for Social Studies of Science
- PETF - Forum on Philosophy, Engineering and Technology
- SPS - Society for Philosophy and Technology
- SHOT - Society for the History of Technology

About the Host Institution

IEEE SSIT is being hosted by the School for the Future of Innovation in Society jointly with the College of Engineering at Arizona State University, Tempe, Arizona. The Conference is being brought to you by the following multidisciplinary groups within ASU:

- Society Policy and Engineering Collection (SPECC)
- Consortium for Science Policy Outcomes (CSPO)
- Innovation in Global Development (IGD) PhD Program
- Human and Social Dimensions (HSD) PhD Program
- Science and Technology Policy (STP) Master Program
- PIF (Public Interest Faculty) Initiative

The School for the Future of Innovation in Society (SFIS) is a transdisciplinary unit at the vanguard of ASU’s commitment to linking innovation to public value. We are pursuing a vision of responsible innovation that anticipates challenges and opportunities, integrates diverse knowledge and perspectives, and engages broad audiences. By examining the ways we translate imagination into innovation — and how we balance technical and social concerns along the way — we learn to build a future for everyone. For more visit: https://satis.asu.edu

About the PET Univerisities Network (PET-UN)

The PET-UN will convene at the Arizona State University (ASU) meeting and happen at Arizona State University. The Public Interest Technology Network is a partnership that fosters collaboration between 20 universities and colleges committed to building the next field of public interest technology and growing a new generation of citizen technologists. Through the development of curricula, research agendas, and experiential learning programs at the public interest technology space, these universities are helping innovation leaders to produce graduates with...
Public Interest Technology University Network

The Public Interest Technology University Network is a partnership that unites colleges and universities committed to building the field of public interest technology and growing a new generation of civic-minded technologists. Through the development of curricula, research agendas, and experiential learning programs in the public interest technology space, these institutions aim to develop graduates with skills and knowledge at the intersection of technology and policy.

To join, contact pituninfo@newamerica.org. New members will be added during a fall enrollment period.
Roba Abbas
Lecturer, School of Management, Operations and Marketing (SMOM), University of Wollongong
Technical Program Chair - ISTAS20
https://scholars.uow.edu.au/display/roba_abbas

Roba Abbas is a Lecturer and Academic Program Director with the Faculty of Business and Law at the University of Wollongong, Australia. She has a PhD in location-based services regulation and has received competitive grants for research addressing global challenges in areas related to co-design and socio-technical systems, operations management, robotics, social media and other emerging technologies. Her current research interests include methodological approaches to complex socio-technical systems design. More recently, she has delivered talks and co-organized panels for Yale University, The Alan Turing Institute, the American Association for the Advancement of Science (AAAS), Arizona State University and Ostfalia University of Applied Sciences. Dr Abbas is Co-Editor of the IEEE Transactions on Technology and Society and was the Technical Program Chair for the IEEE International Symposium on Technology and Society (ISTAS20) hosted by Arizona State University in November 2020. From 2005 to 2010, she was a Product Manager with Internetrix, Wollongong.

Katina Michael
Professor, School for the Future of Innovation in Society, ASU
General Chair - IEEE ISTAS20
www.katinamichael.com

Katina Michael is a professor at Arizona State University, holding a joint appointment in the School for the Future of Innovation in Society and School of Computing, Informatics and Decision Systems Engineering. She is also the director of the Society Policy Engineering Collective (SPEC) and the Founding Editor-in-Chief of the IEEE Transactions on Technology and Society. Katina is a senior member of the IEEE and a Public Interest Technology advocate who studies the social implications of technology. She has held 13 annual workshops on the social implications of national security space and chaired 3 international symposia on technology and society (ISTAS) in Wollongong, Toronto and Phoenix. She is the Senior Editor of the socio-economic impact section in IEEE Consumer Electronics Magazine and was the editor in chief of the award-winning IEEE Technology and Society Magazine. In 2019 she took on the role of working group chair for the IEEE P2089 standard. In 2020 she received the ICTO Golden Medal for lifetime achievement award for exceptional contributions to research in information systems, and the IEEE Phoenix section's Outstanding Member Contributing to Global Humanitarian Projects Award for her contributions to a better understanding of the impact of emerging technologies on humanity. In 2017, she also received the Brian M. O'Connell Society on the Social Implications of Technology (SSIT) Distinguished Service Award.

Andreen Soley
Director of Public Interest Technology University Network, New America
https://www.newamerica.org/our-people/andreen-soley/

Andreen Soley is director of the Public Interest Technology (PIT) University Network at New America. In 2018, Soley joined New America after twenty years of experience working within higher education and the nonprofit sector. From 2001 to 2018, Soley served as the director of educational programs at the City University of New York’s JFK, Jr. Institute for Worker Education Program (IWE), overseeing its workforce development and career advancement initiatives to make higher education accessible to low-income workers. This mutually beneficial model saw human service agencies such as United Cerebral Palsy of New York City and Young Adult Institute agree to provide employees completing IWE’s credit-bearing certificate programs with financial incentives such as a one-time bonus or salary increase, promotions, and/or release time. After relocating to Los Angeles, Soley accepted a position as a researcher with Worker Education Resource Center, an organization established by the Service Employees International Union Local 721 to provide career path programs for over 22,000 Los Angeles County Department of Health Services workers in public hospitals, health centers, and community clinics. Soley assisted in the development of the plan to identify and provide workforce development and career path programs to meet Los Angeles County’s labor needs. Prior to joining New America, she had been working with Mount Saint Mary’s University to develop a university-wide process, which tracks monitors, and reports on the employment outcomes of its graduate alumni. She has a master’s in media ecology from New York University and wants to help technologists transform the world for the better.
Social and Environmental Justice Panel: PITUN20 / IEEEISTAS20

Katina Michael (Moderator), Darshan Karwat, Kirk Jalbert, Traci Morris, and Magali McDuffie.

Biography

Katina Michael is a professor in the School for the Future of Innovation in Society and School of Computing, Informatics and Decision Systems Engineering at Arizona State University. Previously Michael was associate dean international at the University of Wollongong (UOW), Australia, where she was employed in the School of Computing and Information Technology since 2002. She has held visiting academic appointments at Nanjing University (China) and the University of Southampton (U.K.) and has taught at the Singapore Institute of Management, as well as overseeing UOW engineering and information science courses in eight campuses in five countries.

She was previously employed as a senior network engineer at Nortel Networks (1996-2001). She has also worked as a systems analyst at Andersen Consulting (1996) and OTIS Elevator Company (1994).

Michael has published six edited books, as well as coauthored two 500-page reference volumes: "Innovative Automatic Identification and Location Based Services: from Bar Codes to Chip Implants," co-authored with MG Michael (Hershey, PA: IGI, 2009), and "Uberveillance: Social Implications" (Hershey, PA: IGI, 2014), co-edited with MG Michael. She has written more than 200 peer-reviewed papers.

She researches predominantly in the area of emerging technologies, and has secondary interests in technologies used for national security and their corresponding social implications.

Katina has been the guest editor of fourteen special issues including the Proceedings of the IEEE, Computer, IEEE Robotics & Automation Magazine, IEEE Potentials, Journal of Location-Based Services, Computer Communications, Electronic Commerce Research, and Prometheus. She was the editor-in-chief of the IEEE Technology and Society Magazine (2012-2017), and has been senior editor for IEEE Consumer Electronics Magazine since 2015. In 2017, Michael was awarded the Brian M. O’Connell Distinguished Service Award from the Society for the Social Implications of Technology. She is the founding editor-in-chief of the IEEE Transactions on Technology and Society, which will be launched in 2020.
Darshan Karwat is an assistant professor with a joint appointment in the School for the Future of Innovation in Society and The Polytechnic School at ASU, where I run re-Engineered, an interdisciplinary group that embeds environmental projection, social justice, and peace in engineering. Current areas of work and teaching include:

1. Creating Structures to Mobilize Engineers and Scientists to Collaborate with Community Groups Addressing Environmental, Climate, and Energy Justice Challenges
2. Understanding Participation in Just Energy Transitions
3. Infusing Principles of Justice into Energy Technology Design
4. Reimagining the Future of Environmental Governance
5. Activist Engineering and Environmentally-Responsible Engineering
6. Fluid/Gas Dynamics
7. Use-Inspired Design
8. Space Systems

I am originally from Mumbai, India, but feel equally at home in Michigan or Washington, D.C. (and now, the Valley!). I studied aerospace engineering (specializing in gas dynamics and combustion) and sustainability ethics at the University of Michigan. I then spent three years as a AAAS Fellow in Washington, D.C., first at the U.S. Environmental Protection Agency on the Innovation Team, where I worked on climate change resilience and low-cost air pollution sensors; and then at the U.S. Department of Energy in the Water Power Technologies Office, helping design and run the Wave Energy Prize. I also work as co-founder of the Constellation Prize.

Kirk Jalbert Assistant Professor at Arizona State University (ASU) in the School for the Future of Innovation in Society with a joint appointment in the School of Computing, Informatics, and Decision Systems Engineering. I am also a senior sustainability scientist with the Julie Ann Wrigley Global Institute of Sustainability. I am furthermore a JPB Environmental Health Fellow with the Harvard T.H. Chan School of Public Health.

I direct efforts in the Civic Science for Environmental Futures Collaborative, a space exploring participatory action research projects driven by communities working to create more equitable environment futures. My personal research in this space explores public engagements with environmental science and governance that emerge from energy justice movements and how these are shaped by data mobilizations, information technologies, and grassroots scientific research efforts. This work additionally seeks to understand the social, political, and technical dynamics that make for effective academic, nonprofit, and community-based research partnerships. More information about my research can also be found at www.kirkjalbert.com.
Traci Morris is the Executive Director of the American Indian Policy (AIP) Institute at Arizona State University and is a member of the Chickasaw Nation of Oklahoma. Under her leadership, the AIP has grown and diversified its service to Indian Country providing policy analysis, tribally driven research, and economic development capacity building and working with such Indian Country partners as NAFOA, AISES, and the Indigenous Food and Agriculture Initiative. In her work at both ASU and prior, Morris has worked with Native American nations; Tribal businesses; Native American non-profits; written a college-accredited curriculum; and has advocated for digital inclusion at the Federal Communications Commission and on Capitol Hill.

Morris’s research and publications on Native American media and the digital divide is focused on Internet use, digital inclusion, network neutrality, digital and new media curriculums, and development of broadband networks in Indian Country. Morris spearheaded the groundbreaking Tribal Technology Assessment: The State of Internet Service on Tribal Lands in 2019. Her book, Native American Voices: A Reader, continues to be a primary teaching tool in colleges throughout the country.

Dr. Morris is Affiliated Faculty at ASU’s School for the Future of Innovation in Society, an Affiliate of ASU’s Center for Gender Equity in Science and Technology, President of the Board of the Phoenix Indian Center, and on the Advisory Council of the Association of Tribal Archives, Libraries, and Museums. Formerly, Morris served a two-year appointment (2014-2016 and 2010-2012) to the Federal Communications Commission’s Consumer Advisory Committee and a one-year appointment (2017) to the Advisory Board for the Department of Labor’s Native American Employment and Training Council. As an entrepreneur prior to her ASU appointment, Morris founded Homahota Consulting LLC, a national Native American woman-owned professional services firm working in policy analysis, telecommunications, education, and research assisting tribes in their nation-building efforts and working with Native Nations, tribal businesses and those businesses working with tribes.

Morris has an M. A. and Ph.D. from the University of Arizona’s American Indian Studies, in addition to a B.A. in Liberal Arts from Colorado State University.
Magali McDuffie came to Australia from France at the age of 22. I completed a Masters Degree in Film and Television in 2002 before setting up a film production company with my late husband, film and television director Brian McDuffie, on the Far North Coast of New South Wales. In 2005, I was approached by the Tweed Aboriginal Community to document their fight against the construction of the Tugun Bypass highway, which was going to destroy a significant cultural landscape, and produced my first documentary: *Bypassed: the Erosion of our Cultural and Environmental Landscapes* (2006).


My ongoing collaboration with Nyikina women in the Kimberley over the past eleven years has led me to my PhD studies in which I privileged the voices of Nyikina women, and look at how these influenced cultural actions, economic and self-determination initiatives, through filmed interviews and narratives, using film as an advocacy tool.

Through a Foucauldian deconstruction of the historical, anthropological and development discourses that have influenced Nyikina women’s lived experiences, coupled with a strongly Indigenist methodology, my research sought to empower the women in their constantly evolving social and political roles and examined their agency in an increasingly neo-colonial context. Our collaborative work has led to the presentation of our films at the Human Rights Commission in UNESCO, and at national and international film festivals and conferences.

**Abstract**

While COVID-19 brought most of America improvements in air quality, a return of species, fewer carbon emissions, the pandemic also brought to the forefront the fact that indigenous people and people of color are more likely to fall ill and die from the disease. As one educator states, “This increased risk is not incidental but is itself linked to cumulative environmental burdens that have compromised the immune systems and health of people living in communities often treated as sacrifice zones by our majority-white society.” During our panel, we will discuss how environmental and social injustices go deeper than just pollution and how public interest technology’s intersection with justice issues can bring equality to all.
Biography

Jameson Wetmore is an associate professor in the School for the Future of Innovation in Society and co-director of the Center for Engagement and Training in Science and Society at Arizona State University. His work combines the fields of science and technology studies, ethics, and public policy in order to better understand both the interconnected relationships between technology and society and the forces that change those relationships over time. His research spans a broad array of topics and time periods, but most of it comes back to a recurring question: How do people design and create technological systems and, in turn, how do these technological systems help to define, reinforce and propagate specific values?

For instance, Professor Wetmore has studied how the Old Order Amish regulate the technologies they use in order to strengthen their communities. He has examined the complex systems in place in New Orleans to prevent disasters like Katrina. And he has explored how religious thinkers seek to influence the future of nanoscale research and policy. He is currently leading an NSF funded research project to study the developing community of computer scientists trained and working in East Africa. Much of this work is summed up in his co-edited book “Technology and Society: Building our Sociotechnical Future” (MIT Press).

As co-director of the Center for Engagement & Training in Science and Society, Professor Wetmore works to develop ways for scientists, policymakers and others to think about the future of technology and society. As part of this center he is actively involved in training programs for graduate student scientists and engineers and works extensively with science museums and centers across the United States to find ways to integrate discussions about the social aspects of science and technology into their programming.

He is also the associate director for societal and ethical implications of the National Science Foundation’s National Nanotechnology Coordinated Infrastructure Coordinating Office where he works to integrate the social studies of nanotechnology into the technical development of the field.

Toby Shulruff is a Senior Technology Safety Specialist at the National Network to End Domestic Violence, working at the intersection of technology and gender-based violence to analyze the impacts of technologies on individuals and communities. She holds a Bachelor of Arts from the Evergreen State College, and is a graduate student in the Public Interest Technology program at the College of Global Futures at Arizona State University.
Abstract

Today, some of the best PIT-centered work is being launched from academia. Undergraduate and graduate students are putting PIT into practice and making real change in the world. During this panel we will hear from five graduate students who are having success using PIT as their starting point. We will discuss: - Why they decided to focus on PIT in their post-grad work; - What kinds of questions and PIT issues they are exploring; - How they are working with people in the public, private, NGO and NfP sectors to gain experience and insights;
Plenary Session

What kinds of new approaches, theories and methods are challenging the status quo; - What they learned pursuing their projects in science and technology policy, human and social dimensions, innovation and global development, responsible innovation - What’s next for them when they complete their programs, and - Which tips or practices were most successful for them when they first got started.

Best Practices in Public Interest Technology - PITUN 2020/IEEE ISTAS20

Faheem Hussain (Moderator), Faheem Hussain, Robert Cook-Deegan, Alexandrina Agloro, Erik Fisher, Elisa-beth Graffy and Jumana Abu-Ghazaleh

Biography

Faheem Hussain has over 15 years of experience conducting Socio-Economic Development and Technological Interventions related research in Asia, Sub-Saharan Africa, and North America. He is currently working as a Clinical Assistant Professor in the School for the Future of Innovation in Society (SFIS) at Arizona State University (ASU), USA. He holds a Ph.D. and an M.Sc. degree in Engineering and Public Policy from Carnegie Mellon University. His research interests include Digital Solutions for Refugees, Information and Communication Technology for Sustainable Development, Digital Afterlife, Social Media, Digital Rights, Gender Empowerment using STEM, and Sustainable Development Goals.

Before joining ASU, he worked as an Assistant Professor in the Department of Technology and Society, College of Engineering and Applied Sciences at State University of New York (SUNY), Korea. Faheem Hussain also worked as a founding faculty in Asian University for Women in Bangladesh and taught at Carnegie Mellon University’s Qatar Campus.

Beyond academia, Faheem works as a Technology Policy Specialist in various research projects with UN-ESCAP/APCICT, USAID, international development agencies (e.g., IDRC, DFID, Ford and Rockefeller Foundation), and international think tanks (e.g., Freedom House, LIRNEasia, Ideacorps) in the fields of Technology, Public Policy, and Development. Faheem is also a Senior Sustainability Scientist in the School of Sustainability at ASU.

(Email: faheem.hussain@asu.edu)

Dr. Robert Cook-Deegan is a professor in the School for the Future of Innovation in Society, and with the Consortium for Science, Policy & Outcomes at Arizona State University. He founded and directed Duke’s Center for Genome Ethics, Law & Policy (2002-2012). Prior to Duke, he was with the National Academies of Science, Engineering and Medicine (1991-2002); National Center for Human Genome Research (1989-1990); and congressional Office of Technology Assessment (1982-1988). His research interests include science policy, health policy, biomedical research, cancer, and intellectual property. He is the author of The Gene Wars: Science, Politics, and the Human Genome and more than 300 other publications.
Alexandrina Agloro is a media artist, community-based researcher, and doula who believes in the possibilities of the decolonial imaginary using ancestral technologies as liberatory tools. She is an Assistant Professor of Science, Technology, and Innovation in the Borderlands at the School for the Future of Innovation in Society at Arizona State University. Alexandrina utilizes principles of self-determination and relevant education in her teaching and research. She teaches at university and high school levels and specializes in interactive media skill building with young people of color. She is a Director of Situated Critical Race and Media (SCRAM) of FemTechNet, a multi-university collaborative feminist technology organization. She is the Futurist for the Latinx Pacific Archive and is working on developing a line of ovulation-tracking jewelry that is both affordable and flawlessly stylish. As a community-based researcher and participatory designer, her speculative work is anchored in lived experience. Alexandrina uses critical pedagogy and community-based research as platforms to work with institutions, community organizations, birthworkers, researchers, and artists. Right now she cares about the connections between reproductive justice; land, water, and internet sovereignty; and interactive media. Her research has received funding from the Ford Foundation, the National Science Foundation, the Andrew W. Mellon Foundation-John E. Sawyer Seminars, the Teagle Foundation, the Rhode Island Council of the Humanities, and the Voqal Fund. Born and raised in San Francisco, she currently lives between unceded Indigenous land in Arizona and South Africa with her rescue part-cyborg French Bulldog Beauregard.

Erik Fisher is an associate professor in the School for the Future of Innovation in Society and the Consortium for Science, Policy and Outcomes. He is also editor-in-chief of the *Journal of Responsible Innovation* published by Taylor & Francis and directs the international program on Socio-Technical Integration Research (STIR) as well as the Center for Responsible Innovation. Professor Fisher’s work has appeared in numerous journals including *Research Policy*, *Science and Public Policy*, *Science and Engineering Ethics* and *Nature*. Fisher has been a visiting professor at Delft Technical University (2019), Karlsruhe Institute of Technology (2018), the Norwegian University of Technology in Norway (2018, 2016), and the University of Twente in the Netherlands (2013).
Elisabeth Graffy is Professor of Practice in the School for the Future of Innovation in Society and in the Consortium for Science, Policy and Outcomes (CSPO) at Arizona State University. She is an Area Leader for Energy and Society in ASU-LightWorks and Senior Sustainability Scientist in the Julie Ann Wrigley Global Institute of Sustainability and Innovation (GIOSI). An expert on policy and institutional change, she focuses on disruptive challenges that intersect science, technology, politics, economics, and culture. Her issue portfolio includes environmental policy and sustainability, food and agriculture, water, energy, social resilience, and efforts to manage climate change. She has developed award-winning research on the science-policy nexus and leads large-scale, participatory social experiments in accelerating sustainable, inclusive energy transitions that integrate social and technological innovation. She explores strategies for proactive mitigation of water scarcity, wildfires and extreme temperatures in the Central and Western US and post-hurricane recovery of energy systems in Puerto Rico. She also investigates issues associated with emerging markets, policies and technologies for climate change mitigation through carbon dioxide removal, capture and use.

Dr. Graffy designed and leads the Sustainable Energy, Equity, and Knowledge-Sharing (SEEK) project, a novel approach to spurring energy transitions by engaging the collective impact of hard-to-reach or left out sectors with substantial but unrealized social resources. SEEK combines systems research, community engagement and student-led service learning with multi-sectoral partnerships to enhance joint capacities. Partners include technical experts and government agencies as well as key social networks, such as faith communities, and other underserved or less represented sectors in the clean energy economy.

She has been instrumental in establishing several knowledge enterprises at ASU that build community and foster collaborative problem-solving: the Spirituality and Sustainability Initiative, the Environmental Humanities Initiative, the Household Independent Power Project (HIPP), the Center for Energy and Society, and the Climate Engineering Governance Initiative (CEGI). She collaborates with partners in public and private sectors and in diverse disciplinary fields, from engineering to theology. She designed and taught the longest-running graduate seminar on the social and political dimensions of energy transitions at ASU, Sustainable Energy as a Social Problem, attracting students from public affairs, law, business, environmental social science, engineering, sustainability, life sciences, design, and planning.

Her research has impact in the real world. Her analysis of rooftop solar innovations, Does Disruptive Competition Mean a Death Spiral for Electric Utilities? received national media attention, including in the Wall Street Journal and Los Angeles Times, and is cited in state regulatory reforms and legal textbooks. A related study in the Journal of Applied Corporate Finance, Corporate Finance and Sustainability: The Case of the Electric Utility Industry, tested the feasibility of refocusing existing utility finance mechanisms on new goals, with examples in New York and Minnesota. Resilience depends on including public attitudes and cultural knowledge in technology, policy and market innovation, as illustrated in Narrative futures and the governance of energy transitions.

With two decades of governmental, private sector and NGO leadership experience prior to joining the faculty at ASU, Graffy has addressed issues as diverse as housing, refugee relief, rotational grazing, conflict resolution, and energy stewardship. She has authored, co-authored and edited more than 70 academic, governmental and other publications including two major reports for the U.S. Congress, Targeting Environmental Priorities for Agriculture: Reforming Program Strategies and Agriculture, Trade and Environment: Achieving Complementary Policies. As National Policy Advisor to the National Water Quality Assessment (NAWQA) Program at the U.S. Geological Survey, she realigned the science-policy relationship and advanced new approaches to science communication and integrated scientific analysis, including the acclaimed Summary Reports series on water quality aimed at federal and state decision-makers. Her Functions of Scientific Information (FOSI) model guided this realignment and has also been utilized to evaluate the impact of philanthropic investments, inform strategic partnership-building, implement White House policy initiatives, and design solutions-focused research. Her related article, Meeting the Challenges of Policy Relevant Science: Bridging Theory and Practice, won both the Marshall Dimock award for best article and Louis Brownlow award for best article by a practitioner in Public Administration Review, the only such dual award in the journal’s history.
Graffy served as a special adviser to the Acting Secretary of the Interior on a White House-led policy initiative on environmental decision-making, leading a team of five federal departments and managing consultations with the National Academy of Public Administration. She has held policy and program positions at every level of government: the US Congress Office of Technology Assessment, US Geological Survey/Interior, and US Agency for International Development (federal); Wisconsin Department of Agriculture and Legislative Audit Bureau (state); and Philadelphia Commission on Human Relations and New York City Office of Management and Budget (city). She was elected Chair of the Section on Women in Public Administration, the largest membership section in the American Society for Public Administration, and continues to mentor and advocate for inclusion and equity in professional development, public service and leadership.

Jumana Abu-Ghazaleh is the Founder and President of Pivot for Humanity, the organization working to professionalize the social tech industry, creating a more responsible, ethical and accountable internet.

Jumana has spent over 20 years in marketing and brand communications, developing and implementing strategies for corporations such as American Express, Yahoo, Coca-Cola, Bank of America, Ally Bank and Hilton Hotels. She is perhaps most well-known for creating Capital One’s “What’s in your wallet?” campaign.

In 2014, Jumana founded and launched betwixt.us, a digital conversation engine that harnesses technology to create a more authentic connection and communication between individuals on a team.

Abstract

When people talk about public interest technology, there’s often a disconnect. PIT is viewed as a technology rather than what it is: the adoption of human-centered design, product development, process re-engineering, and data science to solve public problems in an inclusive, iterative manner. Unless students understand that PIT is a philosophy, they can’t make it a part of their future career paths. In this panel our experts will discuss how to create courses and content that educates and engages students so they become true PIT practitioners. These will include core courses about: public interest technology principles, codesign in practice (building with people and not for people), technology assessment, public engagement strategies, participatory frameworks and more.
Age Appropriate Published Terms for Children - PITUN 2020/ IEEEISTAS20

Baroness Beeban Kidron (Moderator), Rys Farthing, Alpesh Shah and Ephraim Luwemba

Biography

Baroness Beeban Kidron is the Founder and Chair of 5Rights. She is a Crossbench member of the House of Lords and sits on the Democracy and Digital Technologies Committee. She is a Commissioner for UNESCO’s Broadband Commission for Sustainable Development where she is a member of the Working Group on Child Online Safety; a member of Unicef’s AI group; and sits on the Council on Extended Intelligence.

Rys Farthing is an expert in charity strategy and management. She has worked with a range of not-for-profits in both the UK and Australia, from small charities and large INGOs, and held numerous academic posts exploring the role of the third sector in civil society. Her passion is around co-creation, and maximising the capacity of beneficiary engagement to transform programmes and services. She works extensively with young people, and recently co-authored The Precarious Generation with Routledge. She currently works at Ocean Generation, a UNOPS supported NGO that aims to creatively engage and mobilise young people around the urgent issue of climate change and ocean conservation. It focusses on both supporting innovative solutions directly, and inspiring the next generation to innovate for good.

Alpesh Shah serves as the Senior Director of Global Business Strategy & Intelligence at the IEEE Standards Association, where his focus is on organizational growth and advancements of ecosystems towards accelerated outcomes.

Prior to joining the IEEE, Alpesh worked as a trusted advisor to and for a number of organizations in various industries with a focus on organizational growth.

Alpesh holds an MBA with concentrations in Strategy, Marketing and Finance; MSc in IT Project Management and a BSc in Computer Science. In his spare time he volunteers with Special Spectators, a non profit committed to providing seriously ill children and their families a special day through sporting events across the United States.

Ephraim Luwemba is the Associate Researcher at 5Rights. He is currently enrolled as a PhD student in the University of Nottingham’s Horizon Centre for Doctoral Training. His time working within the Digital Marketing industry caused him to question the uses of personal Data on the web, leading him to Horizon. His PhD work focuses on creating and testing guidelines for child-centred information systems.
Abstract
The moderator of this panel is 5Rights Founder and Chair Baroness Beeban Kidron. On the panel is Dr Rys Farthing Director of Projects at 5Rights, Alpesh Shah from IEEE Standards and Ephraim Luwemba, a PhD Candidate studying Privacy Policies at the Horizon Center at the University of Nottingham. Together this panel will discuss a framework for developing age appropriate digital services for situations where users are children and youth (IEEE P2089). The impact of these future practices on industry will be discussed, with a focus on how vendors build solutions for children, and the role of public institutions and the educational sector.
PIT Colloquium at Arizona State University

The PIT Colloquium was an initiative begun by Program Chair of the Masters of Science of Public Interest Technology, professor Katina Michael of the School for the Future of Innovation at Arizona State University.

The Colloquium ran for 8 weeks preceding IEEE ISTAS each fortnight, and garnered representation from speakers and participants from all over the world. Each Colloquium ran for 2 hours each.

PIT Colloquium Week/Titles/Contributors

Week 1: Public Interest Technology: A Leading Discussion

Week 2: Public Interest Technology: From Cooperation to Codesign
Featuring: Katina Michael (MC), C. Athena Aktipis, Roba Abbas, Nicole Stephensen, Joe Carvalho

Week 3: Public Interest Technology: Creating a Roadmap
Week 4: Public Interest Technology: COVID Responses, Innovation and Public Interests
*Featuring:* Elisabeth Graffy (MC), Kevin Dooley, Bob Cook-Deegan, Anna Muldoon, Katina Michael.

Week 5: Public Interest Technology: We Can’t Put This Off Any Longer: The Time to Preserve our Privacy and Security, by Design
*Featuring:* Katina Michael (MC) and Ann Cavoukian.

Week 6: Public Interest Technology: Numbered Lives: Life and Death in Quantum Media
*Featuring:* Katina Michael (MC) and Jacqueline Wernimont, Erin Twyford, and George Mickhail.
Week 7: Public Interest Technology: Truth, Fact, Time
Featuring: Katina Michael (MC) and Michael Eldred.

Week 8: Public Interest Technology: History Matters
Featuring: Katina Michael (MC) and G. Pascal Zachary.
Technical Programme
### Technical Programme-ISTAS 20

#### Session 1  
**Track 1 (Sydney)**  
**Day/Date**  
Thursday, 12 November 1.30 pm Arizona (MST), 3.30 pm EST, 08.30 pm UTC, Friday, 13 November 07.30am Sydney  
**Zoom**  
[asu.zoom.us/j/84317050041]

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
<th>Author(s)</th>
<th>Institution(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Living on the Edge of Tomorrow: A Moviegoer’s Guide to Public Interest Technology</td>
<td>Andrew Maynard</td>
<td>Arizona State University College of Global Futures, United States</td>
</tr>
<tr>
<td>1</td>
<td>Technology and Human Trafficking</td>
<td>Felicity Gerry,</td>
<td>Australia</td>
</tr>
<tr>
<td>1</td>
<td>Dosing Discrimination: A Critical Analysis of PDMP Risk Scores</td>
<td>Jennifer Oliva,</td>
<td>Seaton Hall United States</td>
</tr>
<tr>
<td>2</td>
<td>The weaponization of AI: Investigating Deepfakes and its Racial and Gendered Warfare</td>
<td>Fatima Zahrae Chrifi Alaoui,</td>
<td>San Francisco State University United States</td>
</tr>
<tr>
<td>2</td>
<td>The Message and the Mission: Narrowing the Gap</td>
<td>Jeremy Pitt,</td>
<td>Imperial College London United Kingdom</td>
</tr>
<tr>
<td>2</td>
<td>Boundaries without Borders: A Call for Resiliency Technology in a world of veillances</td>
<td>Christine Perakslis,</td>
<td>Johnson &amp; Wales University United States</td>
</tr>
<tr>
<td>3</td>
<td>Creating the Public Interest Technologies of the Future - Learning to Love the “Wicked Problem”</td>
<td>Jamie Winterton,</td>
<td>Arizona State University United States</td>
</tr>
<tr>
<td>3</td>
<td>Design Lessons From AI’s Two Grand Goals: Human Emulation and Useful Applications</td>
<td>Ben Shneiderman,</td>
<td>University of Maryland United States</td>
</tr>
</tbody>
</table>

#### Session 2  
**Track 2 (Gong)**  
**Day/Date**  
Thursday, 12 November 1.30 pm Arizona (MST), 3.30 pm EST, 08.30 pm UTC, Friday, 13 November 07.30am Sydney  
**Zoom**  
[asu.zoom.us/j/81166609535]

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
<th>Author(s)</th>
<th>Institution(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Public Interest Technology and Ethics</td>
<td>Fritz Smith,</td>
<td>School for the Future of Innovation in Society Arizona State University Tempe, Arizona</td>
</tr>
<tr>
<td>3</td>
<td>Affective Rights: A Foundation for Ethical Standards</td>
<td>Angelo Ferraro,</td>
<td>Department of Electrical Engineering, University of South Carolina Columbia, South Carolina, USA</td>
</tr>
<tr>
<td>4</td>
<td>Material Value Ethics in the IEEE P7000 Draft Standard</td>
<td>Lee Barford,</td>
<td>Department of Computer Science and Engineering, University of Nevada, Reno, NV, USA</td>
</tr>
<tr>
<td>4</td>
<td>Robots, Ethics, and Pandemics: How Might a Global Problem Change the Technology’s Adoption?</td>
<td>Yvette Pearson and Jason Borenstein,</td>
<td>Dominium University Norfolk, VA, USA, School of Public Policy Georgia Institute of Technology Atlanta, GA, USA</td>
</tr>
</tbody>
</table>

---

1. Department of Philosophy & Religious Studies Old Dominion University Norfolk, VA, USA
2. School of Public Policy Georgia Institute of Technology Atlanta, GA, USA
Session 3  Track 3 (Phoenix)
Day/Date    Thursday, 12 November 1.30 pm Arizona (MST), 3.30 pm EST, 08.30 pm UTC, Friday, 13 November 07.30 am Sydney
Zoom [asu.zoom.us/j/87625476356]

Trevor Robin Smith
Department of Engineering Physics McMaster University, Hamilton, Canada

[093] Developing Use-Cases to Support an Empathic Technology Ethics Standard
Randy Soper1, Karen Bennet2, Pablo Rivas3 and Mathana4
1Managing Consultant Guidehouse Manassas, Virginia, USA, 2Technical Consultant Quality Craft Toronto, Ontario, Canada, 3Department of Computer Science Baylor University Waco, Texas, USA, 4Ctr. for Internet & Human Rights Europe-Universität Vadian Frankfurt (Oder), Germany

[101] Ethical Tech Pedagogy for Public Good: A Review of Educational Initiatives and Approaches
Jason Lajoie1, Alexi Orchard2 and Heather A. Love3
1Council for Responsible Innovation and Technology University of Waterloo Waterloo, Canada, 2Department of English Language and Literature, University of Waterloo Waterloo, Canada

[072] Ethical Concerns: An overview of Artificial Intelligence System Development and Life Cycle
Hassan Al Shazly1, Angelo Ferrari2 and Karen Bennet3
1Life Senior Member, IEEE Columbia, South Carolina, USA, 2Department of Electrical Engineering, University of South Carolina Columbia, South Carolina, USA, 3Life Senior Member, IEEE North York, Ontario, Canada

Session 4  Track 1 (Sydney)
Day/Date    Thursday, 12 November 3.30 pm Arizona (MST), 5.30 pm EST, 10.30 pm UTC, Friday, 13 November 09.30 am Sydney
Zoom [asu.zoom.us/j/84317050041]

[162] Ethics, Governance and Emerging Technologies
Wendell Wallach1, John C Havens2, Jumana Abu-Ghazaleh3 and Roba Abbas4
1Yale University United States, 2IEEE Standards United States, 3PIVOT for Humanity United States, 4University of Wollongong Australia

[150] Everyday Experts: Transforming Research and Design Practices for Disability
Rebecca Monteleone
University of Toledo United States, USA

[147] Social Psychology and Public Interest Technology
Sam Wilson, Diane Sivasubramaniam and Julian Oldmeadow
Swinburne University of Technology, Australia

[154] Time Travelers and Space Invaders - Implications of Pervasive Systems for Public Interest Technology
Eusebio Scornavacca
University of Baltimore United States

[177] Age Appropriate Published Terms For Children
Beeban Kidron1, Rys Farthing2, Alpesh Shah3 and Ephraim Luwemba4
1Rights United Kingdom, 2Rights Foundation United Kingdom, 3IEEE Standards United States, 4Nottingham University United Kingdom

[178] Social and Environmental Justice Panel
Katina Michael1, Darshan Karwat1, Kirk Jalbert1, Traci Morris1 and Magali McDuffie2
1Arizona State University United States, 2SAE Creative Institute Australia
### Technical Programme

#### Best Practices in Public Interest Technology

Faheem Hussain¹, Robert Cook-Deegan¹, Alexandrina Aploro¹, Erik Fisher¹, Elisabeth Graffy¹ and Jumana Abu-Ghazaleh²  
¹Arizona State University United States, ²PIVOTforHumanity United States  

**Session 5**  
**Day/Date** Thursday, 12 November 4.00 pm Arizona (MST), 6.00 pm EST, 11.00 pm UTC, Friday, 13 November 10.00 am Sydney  
**Zoom** [asu.zoom.us/j/84317050041](asu.zoom.us/j/84317050041)

#### Graduate Student-Led Public Interest Technology

Jameson Wetmore, Toby Shulruff, Farah Najar Arevalo, Salah Hamdoun, Elma Hajric and Martín Pérez Comisso  
Arizona State University United States  

#### Embedding Humanistic Values in STEM Education

Larry Ragan¹, Ariel Anbar², Punya Mishra², Richard Pitt³ and Roba Abbas⁴  
¹Penn State University United States, ²Arizona State University United States, ³University of California San Diego United States, ⁴University of Wollongong Australia  

### Session 6

**Day/Date** Thursday, 12 November 4.00 pm Arizona (MST), 6.00 pm EST, 11.00 pm UTC, Friday, 13 November 10.00 am Sydney  
**Zoom** [asu.zoom.us/j/84317050041](asu.zoom.us/j/84317050041)

#### Can We Use Non-transparent Artificial Intelligence Technologies for Legal Purposes?

Greg Adamson  
School of Computing and Information Systems, University of Melbourne  

#### The Future of AI in Development: Ubiquitous Technology for All

Kevin D. Johnson  
Arizona State University, United States  

#### An Introduction to the Sociological Imagination and Treadmill of Production in the Age of Emerging Technology

Soraya Cardenas  
Department of Sociology Cascadia College Bothell, WA USA  

#### "Black Box Justice": Robot Judges and AI-based Judgment Processes in China’s Court System

Nyu Wang  
Department of Science, Technology, and Society Virginia Tech Falls Church, USA  

#### Risks of Bias in AI-Based Emotional Analysis Technology from Diversity Perspectives

Sumiko Shimo  
Associate Partner, Hystede Insights Windsor, Canada  

#### A Costly Emergencies Approach to Estimating Costs for Artificial Intelligence

Sara Jordan and Phillip Gray  
SPIA Virginia Tech Arlington, VA, USA  

#### When AI Gossips

Angelo Ferraro  
Department of Electrical Engineering University of South Carolina Columbia, SC, USA  

#### Artificial Intelligence and Data Governance Challenges in the United States

Elma Hajric  
Human and Social Dimensions of Science and Technology Arizona State University, Tempe, Arizona  

#### AI Development for the Public Interest. From Abstraction Traps to Sociotechnical Risks

McKane Andrus¹, Sarah Dean², Thomas Kendal Gilbert³, Nathan Lambert² and Tom Zick⁴  
¹Partnership on AI, San Francisco, CA, ²Department of Electrical Engineering and Computer Sciences, University of California, Berkeley, ³Center for Human-Compatible AI, University of California, Berkeley, ⁴Berkman Klein Center for Internet and Society, Harvard University  

#### AI Orthopraxy: Towards a Framework for That Promotes Fairness

Pablo Rivas  
Department of Computer Science School of Engineering and Computer Science Baylor University Waco, Texas, USA
Technical Programme

Session 7  Track 1 (Sydney)
Day/Date Thursday, 12 November 7.00 pm Arizona (MST), 9.00 pm EST, Friday, 13 November 02.00 am UTC, 1.00 pm Sydney
Zoom [Link]

[164]  The UOW Library Future-Ready Strategy
Margie Jantti
University of Wollongong Australia

[166]  Citizen Centered Smart Cities and Smart Living NSF-NRT Project
Troy McDaniel, Jordan Miller, Yatiraj Shetty, Edgard Musafiri Mimo, Devon McAslan and Katina Michael
Arizona State University, United States

[170]  Women of Color in Tech: A Blueprint for Inspiring and Mentoring the Next Generation of Technology Innovators
Susanne Tedrick
IBM United States

Darryl Keeton II
Sensagrate United States

Session 8  Track 2 (Gong)
Day/Date Thursday, 12 November 7.00 pm Arizona (MST), 9.00 pm EST, Friday, 13 November 02.00 am UTC, 1.00 pm Sydney
Zoom [Link]

[095]  Rethinking Museum Initiatives as Public Interest Technologies
Sherri Wasserman
Arizona State University United States

[038]  Ways of Working: A Participatory Approach for Public Interest Technology through Active Listening
Alexander Hayes and Magali McDuffie
Oethica Group Productions Perth, Western Australia

Session 9  Track 3 (Phoenix)
Day/Date Thursday, 12 November 7.00 pm Arizona (MST), 9.00 pm EST, Friday, 13 November 02.00 am UTC, 1.00 pm Sydney
Zoom [Link]

[108]  Identifying Positive Socioeconomic Factors of Worker Roles
Shivam Zaveri
School for the Future of Innovation Arizona State University Tempe, AZ U.S.A

[128]  Technology and the Formalization of the Informal Economy
Salah Hamdoun
School for the Future of Innovation in Society Arizona, State University Tempe, United States

[019]  Barriers to the Adoption of Autonomous Vehicles in Rural Communities
Diandra Prioleau1, Priya Dames2, Kiana Alikhademi3 and Juan E. Gilbert
1Computer & Information Science & Engineering University of Florida Gainesville, USA, 2Political Science University of Florida Gainesville, USA

[015]  Virtual Traffic Stop
Isabel Laurenceau, Jessica Jones, DeKita Moon, Michelle Emanndie and Juan Gilbert
Computer Science University of Florida Gainesville, Florida
**Session 10**  
Track 1 (Sydney)  
Day/Date: Thursday, 12 November 9.30 pm Arizona (MST), 11.30 pm EST, Friday, 13 November 04.30 am UTC, 3.30 pm Sydney  
Zoom: [asu.zoom.us/j/84317050041](asu.zoom.us/j/84317050041)

**[196]** Designing a Social Preferable Future  
Nathan Kinch and Mathew Mytka  
GreaterThanLearning Australia

---

**Session 11**  
Track 2 (Gong)  
Day/Date: Thursday, 12 November 9.30 pm Arizona (MST), 11.30 pm EST, Friday, 13 November 04.30 am UTC, 3.30 pm Sydney  
Zoom: [asu.zoom.us/j/81166609535](asu.zoom.us/j/81166609535)

**[031]** “Clik-Thru” Terms of Service: Blockchain Smart Contracts to Improve Consumer Engagement?  
Steven A. Wright  
College of Law Georgia State University Atlanta USA

---

**[135]** When Brain Computer Interfaces Pose an Existential Risk  
Megan Demko¹, Katina Michael², Kennedy Wagner³ and Terri Bookman⁴  
¹Department of English Arizona State University Tempe, AZ, USA, ²School for the Future of Innovation in Society Arizona State University Tempe, AZ, USA, ³School of Life Sciences Arizona State University Tempe, AZ, USA, ⁴New Jersey, USA

---

**[043]** Aging in Smart Environments for Independence  
Jordan Miller¹, Troy McDaniel² and Michael J. Bernstein³  
¹CIDSE Arizona State University Tempe, USA, ²The Polytechnic School Arizona State University Mesa, USA, ³School for the Future of Innovation in Society Arizona State University Tempe, USA

---

**[137]** The Norwegian Covid-19 Tracking App Experiment: Lessons for Pandemic Governance and Civic Activism  
Kristin Sandvik  
University of Oslo, Norway

---

**[142]** Artificial Intelligence: Implications for the Future of Education  
Kholoud Alkayid¹ and Rami Shaheen²  
¹University of Wollongong Australia, ²XiLab-Al advisor United Arab Emirates

---

**Session 12**  
Track 3 (Phoenix)  
Day/Date: Thursday, 12 November 9.30 pm Arizona (MST), 10.00 am EST, 3.00 pm UTC, Sunday, 15 November 2.00 am Sydney  
Zoom: [asu.zoom.us/j/87625476356](asu.zoom.us/j/87625476356)

**[143]** Access Denied  
Diana Madril  
School for the Future of Innovation in Society, Arizona State University, USA

---

**[022]** Considering the Effects of Computer Scientist Stereotypes on Mental Health  
Francesca Vera  
Stanford University, USA

---

**[104]** Effects of Availability and Accessibility of Blue-Green Infrastructure on Environmental Justice and Health Equality  
Maryam Rezaei Ghaleh¹ and Marzieh Rezaei Ghaleh²  
¹Architecture and Urban Planning Department Tabriz Art University Tabriz, Iran, ²The Design School Arizona State University Tempe, The United States

---

**Session 13**  
Track 1 (Sydney)  
Day/Date: Saturday, 14 November 8.00 am Arizona (MST), 10.00 am EST, 3.00 pm UTC, Sunday, 15 November 2.00 am Sydney  
Zoom: [asu.zoom.us/j/84317050041](asu.zoom.us/j/84317050041)

**[085]** The Value of Being Human - Finding Balance between the Artificial and Nature Worlds  
Salema Veliu  
Independent Researcher, United Kingdom

---

**[183]** Innovations in Refugee Camps: A Case Study of the Rohingyas from Myanmar  
Faheem Hussain  
Arizona State University United States

---

**[185]** Advancing Innovative Approaches to Climate Adaptation  
Netra Chhetri  
Arizona State University United States

---

**[152]** Social Impact of Intelligence Amplification  
Joseph Carvalko  
Yale University United States
Technical Programme

Session 14  Track 2 (Gong)
Day/Date      Saturday, 14 November 8.00 am Arizona (MST), 10.00 am EST, 3.00 pm UTC, Sunday, 15 November 2.00 am Sydney

[184] SolarSPELL Build Day
Laura Hosman
Arizona State University United States

[044] Not Another Panic Button: Inclusion in Public Interest Technology
Toby Shulruff
College of Global Futures Arizona State University Tempe, Arizona, United States

[200] Can a Solution Also be a Problem? Some thoughts and Ideas for the Fight Against the COVID-19 Pandemic
Howard Wolfman
Lumise Consulting United States

[057] Body Modifications and Their Health Implications
Lauryn Remmers1 and Katina Michael2
1Pre-med Barrett, the Honors College at ASU Arizona State University Phoenix, USA; 2School for the Future of Innovation Society Arizona State University Phoenix, USA

[058] Public Interest: EEG Implants
Riley Tallman
CIDSE Arizona State University Tempe, United States

[056] Blockchain in the Time Bank: Toward a Community-oriented Public Interest Technology
Chengmeng Zhang1 and Wenqing Yu2
1Institute For Disability and Philanthropy, Shenzhen University, Shenzhen, China; 2Institute for Science and Technology for Development Worcester Polytechnic Institute, Worcester, MA, USA

[10] Using Open Source Licensing to Regulate the Assembly of LAWS: A Preliminary Analysis
Cheng Lin and Ajung Moon
Department of Electrical & Computer Engineering McGill University Montreal, Canada

[045] Public Interest Technology Graduate Studies: Inspirations and Reflections
Toby Shulruff

Session 15  Track 3 (Phoenix)
Day/Date      Saturday, 14 November 8.00 am Arizona (MST), 10.00 am EST, 3.00 pm UTC, Sunday, 15 November 2.00 am Sydney

[099] Pedagogical Participatory Experiences to Promote Public Interest Technology From Volunteer Work
José Cerpeno Saravia1, Cristina Destruff-Serrano2 and Pablo C. Herrera3
1Universidad Peruana de Ciencias Aplicadas Lima, Perú, 2Carrera de Arquitectura Universidad de Lima Lima, Perú

[110] Reimagining the Role(s) of Public Interest Technology
Vandhana Ravi
Breck Center for Social Impact + Innovation Georgetown University Washington D.C

[112] Care and Liberation in Creating a Student-Led Public Interest Technology Clinic
Shreya Chowdhary, Sam Daitzman, Ruby Eisenbud, Emma Fan and Erhardt Graeff
Olin College of Engineering Needham, MA, USA

[120] Translating Public Interest Technology in the Global South?
Yunus Dogan Telliel1 and Robert Krueger2
1Department of Humanities and Arts & Institute for Science and Technology for Development Worcester Polytechnic Institute Worcester, MA, USA; 2Department of Social Science and Policy Studies & Institute for Science and Technology for Development Worcester Polytechnic Institute Worcester, MA, USA

[130] Public-Interest Sensitive Design for Public Interest Technology
Jeremy Pitt and Stephen Cranefield
Imperial College London, UK University of Otago, NZ

[007] Towards an Open Web of Things
Bart Moons and Jeroen Hoebek
Department of Information Technology Ghent University - imec, IDLab Ghent, Belgium

College of Global Futures Arizona State University Tempe, Arizona, United States
Technical Programme

[035] Wearable Ultraviolet Radiation Exposure Sensors for Research and Personal Use
Alyssa Henning1, Nathan Downs2, Jennifer Vanos3
1 School of Engineering of Matter, Transport, and Energy Arizona State University Tempe, United States,
2 School of Sciences University of Queensland Townsville, Australia, 3 School of Sustainability Arizona State University Tempe, United States

[211] Making Publics Visible: Utilizing STS Knowledge for Public Identification and Engagement
Annie Y. Patrick
Department of Science, Technology, and Society Virginia Tech Blacksburg, Virginia, USA

Session 3
Day/Date Saturday, 14 November 8:00 am Arizona (MST), 10:00 am EST, 3:00 pm UTC, Sunday, 15 November 2:00 am Sydney
Zoom [azu.zoom.us/j/88344730024]

[017] Value Sensitive Design and Environmental Impact Potential Assessment for Enhanced Sustainability in Unmanned Aerial Systems
Nicolai Iversen, Morten Birkved and Dylan Cawthorne
University of Southern Denmark The Maersk Institute - UAS Centre Odense, Denmark

[033] Agroforestry for Addressing Multi-Dimensional Poverty in Sub-Saharan Africa
Primrose Dzeng
School for the Future of Innovation in Society Arizona State University Tempe, AZ

Session 16
Day/Date Saturday, 14 November 10:30 am Arizona (MST), 12:30 am EST, 5:30 pm UTC, Sunday, 15 November 4:30 am Sydney
Zoom [asu.zoom.us/j/84317050041]

[126] What Do Roboticists Need to Know About People?
Clinton J. Andrews
E.J. Bloustein School of Planning & Public Policy Rutgers, The State University of New Jersey New Brunswick, NJ, USA

[127] Collaborating to Build the Software Good Policy Deserves
Evagelia Emily Tavoulareas1 and Cyd Harrell2

Kartik Kulkarni1, Sampath Veeraraghavan2, John Funso3 and Pia Torres4
1 HAC Chair, 2 SIGHT Chair and 2021 HAC Chair, 3 HAC Partnerships Chair, R8 Humanitarian Coordinator, and also a COVID project lead, 4 HAC Project Support and Oversight Ad Hoc Chair and HAC/SIGHT COVID CoP lead

[172] Non-Digital Citizenry: Unmapped, Unbanked and Unknown
Jason Sargent, Paul Scifeet and Mohamed Ibrahim
Swinburne University of Technology Australia

[186] Citizen Participation in Global Governance of the Internet
Mahmud Farooque
Arizona State University United States

[208] Innovation-Led Transformation and Human 2.0
Andreas Sjostrom
United States CapGemini

[158] IEEE HAC & SIGHT Response to COVID-19

IEEE SSIT ISTAS 20
International Symposium on Technology and Society
November 12 - 15, 2020
Public Interest Technology
[134] The Implications of Neuralink and Brain Machine Interface Technologies
William Armstrong and Katina Michael
School for the Future of Innovation in Society, Arizona State University, Tempe, AZ, USA

[034] Emerging Threats and Ethical Implications of Cyber-Physical Critical Infrastructure
Caitlin Grady1, Sarah Rajtmajer2 and Lauren Dennis3
1Department of Civil and Environmental Engineering Rock Ethics Institute Penn State University University Park, PA USA, 2College of Information Sciences and Technology Rock Ethics Institute Penn State University University Park, PA USA, 3Department of Civil and Environmental Engineering Penn State University University Park, PA USA

Session 18 Track 3 (Phoenix)
Day/Date Saturday, 14 November 11.00 am Arizona (MST), 1.00 pm EST, 6.00 pm UTC, Sunday, 15 November 5.00 am Sydney
Zoom asu.zoom.us/j/87625476356

[068] Clickbait’s Impact on Trust in News Media
V. Kausel and K. Vemuri
Cognitive Sciences Lab, IIIT Hyderabad, Hyderabad, Telangana, India

[070] Only Location: A Systematic Literature Review on Context Marketing
Anna-Lena Christina Krusch, Per Ole Uphaus and Harald Rau
Institute for Media Management Ostfalia University of Applied Sciences Salzgitter, Germany

[083] An analysis of the Australian News Coverage of the Hannah Clarke and Family Suicide-Murder in February 2020
Julia Najjar
University of Wollongong NSW, Australia

Session 3 SessionTrack 4(Phoenix)
Day/Date Saturday, 14 November 11.00 am Arizona (MST), 1.00 pm EST, 6.00 pm UTC, Sunday, 15 November 5.00 am Sydney
Zoom asu.zoom.us/j/88344730024

[167] Mission Galactic
George Gabriel Michaeli
All Saints Grammar School Australia

[169] Dystopia (I)
George Gabriel Michael
All Saints Grammar School Australia

Session 19 Track 1 (Sydney)
Day/Date Saturday, 14 November 1.30 pm Arizona (MST), 3.30 pm EST, 8.30 pm UTC, Sunday, 15 November 7.30 am Sydney
Zoom asu.zoom.us/j/84317050041

[187] HASTAC: Changing the Way We Teach and Learn
Jacqueline Wernimont
Dartmouth College United States

[131] A Long, Long Game: The Philosophy of Engineering and Culture Change in Engineering Practice
Zachary Pirtle
Independent Research United States

[074] Student Pugwash: Perspectives on Social Responsibility in Science & Technology
Rachel Svetanoff
Student Pugwash USA United States

[188] HASTAC: Changing the Way We Teach and Learn
Judith Bessant1, Rys Farthing2, Ellis Howard2 and Yamique Bird
1RMIT University Australia, 2Independent Researcher United Kingdom, 3United Kingdom
### Technical Programme

#### Session 20  
**Track 2 (Gong)**

**Day/Date:** Saturday, 14 November 1.30 pm Arizona (MST), 3.30 pm EST, 8.30 pm UTC, Sunday, 15 November 7.30 am Sydney  

**Zoom:** [asu.zoom.us/j/81166609535](asu.zoom.us/j/81166609535)

<table>
<thead>
<tr>
<th>Paper Title</th>
<th>Authors</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>[109] Analyzing Cyber-Physical Threats to Pennsylvania Dams Through A Lens of Vulnerability</td>
<td>Lauren Dennis¹, Sarah Rajtmajer² and Caitlin Grady³ ¹Department of Civil and Environmental Engineering, Penn State University, University Park, PA USA, ²College of Information Sciences and Technology, Rock Ethics Institute Penn State University, University Park, PA USA, ³Department of Civil and Environmental Engineering, Rock Ethics Institute Penn State University, University Park, PA USA</td>
<td>Pg 32</td>
</tr>
<tr>
<td>[113] Evaluation and Load Selection using Energy Storage System Priority Index (EESPI)</td>
<td>Guillermo Lopez-Cardalda¹, Eduardo Ortiz-Rivera¹ and Melvin Lugaro-Alvarez² ¹Department of Electrical and Computer Engineering, University of Puerto Rico Mayagüez, Mayagüez, Puerto Rico, ²Department of Mechanical and Aerospace Engineering, University of California San Diego San Diego, USA</td>
<td>Pg 33</td>
</tr>
</tbody>
</table>
| [125] The “Criminality from Face” Illusion | Walter Scheiter  
University of Notre Dame United States | Pg 33 |
| [103] Harvesting Faces from Social Media Photos for Biometric Analysis | Giordano Benitez Torres and Michael C. King  
College of Computer Engineering and Sciences Florida Institute of Technology Melbourne, Florida | Pg 33 |
| [206] Technology as Education in Facilitating Peace Dialogues for Women and Youth in Post-Conflict Rwanda and Afghanistan: Comparative Analysis | Yagana Hafed and Oluvabukola Makinde  
Arizona State University United States | Pg 34 |

#### Session 21  
**Track 3 (Phoenix)**

**Day/Date:** Saturday, 14 November 1.30 pm Arizona (MST), 3.30 pm EST, 8.30 pm UTC, Sunday, 15 November 7.30 am Sydney  

**Zoom:** [asu.zoom.us/j/87625476356](asu.zoom.us/j/87625476356)

<table>
<thead>
<tr>
<th>Paper Title</th>
<th>Authors</th>
<th>Pages</th>
</tr>
</thead>
</table>
| [001] Exploratory Data Analysis of Government Procurement Data to Influence Bidding Decision and Strategy in Albay, Philippines | Maria Jhan Sangil  
Lapitech Software Labs, Inc. Daraga, Philippines | Pg 34 |
| [012] Recycling process through 3D videogame technologies for web platforms in Latin-American context | Angel Torres-Toukoumidis¹, Vladimir Robles-Bykbbaev² and Mario Cajamarca³ ¹Head of Gamelab-UPS Research Group Universidad Politecnica Salesiana Cuenca, Ecuador, ²Mario Cajamarca Research assistant Universidad Politecnica Salesiana Cuenca, Ecuador | Pg 34 |
| [025] Re-Designing Dark Patterns to Improve Privacy | Davide Maria Parrilli and Rodrigo Hernández-Ramírez  
Unidcom/Iade, Universidade Europeia Lisbon, Portugal | Pg 35 |
| [036] Categorizing Online Harassment Interventions | Chenlu Feng¹ and Donghee Yvette Wohn² ¹Faculty of Electrical Engineering, Mathematics and Computer Science, University of Twente Enschede, Netherlands, ²Department of Informatics New Jersey Institute of Technology Newark, NJ, USA | Pg 35 |
Department of Computer Information Science and Engineering, University of Florida Gainesville, USA | Pg 35 |
| [207] How it started, how it’s going - Education in Afghanistan | Safia Barikzai  
London Southbank University United Kingdom | Pg 35 |
Session 3
Track 4 (Tempe Radio) Podcasts
Day/Date: Saturday, 14 November. 1:30 pm Arizona (MST), 3:30 pm EST, 8:30 pm UTC, Sunday, 15 November. 7:30 am Sydney
Zoom: [link]

[138] Kernel Regression to find patterns in multiple layers of society
Venkatesh Vaidyanathan
Robotics and Autonomous Systems Arizona State University Tempe, Arizona

Session 22
Track 1 (Sydney)
Day/Date: Saturday, 4.30 pm Arizona (MST), 6.30 pm EST, 11.30 pm UTC, Sunday, 10.30 am Sydney
Zoom: [link]

[189] Digital Afterlife: What happens to our data after our death and should we care?
Faheem Hussain
Arizona State University United States

Session 23
Track 2 (Gong)
Day/Date: Saturday, 14 November 4.30 pm Arizona (MST), 6.30 pm EST, 11.30 pm UTC, Sunday, 15 November 10.30 am Sydney
Zoom: [link]

[201] Datafication: Why Process Matters
Alexander Halavais
Arizona State University United States

[202] The Future of Solar-Powered Societies
Clark Miller
Arizona State University United States
<table>
<thead>
<tr>
<th>Session 24 Track 3 (Phoenix)</th>
<th>Session 3 Track 4 (Tempe Radio) Podcasts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Day/Date</strong></td>
<td><strong>Day/Date</strong></td>
</tr>
<tr>
<td>Saturday, 14 November 4:30 pm Arizona (MST), 6:30 pm EST, 11:30 pm UTC, Sunday, 15 November 10:30 am Sydney</td>
<td>Saturday, 14 November 4:30 pm Arizona (MST), 6:30 pm EST, 11:30 pm UTC, Sunday, 15 November 10:30 am Sydney</td>
</tr>
<tr>
<td><strong>Zoom</strong></td>
<td><a href="asu.zoom.us/j/87625476356">asu.zoom.us/j/87625476356</a></td>
</tr>
<tr>
<td><strong>[040]</strong> The Fourth Industrial Revolution: Promise or Peril?</td>
<td><strong>[176]</strong> The Praxis of UN SDG 5 &amp; 15: Student Deep Dives into Gender Equality and Life on Land in the Remote Satpuda Ranges of Maharashtra State, India</td>
</tr>
<tr>
<td>Chris J. Barton</td>
<td>Ben Corbett, Felix Harvey, Zivi Kate Song, Kandice Stern, Nathan Rhodes, Jorel Basangan, Hadley Dixon, Yu Kai Teh, Jason Sargent, Vasudeva Achary, Julian Draudins, Jake Pringle and Stuart McLoughlin</td>
</tr>
<tr>
<td>School for the Future of Innovation in Society Arizona State University Tempe, Arizona, USA</td>
<td>A Digital “Yellow Card” for Securely Recording Vaccinations using Community PKI Certificates</td>
</tr>
<tr>
<td>Stephen Wilson</td>
<td><a href="asu.zoom.us/j/88344730024">asu.zoom.us/j/88344730024</a></td>
</tr>
<tr>
<td><strong>[086]</strong> A Digital “Yellow Card” for Securely Recording Vaccinations using Community PKI Certificates</td>
<td>Socio-Technical Education Platform for Young Adults. A Preliminary Overview</td>
</tr>
<tr>
<td><strong>[048]</strong> Contending with Wicked Crypto</td>
<td>Areana Tran, Faculty of Business and Law, University of Wollongong Serena Tran, Faculty of Business and Law (Student), University of Wollongong</td>
</tr>
<tr>
<td>Kevin Kredit</td>
<td><strong>[136]</strong> Socio-Technical Education Platform for Young Adults. A Preliminary Overview</td>
</tr>
<tr>
<td>Grand Valley State University</td>
<td><a href="asu.zoom.us/j/84317050041">asu.zoom.us/j/84317050041</a></td>
</tr>
<tr>
<td><strong>[049]</strong> Cyberbullying and Indian Society: Outcomes from Social Conclave Conference</td>
<td><strong>[027]</strong> Can We Design Socially-Focused Enterprises to Address Environmental, Climate, and Energy Justice Challenges?</td>
</tr>
<tr>
<td>Rishabh Reddy¹, Rishabh Singh¹, Vidhi Kapoor² and Prathamesh Churi³</td>
<td>Darshan M.A. Karwat¹, Jared Byrne² and Jean L. Boucher³</td>
</tr>
<tr>
<td>¹Department of Technology Management M.B.A Tech (Computer Engineering) School of Technology Management and Engineering, NMIMS University Mumbai, India, ²Department of Data Science B.Tech (Data Science) School of Technology Management and Engineering, NMIMS University Mumbai, India, ³Department of Computer Engineering School of Technology Management and Engineering, NMIMS University Mumbai, India</td>
<td>¹Arizona State University United States, ²University of Oklahoma United States</td>
</tr>
<tr>
<td><strong>[114]</strong> Bidirectional Transformer based on online Text-based information to Implement Convolutional Neural Network Model For Secure Business Investment</td>
<td><strong>[016]</strong> Engineers and Scientists in Community-based Collaborations: Incentives, Barriers, and Potential</td>
</tr>
<tr>
<td>Maryam Heidari and Setareh Rafatirad</td>
<td>Jean Boucher¹, Anthony Levenda², Jorge Morales-Guerrero¹, Madison Macias³ and Darshan Karwat¹</td>
</tr>
<tr>
<td>George Mason University</td>
<td>¹School for the Future of Innovation in Society &amp; The Polytechnic School Arizona State University Tempe, AZ, and Mesa, AZ, ²W.P. Carey School of Business Arizona State University Tempe, AZ, ³School for the Future of Innovation in Society Arizona State, Arizona State University, Tempe, AZ</td>
</tr>
<tr>
<td></td>
<td>Pang², Rishabh Singh¹, Vinayak Kadam³ and Somak Roy¹</td>
</tr>
<tr>
<td><strong>[116]</strong> Can We Design Socially-Focused Enterprises to Address Environmental, Climate, and Energy Justice Challenges?</td>
<td>¹Arizona State University United States, ²University of Oklahoma United States</td>
</tr>
<tr>
<td>Darshan M.A. Karwat¹, Jared Byrne² and Jean L. Boucher³</td>
<td><strong>[027]</strong> Can We Design Socially-Focused Enterprises to Address Environmental, Climate, and Energy Justice Challenges?</td>
</tr>
</tbody>
</table>

---

1 Department of Technology Management M.B.A Tech (Computer Engineering) School of Technology Management and Engineering, NMIMS University Mumbai, India, 2 Department of Data Science B.Tech (Data Science) School of Technology Management and Engineering, NMIMS University Mumbai, India, 3 Department of Computer Engineering School of Technology Management and Engineering, NMIMS University Mumbai, India
When Mental Walls Lead to Physical Walls: Using Art to Investigate the Social Responsibility of Engineers
Madison Macias¹, Peter Pohorily², Jorge Morales Guerrero³ and Darshan Karwat⁴
¹Ira A. Fulton Schools of Engineering, Arizona State University United States, ²College of Integrative Sciences and Arts, Arizona State University United States, ³School of Sustainability, Arizona State University United States, ⁴School for the Future of Innovation in Society, Arizona State University United States

A Commentary on Covid-19 Contact-T raining Apps and Broader Societal Implications of Technosolutionism
Elma Hajric
Human and Social Dimensions of Science and Technology PhD Arizona State University Tempe, Arizona

"Killing Two Birds with One Stone"? A Case Study of Development use of Drones
Ning Wang
Institute of Biomedical Ethics and History of Medicine (IBME) University of Zurich Zurich, Switzerland

Understanding Surveillance Societies: Social Cognition and the Adoption of Surveillance Technologies
Jordan Richard Schoenherr
Department of Psychology / Institute for Data Science, Carleton University

Is That Traffic Light Tracking You? A Case Study on A Municipal Surveillance Technology in Seattle
Cynthia Spiess
United States

Cultivating Technological Stewardship to Change the Culture of Engineering
Jason Lapointe¹, George Roter² and Mark Abbott³
¹Council for Responsible Innovation and Technology University of Waterloo Waterloo, Canada, ²Engineering Change Lab Toronto, Canada

Do-It-Yourself Technology for Autonomous Engineering: Building an Open-Source Eye-Tracker
Sara G. Lail¹, Angela Beck², Sergio Canu³, Matthew Gary⁴, Shirley G. Johnson⁵, Matt Haslam⁶ and Brian A. Lail⁷
¹Engineering, Electrical Embry-Riddle Aeronautical University Prescott, USA, ²Humanities and Communication Embry-Riddle Aeronautical University Prescott, USA, ³Computer Programming Pysource Sofia, Bulgaria

The Place of Wicked Problems in Engineering Problem Solving: A Proposed Taxonomy
Beth-Anne SchueiLeech
University of Windsor Windsor, Ontario, Canada

Decoding the Public Interest of Aarogya Setu, Contact Tracing App for Managing the COVID-19 Pandemic in India
Farah Najar Arevalo
ASU Center for Smart Cities and Regions ASU Society Policy Engineering Collective Tempe, Arizona, United States

Question Answering with Deeper Reasoning and Unanswerable Questions for COVID-19
Nickolas Dodd
School of Computing, Informatics, and Decision Systems Engineering Arizona State University Tempe, AZ, USA

Design Futures For Electrical Engineering Undergraduate Course
Maria Clara Sousa Magalhaes and Jalberth Fernandes de Araújo

Genealogy, Archeology, Hermeneutics: Techniques of Interpretation in Machine Learning Datasets
Razvan Amironesei¹, Emily Denton² and Alex Hanna²
¹USF Center for Applied Data Ethics United States, ²Google United States
[122] The Historical and Ideological Chasm between Engineering and Development
Eric Stribling1,2
1Institut Supérieur des Sciences et Technologies, l’Université des Montagnes, Baneke, Cameroon and School for the Future of Innovation in Society, Arizona State University Phoenix, USA

[214] Taiwan’s Ability to Reduce the Transmission of COVID-19. A Success Story
Haowen Fan
Fulton Schools of Engineering Arizona State University Tempe, AZ, United States

Session 3 SessionTrack 4 (Tempe Radio) PodCasts
Day/Date Sunday, 15 November 9.00 am Arizona (MST), 11.00 am EST, 4.00 pm UTC, Monday, 16 November 3.00 am Sydney
Zoom asu.zoom.us/j/84317050041

[194] Discussion with Baroness Susan Greenfield about Screen Culture and Stare Into The Lights My Pretties
Jordan Brown1 and Susan Greenfield2
1Filmmaker United States, 2House of Lords United Kingdom

[199] The Spectacle to Distract
Jordan Brown
Filmmaker Australia

Session 28 Track 1 (Sydney)
Day/Date Sunday, 15 November 12.00 pm Arizona (MST), 2.00 pm EST, 7.00 pm UTC, Monday, 16 November 6.00 am Sydney
Zoom asu.zoom.us/j/81166609535

[192] Why Censorship and Secrecy Undermine Democracy and Security
Vanessa Teague
Thinking Cybersecurity Australia

[175] In privacy, do we protect the helmet... or the head?
Nicole Stephens
Ground Up Consulting Pty Ltd Australia

[191] "Cry Havoc and Let Slip the Dogs of War?"
Kobi Leins
University of Melbourne Australia

[145] A Future-Oriented Consideration of Pathways to a High-Tech, Low-Vulnerability Society
Lindsay Robertson
Massey New Zealand

Session 29 Track 2 (Gong)
Day/Date Sunday, 15 November 12.00 pm Arizona (MST), 2.00 pm EST, 7.00 pm UTC, Monday, 16 November 6.00 am Sydney
Zoom asu.zoom.us/j/88344730024

[020] Tesseract Optimization for Data Privacy and Sharing Economics
Shubhadip Ray1, Tharangini Palanivel2, Norbert Herman3 and Yixuan Li4
1IBM Corporation New Jersey, USA, 2IBM Corporation New York, USA, 3IBM Corporation Colorado, USA, 4Wunderman Thompson New Jersey, USA

[042] Recovering Human Genome Information from Wastewater: The Need for an Ethical Framework
Danielle Jacobs1, Troy McDaniel2, Arvind Varsani3, Rolf U. Halden4, Stephanie Forrest5 and Heewook Lee1
1The School of Computing, Informatics, and Decision Systems Engineering Arizona State University Tempe, Arizona, 2The Polytechnic School Arizona State University Mesa, Arizona, 3The Biodesign Center for Fundamental and Applied Microbiomics Arizona State University Tempe, Arizona, 4The Biodesign Center for Environmental Health Engineering Arizona State University; OneWaterOneHealth/AquaVitas Tempe & Scottsdale, Arizona

[064] LBS and Dementia: An Insight Pertaining their Security and Privacy
Mohamad Soubra Monitoring and Evaluation officer at Makhzoumi Foundation Beirut, Lebanon

[039] Hope Gardens
Amulya Prakash
UNSW Australia

Session 30 Track 3 (Phoenix)
Day/Date Sunday, 15 November 12.00 pm Arizona (MST), 2.00 pm EST, 7.00 pm UTC, Monday, 16 November 6.00 am Sydney
Zoom asu.zoom.us/j/87625476356

[046] Arbiter: Improved Smart City Operations through Decentralized
Technical Programme

in Arizona Legislative Districts
Justin Colyar
Barrett, the Honors College Arizona State University
Tempe, USA

[032] Problematisation in Machine Learning
- On What it Means to ‘Dot One’s Eyes’
Razvan Amironesei1, Emily Denton2 and Alex Hanna2
1USF Center for Applied Data Ethics, USA, 2Google, USA

[067] Fairness of Machine Learning Algorithms for the Black Community
Sountongnoma Martial Anicet Kiemde and Ahmed Doogy Kora
Laboratory E-Inov Ecole Supérieure Multinationale des Télécommunications Dakar, Senegal

Session 33  Track 3 (Phoenix)
Day/Date  Sunday, 15 November 2.30 pm Arizona (MST), 4.30 pm EST, Monday, 16 November 8.30 am Sydney
Zoom  asu.zoom.us/j/87625476356

[047] COVID-19 Impacts on Native American Citizens and Tribal Governments
Leonard Bruce
Arizona State University Tempe, United States

[054] COVIDFREE App: The User-Enabling Contact Prevention Application
Edgard Musafiri Mimo and Troy McDaniel
The Polytechnic School Arizona State University Mesa, USA

[058] Mixed-Initiative Flexible Autonomy in Drone Swarms for COVID-19 Applications
Parth Khopkar
School of Computing, Informatics, and Decision Systems Engineering Arizona State University Tempe, USA

Session 3  Session Track 4 (Tempe Radio) PodCasts
Day/Date  Sunday, 2.30 pm Arizona (MST), 4.30 pm EST, Monday, 8.30 am Sydney
Zoom  asu.zoom.us/j/81166609535

[204] Addressing Complex Challenges of Managing Data Protection at Universities
K.Royal1 and Paul Breitbarth2
1Arizona State University United States, 2Trust Arc Netherlands

Ni Putu Intan Maharani
University of Wollongong Wollongong, Australia

Session 34  Track 1 (Sydney)
Day/Date  Sunday, 15 November 5.30 pm Arizona (MST), 7.30 pm EST, Monday, 16 November 00.30 am UTC, 11.30 am Sydney
Zoom  asu.zoom.us/j/84317050041

[168] Autism: Awareness, Acceptance and Public Interest
Sandra Jones
Australian Catholic University Australia

[144] Being Human: Principles for Technology Design enabling Human and Planetary Flourishing
Theresa Anderson
Ethics for AI and ADM Australia

[195] IEEE SSIT Publications
Terri Bookman1, Katina Michael2 and Roba Abbas3
1IEEE TSM United States, 2Arizona State University United States, 3University of Wollongong Australia

Session 35  Track 2 (Gong)
Day/Date  Sunday, 15 November 5.30 pm Arizona (MST), 7.30 pm EST, Monday, 16 November 00.30 am UTC, 11.30 am Sydney
Zoom  asu.zoom.us/j/81166609535

Alireza Ebrahimi
School of Business The State University of New York at Old Westbury Old Westbury, NY, USA

[062] Algorithms that Empower? Platformization in U.S. Intelligence Analysis
Matthew Schmidt1 and Kathleen M. Vogel2
1Laboratory of Analytic Sciences North Carolina State University Raleigh, USA, 2School for the Future of Innovation in Society Arizona State University Tempe, USA

[121] A Recommendation Algorithm using Adaptive Aggregation of Binary Ratings

IEEE SSIT ISTAS 20
International Symposium on Technology and Society
November 12 - 15, 2020
Public Interest Technology
Bidur Subedi and Stephanos Mavromoustakos
1School of Computer Science University of Windsor
Windsor, ON, Canada, 2School of Computer Sciences
Indiana Institute of Technology Fort Wayne, IN, USA

[051] Cyber, Social and Communication Failures in the Implantable Medical Device Ecosystem
Josh Massad
Johnson & Wales University United States

[063] Implantable Medical Device Database: Improving Consumer Access to Post-Market Device Performance
Peter Pohorily
School for the Future of Innovation in Society Arizona State University Tempe, Arizona

[205] Techno-Economic Entanglement, 2020
Ahmed Abbas
Independent Researcher Australia

Session 3 Track 3 (Phoenix)
Day/Date Sunday, 15 November 5:30 pm Arizona (MST), 7:30 pm EST, Monday, 16 November 00:30 am UTC, 11:30 am Sydney
Zoom

[026] Public Accountability: Understanding Sentiments towards Artificial Intelligence across Dispositional Identities
Brianna Richardson, Diandra Prioleau, Kiana Alikhademi and Juan E. Gilbert
Computer & Information Science & Engineering
University of Florida Gainesville, USA

[079] A Framework on Deep Learning-Based Indoor Child Exploitation Alert System
Shinshi Tasnim Himi, Sarmistha Sarna
Gomasta, Natasha Tanzila Monalisa and Ezharul Islam
Department of Computer Science and Engineering
Jahangirnagar University, Savar, Bangladesh
### 7 PIT UN Day Two Program

<table>
<thead>
<tr>
<th>Session</th>
<th>Plenary Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day/Date</td>
<td>Friday, 13 November</td>
</tr>
</tbody>
</table>

#### [Planery 1] Public Accountability:
Understanding Sentiments towards Artificial Intelligence across Dispositional Identities

Brianna Richardson, Diandra Prioleau, Kiana Alikhademi and Juan E. Gilbert

Page 64


Jameson Wetmore, Toby Shulruff, Farah Najjar Arevalo, Salah Hamdoun, Elma Hajric and Martin Pérez Comisso

Page 64


Faheem Hussain, Faheem Hussain, Robert Cook-Deegan, Alexandrina Agloro, Erik Fisher, Elisabeth Graffy and Jumana Abu-Ghazaleh

Page 64

#### [Planery 4] Age Appropriate Published Terms for Children - PITUN 2020/IEEE ISTAS20

Baroness Beeban Kidron, Rys Farthing, Alpesh Shah and Ephraim Luwemba

Page 64

#### [Planery 5] Embedding Humanistic Values in STEM Education - PITUN/IEEE ISTAS20

Larry Ragan, Ariel Anbar, Punya Mishra, Richard Pitt and Roba Abbas. Larry, Ariel and Punya

Page 65
### Abstracts

<table>
<thead>
<tr>
<th>Session 1</th>
<th>Invited Speakers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day/Date</td>
<td>Thursday, 12 November 1.30 pm Arizona (MST), 3.30 pm EST, 08.30 pm UTC, Friday, 13 November 07.30 am Sydney</td>
</tr>
<tr>
<td>Zoom</td>
<td><a href="https://asu.zoom.us/j/84317050041">https://asu.zoom.us/j/84317050041</a></td>
</tr>
</tbody>
</table>

#### Track 1 (Sydney) 140 1.30 pm AZ

**Living on the Edge of Tomorrow: A Moviegoer’s Guide to Public Interest Technology**

Andrew Maynard  
Arizona State University College of Global Futures, United States  
E-mail: andrew.maynard@asu.edu

In today’s increasingly interconnected world, the need to understand the complex intersections between technology and society, and how these in turn impact the future, has never been greater. Advances that include nanotechnology, gene editing, artificial intelligence, big data, brain machine interfaces, and many other, are pushing us ever-closer toward a tipping point that, if we are not careful, will lead to futures for are far removed from what we aspire to. At the same time, these technologies, if developed and used with wisdom, humility and maturity, could vastly improve quality of life for billions of people. This is a tension that lies at the heart of public interest technologies. Successfully navigating it requires both innovators and practitioners to have a sophisticated understanding of the convoluted landscape between good ideas and socially beneficial outcomes. Yet conventional forms of instruction often struggle to illuminate pathways forward on their own, given the boundary-transcending nature of public interest technologies. When coupled with the medium of film however, intriguing new opportunities arise. Science fiction movies in particular are capable of intimately and compellingly transporting us to future worlds, enabling us to imagine the potential dangers and opportunities that arise when emerging technologies collide with humanity. And as they do, they can help reveal hidden pitfalls as well as new possibilities. Drawing on his book Films from the Future, Andrew Maynard will explore how science fiction movies can help reveal the need for and the benefits of socially responsive public interest technologies, while informing emerging practices.

**Keywords:** Public interest Technology, innovation, Emerging technologies, Responsible innovation, Science fiction

#### Track 1 (Sydney) 160 1.30 pm AZ

**Technology and Human Trafficking**

Ben Shneiderman  
University of Maryland United States  
E-mail: bshneider@umd.edu

Felicity Gerry QC will be talking about the application of technology in addressing human trafficking. She will highlight the importance of corporate responsibility in the context of slavery in supply chains, and the analysis of corporate databases in evidentiary practice and justice.

**Keywords:** Technology, Human Trafficking, Corporate Responsibility, Supply Chains, Corporate Databases, Analysis, Evidence, Justice.

#### Track 1 (Sydney) 161 1.30 pm AZ

**Dosing Discrimination: A Critical Analysis of PDMP Risk Scores**

Jennifer Oliva  
Seton Hall United States  
E-mail: jennifer.oliva@shu.edu

This talk will briefly chronicle the United States’ turbulent history with opioids and pain management as well as its law enforcement-driven, supply side response to substance use disorder and drug control, including the implementation of prescription drug monitoring programs (PDMPs) across the country as law enforcement surveillance tools that aim to root out opioid pill mills, doctor shopping, fraud, and diversion. It will then explain the nature and advent of PDMP Narx Scores and those scores’ potential impact on vulnerable patients. Research indicates that Narx Score algorithms likely produce artificially inflated risk scores for particular patients, including women and racial minorities with complex, pain-related conditions; uninsured, underinsured, and rural individuals; and patients with severe and particular co-morbid disabilities or diseases, including substance use disorder and/or mental health conditions, and individuals who live in rural America. Narx Scores, therefore, may exacerbate discrimination against patients by generating flawed, short-cut assessment tools that incentivize providers to either abandon vulnerable individuals or deny them indicated treatment.

**Keywords:** Technology, Human Trafficking, Corporate Responsibility, Supply Chains, Corporate Databases, Analysis, Evidence, Justice.
Technology has become an integral part of society, streamlining the flow of information, communication, and making complex activities easier and quicker. Technological capabilities continue to expand, including the abilities and capabilities provided by artificial intelligence. Artificial intelligence will be an integral part of bringing technological advancements to the next level. As the benefits provided by increased capabilities of artificial intelligence increase, so do the potential ramifications if artificial intelligence technologies are misused or weaponized. Imagine seeing yourself in a sexually explicit video in which you have never participated. This is a distinct possibility today for women living in the age of Deepfakes. The purpose of this study is to explore some capabilities currently provided by artificial intelligence and explore the potential repercussions if these technologies are hijacked, manipulated, or misused as weapons.

Keywords: Deepfakes, AI, Weaponization, Warfare, Gender, Racial

Technology is a mechanism for accomplishing a great variety of objectives, but can also be, as an unintended consequence, the source of many unexpected difficulties; moreover, pace McLuhan, digital, information and communication technologies have brought about a completely unprecedented change in scale or pace or pattern, at such a scale and pace and pattern, of human affairs, values and thought processes. In this talk, we will discuss the societal impact of digital technology, and in particular Artificial Intelligence, on a variety of such issues, including rhetoric, satire, dependence, convenience and democracy.

We conclude by arguing that although we need a framework for responsible development that takes into account legal, educational and political perspectives, from a technological perspective, a second requirement is the codification of deep social knowledge in social media platforms that eschew the privatization of invention and the private ownership of the means of social coordination, if we are to address wicked collective action problems such as the climate emergency.

Keywords: Unintended consequences, McLuhan, Digital, Democracy, Responsible development, Social media, Collective action

Research across 140 countries reveals that stress levels are at a new high; levels of worry and sadness also increased. As a global society, we are increasingly stressed. Society’s growing attachment to, and constant use of, technology can oft be a contributing factor to higher stress levels. Yet, technology can also be used to alleviate stress. The converging veillances (i.e., surveillance, sousveillance, dataveillance, and uberveillance) also represent a diverse mix of contributing factors to stress because humans are often impacted negatively when surveilled. Researchers purport surveillance and stress have a direct relationship. Surveillance also allows for watchers to exploit the watched resulting in the potential for a detrimental imbalance of power. Chronic stress is becoming a public health crisis, which often leads to allostatic load (ALoad) with significant physiological consequences due to repeated exposure to prolonged chronic stressors. Communities also accumulate stress leading to alleged Collective ALoad. As scholars extend their research from the individual level to the community levels, we would do well to take into account the salient issues of ALoad (and resilience) for the (re)design, (re)development, and/or (re)deployment of technology. As a PIT community, how could we more deeply and broadly assess and address ALoad for the good of society for the long-term?

Keywords: Allostatic load (ALoad), Converging veillances, Surveillance, Uberveillance, Sousveillance, Dataveillance, Allostasis, Resiliency technology, Collective ALoad.
Many public interest technologies are created to address "wicked problems"—those that are complex, interdisciplinary, and often have no well-defined solution. Rittel and Webber’s seminal paper “Dilemmas in a General Theory of Planning” states that “the search for scientific bases for confronting problems of social policy is bound to fail because of the nature of these problems”. Rather than give up, we should understand the “wickedness” inherent in these problems, allowing us to design socially responsible, comprehensive, and effective responses.

Keywords: Public interest technologies, Wicked problems, Complexity, Interdisciplinary, Design, Socially responsible.

A greater emphasis on human-centered AI could reduce AI’s existential threats and increase benefits for users and society, such as in business, education, healthcare, environmental preservation, and community safety.

Keywords: Design, Artificial intelligence, Human emulation, Existential threats, Users, Benefits, Humanoid robots, Autonomous systems, Humans, Teams, Human-centered approaches.

Affective Rights: A Foundation for Ethical Standards
Angelo Ferraro
Department of Electrical Engineering University of South Carolina Columbia, South Carolina, USA E-mail: aferraro@email.sc.edu

Current industry practices concerning the protection of rights and privacy has been found wanting. This discussion provides analysis and justification on the realignment needed to re-establish ethical development practices as the norm rather than the exception.
Support for change is based on the recognition of human rights, to one extent or another, among the nations of the world. The introduction of Affective Rights is made and shown to have always existed as inalienable. To aid in acceptance and to encourage appropriate development of the new approach, a conceptual system design is outlined as a straightforward strategy using proven technology. To be effective, changes will be required in the way consumers, developers, and regulatory agencies protect these rights, and are made aware of these issues. To that end, it is proposed independent auditing services be created as part of the prototype to verify and validate stakeholder compliance to accepted ethical standards. A flagship pilot program is proposed as a proof of concept.

**Keywords**: Affective computing, Affective rights, Human rights, Ethical/Societal implications, Ethics, Property rights, Privacy, Proprighty, Stakeholder.

---

Material Value Ethics in the IEEE P7000 Draft Standard

Lee Barford

Department of Computer Science and Engineering University of Nevada, Reno Reno, NV, USA

Ethical evaluation of systems after they designed—or worse, after they are operational—is insufficient. Ethical consideration needs to begin with system specification. The IEEE P7000 draft standard gives a process for developing specifications for systems (especially communication and information technology and complex software including applications of artificial intelligence) that incorporate human ethical values in addition to the traditional engineering, business, and organizational objectives. In order to incorporate human values into specifications, values must be thought about. For example, the relevant values must be identified, named, and prioritized.

---

Robots, Ethics, and Pandemics: How Might A Global Problem Change the Technology’s Adoption?

Yvette Pearson1 and Jason Borenstein2

1Department of Philosophy & Religious Studies Old Dominion University Norfolk, VA, USA E-mail: ypearson@odu.edu
2School of Public Policy Georgia Institute of Technology Atlanta, GA, USA E-mail: borenstein@gatech.edu

Using the COVID-19 pandemic to frame the discussion, this paper explores the potential ethical impacts of a greater reliance on robots during a public health emergency.

Through an examination of various uses of different kinds of robots across the prevention, response, and recovery phases of the pandemic, this paper considers ethical pitfalls as well as the possible benefits of expanded deployment and use of robots to facilitate human management of public health emergencies. Alongside consideration of pandemic-related uses of robots, this paper also explores ethical concerns related to their use in public health practice and health care beyond the context of a public health emergency.

**Keywords**: Robot ethics, Human-robot interaction, COVID-19, Public health emergency management, Health care.

---

New technology enabling previously unfeasible automation processes creates potential issues for those who once conducted said tasks. By reducing the resources taken to perform costly operations, businesses and organizations can potentially create substantial savings, increasing profitability by re-evaluating resources and their necessity. This shift towards automation exposes a vital issue; Where do displaced humans fit in the post-automation regime? This work proposes a new approach to this problem - an abstract framework for human-centric automation based on virtue ethics and system theory principles. Exploring the role of human agents within complex systems reveals an argument for the necessity of human-centric automation. By proposing a preliminary framework to enforce a set of mutually agreed-upon fundamental rights for workers and stakeholders, the resulting system can implement ethical treatment for all individuals within a system. The work concludes with a dialogue on the implications and applications of the proposed model with possible future extensions.

**Keywords**: System theory, Autonomous systems, Virtue ethics, Automation, Task scheduling.
Developing Use Cases to Support an Empathic Technology Ethics Standard

Randy Soper1, Karen Bennett2, Pablo Rivas3 and Mathana4
1Managing Consultant Guidehouse Manassas, Virginia, USA E-mail: rsoper72@gmail.com
2Technical Consultant Quality Craft Toronto, Ontario, Canada E-mail: karen.bennet@gmail.com
3Department of Computer Science Baylor University Waco, Texas, USA E-mail: Pablo_Rivas@Baylor.edu
4Ctr. for Internet & Human Rights Europa-Universität Viadrina Frankfurt (Oder), Germany E-mail: emailmathana@gmail.com

Artificial Intelligence (AI) is becoming endemic to everyday life and continues to promise significant positive impacts to global quality of life in many areas, but AI and empathic technology, in particular, needs a better framework for ethical and human-centered design to reach its full potential and improve both specific contextual and general societal outcomes. We developed an approach which helped the standard designers to create use cases by exercising draft standard content, tools, and frameworks to ensure their effectiveness in the real world. A diverse set of use cases were identified across a range of criteria. We composed them into catalogues which provided, flexibility in identifying weaknesses and strengths and otherwise proving standard content as a design tool. While an essential tool in supporting rigor in the final ethical standard, use cases are only one option, and other approaches should be used in parallel as part of the verification and validation approach to create the draft standard.

Keywords: Ethics, Standards, Artificial Intelligence, Empathic Technology, Emotional AI, Biometrics, User-centered design, Human-computer interaction,

Ethical Tech Pedagogy for Public Good: A Review of Educational Initiatives and Approaches

Jason Lajoie1, Alexi Orchard2a and Heather A. Love2b
1Council for Responsible Innovation and Technology, University of Waterloo, Waterloo, Canada. E-mail: j2lajoie@uwaterloo.ca
2Department of English Language and Literature, University of Waterloo, Waterloo, Canada. E-mail: a.Alexi.Orchard@uwaterloo.ca

Our research team is conducting a scoping literature review of scholarly and popular publications that address the role of ethics and ethical thinking in relation to engineering education curriculum, professional engineering practices more broadly, and their integration in the tech sector at large. This paper reports on the preliminary results of that review, which so far covers current approaches (i.e. from the last ten years) to cultivating and scaling these principles in academia and industry, and also examines local initiatives that implement some of these ideas in the classroom. We (a) identify recent knowledge and gaps on effective approaches to embedding ethics in engineering curriculum, including pedagogies that mobilize novel collaborative instruments and technologies for engaging the public; and (b) describe current academic approaches to centering ethics and ethical thinking as core elements of training and professional practice at the University of Waterloo (Ontario, Canada).

In keeping with the 2021 ISTAS "Public Interest Technology" theme, the paper emphasizes efforts underway to train professional and aspiring engineers in North America with the integrated critical thinking skills they need to ethically assess the social and cultural impacts of the technologies they design, develop, and deploy.

Keywords: Engineering ethics, Engineering pedagogy and curriculum development, Knowledge translation, Interdisciplinary approaches, Technological innovation, Literature review, Synthesis
Ethical Concerns: An Overview of Artificial Intelligence System Development and Life Cycle

Hassan Al Shazly1, Angelo Ferraro2 and Karen Bennett3
1Life Senior Member, IEEE Columbia, South Carolina, USA
E-mail: alshazly@IEEE.org
2Department of Electrical Engineering, University of South Carolina Columbia, South Carolina, USA
E-mail: aferraro@email.sc.edu
3Life Senior Member, IEEE North York, Ontario, Canada
E-mail: bennetkl@yahoo.com

The expansive growth of Artificial Intelligent Systems (AIS), areas of applications, and their architectural complexity resulting in compound Systems of Systems has also carried with this, a myriad of ethical challenges. The ethical concerns are not limited to just the applications but also the data collection processes and derivative computed Information and Knowledge. A byproduct that has resulted is the extended marketing venues of data conversion to commodities. This paper examines how these issues effect ethics throughout the life cycle of the AIS and carries into the life cycle of the data.

Keywords: Artificial intelligence system, AIS, Ethics, Data life cycle, Stakeholders, Development Process, Stakeholder.

Wallach addresses international governance initiatives, Havens P7000 organisational hopes designed by IEEE’s ethical alignment initiatives in the tech and non-tech sectors at large, and Abu-Gazaleh professionalisation of the field of STEM from her perspective at PIVOTforHumanity. The session is moderated by Roba Abbas from the Business and Law Faculty at the University of Wollongong.

Keywords: Ethics, Governance and Emerging technologies

Everyday Experts: Transforming Research and Design Practices for Disability

Rebecca Monteleone
University of Toledo, United States
E-mail: Rebecca.Monteleone@utoledo.edu

People are experts of their own bodies and minds. By taking the experiences, desires, and needs of people with disabilities seriously, we create better technologies, health infrastructure, social systems, and political structures. However, despite on-going dialogues among engineers about person-centered research and practice, disabled people still remain conspicuously absent from technology design. More often than not represented by flat personas that reduce disabled people to a list of functional impairments, the resulting technologies often embed stereotypes about disability in their design. Science and engineering that has not been attentive to the lived reality of disability has proven to not only be ineffective, in terms of adoption, usability, and abandonment, but contributes to non-inclusive, discriminatory and disenfranchising social and material conditions. Drawing on examples from media, disability activism, and my own empirical work on individual experiences of biomedical technologies, this talk will present an argument that current practices in engineering and design are insufficient and oppressive when they fail to acknowledge the embodied and experiential expertise of disabled people. I will conclude by providing a series of recommendations for transforming engineering culture and practice. These include creating and supporting pathways for disabled researchers, reimagining design teams to better incorporate and appreciate different kinds of expertise and embracing a willingness to shift between individualized and collective solutions.

Keywords: Design, Disability, Practice, Biomedical technologies, Disabled people, Person-centered, Sociology of technology, Ethics.
Social Psychology and Public Interest Technology
Sam Wilson, Diane Sivasubramaniam and Julian Oldmeadow
Swinburne University of Technology, Australia
E-mail: sgwilson@swin.edu.au, dsivasubramaniam@swin.edu.au, joldmeadow@swin.edu.au

Arguably, Public Interest Technology is as much about people as it is about technology. That is, PIT is an interaction between technology and the often shifting needs of different groups of people. Engineers and Designers typically fall closer to the technology side of the equation, whereas social psychologists are typically experts in understanding people and groups, but less about technology. In this symposium we aim to generate discussion around the value that social psychology can bring to the technology development and design process. First, we will consider what the public interest means and how its meaning may be subject to various social psychological processes rooted in group and intergroup dynamics. Second, we will consider the notion of co-design from a social psychology perspective to unpack why it may lead not only to a better needs analysis, but to a higher level of public engagement in technology. Finally, we will illustrate how social psychology can contribute directly to the design process by way of an example from a recent project by our team.

Keywords: Social psychology, Innovation research, Public interest technology

Time Travelers and Space Invaders - Implications of Pervasive Systems for Public Interest Technology
Eusebio Scornavacca
University of Baltimore, United States
E-mail: escornavacca@ubalt.edu

In 2014, the total number of mobile-connected devices has exceeded the world’s human population and it is forecasted to surpass the 12 billion mark by 2022. The widespread adoption of new integrated forms of pervasive computing, alongside advances in ubiquitous networks and the proliferation of fluid multi-device platforms are enabling the rise of Ubiquitous Digital Ecosystems. The pervasive nature of these technologies is nurturing a state of perpetual connectivity that is blurring the temporospatial boundaries of human and machine interaction - paving the way in our society to a number of ‘paradoxes of technologies’ that are simultaneously emancipating and enslaving.

In this presentation, we focus on digital disruption created by pervasive systems and its broad repercussions for public interest technology. We highlight the associate risks and potential consequences of the hectic diffusion of these technologies with the aim to stimulate a dialogue on how can we create a smart, inclusive and sustainable future.

Keywords: Ubiquitous digital ecosystem, Temporospatial boundaries, Human and machine interaction, Paradox of technologies, Digital disruption, Emancipation, Enslavement, Smart, Inclusive, Sustainable.

Age Appropriate Published Terms For Children
Beeban Kidron, Rys Farthing, Alpesh Shah and Ephraim Luwemba
15Rights, United Kingdom E-mail: b@beeban.com
5Rights, Foundation United Kingdom E-mail: ryf@5rightsfoundation.com
IEEE Standards, United States E-mail: alpesh.shah@ieee.org
Nottingham University, United Kingdom E-mail: ephraim.luwemba@nottingham.ac.uk

The moderator of this panel is 5Rights Founder and Chair Baroness Beeban Kidron. On the panel is Dr Rys Farthing Director of Projects at 5Rights, Alpesh Shah from IEEE Standards and Ephraim Luwemba, a PhD Candidate studying Privacy Policies at the Horizon Center at the University of Nottingham. Together this panel will discuss a framework for developing age appropriate digital services for situations where users are children and youth (IEEE P2089). The impact of these future practices on industry will be discussed, with a focus on how vendors build solutions for children, and the role of public institutions and the educational sector.

Keywords: Age appropriate, Digital services, Children, Youth, IEEE Standards, IEEE P2089
While Covid-19 brought most of America improvements in air quality, a return of species, fewer carbon emissions, the pandemic also brought to the forefront the fact that indigenous people and people of color are more likely to fall ill and die from the disease. As one educator states, “This increased risk is not incidental but is itself linked to cumulative environmental burdens that have compromised the immune systems and health of people living in communities often treated as sacrifice zones by our majority-white society.”

During our panel, we will discuss how environmental and social injustices go deeper than just pollution and how public interest technology’s intersection with justice issues can bring equality to all.

Keywords: COVID19, Social justice, Environmental justice, Risk, Health, America pollution, Indigenous, Carbon emissions
Embedding Humanistic Values in STEM Education

Larry Ragan1, Ariel Anbar2, Punya Mishra2,3, Richard Pitt2 and Roba Abbas3
1Penn State University, United States E-mail: lcr1@psu.edu
2Arizona State University, United States E-mail: anbar@asu.edu
3University of California San Diego, United States E-mail: rpit@ucsd.edu
4University of Wollongong, Australia E-mail: robab@uow.edu.au

Abstract:

Dr Lawrence Ragan will moderate a panel on humanistic values in STEM education. Ariel Anbar and Punya Mishra will discuss the state of play in STEM and the fact that we are underprepared at multiple levels for the economic, environmental, and societal disruptions that accompany the advance of global civilization and technology. With the assistance of Richard Pitt, Associate Professor of Sociology at the University of California San Diego, the panel will ask the question whether humanistic knowledge of values is what will remedy this problem and Roba Abbas, Lecturer in Digital Business will discuss engaging students in the research-teaching nexus, to ensure learning-by-doing. Humanistic knowledge includes attributes that provide a learner with a vision and narrative of the self within social contexts, scaling from local to global.

Keywords: STEM education, Humanistic values, Economic, Environmental, Societal, Disruptions, Research-teaching nexus, Learning-by-doing, Vision, Narrative, Social contexts, Ethics, Humanistic knowledge

Can We Use Non-transparent Artificial Intelligence Technologies for Legal Purposes?

Greg Adamson
School of Computing and Information Systems, University of Melbourne E-mail: greg.adamson@unimelb.edu.au

Abstract:

An aspect of this attention is an interest in understanding how AI works when applied to a process of law, or to a regulated application of technology such as driverless vehicles. One approach is to seek to understand what the AI technology does, with goals including “transparency” and “explainability”. This paper considers these concepts from a law and technology perspective. Research in this area commonly examines the challenge of “black box” technologies, particularly the approach of “post hoc explainability”. This paper points out that the post hoc approach provides an inference, rather than an actual description of AI behavior. It considers circumstances in which the post hoc approach may be satisfactory, and those involving arbitrary power in which it should not be used, as inconsistent with the principle of regularity in the rule of law. It recommends that the output of non-transparent AI technologies should necessarily be viewed critically. It concludes that human attention is required in determining whether or not to accept AI technology explanations.

Keywords: Artificial intelligence, Transparency, Post hoc explainability, Black box, Law and technology, Evidence law, Arbitrary power.
An Introduction to the Sociological Imagination and Treadmill of Production in the Age of Emerging Technology

Soraya Cardenas
Department of Sociology, Cascadia College, Bothell, WA, USA
E-mail: scardenas@cascadia.edu

This theoretical article explores the Sociological Imagination as it relates to society in the age of emerging technology. Through the Sociological Imagination (SI), perspective helps provide a varied approach and lens when looking at society and technology. This paper looks through the lens of a female, woman of color and how their personal experiences and expertise as a Sociologist can contribute to the technical community in helping them engage in alternate views through the Sociological Imagination. This paper attempts to introduce the concept of the Sociological Imagination through issues of disparities in marginalized groups and spaces, breaking down biases through a Sociological lens. The Sociological Imagination is then coupled with the introduction of the Treadmill of Production, a Sociological Theory used to describe technology and its effects on society. Together the Sociological Imagination and the Treadmill of Production (TTP) are introduced to provide tools in helping technical scientists interpret the world around them.

Keywords: Sociological imagination, Treadmill of production, Sociology, Technology, Biases, Society.

“Black Box Justice”: Robot Judges and AI-based Judgment Processes in China’s Court System

Nyu Wang
Department of Science and Technology, Society, Virginia Tech, Falls Church, USA
E-mail: nyu.wang@vt.edu

Artificial Intelligence (AI) has been widely adopted in China’s court system to improve work efficiency to better serve the public. This paper evaluates the three stages of how AI is transforming China’s court system: from being a simple auxiliary tool, performing basic tasks through reconciliation of case and trial information; to assisting judges in decision-making by providing recommendations via the AI’s ability to learn from past precedent and standardized evidence review; and finally, to developing into autonomous agents able to take charge of the court and make judgments as robot judges.

However, public skepticism around the credibility of the so-called ‘black box’ of AI algorithms in ensuring fair judgment and achieving justice is escalating, with the concern that efficiency does not guarantee effectiveness or ensure public interest. This paper aims to analyze ‘black box’ issues in each stage and demonstrates why China’s effort to pursue AI as an innovative technical practice to realize judicial fairness should take complex social and ethical contexts into consideration. In order to serve for public good in China’s court system, the new technology must ensure its representation of human values and include public participation.

Keywords: Law and society, Artificial intelligence, Robot judge, Public interest, Ethics, Justice.

Risks of Bias in AI-Based Emotional Analysis Technology from Diversity Perspectives

Sumiko Shimo
Associate Partner, Hofstede Insights, Windsor, Canada
E-mail: sumiko.shimo@gmail.com

Emotion AI technology captures emotional reactions in real-time and decodes both verbal and non-verbal emotional behaviors of people, promising better service experience, devices, and technologies. On the other hand, it is observed that emotion AI systems are developed and used to assume that there is little variation in emotional expression across the human population. Insufficient understanding of human diversity and cultural diversity can lower the accuracy in detecting and interpreting underrepresented groups’ emotions, leading to biases, discrimination, and negative consequences in their lives. These growing concerns about emotion AI technology are potentially caused by a lack of workforce diversity in the AI sector and human diversity in the AI system. This paper explores workforce diversity and human diversity in AI systems, along with ethical concerns, and suggests possible paths forward.

Keywords: Ethical AI Systems, Emotion AI, Biases, Diversity, Culture.
A Costly Emergencies Approach to Estimating Costs for Artificial Intelligence
Sara Jordan and Phillip Gray
SPLA Virginia Tech Arlington, VA, USA E-mail: srjordan@vt.edu

Artificial intelligence (AI) research is increasingly considered to be a risky endeavor. The present prevailing model of AI risk management imports the commitments of research ethics, in terms of principles, approach to risk assessment, mitigation, and management. Despite the history and appeal of the research ethics model, alternative models for evaluation of AI risk should be entertained before adopting this approach. Here we propose a hypothetical applied information economics approach that changes the model for risk review from ex ante hypotheticals paid for as a fixed cost borne by all to variable costs that could be calculated in response to consumers’ willingness to pay for risky technology or to be paid for by companies willing to shoulder the cost of risks. Some of these risks will be of such magnitude that mitigating them constitutes an existential emergency for which an ex-ante research review approach may be justifiable. But, for risks that are less than non-remediable, existential, threats, a more cost sensitive approach may represent a more equitable path that shifts costs to those willing to bear them. We approach thinking through AI risks as something with specific costs we can estimate using known risks from similar activities of daily life.

Keywords: Artificial Intelligence, Ethics, Ethical Review, Cost, Risk Mitigation.
Despite interest in communicating ethical problems and social contexts within the undergraduate curriculum to advance Public Interest Technology (PIT) goals, interventions at the graduate level remain largely unexplored. This may be due to the conflicting ways through which distinct Artificial Intelligence (AI) research tracks conceive of their interface with social contexts. In this paper we track the historical emergence of sociotechnical inquiry in three distinct subfields of AI research: AI Safety, Fair Machine Learning (Fair ML) and Human-In-the-Loop (HIL) Autonomy. We show that for each subfield, perceptions of PIT stem from the particular dangers faced by past integration of technical systems within a normative social order. We further interrogate how these histories dictate the response of each subfield to conceptual traps, as defined in the Science and Technology Studies literature. Finally, through a comparative analysis of these currently siloed fields, we present a roadmap for a unified approach to sociotechnical graduate pedagogy in AI.

This paper describes a preliminary, ongoing, study and shows the early stages of a prototype framework, including a visual representation of the level of AI Orthopraxy of a model using hive plots. This work can potentially help create fair and trustworthy AI built upon the core tenets of accountability, transparency, and fairness. One of the current limitations is that it requires validation of peers that are willing, able, and trained to evaluate an AI model or technology using standards and other novel frameworks.

Keywords: AI orthopraxy, AI ethics, Fairness, Transparency, Accountability, Ethical frameworks, Standards, P7000, Assessment tools
Citizen Centered Smart Cities and Smart Living NSF-NRT Project

Troy McDaniel, Jordan Miller, Yatiraj Shetty, Edgard Musafiri Mimo, Devon McAslan, and Katina Michael

Arizona State University, United States

E-mail: troy.mcdaniel@asu.edu, jlmill41@asu.edu, yatirajkshetty@gmail.com, emusafiri@asu.edu, dmcashla@asu.edu, katina.michael@asu.edu

The National Science Foundation Research Traineeship (NRT) project at Arizona State University, Citizen-Centered Smart Cities and Smart Living, trains the next generation of master’s and doctoral students through an interdisciplinary focus on the technological, societal and environmental aspects of citizen-centered solutions for smart cities and smart living. The program is citizen-centric because of the varied backgrounds, customs and contextual factors that result in diverse life experiences of a city’s residents. Therefore, one-size-fits-all solutions are no longer viable. Adaptive and citizen-centered solutions require further research and investigation. In this presentation students together with faculty grant holders will discuss the NSF-NRT project. Students and faculty will discuss participation in research penetrating traditional departmental and institutional barriers; describe service-learning experiences with research and industry partners; and will reflect on augmented forms of learning, such as entrepreneurial thinking and leadership. The NSF NRT program at ASU employs a training model that stresses integration and interdisciplinary scholarship and cooperation. Alongside the core NRT curriculum, students are provided opportunities to participate in industry-facing service learning, applied learning experiences, entrepreneurship and well-rounded research training that considers all aspects of smart cities and smart living.

Keywords: National Science Foundation (NSF), National Research Traineeship (NRT), Student Perspectives, Social Implications, Ethical Implications, Legal Implications, Benefit, Transdisciplinarity.

Women of Color in Tech: A Blueprint for Inspiring and Mentoring the Next Generation of Technology Innovators

Susanne Tedrick

IBM United States

E-mail: susannedtedrick@gmail.com

WOMEN OF COLOR IN TECH seeks to inform and inspire women of color to pursue tech careers. The book describes the wide variety of popular tech careers (beyond coding/software engineering) that exist and practical tips/resources on how to prepare for them. WOMEN OF COLOR IN TECH also speaks candidly about the particular challenges women of color have cited as reasons to either not pursue tech, or leave tech altogether, and attempts to give readers advice and strategies on how to navigate them. This is so that readers not just survive, but thrive in their tech careers. We are greeted by author Susanne Tedrick who has generally given us her time to discuss her book and what it means to the next generation. More here: https://www.linkedin.com/company/women-of-color-in-tech/

Keywords: Women of color, Technology, Tech careers, STEM, Inclusion, Diversity, Inform, Inspire, Women

Creating Future Smart Infrastructure: Intelligent and Autonomous Infrastructure

Darryl Keeton II

Sensagrate United States

E-mail: dkeeton@sensagrate.com

In order for the United States to become a leader in enabling Intelligent and Autonomous Cities, we need to lead the adoption of the Intelligent and Autonomous Infrastructure. For connected and autonomous vehicles to make the full transition from fantasy to reality, America’s roads must make the transition with them, while allowing for mobility solutions to start decreasing congestion and improving roadway safety. Darryl will present and share industry insights and his company SensaVision, a computer vision AI software company with a product called SensaVision an AI Mobility-as-a-Service (MaaS) software platform that provides real-time analytics and visualizations to improve mobility and safety.

Keywords: Public interest technologies, Community, People focused, Smart cities, Infrastructure-to-vehicle (I2V), Congestion, Safety, IoT, Mobility as a Service, Autonomous vehicles, SensaVision
Andreen Soley, Katina Michael and Roba Abbas close New America’s PIT-UN Conference, looking forward to the program continuing on with the IEEE SSIT annual symposium, the International Symposium on Technology and Society 2020 event, hosted by Arizona State University. Four tracks, over 200 presentations, 350+ authors, and dozens of pre-recorded videos.

**Keywords**: PIT-UN, IEEE SSIT, IST AS20, Technology, Society, Public interest technology, Humanitarian activities

---

**Session 8**

**Track 2 (Gong)**

Rethinking Museum Initiatives as Public Interest Technologies

Sherri Wasserman

Arizona State University

States E-mail: sherri.wasserman@asu.edu

The place and understood value of technologically-enabled initiatives within museums has increased throughout the last two decades. Necessity of distanced access due to the global pandemic, particularly during a time of cultural reckonings, provides an opportunity to examine what on- and off-site technologically-enabled visitor engagement may provide for accessing, contextualizing, and challenging institutions’ collections and voices. We may look to previous projects, such as Brooklyn Museum’s Ask, Museums Respond to Ferguson, multiple examples of alternative tours, and initiatives that enable crowdsourced improvement of collections data, amongst others, for inspiration. These initiatives have not been, and cannot be, monolithic; different museum types - science, natural history, art, historic sites, etc.

Fulfill different sociocultural purposes. However, a multifaceted look at previous innovations in visitor engagement, combined with an assessment of what strengths museums may bring to a PIT approach, may set museum technology practitioners on improved paths towards meaningful use of collections data, more expansive forms of sensemaking, and increased usefulness for reckoning with institutional legacies in ways which embrace complexity. In addition to refining approaches to technological initiatives to address historical and current concerns, PIT strategies may also reposition initiatives to serve individual and collective visions of the future.

**Keywords**: Museums, Collections, Visitor Engagement, Collaboration

---

**Ways of Working: A Participatory Approach for Public Interest Technology through Active Listening**

Alexander Hayes\(^1\) and Magali McDuffie\(^2\)

Orthica Group Productions Perth, Western Australia,

E-mail: \(^1\)alex@oethica.org, \(^2\)magali@oethica.org

A participatory approach for engaging with First Nations peoples acknowledging cultural rights through the first principle of listening is central in addressing the human rights needs and related social justice challenges encapsulated in the human relational domain of Public Interest Technology (PIT). The Aboriginal Nyikina term ‘Ngikalikarra’, which means literally ‘you have got to listen’ is central to the ways of working which Magali McDuffie PhD and Alexander Hayes PhD have collaborated with rural and remote communities in Australia over the last 20 years. This paper details the emancipatory ‘reveal, make seen’ process forming a framework for participatory filmmaking known as ‘Kalara’ developed by McDuffie and cognent examples of the socio-ethical implications of ‘Ngikalikarra’ as a framework for sustainable behaviours that prioritise place-centeredness (Blaser, 2004) and protecting Country (Marshall, Poelina & Warbie, 2015; Hammond, 2018) in duality with corporate social responsibility and compliance.

**Keywords**: Public interest technology, Socio-ethical implications, Country, Place-centeredness, Participatory approach, Human rights, Social justice, Kalara framework, Ngikalikarra framework.
Workers incorporating new technologies into their workflow is crucial for organizations to remain competitive in a globalizing landscape. Some organizations make capital investments in technologies to increase productivity while considering their workforce as a cost liability. The effects of replacing workers with automated technologies harm the workers, organization, and cause internal strife with unintended consequences. Treating workers as an asset that can be trained to harness the potential of new artificial intelligence (AI) and automation technologies is a middle ground not afforded by most organizations. The stakeholder composition of this Future of Work study are organizations, human workers, technologies, and researchers. Researchers are well aware of automation and AI technology effects on workforce displacement [6]. AI technologies, as with any technology, can be implemented to enhance workers’ skills, resulting in productivity and profitability without systemic fallout. The cause of lost jobs was a calculated choice, whereas organizations blame the market and competition. A firm understanding of workforce displacement and its impact on worker roles due to technology is needed. This study is to aid stakeholders in understanding the positive socioeconomic factors to create solutions to workforce displacement that can incorporate AI technologies while positively impacting the workers.

Keywords: Social implications of technology, Future of work, Workforce development, Disruption, Automation, Artificial intelligence, Training systems, Human-robot teams, Socioeconomic factors, Responsible innovation in industry, Job satisfaction
Rural communities are more dependent on transportation than their urban peers. Transportation within rural areas is necessary to access food, healthcare, educational opportunities, and employment, especially since rural residents have longer distances to travel to access them. Therefore, the availability of efficient and affordable transportation can lead to economic growth in rural areas and ensure that people can obtain the services they need. Autonomous Vehicles (AV) can improve accessibility and mobility in these communities. However, research that discusses autonomous vehicles’ impact mostly focuses on urban transportation with limited focus on rural areas. In this paper, the barriers to adopting autonomous vehicles in rural areas are discussed by examining the current struggles of rural communities concerning finance, transportation infrastructure, policy, and demographics. First, we suggest the availability of efficient and affordable transportation can be an irregular occurrence to the everyday driver, when the driving population is looked at as a whole, they are, in fact, a frequent affair. Traffic stops make up the most common type of contact civilians have with the police. In recent years, media footage of traffic stops has shown how dangerous these encounters can be. Researchers conducted unstructured group interviews and participated in ride-along drives with local law enforcement officials. From this method, four user requirements are presented to the system: the system should serve as a de-escalation tool, and the system should be cost-effective and easily adaptable for agencies and citizens alike.

Keywords: Traffic stop, Police-community tool, De-escalation tool, User-centered design.

Designing a Social Preferable Future
Nathan Kinch\textsuperscript{c} and Mathew Mytka\textsuperscript{b}
Greater Than Learning, Australia
E-mail: *nkin@greaterthanexperience.design*, \textsuperscript{b}mm@greaterthanexperience.design

Trust is at an all time low. Institutions globally are seen to be failing at ethics. Citizen populations want and expect better. In this presentation, Nate and Mat, co-founders of Greater Than Learning, will share their story and practical insights working at the forefront of the socially preferable technology movement. They’ll use their new venture as a reference point to describe how institutions can design their organisations for the qualities of trustworthiness.
They’ll explain how more inclusive and participatory design methods can enable organisations to work with their stakeholders, validate ‘overwhelming support’ for the intent and outcomes of their actions, and begin designing a more socially preferable future.

Keywords: Ethics, Citizens, Institutions, Technology, Movement, Trustworthiness, Stakeholders, Intent, Outcomes, Actions, Socially preferable, Future.

**Session 11 Author Track**

**Day/Date**  
Thursday, 12 November  
9.30 pm Arizona (MST), 11.30 pm EST,  
Friday, 13 November  
04.30 am UTC, 3.30 pm Sydney

**Zoom**  
https://asu.zoom.us/j/81166609535

**Track 2 (Gong) 031 9.00 pm AZ**

"Clik-Thru" Terms of Service: Blockchain Smart Contracts to Improve Consumer Engagement?  
Steven A. Wright  
College of Law, Georgia State University, Atlanta, USA

Technology entrepreneurship has enabled the widespread commercial adoption of internet technologies. These internet technologies have reformed consumer commercial experiences towards an online environment. The pervasiveness of the online experience raises the importance of protecting the consumer in the online context. Online services are typically delivered under “Clik-Thru” terms of service developed by the service provider alone, and accepted by the consumer with a single click and little if any consideration. The successful adoption of new internet-based technologies and commercial practices has encouraged more technology entrepreneurship in a positive feedback cycle. Efforts at improved readability are insufficient to engage consumers with these “Clik-Thru” contracts. This paper argues that some efforts at increasing consumer engagement with the “Clik-Thru” terms of service may be a useful and tractable step towards improved consumer experiences. Blockchain smart contracts appear to provide promising capabilities to enable greater consumer engagement with “Clik-Thru” contracts.

**When Brain Computer Interfaces Pose an Existential Risk**  
Megan Demko1, Katina Michael2, Kennedy Wagner3, and Terri Bookman4

1Department of English, Arizona State University Tempe, AZ, USA  
E-mail: m.kdemko@asu.edu  
2School for the Future of Innovation in Society, Arizona State University Tempe, AZ, USA  
E-mail: katina.michael@asu.edu  
3School of Life Sciences, Arizona State University Tempe, AZ, USA  
E-mail: kennedy.wagner@asu.edu  
4New Jersey, USA  
E-mail: terri.bookman@gmail.com

This paper explores the prospect of brain implants as related to human activity and functioning. The researchers present information compiled through popular data collection using specific keywords related to brain implantation. The study calls into question and discusses the harm that could result if a negligent populace receives brain implants to "merge" with artificial intelligence through brain computer interfaces. Its intent is to raise awareness of the risks that brain implantation imposes on an individual’s health, wellbeing and livelihood.

Keywords: Brain implant, Health, Livelihood, Artificial intelligence, Brain computer interfaces, BCI

**Aging in Smart Environments for Independence**  
Jordan Miller1, Troy McDaniel2, and Michael J. Bernstein3

1CIDSE Arizona State University Tempe, USA  
E-mail: jlmill41@asu.edu  
2The Polytechic School, Arizona State University Mesa, USA  
E-mail: troy.mcaniel@asu.edu  
3School for the Future of Innovation in Society, Arizona State University Tempe, USA  
E-mail: mjbernst@asu.edu

This paper highlights current technological limitations and offers recommendations for scientists and engineers when designing devices to support aging in place. Existing technology for older adults to support independent living is examined as well as the implications of contextual factors, namely, location, on how people live and age based on the location in which they reside. This is the first review to investigate how challenges of aging change relative to location of residence and, subsequently, how such variation may inform technological solutions. To date, few devices consider the environment in which older individuals age. Places examined include aging: at home, assisted living facilities, nursing homes, and family housing.
Challenges found in common across these locations were financial strain and isolation. In addition, each setting was found to have its own unique hurdles. Understanding these barriers is essential to developing technology that enables older adults to successfully age in place.

Keywords: Aging in place, Gerontechnology, Smart home, Robotics, Older adults, Seniors.

The Norwegian Covid-19 Tracking App Experiment: Lessons for Pandemic Governance and Civic Activism
Kristin Sandvik
University of Oslo, Norway

Taking the lifecycle of the Norwegian tracing app ‘Smittestopp’ as a case study, the paper is intended as an early socio-legal contribution to the literature on Covid-19 tracing apps as socio-technical systems and to public interest assessments of Covid-19 digital responses. The paper explores what this experiment tells us about the digital transformation of governance and of efforts to govern at the national level.

Keywords: Covid19 app, Norway, Accountability, Activism, Data protection, Democracy.

Artificial Intelligence: Implications for the Future of Education
Kholoud Alkayid1 and Rami Shaheen2
1University of Wollongong Australia E-mail: kholoud@uow.edu.au
2Xlab-AI advisor United Arab Emirates E-mail: dr.rami.b.h@gmail.com

This paper is constructed to examine the Artificial Intelligence and Future Management Tools in developing the appropriate E-learning solutions for countries and educational systems. These tools are designed to assist individuals and organizations as part of e-learning settings. Corporate training can also benefit from AI personalization that provides online tools for professional training, uses AI algorithms to recognize learner preferences and dynamically adapt course content to meet their needs. However, this paper examines the impact of the ethical and social hazards include privacy compromise, lack of control, reduced individual capability, and the commodification of education. The main benefits of education 4.0 are related with digital, virtual and smart revolution for teachers and other stakeholders. Both teachers and students are able to achieve the learning outcomes, communicate easily and improve educational results. Hence, the interplay of AI in the education field can lead towards the precious objective of evolution of learning 4.0.

Keywords: Artificial intelligence, Education training, Social implication of technology

Access Denied
Diana Madril
School for the Future of Innovation in Society, Arizona State University

Artificial intelligence (AI) and biometric technology, some would argue as innovative and responsible, yet over time other researchers have seen the less inclusive environment these technologies create. Additionally, the gaps in these predictive technology systems may deny access to some individuals and, in some cases, deem the technology as a truth-telling mechanism even when proper identification is presented. This paper highlights a literature review and discussion around the ways we may responsibly innovate. Responsible innovation, anticipatory governance, and policy decision making can shape innovative practices’ fabrication molded for an inclusive environment. The paper also brings a collective discussion of researchers who argue the harmful impacts within these innovative technology systems that guide our social environments. Oftentimes, we assume the systems innovated, such as AI and biometric technology, provide a path for control and safety. Yet, we need to reconsider the undesirable impact and discover new ways to create inclusive technology that does not wrongfully deny access to some citizens. The governance of technology may be a path for responsibly structuring for the public’s interest. These innovative systems are theoretically set for shaping our future, yet some researchers argue these technology systems contain archaic social system practices.

Keywords: Public Interest Technology (PIT), Responsible Innovation (RI), Artificial Intelligence (AI), Anticipatory Governance, Facial Recognition (FR).
Considering the Effects of Computer Scientist Stereotypes on Mental Health
Francesca Vera
Stanford University, USA

Despite the research, reports, and personal testimonials documenting mental health issues in Computer Science (CS) around the world, little exploration has been done in how the “identity” and social perception of a typical computer scientist affect the mental health of participants in the field. Such investigation helps fill the present gap in our understanding of why computer scientists may experience symptoms of mental illness. In breaking down the different stereotypical components of a computer scientist—technology-oriented obsession, innate genius, social awkwardness, unattractive physical appearance, and masculinity—which have long served as barriers for entry into CS, one can uncover how those facets may contribute to mental distress. Based on thematic qualitative analyses of academic literature, reports, articles, essays, and personal narratives, among the possible effects of CS stereotypes on mental health are anxiety, depression, difficulty handling disappointment, physical and emotional stress, insecurity, and lack of belonging. After considering the impact computer scientist stereotypes have on the mental health of participants in the field, this research encourages educational institutions and workplaces to challenge existing norms, open the dialogue surrounding mental health, conduct further research on wellbeing, and better support members of the CS community.

Effects of Availability and Accessibility of Blue-Green Infrastructure on Environmental Justice and Health Equality
Maryam Rezaei Ghaleh1 and Marzieh Rezaei Ghaleh2
1Architecture and Urban Planning Department, Tabriz. Art University Tabriz, Iran. E-mail: m.rezaeighaleh@tabriziau.ac.ir
2The Design School, Arizona State University Tempe, The United States E-mail: mrezaeig@asu.edu

Rapid urbanization, especially in developing countries, and population growth lead to a wide range of health risks in many cities. Recent researches have also shown a linear relationship between two factors of green spaces and health. Besides, the sustainable development goals (SDGs) emphasize access to safe, green, and public spaces for all people.

This paper aims to indicate that accessibility and availability of blue-green infrastructure are more important than other factors in health issues. Our research method is case-study, and therefore, we chose Qazvin City in Iran as a developing city in the Middle East. In recent years, Qazvin has faced with an upward trend in urban development and population growth. Then, to find the relation between the availability and accessibility of BGI and health justice, we analyze the total number of monthly ambulance calls for all six Qazvin districts. We visualize the distribution of the ambulance calls for each district and show the BGI distribution on the city map and calculate the amount of BGI availability and accessibility of each city district by GIS. Then we set the ranking for BGI availability and accessibility and conduct a linear correlation analysis with the total number of ambulance calls and health variables and employ Spearman’s Rho as the correlation measure. Consequently, the results demonstrate a significant relationship between the availability and accessibility of BGI and the number of ambulance calls. In other words, the inhabitants of the districts with a low level of availability and accessibility to BGI suffer from environmental injustice and health inequality. Finally, we conclude that urban planning can help to reduce health inequalities by improving blue-green infrastructure.

Keywords: Health equality, Environmental justice, Blue-Green Infrastructure (BGI), Availability, Accessible area

The Value of Being Human - Finding Balance Between the Artificial and Nature Worlds
Salema Velu
Independent Researcher, United Kingdom E-mail: peterpoho@gmail.com

Emerging out of but still with COVID19, we can all see how technology and AI have increased our digital dependency. Using it to stay connected, shop, and work. It has redesigned our lives like never before influencing what we see, what we experience. What technology and AI have increased our digital dependency. Using it to stay connected, shop, and work. It has redesigned our lives like never before influencing what we see, what we experience. Leading, many to ask themselves some very profound questions on the nature and future of life and work.
And where we as humans will fit into the unfolding futuristic world that George Orwell once wrote about in his book 1984.


---

**Innovations in Refugee Camps: A Case Study of the Rohingya from Myanmar**

Faheem Hussain  
Arizona State University United States  
E-mail: Faheem.Hussain@asu.edu

This research highlights the challenges and aspirations of Rohingya refugees from Myanmar, one of the most persecuted groups in the world. Accessing information and maintaining communication are huge challenges for Rohingya Refugees in Bangladesh due to absence of any written language, ban on the internet, and lack of localized content. My research shows a number of technological innovations introduced by refugees at the grassroots to overcome such challenges.

**Keywords**: Innovation, Refugee camps, Rohingya, Displaced persons

---

**Advancing Innovative Approaches to Climate Adaptation**

Netra Chhetri  
Arizona State University United States  
E-mail: Netra.Chhetri@asu.edu

Netra B. Chhetri has been in the forefront of advancing innovative approaches to climate adaptation that tie together and link multi-scalar processes between environmental dynamics and social outcomes. Working at the complex intersections of climate change adaptation, food security, resource governance, grassroots innovation, and public engagement Professor Chhetri’s skill set allows him to span the boundary of knowledge and practice, so that each reinforces the other. As a scholar, Professor Chhetri’s efforts to develop a method for assessing the multiple sources of environmental impacts on society is unique and an important tool for designing and prioritizing climate adaptation strategies.

---

**SolarSPELL Build Day**

Laura Hosman  
Arizona State University, United States  
E-mail: laura.hosman@asu.edu

Access to high-quality, relevant information is absolutely foundational for a quality education. Yet, so many schools across the developing world lack fundamental resources, like textbooks, libraries, electricity and Internet connectivity. The SolarSPELL (Solar Powered Educational Learning Library) is designed specifically to address these infrastructural challenges, by bringing relevant, digital educational content to offline, off-grid locations. This talk will examine the design, development, and deployment of this for-the-field technology that looks simple but has a quite complex background.
SolarSPELL is a portable, ruggedized, solar-powered digital library that broadcasts a webpage with open-access educational content over an offline WiFi hotspot, content that is curated for a particular audience in a specified locality - in this case, for schoolchildren and teachers in remote locations. It is a hands-on, iteratively developed project that has involved undergraduate students in all facets and at every stage of development.

Keywords: Solar SPELL, Build day, Development, Quality education, Access, Digital library

Session 14 Author Track
Day/Date Saturday, 14 November 8.00 am Arizona (MST), 10.00 am EST, 3.00 pm UTC, Sunday, 15 November 2.00 am Sydney
Zoom [link]

Track 2 (Gong) 200 8.00 am AZ
Can A Solution Also Be A Problem? Some Thoughts and Ideas for the Fight Against the Covid-19 Pandemic
Howard Wolfman
Lumispec Consulting, United States E-mail: hlwolfman@gmail.com

One of the tools available to fight COVID-19 is the use of Ultraviolet light in the C range (UVC). This presentation will briefly explore the benefits and drawbacks of the use of UVC in fighting COVID-19. In addition, possible treatments for the virus will be discussed and Social Interaction requirements will be reviewed.

Keywords: Solution, Problem, COVID-19, Pandemic

Track 2 (Gong) 044 8.00 am AZ
Not Another Panic Button: Inclusion in Public Interest Technology
Toby Shulruff
College of Global Futures, Arizona State University Tempe, Arizona, United States E-mail: tshulruf@asu.edu

Developing technology in the public interest can minimize and mitigate unintended consequences and promote beneficial outcomes. User-centered design approaches require the meaningful participation of those affected by the problem to be solved. For example, some technology solutions intended to address gender-based violence have been less successful due to poor alignment with the dynamics of gender-based violence. Maximizing the potential of these solutions to help address the problem of gender-based violence requires including the perspectives of survivors of violence and their communities from the earliest stages of technology development.

Keywords: Public interest technology, Gender-based violence.

Track 2 (Gong) 057 8.00 am AZ
Body Modifications and Their Health Implications
Lauryn Remmers¹ and Katina Michael²
¹Pre-med Barrett, the Honors College at ASU Arizona State University Phoenix, USA E-mail: lremmers@asu.edu
²School for the Future of Innovation in Society Arizona State University Phoenix, USA E-mail: katina.michael@asu.edu

This paper comprehensively defines three forms of body modifications: tattoos, piercings and implants. Some body modifications are functional while others are aesthetic, each serving the needs of its bearer or wearer. The paper describes the motivations behind different forms of body modifications. A document analysis was conducted, inclusive of a public image repository search, to ensure the depth required to reach saturation in the literature and content. A comparison of body modification techniques is assessed across cultural uses, modern applications and risks. Additionally, the health implications of these body modifications are considered and the findings clustered into the themes: physical, psychological and privacy implications. The contribution of this paper is in starting a serious discussion around the potential for health issues to arise from body modification and the impact they may have on the end-user.

Keywords: Tattoos, Piercings, Implants, Health, Implications.
Public Interest: EEG Implants
Riley Tallman
CIDSE Arizona State University Tempe, United States
E-mail: rtallman@asu.edu
Society acts according to the public interest. Products and technologies are integrated into society based on their value in people’s lives. Neuralink is developing an EEG implant that can bring many useful features to the public. This work explores the technological feasibility of a brain implant becoming a mainstream product as accepted by the public, and presents capabilities that are possible with such a device that would benefit people’s daily lives. The paper concludes that a brain implant will likely be adopted into the mainstream in the future due to its many functional benefits like driving assistance, vision enhancements, paralysis cures, and human-computer interaction benefits.

Keywords: EEG, Neuralink, Public interest.

Blockchain in the Time Bank: Toward a Community-oriented Public Interest Technology
Chengmeng Zhang and Wenqing Yu
1Institute For Disability and Philanthropy, Shenzhen University
2Jack, Joseph and Morton Mandel School of Applied Social Sciences, Case Western Reserve University
Blockchain technology has been greatly popularized in recent years which fundamentally has affected the way people trade and exchange in the world. People exchange services and skills in “time bank” with reciprocity as the underlying premise. Previous research has indicated that the community-based system can be developed using blockchain technology. This study aims to explore how to apply blockchain technology to the “time bank” and describes how the role and functions of “time bank” will change once blockchain technology is adopted widely in communities. The proposed blockchain solution for “time bank” will provide a meaningful reference for government policymakers, non-profit organizations, social workers, communities and researchers. Meanwhile, the blockchain will find its own pathway in the complex social welfare field and contribute greater values to society at large.

Keywords: Lethal autonomous weapon systems, Regulation, Open source software, Soft law, Export control, Technology activism, Artificial intelligence.
Public Interest Technology Graduate Studies: Inspirations and Reflections

Toby Shulruff
College of Global Futures Arizona State University Tempe, Arizona, United States E-mail: tshulruf@asu.edu

Public Interest Technology is an evolving field focused on promoting perspectives, practices and commitments to technology that serves society and the planet. My own reflections on what drew me to this field, the learning community I have found, and the ways I hope to apply the learnings are of benefit both to others interested in pursuing graduate studies in Public Interest Technology and those who seek to support the emerging field.

Keywords: Public interest technology, Graduate programs, Technology governance.

Pedagogical participatory experiences to promote Public Interest Technology from volunteer work

José Cepero Saravia1,4, Cristina Dreifuss-Serrano2 and Pablo C. Herrera1,6
1Universidad Peruana de Ciencias Aplicadas Lima, Perú E-mail: jcpero@upc.edu.pe, pherrera@upc.edu.pe
2Carrera de Arquitectura Universidad de Lima, Lima, Perú E-mail: cdreifuss@ulima.edu.pe

Public Interest Technologies allow practices and learning opportunities for the sustainable improvement of living conditions. Our analysis of participatory pedagogical experiences, from the perspective of student volunteer tourism, adds elements to this emerging field of study by analyzing the steps, main opportunities, and challenges as a basis for the implementation of PIT in higher education. In six case studies, students from the Northern hemisphere reached out to vulnerable communities in Lima (Peru) through universities and local NGOs, in events ranging from welfarism to co-design and participation.

Experiences of Practice Based Education promoted direct interaction with different local realities, enhancing communication, socialization and empathy, key skills in the training of a new generation of professionals that will work in the implementation of new inclusive and participatory policies in our communities. Technology becomes an ally of processes once trust has been consolidated, seeking sustainability in the public interest.

Keywords: Volunteer tourism, Participative design, Higher education, Public interest.

Care and Liberation in Creating a Student-Led Public Interest Technology Clinic

Shreya Chowdhary1, Sam Daitzman2, Ruby Eisenbud3, Emma Pan4 and Erhardt Graeff5
1Olin College of Engineering, Needham, MA, USA E-mail: 1schowdhary@olin.edu, 2sdaitzman@olin.edu, 3reisenbud@olin.edu, 4epan@olin.edu, 5egraeff@olin.edu

The emerging field of Public Interest Technology contains the seeds for an engineering practice that embodies the ethic of care and undergraduate engineering educational experiences in the mold of liberatory education. We realized these opportunities by creating an undergraduate, student-led public interest technology clinic. Using autoethnography, we reflect on our effort to create the clinic and find that we prioritized emotions and relationships, embraced slowness and deliberation, and claimed student ownership.
These practices define public interest technology and redefine engineering in ways centering care and equity, which enabled us to create the inclusive and effective engineering and public interest technology educational experiences we wanted for ourselves.

Keywords: Public interest technology, Engineering education, ethic of care, Liberatory education.

In the last several years the framework of public interest technology (PIT) has enabled a conversation that brings together a wide range of critical voices in industry and academia. The appeal of this framework is understandable given the increasing disappointment with tech companies. While technocapitalism has transformed how we relate to ourselves and others in some major ways, it has not delivered its promise of a better world for most people. If this disillusionment is the question, the PIT framework has been the response. Interestingly, the focus of current PIT initiatives has been mainly limited to North American and European countries. In this talk, we ask whether and how the PIT framework translate into actually existing discourses of technology use and design in the Global South. Reflecting on our research in Ghana and other research in engineering studies and development studies, we suggest that historical examples abound where ‘public interest’ was defined as the target. Moreover, we conclude that, post-pandemic, it is necessary not just to follow the slogan ‘build back better’, but to build back fairer; otherwise, low inclusivity and no responsibility will result in bad decisions, no communal buy-in and the continued loss of trust in governing authorities. This means we need public interest technologies which support public consultation (rather than crony consultation), impart genuine accountability of decision-makers to those affected by their decisions, and provide for citizen empowerment and self-determination. For this, we need public-interest-sensitive design.

**Translating Public Interest Technology in the Global South?**

Yunus Dogan Telli1 and Robert Krueger2

1Department of Humanities and Arts & Institute for Science and Technology for Development, Worcester Polytechnic Institute, Worcester, MA, USA E-mail: ydtelli@wpi.edu

2Department of Social Science and Policy Studies & Institute for Science and Technology for Development, Worcester Polytechnic Institute Worcester, MA, USA E-mail: krueger@wpi.edu

In the last several years the framework of public interest technology (PIT) has enabled a conversation that brings together a wide range of critical voices in industry and academia. The appeal of this framework is understandable given the increasing disappointment with tech companies. While technocapitalism has transformed how we relate to ourselves and others in some major ways, it has not delivered its promise of a better world for most people. If this disillusionment is the question, the PIT framework has been the response. Interestingly, the focus of current PIT initiatives has been mainly limited to North American and European countries. In this talk, we ask whether and how the PIT framework translate into actually existing discourses of technology use and design in the Global South. Reflecting on our research in Ghana and other research in engineering studies and development studies, we suggest that historical examples abound where ‘public interest’ was defined as the target. Moreover, we conclude that, post-pandemic, it is necessary not just to follow the slogan ‘build back better’, but to build back fairer; otherwise, low inclusivity and no responsibility will result in bad decisions, no communal buy-in and the continued loss of trust in governing authorities. This means we need public interest technologies which support public consultation (rather than crony consultation), impart genuine accountability of decision-makers to those affected by their decisions, and provide for citizen empowerment and self-determination. For this, we need public-interest-sensitive design.

**Towards an Open Web of Things**

Bart Moons1 and Jeroen Hoebeke2

1Department of Information Technology Ghent University - imec, IDLab Ghent, Belgium E-mail: bamoons.imec@ugent.be

2Jeroen.hoebeke@ugent.be

Sensors of governments, companies and citizens have been adding a lot of data in recent years to the global datasphere. Yet the vast majority of this data does not belong to its rightful owner causing privacy issues and keeping potential of the data untapped. Local authorities mainly use this data to improve monitoring of the city and to perform their daily tasks more efficiently and — often due to a lack of resources — not to develop new, innovative applications. In addition, sensor data from consumer products often does not belong to the users and remains trapped within walls of platforms. These factors cause an imbalance in online data possession and generated data remaining largely unused. However, by connecting technologies that are available today, sensor data can end up with the rightful owner.
Additionally, the data can be linked and shared, which might distribute the opportunities better, so anyone can build novel applications or gain insight. If local authorities adopt the same approach, they can become more transparent and create more awareness into what is happening in their citizens’ living environment. Also, innovative solutions, build on the basis of this data, can respond to the (local) needs of people. This opinion article tries to shed light on the possibilities and challenges of an open Web of Things.

Keywords: Linked open data, Web of things, Smart cities.

Wearable Ultraviolet Radiation Exposure Sensors for Research and Personal Use

Alyssa Henning1, Nathan Downs2 and Jennifer Vanos3

1School for Engineering of Matter, Transport, and Energy Arizona State University Tempe, United States, E-mail: Alyssa.L.Henning@asu.edu

2School of Sciences University of Southern Queensland Toowoomba, Australia E-mail: Nathan.Downs@usq.edu.au

3School of Sustainability Arizona State University Tempe, United States E-mail: Jenni.Vanos@asu.edu

Skin cancers are the most common type of cancer in the United States and are strongly associated with personal exposure to ultraviolet (UV) radiation, which is also the most preventable risk factor. People are exposed to UV rays when they engage in outdoor physical activity (PA), which is associated with increased skin cancer risk, yet is also an important health behavior. Thus, researchers and the general public alike have shown increasing interest in measuring acute, daily, and long-term UV exposures related to PA. However, minimal research exists at the intersection of UV sensors, personal exposure, adaptive behavior due to exposures, and risk of skin damage. Recent years have seen an influx of new consumer-based and research-based UV sensing technologies with wide-ranging form factors and purposes. The objectives of this state-of-the-art literature review are to (1) compare technical specifications of UV wearables with their stated applications, and (2) to guide researchers involved in personal UV exposure studies to determine which wearables are best for their purposes.

Public Interest Technology (PIT) is an emerging field focused upon ensuring that innovative technologies are designed, distributed, and mediated for the well-being of the public. PIT seeks to educate technologists, engineers, and researchers to be cognizant of the public impact of their work and to train policymakers to equitably mediate the scope and reach of technology. However, the reach and impact of PIT work can be further enhanced through theoretical and pragmatic understanding of the field. An in-depth qualitative study of the department revealed several challenges within the department regarding identity, sense of belonging, invisible work, and career trajectory. As a scholar-practitioner, I employed STS theory and pragmatic knowledge to create three critically crafted interventions to address these challenges. First, STS knowledge was utilized to investigate the challenges within the department and understand how these challenges affected the multiple stakeholders and the culture of the ECE department. Second, pragmatic STS knowledge was utilized to create projects to shift the boundaries within the engineering department that limited the professional, academic, and personal opportunities of the engineering student. The purpose of this paper is to illustrate how my application of STS theoretical and pragmatic scholarship to address the culture of an electrical and computer engineering department can contribute to the field of PIT.

Keywords: Education, STEM, Engineering students, Collaboration
Value Sensitive Design and Environmental Impact Potential Assessment for Enhanced Sustainability in Unmanned Aerial Systems
Nicolaï Iversen¹, Morten Birkved² and Dylan Cawthorne³
University of Southern Denmark, The Maersk Institute - UAS Centre Odense, Denmark, E-mail: ¹niiv@sdu.dk, ²morb@sdu.dk, ³dyca@sdu.dk

Value sensitive design (VSD) is an approach that facilitates the pro-active incorporation of human values into technological design. The VSD literature, as well as empirical studies, identify environmental sustainability as a human value with importance in design, and therefore importance in Unmanned Aerial Systems (UAS) design. UAS have begun to spark significant public interest and environmental changes. However, there are few studies that address how to design UAS for these changes, and none that take VSD as their point of departure. In this work, the environmental sustainability of UAS are analyzed using VSD and environmental impact potential assessment (EIPA) approaches. VSD envisioning cards are used as design prompts to identify relevant social and environmental impacts for two case studies to illustrate the approach: a healthcare application, and a powerline inspection application. The environmental impact potential is assessed, along with consideration of the drone’s materials and manufacturing processes which have an effect on toxicity to humans, water depletion, and acidification. Then, general insights into how UAS can be designed for enhanced environmental sustainability are discussed. The results show high sensitivity to changes in defining the system boundaries and in defining relevant UAS scenarios, as a direct comparison of drone and non-drone scenarios is not possible. Thus, VSD and EIPA approaches can provide a nuanced way to analyze UAS applications, leading to positive social impacts and enhanced environmental sustainability in UAS in the future.

Keywords: Value sensitive design, Drones, Sustainability, Environmental impact potential assessment, Public interest technology.

Agroforestry for Addressing Multi-Dimensional Poverty in Sub-Saharan Africa
Primrose Dzenga
School for the Future of Innovation in Society Arizona State University Tempe, AZ E-mail: pdzenga@asu.edu

Rural Sub-Saharan Africa is a region facing the crippling challenges of multi-dimensional poverty and food insecurity. There is general consensus that agroforestry, a landscape ecosystem approach to food security, can be a sustainable way to grow food and reduce hunger in Sub-Saharan Africa. This study aims to design a framework of agroforestry intervention to demonstrate its effectiveness as a sustainable food system that works for communal smallholder farmers across rural Sub-Saharan Africa. However, implementing agroforestry interventions with desirable outcomes requires a multi-disciplinary approach which takes into account environmental, socio-economic, food and nutrition security and, health and wellbeing outcomes of the communities involved. To test the assumption that community-based agroforestry can create food security on a sustainable basis while reducing poverty, a randomized control trial on citrus community agroforestry in three rural villages in Zimbabwe will be carried out. The 30-hectare citrus community orchards will be intercropped with legumes like cowpeas, peanuts, alfalfa and soybeans, which are soil nitrogen fixers, animal fodder and plant-based protein. This intervention is scalable in countries with similar cultural, political and socio-economic structures like South Africa, Malawi, Zambia, and Mozambique. Populating the orchards with citrus ensures a high return on investment at roughly 40 tons of fruit per hectare with a commercial value of at least $50,000 per season, while providing large amounts of vitamin C for the community’s immediate nutrition. This is in addition to the plant-based protein from legumes like beans and cowpeas used for intercropping. Practicing this level of organic, bio-diverse intensive agriculture, with a focus on low-external inputs, produces enough fruit to generate substantial income and an industry for the community, not only to balance their nutrition but to improve their livelihoods and health outcomes and ultimately, address multi-dimensional poverty.

Keywords: Multi-dimensional poverty, Agroforestry, Citrus community orchards, Sub-Saharan Africa.
IEEE HAC & SIGHT Response to COVID-19
Kartik Kulkarni, Sampath Veeraraghavan, John Funso and Pia Torres

This panel will address how IEEE HAC & SIGHT responded to the COVID pandemic.

Greetings from the Field
Jason Sargent
Swinburne University of Technology, Australia
E-mail: jpsargent@swin.edu.au

Fieldwork in a developing country can be confronting, overwhelming, uplifting, humbling and life-changing. It can be all elements in a single day as well. Leading a team of students into locales where these characteristics emerge, often unexpectedly, requires a unique skill set that develops longitudinally and is impossible to possess pre-departure. This workshop looks at the reflections of an academic who has taken small project teams into the remotest parts of India and the lesson-learned. It is centred on the core question posed by the academic to the student in such an environment “Who/what am I to you?”. Typical of a ‘letter to your younger self’ narrative, the workshop will use imagery of moments in time captured with students in the field and speak to the critical human connection of mentor/coach/academic supervisor to student that the academic wishes he knew then what he knows now. The presentation will be deeply personal and informal and seek to engage participants with insights on remembering that to teach is to learn twice.

Keywords: Fieldwork, Developing country, Skills, Self, Narrative, Human connection, Mentorship, Supervision, Student, Learner, Journey

Non-Digital Citizenry: Unmapped, Unbanked and Unknown
Jason Sargent, Paul Scifleet and Mohamed Ibrahim
Swinburne University of Technology, Australia
E-mail: jsargent@swin.edu.au, pscifleet@swin.edu.au, mohamedibrahim@swin.edu.au

In a world of big data and ‘the data deluge’ there is an assumption that everyone has a digital footprint and that access to public services such as health and education is facilitated through a digital identity. However, in many parts of the world, particularly in developing countries, this is not the case. This workshop presentation will explore the digital divide from the perspective of individuals and communities who have been disadvantaged, through no fault of their own, by not having a digital footprint. Vignettes from India, Somalia and the United States will describe the perilous connection to land (unmapped), finance (unbanked) and digital identification (unknown).

Keywords: Big data, Data deluge, Digital identity, Digital divide, India, Somalia, United States

Citizen Participation in Global Governance of the Internet
Mahmud Farooque
Arizona State University, United States
E-mail: Mahmud.Farooque@asu.edu

Mahmud Farooque will share results on Citizen Participation in Global Governance of the Internet from https://wethenet.org/ that are presented at the Internet Governance Forum (IGF).

Keywords: Citizens, Participation, Internet Governance Forum (IGF)

Innovation-Led Transformation and Human 2.0
Andreas Sjostrom
United States CapGemini
E-mail: andreas.sjostrom@capgemini.com

Leaders in applied innovation outgrow industry peers by up to 3.6x. The public sector accelerates its digital leverage to improve its ability to deliver value to society and citizens. Purpose driven business, ethics, and sustainability are aspects that increasingly are associated with meaningful innovation.
What are leading organizations exploring today to strengthen social responsibility and find that next competitive edge, and what might the future look like as physical and digital merge, enabling new human augmentation concepts. Listen to Andreas Sjostrom, author, innovator, and thought leader from Capgemini, share his experiences from the Applied Innovation Exchange, San Francisco.

Keywords: Innovation-led, Transformation, Social responsibility, Digital, Human augmentation, Ethics, Public sector

Session 17  Author Track
Day/Date  Saturday, 14 November
11.00 am Arizona (MST), 1.00 pm EST, 6.00 pm UTC,
Sunday, 15 November
5.00 am Sydney
Zoom  https://asu.zoom.us/j/81166609535

Track 1 (Sydney) 126 10.30 AZ
What Do Roboticsists Need to Know About People?
Clinton J. Andrews
E.J. Bloustein School of Planning & Public Policy Rutgers, The State University of New Jersey New Brunswick, NJ, USA
This essay considers how and why university robotics curricula should be expanded to include elements important to socially cognizant robotics applications.

Keywords: Robotics, Social settings, Education

Track 1 (Sydney) 127 10.30 AZ
Collaborating to Build the Software Good Policy
Deserves
Evagelia Emily Tavoulareas1 and Cyd Harrell2
1Rock Center for Social Impact and Innovation (of Georgetown University) Washington, D.C. U.S.A.
E-mail: evta@georgetown.edu
2A Civic Technologist’s Practice Guide San Francisco, CA U.S.A.
E-mail: cyd@cydharrell.com

In 2020, key policy priorities depend on software for their implementation. While engineering skills are important, we believe the critical factor in better software is sustained cross-disciplinary collaboration. We outline some of the requirements for this collaboration: redefining hard skills, prioritizing collaborative skills, and shaping a work environment that promotes collaboration.

Keywords: Software, Collaboration, Engineers, Social scientists, Hiring, Team building, Government, IT

Brain machine interfaces (BMI) have traditionally been considered for medical prosthetics. They are now being presented as a means to “merge with the AI”. Entrepreneur Elon Musk has begun trialing his Neuralink technology on pigs, and hopes to incorporate human subjects into his clinical trials of a “breakthrough technology” before year end. Independent of the technology’s success to continue through the medical innovation process via the US Food and Drug Administration, it is time to be pondering the social implications of this novel technology. This paper points to some of the questions philosophers and practitioners alike are asking about the potential for BMI.

Keywords: Neuralink, Brain Machine Interfaces, BMI, BCI, Social Implications, Public Perceptions, Risk

The provisioning of basic goods and services relies upon an intricate web of critical infrastructure systems. New technology and increasing cyber-connectedness are changing how cyber and physical critical infrastructure assets are related and reliant upon each other.

Keywords: Software, Collaboration, Engineers, Social scientists, Hiring, Team building, Government, IT
This conference presentation presents two important aspects of cyber-physical critical infrastructure. First, we articulate the emerging threat landscape through categorizing and describing the myriad of shifting motivations and emerging types of harm to cyber-physical critical infrastructure. Next, we present a coupled epistemic-ethical analysis of responsibility, ethics, and moral principles tied to these threats across cyber-physical critical infrastructure. Finally, we articulate several future research thrusts across both ethical and epistemic inquiry highlighting the need for value transparency throughout scientific and decision-making processes.

Keywords: Critical infrastructure, Ethics, Risk, Cybersecurity, Cyber attack, Responsibility.

Session 18 Author Track
Day/Date Saturday, 14 November
11.00 am Arizona (MST), 1.00 pm EST, 6.00 pm UTC,
Sunday, 15 November 5.00 am Sydney
Zoom https://asu.zoom.us/j/87625476356
Track 3 (Phoenix) 068 10.30 AZ
Clickbait’s Impact on Trust in News Media
V. Kaushal and K. Vemuri
Cognitive Sciences Lab, IIIT Hyderabad, Hyderabad, Telengana, India
Catchy headlines that lure readers to click on them and link to accompanying articles are called ‘clickbait’ [1]. We studied the impact of clickbait news headlines on the credibility of news items using an experimental setup that simulated the free-scrolling news consumption common in modern digital media. In addition to credibility, the impact of curiosity, age and other demographic factors on participants’ propensity to engage with clickbait was also studied. Amazon’s Mechanical Turk platform was used to recruit 200 participants, in addition to 100 annotators for pre-testing—split evenly between Indian and American participants. 6 articles and their corresponding pairs of news headlines (clickbait and non-clickbait) were selected from the Webis Clickbait 17 dataset [2] for both the American and the Indian cohorts after verification of the headline’s “clickbait-iness” by 50 independent annotators each. Chosen articles were different for both the cohorts to maintain contextual relevance. For both the cohorts, 3 of these articles had an originally clickbait headline and a generated non-clickbait headline and vice-versa.

Participants were presented with the 6 randomly chosen headlines (one each for each article) such that there were 3 clickbait and 3 non-clickbait headlines on screen and then asked to read through any 2 articles of their choice. This was followed by a credibility survey [3], an epistemic curiosity survey [4] and a demographic survey. Clickbait headlines were found to significantly lower the credibility of news articles (F1,398=4.93, p<.05). Additionally, a positive correlation was observed between age and participants’AZ propensity for clickbait headlines (rs=0.16, p<.05). Epistemic curiosity did not have a discernible impact on participants’ propensity for clickbait headlines. We hope that our work on the impact clickbait has on credibility of news will affect policy level decisions at media houses and eventually result in improved user-experience for people who consume news online.

Keywords: Context marketing, Systematic literature review, Context Marketing
Anna-Lena Christina Krusch1, Per Ole Uphaus2 and Harald Rau3
Institute for Media Management, Ostfalia University of Applied Sciences Salzgitter, Germany. E-mail:1 krusch@ostfalia.de, 2 pe.uphaus@ostfalia.de, 3 h.rau@ostfalia.de
In today’s information era, the ability to address the needs of potential customers at a moment when they are particularly receptive to the information provided becomes increasingly important. Modern mobile devices allow to collect precise data about the users’ context, thus enhancing possibilities to better estimate, proof and react to current situations in real time. Given that, ‘context marketing’ nowadays is an approach frequently discussed in literature. This contribution aims to systematize existing publications on the subject of context marketing, in order to build a basis for future research and to uncover potential gaps and contradictions in previous research. Methodologically, the two scientific databases “Scopus” and “Web of Science” were searched for context marketing related contributions. The evaluation made use of a mixed methods approach including qualitative content analysis, and subsequently further quantitative evaluations. The findings reveal the majority of publications to focus on the users’ location as the only context factor, resulting in a predominant focus on location-based advertising related research.

Keywords: Context marketing, Systematic literature review, Contextual factors, Targeted advertising, Media management.
An analysis of the Australian News Coverage of the Hannah Clarke and Family Suicide-Murder in February 2020
Julia Najjar
University of Wollongong NSW, Australia
E-mail: jmn844@uowmail.edu.au

There is a considerable amount of literature on domestic violence and news framing. Domestic violence in Australia is a widespread issue, with some severe cases resulting in homicide. The current study focuses on the media’s newspaper reporting of a recent murder-suicide of Hannah Clarke and her three children in February 2020. The data collection spanned over a three-week period from 19th February 2020 to 9th March 2020. The keyword “Hannah Clarke” was entered into the Factiva database and newspaper samples were randomly selected from various publications. The analysis shows that the reporting during this timeframe often omits social context, sensationalises and shifts the blame to the victim. The perpetrator was viewed as a glorified persona. The findings of the paper show that the role of the media when it comes to domestic violence reporting is amplified for a certain period and then ignored once the news cycle changes as shown in the Hannah Clarke murder-suicide case. It is crucial for the news media to rely on the appropriate stakeholders to push for reform and change in Australia.

Keywords: Hannah clarke, Domestic violence, Media framing, Newspaper, Sensationalism

Mission Galactic
George Gabriel Michael
All Saints Grammar School
Australia E-mail: georgegmichael03@gmail.com

New “Mission Galactic” is an original composition by George Gabriel Michael, a high school student. Available for viewing here: https://www.youtube.com/watch?v=OL709K3t2dQ. The song is about video games, addiction, the seductive nature of the cyberworld. Michael writes: “Escaping can be good at times, but it’s better to know the way back.” A number of suicides have occurred by high profile gamers in the last 12 months, despite that players don’t play alone, it sometimes feels like that. In today’s (massively multiplayer online roleplaying game, there is really no end to a game, and as the writer says, it can be a “system overload”. Michael speaks about “wifi in my brain” and the need to refuel, and escapism to the online world, with all its perils.

Keywords: Video games, Addiction, Harm, Gaming, Alone, Escapism, Seductive cyberworld, Refuelling, Wifi, Brain, Activity, Journey, Online, MMPROG.
This instrumental was inspired by David Bowie’s mysterious song “Blackstar” and Alex Boya’s unique futuristic art. These two beautifully “disturbing” creations seemed the perfect fit. I saw a dystopia both in the internal and external realms of existence. The place where things lose their place and together with truth and reality they can become severely distorted and confused. And then the challenge to put the pieces back together again into some recognisable form. If we can see the pitfalls, how can we evade them?.

Keywords: Dystopia, Technology, Harm, Society, Pitfalls, Public interest technology, Social implications, Future, prevent

Population Changes the ethical culture of engineers requires playing the long game. Indeed, efforts to change the ethics of engineering practitioners have been ongoing for over a hundred years, but some historians (Layton 1971 and Wiesninski 2012) have shown how financial, cultural and political factors limited ethical reflection in engineering. There are no easy solutions, and many great researchers and engineers work on improving engineering with zest. I want to offer some humble but well-intentioned reflections on how to change the culture of engineering, discussing the role of translation and holistic thinking for helping engineers see their responsibilities. Helping engineers to see how their decisions can lead to better or worse outcomes requires several layers of translation and collaboration with social scientists. However, recognizing the above history, I want to caution that all of this may not matter without institutionalization of ethical considerations and connection to decision makers.

I will base my discussion two areas of engagement that I have been involved in: a) interaction between engineers and philosophers through the Forum on Philosophy, Engineering and Technology; and b) experience with discussing public values with engineering practitioners and policy makers (Tomblin, Pirtle et al 2017).

Keywords: Engineering ethics, Responsible innovation, Philosophy of engineering
Student Pugwash: Perspectives on Social Responsibility in Science & Technology

Rachel Svetanoff
Student Pugwash USA United States
E-mail: rsvetanoff@studentpugwash.org

Student Pugwash’s mission is to empower and equip students and young professionals to identify, critically analyze, and shape the ethical, policy, and societal dimensions of science and technology. We don’t tell students what to think or what’s ethical; we provide the framework such that making ethical choices, as each student decides what those are, is part and parcel of the work they do currently and later as professionals. Student Pugwash began in 1979 in the image of the Pugwash Conferences on Science and World Affairs, bringing together students with experts on ethical issues in science and technology. The Pugwash Conferences on Science and World Affairs, founded in 1957 in the town of Pugwash, Nova Scotia on the principles outlined in the 1955 Russell-Einstein Manifesto, is dedicated to issues of international security, especially existential and genocidal threats to humanity. In 1995, Pugwash Conferences shared the Nobel Peace Prize with one of their co-founders and long-term President, Joseph Rotblat. Our general membership program is named in his honor and memory (and with his permission). We were founded to replicate Pugwash’s model at the student level, although in the years since we have taken on broader topical areas of global issues.

Keywords: Social responsibility, Ethics, STEM, Responsible innovation, Pugwash.

Analyzing cyber-physical threats to Pennsylvania dams through a lens of vulnerability

Lauren Dennis1, Sarah Rajtmajer2 and Caitlin Grady3
1Department of Civil and Environmental Engineering, Penn State University, University Park, PA USA E-mail: lud93@psu.edu
2College of Information Sciences and Technology, Rock Ethics Institute Penn State University, University Park, PA USA E-mail: smr48@psu.edu
3Department of Civil and Environmental Engineering, Rock Ethics Institute Penn State University, University Park, PA USA E-mail: cgrady@psu.edu

Protecting critical infrastructure, such as water supply systems and dams, remains a top priority across multiple administrations in the United States. We study the ethical and environmental justice implications of potential disruptions to 29 dams across the State of Pennsylvania that serve as a water supply. Using census data, we investigate the communities surrounding these dams to look for relationships between community demographics and dam characteristics that may contribute to risk. We highlight the role of dam age, dam ownership, dam capacity, and dam downstream hazard potential in this analysis. Our results reveal associations between dam ownership, age, and capacity with the race of the population served, as well as an association between dam ownership and household income band. We conclude with a discussion on the increasing complexity of cyber-physical critical infrastructure and the need for future research which explicitly takes the populations served by this infrastructure into account.

Keywords: Critical infrastructure, Cyber attack, Failure, Dams, Water supply, Vulnerability, Ethics

HASTAC: Changing the Way We Teach and Learn

Judith Bessant1, Jys Farthing2, Ellis Howard3 and Yanique Bird1
1RMIT University, Australia E-mail: judith.bessant@rmit.edu.au
2Independent Researcher, United Kingdom E-mail: jysfarthing@gmail.com
3United Kingdom

This session explores what public interest technology might look like for future generations, and outlines some key considerations from an intergenerational perspective. It includes the experiences of two younger advocates who are trying to change the world for the better and describes how technology could support their actions for the future.

Keywords: HASTAC, Teach, Learn, Membership, Society
Evaluation and Load Selection using Energy Storage System Priority Index (ESSPI)
Guillermo Lopez-Cardalda1, Eduardo Ortiz-Rivera1 and Melvin Lugaro-Alvarez2
1Department of Electrical and Computer Engineering, University of Puerto Rico Mayaguez, Mayaguez, Puerto Rico
E-mail: a guillermo.lopez@upr.edu, b eduardo.ortiz7@upr.edu
2Department of Mechanical and Aerospace Engineering, University of California San Diego San Diego, USA
E-mail: mlugoalv@ucsd.edu
This paper discusses important metrics that should be considered for determining critical loads and locations for energy storage. The evaluation process for these loads is to rank them as critical, essential, discretionary, luxury, and disposable. This paper also describes the evaluation criteria for location selection of energy storage systems. The equation presented in this paper determines which loads should be considered to have a backup energy storage system, so in case of a blackout event, the critical and important loads/locations can recover faster. The decision and criteria are based on the experience of Puerto Rico after hurricane Maria. These criteria can be changed or adapted for different regions around the world for different loads that need energy storage systems.
Keywords: Energy Storage System, Reliability, Resiliency, ESSPI

The "Criminality from Face" Illusion
Walter Scheirer
University of Notre Dame, United States
E-mail: walter.scheirer@nd.edu
The automatic analysis of face images can generate predictions about a person’s gender, age, race, facial expression, body mass index, and various other indices and conditions. A few recent publications have claimed success in analyzing an image of a person’s face in order to predict the person’s status as Criminal / Non-Criminal. Predicting “criminality from face” may initially seem similar to other facial analytics, but this talk argues that attempts to create a criminality-from-face algorithm are necessarily doomed to fail, that apparently promising experimental results in recent publications are an illusion resulting from inadequate experimental design, and that there is potentially a large social cost to belief in the criminality from face illusion.
Keywords: Computer vision, Biometrics, Face analysis, Ethics

Harvesting Faces from Social Media Photos for Biometric Analysis
Giordano Benitez Torres and Michael C. King
College of Computer Engineering and Sciences Florida Institute of Technology Melbourne, Florida
E-mail: a gbenitez2013@my.fit.edu, b michaelking@fit.edu
The accuracy of automatic face recognition has increased significantly over the last decade. Technology developers actively try to improve their tools and algorithms for this to occur, there is a need for high-quality datasets with a large number of images to test and develop new techniques. Online social networks provide a vast digital media resource, given the volume of traffic that goes through its infrastructure. The content within it varies but is predominantly flooded by images. In this era where selfies are the norm, we examine a collection method employed to harvest face data from the subject’s images via the web. We then show how it can be processed and organized so that it is useful for biometric applications. In addition, this experiment demonstrates how restrictions put in place by social media platforms are inadequate in the protection of their user’s data.
Keywords: Privacy, Anonymity, Cryptography, Cryptographic Packet Format, Packet Format, Message Format, Cryptographic Message Format, Sphinx, Remailer, Mix Network, Mixnet, Quantum, Quantum Networking, Telecommunication Traffic, Global Passive Adversary
Armed conflicts have undesirable socio-economic consequences, and its effects are most severe on women and youth. Rape, sexual abuse, women being used as tools of war, increased migration, and unnecessary dehumanization are common outcomes. Post-conflict reconstruction is even more tasking as economic, social and political development can take decades to accomplish. Countries like Rwanda and Afghanistan are highly unstable regions with long decades of ethnic conflict and violence that has shocked the economy to its core. These countries have established some post-conflict reconstruction mechanisms such as quota systems in parliaments and public dialogue forums, that have included bringing women and youth into peace negotiations and nation building. International efforts from the United Nations Human Rights Commission (UNHCR) and the Development Fund for Women (UNIFEM) provided platforms for grassroot innovation and peace dialogues among ethnic groups. However, some pre-existing social and cultural norms have made it difficult for inclusion to be achieved. Factors like religion, ethnicity, political rivalries have exacerbated conflicts in the region. Public and stakeholder engagement is considered necessary to halt conflicts and shift focus towards national reconstruction. With the adoption of Information and Communication Technologies, there has been expansion of access to community dialogue forums and civic participation. Through technology, various platforms highlighting civil liberties and rights have been created to educate and increase participation of women and youth in post-conflict reconstruction. This paper provides a comparative analysis of the successes and failures of technological mechanisms that have fostered the role of women and youth in post conflict setting in Afghanistan and Rwanda. Particularly, the paper will be highlighting grassroots participatory forums for empowering vulnerable groups to be actively involved in the post-conflict reconstruction.

Keywords: Post-conflict Setting, Women, Youth, Peace negotiation and Nation building International organizations, Development
It is worth mentioning that these are the first 2 games made in Ecuador by a university institution that aims to raise awareness of sustainable development among its student population. Under this line, the article seeks to present the technical considerations considered to promote the transversal knowledge and ecological awareness.

**Keywords:** A-Frame, Videogames, Environment, Html5, Virtual reality, Typescript.

---

**Track 3 (Phoenix) 025 1.30 pm AZ**

**Re-Designing Dark Patterns to Improve Privacy**

Davide Maria Parrilli and Rodrigo Hernández-Ramírez
UNEDCOM/ADE Universidade Europeia Lisboa, Portugal

Dark patterns are highly unethical tools used in digital design to obtain, *inter alia*, as much personal data as possible from users, normally, without their consent. However, the methods followed by dark patterns can be re-purposed to actually enhance users’ privacy, thus turning them into ethical tools. This ongoing research aims to show how dark patterns can be re-designed to steer users into choosing the strictest privacy settings. From the point of view of ethical design practices, this implies a substantial transformation of something inherently bad into a public interest enabler.

**Keywords:** Dark patterns, Design ethics, Privacy, Data protection.

---

**Track 3 (Phoenix) 036 1.30 pm AZ**

**Categorizing Online Harassment Interventions**

Chenlu Feng¹ and Donghee Yvette Wohn²

¹Faculty of Electrical Engineering, Mathematics and Computer Science, University of Twente Enschede, Netherlands, E-mail: c.feng@student.utwente.nl
²Department of Informatics, New Jersey Institute of Technology Newark, NJ, USA, E-mail: wohn@njit.edu

Online harassment has become an unavoidable issue and many people are trying to find methods to mitigate online harassment. In this study, we did a systematic review of online harassment interventions. We focused on studies that proposed online mechanisms and designed experiments to test the corresponding effects. We collected 17 studies from scholarly databases which met our criteria. Among these studies, we categorized the interventions into 7 groups based on the theoretical or design-related mechanism they were using to justify the intervention. At the end of the study, we critically reviewed these studies and proposed some ideas for future research.

**Keywords:** Accessibility, Robocalls, Usability, Security.

---

**Track 3 (Phoenix) 037 1.30 pm AZ**

**Truly Visual Caller ID? An Analysis of Anti-Robocall Applications and their Accessibility to Visually Impaired Users**

Imani N. Sherman¹, Jasmine D. Bowers, Liz-Laure Laborde, Juan E. Gilbert, Jaime Ruiz and Patrick G. Traynor

Department of Computer Information Science and Engineering
University of Florida Gainesville, USA, E-mail: ¹shermani@ufl.edu

Robocalls interrupt daily activity, cause financial harm, and influence users to ignore calls from unfamiliar numbers. Service providers and developers have created Anti-Robocall applications to attempt to restore trust in the phone and decrease the impact of robocalls on daily life. However, whether or not such applications meet accessibility standards and are therefore usable by vulnerable populations, particularly the visually impaired, is unknown. In this paper, we use a combination of the W3C’s Mobile Web Content Accessibility Guidelines (MWCAG) and interviews with 11 visually impaired users to establish accessibility metrics for Anti-Robocall applications. We then evaluate 56 Anti-Robocall applications for Android to assess whether they met the needs of the visually impaired community.

Our results indicate that 100% of the applications fail to meet all basic accessibility guidelines including minimum color contrast, button labels (to assist screen readers), and automatic audible alerts. As a result, we show that despite the availability of a variety of tools to help developers identify and correct these problems, this important class of applications does not meet basic accessibility requirements. We conclude by suggesting viable paths forward that ensure inclusion and protection for the visually impaired community.

**Keywords:** Accessibility, Robocalls, Usability, Security.

---

**Track 3 (Phoenix) 038 1.30 pm AZ**

**How it started, how it’s going - Education in Afghanistan**

Safa Barikzai

London Southbank University, United Kingdom E-mail: safabaranis2010@gmail.com

This talk will share stories of Afghan women’s education through the generations and the positive role technology can play in bringing learning communities together.

**Keywords:** Afghanistan, Education, Women, Systemic change, Time.
Kernel Regression to Find Patterns in Multiple Layers of Society
Venkatesh Vaidyanathan
Robotics and Autonomous Systems Arizona State University Tempe, Arizona E-mail: vvaidya5@asu.edu

Multiple layers of the society consist of a great deal of information which can be highly useful in modeling and finding meaningful patterns in. The comparison drawn here is to how multiple layers of can be analyzed through data mining and using distributed regression in similar fashion to analyzing sensor network data. It is perceived in this method of using sensor network analysis to societal networks in that it both small scale sensor networks behave similar to large scale societal networks.

Keywords: Data mining, Artificial intelligence, Machine learning, Network analysis

Towards Engineering Inclusiveness For The Disabled Community Into Smart City Response During COVID-19
Yatiraj Shetty
Department of Systems Engineering, The Polytechnic School Arizona State University Tempe, US E-mail: shetty@asu.edu

The current pandemic has demonstrated a lot of weak links in the social and economic fabric of the society. Addressing these issues is paramount to enable any successful discussion of smart city technologies. The health inequity and accompanying problems faced by the disabled community during the pandemic underlined that our current systems are not built for resiliency: it is important for us to understand what has been done towards solving this complex problem and where we could further allocate our resources to tackle this issue. It is important for us to understand what has been done towards solving this complex problem and where we could further allocate our resources to tackle this issue.

Keywords: COVID-19 pandemic, Disability, Smart city, Health inequity

Digital Afterlife: What happens to our data after our death and should we care?
Faheem Hussain
Arizona State University, United States E-mail: Faheem.Hussain@asu.edu

This workshop focuses on a relatively less-studied phenomenon within the Public Interest Technology scholarship: the Digital Afterlife. The primary goal of this event is to 1) share the leading concepts and challenges of Digital Afterlife, and 2) initiate a dialogue on the public perceptions on Digital Afterlife through the lenses of PIT. Such knowledge can help us to design, develop, and manage inclusive and efficient technological solutions with social empathy in the post-COVID-19 world.

Keywords: Digital afterlife, Life, Death, Assets, Passwords, Platforms, Paywall, Ownership
This is critical since developing regions often receive technology produced in the industrialized countries, sometimes resulting in benefits and other times creating harm, as in mobile technologies that have enabled e-commerce and e-health, and then the e-waste from the Global North which endangers waste pickers in Africa and Asia. What can the two foci of public interest technology and global technology and development share and learn from each other? This session will consider the conceptual and theoretical connections among these streams of inquiry and knowledge creation, exploring ways in which they can mutually enrich our understanding the process of adapting and creating new technologies for social benefit.

**Keywords:** New technologies, Social benefit, Mobile technologies, Global technology and development, Knowledge creation, Programs, Education, Public interest technology social, Economic, Political, Development, Transdisciplinarity, Information and Communication Technology for Development (ICT4D)

**Thinking south: Public Interest Technologies Beyond American Frameworks**

Martin Perez Comisso  
School for the Future of Innovation in Society, Arizona State University, United States  
E-mail: maperezc@asu.edu

How Public Interest technology (PIT) engage with the global south? Analyzing how models and practices around PIT reproduce colonial thinking, I advocate for embracing internationally and multiculturally how to govern emerging and public technologies. As a new community of learning, the proposal of Public interest technology needs to acknowledge local epistemologies and cultures, that are an expression of situated technologies, to avoid the dependency from unregulated emerging technologies. The case is urgent, considering that the digital commons and services’ governance happens where the providers are based (mostly in the U.S.), but the users are all around the world. A responsible approach to Public Interest Technology needs to anticipate and include users and experts worldwide. I discuss the challenges and advantages of early engagement with diverse ways of knowing to tackle the current pathway from another field framed by the U.S.A.

**Keywords:** Public interest technology, Decolonial technologies, Ways of knowing

**Smart Mobility as Public Interest Technology?**

Devon McAslan  
Arizona State University, United States  
E-mail: dmcashla@asu.edu

New technologies are being deployed within the transportation sector at an increasing rate in an effort to address the nearly century long problems associated with automobility: safety, congestion, pollution, and urban sprawl, among others. This paper will explore three different transportation and mobility technologies and infrastructures—autonomous vehicles, e-scooters, and intelligent transportation corridors. Within the context of public interest technology, the existing and emerging technologies discussed in this paper/presentation show that there is no singular ‘public interest’. In fact, the needs of multiple ‘publics’ must be considered and balanced and the full range of benefits and risks for these different groups must be weighed against each other. The ways in which these technologies are deployed will depend significantly on political dialogue and highlights the reality that technology alone cannot solve complex urban problems, such as those evident in our currently automobile dependent transportation systems.

**Keywords:** Public interest technology, Decolonial technologies, Ways of knowing

**The socioeconomic impacts of automation in the future of work**

Sarah Martin  
Arizona State University, United States  
E-mail: sarahmartin@asu.edu

With levels of automation rapidly increasing in the workforce, it is vital to examine its broader socioeconomic impact on the future of work. While AI will increase productivity and create new types of opportunities, it poses the risk of heightening the inequality in demand for skills-based employment. Demand for different professions will shift, and as of 2020, 40% of workers are projected to require reskilling training of up to six months. However, technology adoption comes with its own set of economic costs, and a blended configuration could prove to be the strongest business case. This presentation will focus on the shift in workforce demands caused by automation and examine the nature and economic tradeoffs that accompany subsequent reskilling.

**Keywords:** Future of work, Automation, Socioeconomic factors, AI
Track 1 (Sydney) 197 4.30 pm AZ

**SenSIP Center Research on Machine Learning for Solar Systems**

Andreas Spanias  
Arizona State University, Tempe, AZ. E-mail: spanias@asu.edu

This presentation will cover a series of research activities of the NSF Industry-university center site (I/UCRC) on solar energy systems. The presentation will focus specifically on the use of machine learning for monitoring and optimizing solar arrays. The research presentation will begin by covering technical activities in our NSF Cyber Physical systems (CPS) program which will include results on elevating the efficiency of solar plants. We will also discuss SenSIP workforce development programs on sensors and machine learning for solar energy systems. We will close the presentation with a short description of the SenSIP collaborative NSF IRES program on solar energy with the University of Cyprus KIOS center of excellence.

**Keywords**: SenSIP, Machine learning, Solar systems

---

Track 1 (Sydney) 201 4.30 pm AZ

**Datafication: Why Process Matters**

Alexander Halavais  
Arizona State University, United States. E-mail: ahalavais@asu.edu

The word ‘datafication’ comes with baggage. It is often used positively in business settings for instrumenting activities and negatively in social contexts for dehumanizing them. That simplification misses the point that the processes that result in data, and the processes by which these data are refined and reified, are what we should be attending to if we wish to ensure information and communication technologies are used for public good.

**Keywords**: Datafication, Social contexts, Dehumanizing, Information and Communication technologies, Public good, ASU, Critical data studies

---

Session 23  Author Track
Day/Date  Saturday, 14 November
4.30 pm Arizona (MST), 6.30 pm EST, 11.30 pm UTC,  
Sunday, 15 November  
10.30 am Sydney

Track 2 (Gong) 011 4.30 pm AZ

**Health Information Seeking Behaviour, Risk Communication, and Mobility During COVID-19**

Jordan Richard Schoenherr and Robert Thomson
1 Department of Psychology Institute of Data Science, Carleton University, E-mail: Jordan.Schoenherr@carleton.ca  
2 Army Cyber Institute Behavioral Science and Leadership Department, US Military Academy, E-mail: robert.thomson@westpoint.edu

The existence of physical and financial barriers in the provision of healthcare leads to an increasing recognition that alternative sources of information are being used to supplement or replace the advice of healthcare professionals. Internet search engines are a common means to obtain health information. However, information, misinformation, and disinformation are all available concurrently, leaving health information seekers to distinguish these categories of information. Following a review of theories directly and indirectly related to health information-seeking behaviour (HISB), we examine how public announcements made by credible sources (e.g., health professionals and politicians) in varying geographic regions (globally, nationally (Canada), and regionally (New York State) influenced both HISB (represented by Google Searches) and whether this influences human behaviour (represented by Google Mobility Data). Across these analyses, we demonstrate that there are strong correlations between information search behaviour and mobility around the time of public health announcements suggesting that, directly or indirectly, health communication was associated with changes in individual behaviour.

**Keywords**: Health information-seeking behaviour, Mental models, COVID-19, Behaviour change.
Can US Middle Class Survive Technological Progress?
Danil Prokhorov
Canton, MI USA E-mail: dprokhorov@gmail.com
The value of vibrant and growing middle class is well known for the US democracy. I comment on a socio-technical interplay between wealth and technology, expressing my concerns about dominant trends.
Keywords: Middle class, Elites, Technology, Amazon, AI, Transportation

Stakeholders in the Cloud Computing Value-Chain: A Socio-Technical Review of Data Breach Literature
David Kolevski1,2, Roba Abbas2, Katina Michael3 and Mark Freeman1,3
1School of Computing and Information Technology, University of Wollongong NSW, Australia E-mail: dk616@uowmail.edu.au;
2School of Management, Operations and Marketing, University of Wollongong NSW, Australia E-mail: roba@uow.edu.au;
3School for the Future of Innovation in Society, Arizona State University Phoenix, Arizona E-mail: katina.michael@asu.edu
This paper is about stakeholders in the cloud computing value-chain. Early cloud computing literature focused on the technical aspect of the technology and viewed the provider and customer as essential value-chain stakeholders. The more users that use cloud services, the potential for data breaches increases. The review of the literature was carried out using a social-technical approach. Socio-technical theory encapsulates the social, technical and environmental dimensions of a system. The outcomes of the search indicated that there are two pertinent stakeholder types: operational and non-operational. Operational stakeholders include cloud providers, customers, enablers, resellers and third-party providers. Non-operational stakeholders include regulators, legislators, courts, non-government organisations, law enforcement, industry-standard bodies and end-users. The end-users are critically important in the cloud value-chain in that they rely on online services for everyday activities and have their data compromised. The cloud value-chain presents that cloud services encapsulate more than just technology services. The paper considers the complex stakeholder relationships and data breach issues, indicating the need for a better socio-technical response from the stakeholders within the value-chain.
Keywords: stakeholders, Cloud computing, Data breach, Ecosystems, Value-chain, Socio-technical, Operational, Non-operational, End-users, Literature review

Defending Deep Learning Based Anomaly Detection Systems Against White-Box Adversarial Examples and Backdoor Attacks
Khaled Alrawashdeh1 and Stephen Goldsmith2
Department of Computer Science and Cybersecurity, Avila University Kansas City, MO, USA E-mail: khaled.alrawashdeh@avila.edu, goldsmith319053@avila.edu
Deep Neural Network (DNN) has witnessed rapid progress and significant successes in the recent years. Wide range of applications depends on the high performance of deep learning to solve real-life challenges. Deep learning is being applied in many safety-critical environments. However, deep neural networks have been recently found vulnerable to adversarial examples and backdoor attacks. Stealthy adversarial examples and backdoor attacks can easily fool deep neural networks to generate the wrong results. The risk of adversarial examples attacks that target deep learning models impedes the wide deployment of deep neural networks in safety-critical environments. In this work we propose a defensive technique for deep learning by combining activation function and neurons pruning to reduce the effects of adversarial examples and backdoor attacks. We evaluate the efficacy of the method on an anomaly detection application using Deep Belief Network (DBN) and Coupled Generative Adversarial Network (CoGAN). The method reduces the loss of accuracy from the attacks from an average 10% to 2% using DBN and from an average 14% to 2% using CoGAN. We evaluate the method using two benchmark datasets: NSL-KDD and ransomware.
Keywords: Deep Learning, Neural Network, Intrusion Detection System, Adversarial Examples, GAN, Backdoor Attacks.
The transformation of global energy systems currently underway is also a societal transformation. Most people now believe that solar energy will provide half or more of the world’s energy by 2050. What will the societies built on solar power look like? This talk will present various insights into thinking about integrated socio-energy systems transformation and what it might mean for the human future.

Keywords: Global energy, Societal transformation, Solar energy, Socio-energy systems transformation, Human future

Please watch the video for more information.
Contending with Wicked Crypto
Kevin Kredit
Grand Valley State University E-mail: kkredit.us@ieee.org

Public debate has resumed over whether encryption systems should support alternative means of decryption intended for law enforcement use, called exceptional access (EA). Rather than a renege on a solemn promise made at the end of the 1990s “crypto war,” this represents a valid reassessment of optimal policy in light of changing circumstances. Achieving proper balance between privacy and access in the context of constantly changing society and technology is a wicked problem that has and will evade a permanent solution. As policymakers consider next steps, it behooves the technical community to stay engaged. Although the introduction of EA would inevitably introduce risk, the quality of the technical and regulatory approach can make a substantial difference. Furthermore, if one considers ham-fisted legislative action and malicious abuse of cryptosystems as part of the threat model, well-designed EA may reduce overall risk. The root of the conflict lies in cryptography’s dual role as enabler of unprecedented privacy and cornerstone of security. The emergence of strong encryption triggered the first crypto war, and its proliferation is causing the second. In response to both polarized and conciliatory voices, I will analyze strategies that do and do not work on wicked problems and promote polarized and conciliatory voices, I will analyze strategies that do and do not work on wicked problems and promote

Cyberbullying and Indian Society: Outcomes from Social Conclave Conference
Rishabh Reddy1, Rishabh Singh1, Vidhi Kapoor2 and Prathamesh Churi3
1Department of Technology Management M.B.A., Techno ignite (Computer Engineering) School of Technology Management and Engineering, NMIMS University Mumbai, India E-mail: rishahl656@gmail.com, rishahl3singh@gmail.com
2Department of Data Science B. Tech (Data Science) School of Technology Management and Engineering, NMIMS University Mumbai, India E-mail: vidhikapoor200@gmail.com
3Department of Computer Engineering School of Technology Management and Engineering, NMIMS University Mumbai, India E-mail: prathamesh.churi@ieee.org

It is not technology but people’s mindset that makes the world a scary place to live in.” India is one of the top 3 countries to report cyberbullying cases. One in 10 Indian adolescents faces cyberbullying, half of them don’t even report it. Cyberbullying is one of the issues that are so common in India. There are so many social issues that are not openly discussed. With such increasing issues, it is very essential to address them. Technology affects us in all possible ways today. It is technological solutions that can help us fight such issues. This paper discusses — Social Conclave, a national social conference that discusses those pressing issues and comes up with solutions that are then implemented. Social Conclave is the social conference of NMIMS’ School of Technology Management and Engineering. Social Conclave aims at discussing the pressing issues that are prevalent in India to come up with a solution that is the betterment of society. Delegates from all over the country meet up to discuss these different social issues. They are taken to various field visits to experience and see what India is dealing with. The debate among themselves to come up with the most sustainable solution for a particular issue. The solution given by the delegates is then implemented on the ground level by the students. This paper shares the idea and the experience of the conference.

Keywords: Social Conclave, Cyberbullying, Conference, India, NMIMS.

Cyberbullying and Indian Society: Outcomes from Social Conclave Conference
Rishabh Reddy1, Rishabh Singh1, Vidhi Kapoor2 and Prathamesh Churi3
1Department of Technology Management M.B.A., Techno ignite (Computer Engineering) School of Technology Management and Engineering, NMIMS University Mumbai, India E-mail: rishahl656@gmail.com, rishahl3singh@gmail.com
2Department of Data Science B. Tech (Data Science) School of Technology Management and Engineering, NMIMS University Mumbai, India E-mail: vidhikapoor200@gmail.com
3Department of Computer Engineering School of Technology Management and Engineering, NMIMS University Mumbai, India E-mail: prathamesh.churi@ieee.org

Real estate investment decisions are critical for low-income people who have just one home as their life-time investment option. So during the COVID-19 pandemic, unemployment causes many homeowners with a low income to lose their homes because of two major factors: one, they could not pay their mortgages without a job, and second, their house could not be rented easily. Rent prediction in real-estate can guarantee the success of an investment. Online information from real estate websites plays a significant role in making a business decision to buy a home. This paper applies natural language processing models to introduce a new model for safe real estate investment based on online information. For the first time, we use a transfer learning model based on online information from various online resources to detect a profitable rental property. Bidirectional Encoder Representations from Transformers(BERT) are used to implement a semantic convolutional neural network model to predict real estate investment safety.
This work introduces a new model for rent prediction based on the United States housing market. Our contribution is three-fold: (1) using natural language processing approach to use the semantics of online information on Airbnb, Zillow, Schools, Public transportation, and crime rate websites for rent prediction; (2) We perform a comprehensive analysis of eager and lazy machine learning models as a traditional Machine learning models with our proposed new transfer learning model for rent prediction; (3) Creating a new public data set of semantic analysis for more than 5 million houses in the United States based on online information. This data set will be available for public research in natural language processing research for people analytic applications. This work introduces a new machine learning model to guarantee safe investment in the real estate market using a transfer learning approach based on online information.

Keywords: Natural language processing, Transfer learning, Neural Network, Real estate

The Praxis of UN SDG 5 & 15: Student deep dives into gender equality and life on land in the remote Satpuda Ranges of Maharashtra State, India

Ben Corbett, Felix Harvey, Ziyi Kate Song, Kandice Stern, Nathan Rhodes, Jorel Basangan, Hadley Dixon, Yu Kai Teh, Jason Sargent, Vasaudeva Achary, Julian Draudin, Jake Pringle and Stuart McLoughlin

Swinburne University of Technology Australia

E-mail: *102332064@student.swin.edu.au, 102093772@student.swin.edu.au, 102332064@student.swin.edu.au, 102093772@student.swin.edu.au, 102109687@student.swin.edu.au, 102111496@student.swin.edu.au, 102077349@student.swin.edu.au, 102583639@student.swin.edu.au, 102586887@student.swin.edu.au, jpsargent@swin.edu.au, vsaudeva@swin.edu.au*

The United Nations Sustainability Goals (UNSDGs) were set in 2015 as a blueprint for peace and prosperity for people and the planet, now and into the future. Goal 5 focuses on Gender Equality and Goal 15 Life on Land.

A small project team of academics and undergraduate students from Swinburne University of Technology in Melbourne, Australia has been visiting the remote villages of Pal, Jamnya, Mohamandali and Mangrul in the Satpuda Ranges of Maharashtra, India since 2014. The project team embeds into the village of Pal for 10 days and work with their host Satpuda Vikas Mandal, a 3rd Generation Gandhian philosophy NGO, on a range of ways technology can be deployed to support curriculum delivery in village schools and in community and farming development initiatives. The COVID-19 pandemic has meant that this year’s 2020 projects took on a virtual aspect with conceptual R & D iteration extensions of previous year’s projects. This workshop describes 2 outstanding student developed projects: one on technology as an enabler of gender equality and empowerment and the other a pest ID and treatment protocol App which will be deployed on the next subsequent visit to Pal which is expected to be in December 2021. The students will explain their research, ideation and solutions and their experiences in putting theory into practice, practice into service and service into life in a virtual environment.

Keywords: UN SDG, Sustainable development goals, Peace, Prosperity, NGO, India, Gender life on the land
The information is then condensed and packaged into a medium that engages with students in stages 4 and 5 of their secondary education. Options for presentation include PowerPoint presentations, comparative video/image clips, interactive skits, accompanying e-commerce website/s and live Q&A sessions that travel around Australia in face-to-face workshops with local secondary schools. These workshops are an attempt to convey knowledge to Australian youth and educate them on important issues they may experience within their life. The system is supported by a range of information systems such as scheduling software, media creation software and simple business interaction software to house organisational data and enhance communication between staff members in the field and administration staff at base. This places the social elements at the forefront of the system, using technology as an enabler for successful operation.

Keywords: Socio-technical system, Education, LGBTQI, Women’s Health, Sexual Health.

Can We Design Socially-Focused Enterprises to Address Environmental, Climate, and Energy Justice Challenges?
Darshan M.A. Karwat1, Jared Byrne2 and Jean L. Boucher3
1School for the Future of Innovation in Society & The Polytechnic School Arizona State University Tempe, AZ, and Mesa, AZ, E-mail: darshan.karwat@asu.edu
2W.P. Carey School of Business Arizona State University Tempe, AZ, E-mail: jared.byrne@asu.edu
3School for the Future of Innovation in Society Arizona State University Tempe, AZ, E-mail: jlbouch1@asu.edu

There are widespread environmental, climate, and energy justice challenges in the US. Communities fighting these injustices could benefit greatly from better access to engineering and scientific resources, since addressing these injustices implicates technical and technological questions. Over the past two decades, engineers and scientists have, from theory to practice, developed the tools, resources, and frameworks to do engineering and science in service of communities. Research shows that many engineers and scientists indeed enter their careers believing they can use their technical skills and knowhow to have direct impact on underserved communities. However, much of community work has been done through volunteer and pro bono efforts, with it counting little towards engineers’ and scientists’ professional standing (and possibly detracting from it).
This reality begs the questions: If the need for conducting engineering and science in collaboration with communities exists and so many engineers and scientists indeed want to do such work, why hasn’t a marketplace been created to address these unmet needs? Might it be possible, even with a lack of socioeconomic resources in affected communities, that collective efforts can mobilize the resources necessary to build a field of collaboration with engineers and scientists? In this interactive workshop, we will brainstorm approaches to address the engineering and scientific needs of communities fighting for environmental, climate, and energy justice. We hope to generate ideas that, if experimented with, can lead to a set of financially sustainable business models and practices. This workshop builds on our own research, and on a range of theories across disciplines, including field theory from sociology, community-based participatory research, and socially-focused entrepreneurship.

**Keywords:** Environment, Climate, Energy, Justice, Engineering, Science, Impact, Entrepreneurship, Business.

---

**When Mental Walls Lead to Physical Walls: Using Art to Investigate the Social Responsibility of Engineers**

Madison Macias¹, Peter Pohorecky², Jorge Morales Guerreiro³ and Darshan Karwat⁴

¹Ira A. Fulton Schools of Engineering, Arizona State University
²United States E-mail: rmacias@asu.edu
³School of Sustainability, Arizona State University
⁴United States E-mail: jmorales2@asu.edu

Engineering work indisputably and meaningfully impacts society and the Earth, from the construction of highways and energy infrastructure to programming the functionality of smartphones and optimizing computing hardware. This fact makes it imperative that the non-engineering public understands the crucial role that engineers play in shaping society and holds engineers accountable for the work that they do. We have designed, built, and installed an interactive art installation called When Mental Walls Lead to Physical Walls to generate public conversation about the social responsibilities of engineers and engineering, using the US-Mexico border wall as a case study. We find that the politically charged nature of the topic might make it difficult for experiencers to speak directly to ideas of social responsibility.

At the same time, the installation provides opportunities for experiencers to question, critique, and reflect on the effectiveness and impacts of the design of the border wall and the motivations engineers might have in working on this project. With proper planning and execution, the installation can be used as a research tool to understand how diverse audiences can understand the work engineers do and the values embedded in that work. In this presentation, we share our work and results and invite others to build their own installations.

**Keywords:** Engineering, Engineers, Social responsibility, US-Mexico border wall, Research installation, Interactive, Research through art.

---

**A Commentary on Covid-19 Contact-Tracing Apps and Broader Societal Implications of Technosolutionism**

Elma Hajric

Human and Social Dimensions of Science and Technology PhD, Arizona State University Tempe, Arizona

This paper is a commentary on COVID-19 technological solutions, such as contact tracing apps, bringing into question the effectiveness of technosolutionism, and the sociotechnical implications resulting from such technologies. This paper argues that the abyss created from the lack of governance-led leadership in COVID-19 responses has exacerbated power asymmetries reliant upon technology sector led solutions that reflect current political dynamics and governance structures. In relation to these power asymmetries favoring technology companies, we are potentially creating opportunities for technocratic future visions to be further embedded into concepts of smart cities under the guise of public health. These visions and circumstances are dubbed as ‘imaginaries of health’ in the analyses. The analysis is primarily focusing on COVID-19 contact tracing apps and US context, but also references other countries’ findings, such as Australia and Singapore, as examples of contact tracing app’s technological limitations. The conclusion of the paper incorporates an examination of sociotechnical effects, calls for the incorporation of alternative imaginaries, and includes suggestions for where these technologies may be better served with creative implementations, along with considerations for the development of further apps. This commentary serves as an examination of sociotechnical implications of technosolutionism under COVID-19 based technical solutions, such as contact tracing apps, with a predominant US-focus.

**Keywords:** COVID-19, Technosolutionism, Governance, Sociotechnical imaginaries, Smart cities
"Killing Two Birds with One Stone"? A Case Study of Development Use of Drones

Ning Wang
Institute of Biomedical Ethics and History of Medicine (IBME)
University of Zurich Zurich, Switzerland
E-mail: ning.wang@ibme.uzh.ch

With the rise of the ‘humanitarian drone’ in recent years, drones have become one of the most controversial public interest technologies that have gained increasing media attention. It is worth noting that, although there is a perception in the aid sector that drones hold the promise to reinvent the health supply logistics, to date, routine drone delivery is still relatively new and largely unproven. This paper presents a recent field study conducted in 2019, where drones were deployed in Malawi to help address the last mile challenge in medical supply delivery, and where a noticeable mentality of ‘killing two birds with one stone’ around the attempt of using drones in resource-poor settings is observed. The objective of the paper is to shed light, through a real-world case study and from the ethical perspective, on the impacts of implementing such a systemic change in the existing health supply chain systems. As conclusion, a call for more reflexive approaches for the critical examination, as well as more structured guidance for the responsible evaluation, of medical cargo drones is raised.

Keywords: Public Interest Technology, Humanitarian Drone, Medical Supply Delivery, Medical Cargo Drone, Health Supply Chain System.

Understanding Surveillance Societies: Social Cognition and the Adoption of Surveillance Technologies

Jordan Richard Schoenherr
Department of Psychology / Institute for Data Science, Carleton University, E-mail: Jordan.Schoenherr@carleton.ca

Surveillance technologies have come to occupy a central position in human affairs, whether in terms of CCT cameras, smart homes, or network security technologies. Due to function creep and the relative invisibility of these technologies, individuals and societies continue to grapple with the potential trade-offs between security, convenience, and privacy. The attitudes toward surveillance technologies appear to differ significantly between groups and societies. Following a review of surveillance technologies and the ethical issues associated with them, the present study suggests that a number of social-cognitive factors (e.g., group size, social identity, relational models, and conformity bias) likely affect the acceptance and adoption of surveillance technologies within a group.

Keywords: Surveillance, Ethics, Privacy, Artificial intelligence.

Cultivating Technological Stewardship to Change the Culture of Engineering

Jason Lajoie1, George Roter2 and Mark Abbott2
1Council for Responsible Innovation and Technology, University of Waterloo Waterloo, Canada, E-mail: j2lajoie@uwaterloo.ca
2Engineering Change Lab Toronto, Canada
E-mail: markabbott@engineeringchangelab.ca

This paper describes the Canada-based Engineering Change Lab’s (ECL) approach to transform engineering culture towards becoming more proactive and skillful stewards of technology. We stress the need to grow ethical thinking and social responsibility in the engineering profession, and then describe two of ECL’s recently proposed projects in collaboration with the University of Waterloo’s Council for Responsible Innovation and Technology to cultivate...
Technological Stewardship principles in the engineering community.

Keywords: Social implications of technology, Technological innovation, Engineering ethics, Science and technology studies, Interdisciplinary research approaches, Technological stewardship.

**Do-it-Yourself Technology for Autonomous Engineering: Building an Open-Source Eye-Tracker**

Sara G. Lail1,2, Angela Beck3, Sergio Canu1, Matthew Gary1, Shirley G. Johnson2,2, Matt Haslam2 and Brian A. Lail2

1Engineering, Electrical Embry-Riddle Aeronautical University Prescott, USA
2Humanities and Communication Embry-Riddle Aeronautical University Prescott, USA
3Computer Programming Pysource Sofia, Bulgaria

E-mail: basl@uwindsor.ca

The engineering method is one of the key features of defining and identifying engineers. Engineering education overwhelmingly relies on well-structured problems to teach students the deductive process of breaking down problems into their components in order to find solutions. However, many of the problems facing society are not well-structured. This paper presents a taxonomy of different types of problems that engineers face based on both the structure of the problem (i.e., whether it is well-structured or ill-structured) and whether there is a previously identified solution space.

The taxonomy includes four types of problem: Routine problems that are well-structured with established solutions; Originative problems that are also well-structured, but have no established solution; Process-oriented problems that are ill-structured, but there are established solutions and methods for finding solutions; and Wicked problems that are ill-structured and have no pre-defined solutions. A study of the types of problems incorporated in engineering curricula in eight engineering programs is presented. The results show that there is an overwhelming reliance on well-structured problems, with an average of 95.4% of engineering courses using well-structured problems. Process-oriented problems are represented in an average of 5.6% of courses. Originative problems are given in an average of 9.0% of courses. Wicked problems are not represented in any of the engineering courses.

Keywords: Problem solving, Wicked problems, Engineering education.

**The Place of Wicked Problems in Engineering Problem Solving: A Proposed Taxonomy**

Beth-Anne Schauke-Leech

University of Windsor, Windsor, Ontario, Canada

E-mail: bale@uwindsor.ca

The engineering method is one of the key features of defining and identifying engineers. Engineering education overwhelmingly relies on well-structured problems to teach students the deductive process of breaking down problems into their components in order to find solutions. However, many of the problems facing society are not well-structured. This paper presents a taxonomy of different types of problems that engineers face based on both the structure of the problem (i.e., whether it is well-structured or ill-structured) and whether there is a previously identified solution space.

The engineering method is one of the key features of defining and identifying engineers. Engineering education overwhelmingly relies on well-structured problems to teach students the deductive process of breaking down problems into their components in order to find solutions. However, many of the problems facing society are not well-structured. This paper presents a taxonomy of different types of problems that engineers face based on both the structure of the problem (i.e., whether it is well-structured or ill-structured) and whether there is a previously identified solution space.

Sociotechnical systems abound in examples of the ways they constitute sources of oppression for historically marginalized groups. Our research hypothesis is that focusing exclusively on the content of training datasets - the data used for algorithms to “learn” associations - only captures part of the problem. Instead, we should identify the conditions which unveil the modes of dataset construction. We propose here an analysis of datasets from the perspective of three techniques of interpretation: genealogy, archaeology, and hermeneutics. First, genealogy asks the question: what are the historical conditions of possibility for all the present and absent stakeholders (including data scientists and dataset curators) and the background assumptions operative in the background assumptions operative in the dataset construction.
**Keywords:** Techniques of interpretation, Machine learning datasets, Genealogy, Archeology hermeneutics

<table>
<thead>
<tr>
<th>Session 27</th>
<th>Author Track</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day/Date</td>
<td>Sunday, 15 November</td>
</tr>
<tr>
<td>Time</td>
<td>9:00 am Arizona (MST), 11:00 am EST, 4:00 pm UTC, Monday, 16 November 3:00 am Sydney</td>
</tr>
<tr>
<td>Zoom</td>
<td><a href="https://asu.zoom.us/j/87625476356">https://asu.zoom.us/j/87625476356</a></td>
</tr>
</tbody>
</table>

**Decoding the Public interest of Aarogya Setu, contact tracing app for managing the COVID19 pandemic in India**

Farah Najar Arevalo  
ASU Center for Smart Cities and Regions  
ASU Society Policy Engineering Collective Tempe, Arizona, United States  
E-mail: fnajarar@asu.edu

At the time of the writing of this paper, India is the second country worldwide with more COVID19 cases just after the United States. India has followed its Asian and Western peers in relying on mobile apps to operate one of the pandemics and epidemics management strategies: contact tracing. Contact tracing apps have been a widespread tool adopted by national governments across the world to aid in the COVID19 pandemic management. As these apps function by creating the trace of individuals who have been in physical contact with a person tested as positive to inform the possibility of spreading, possible misuse or secondary uses have raised concern. More than situating the app in two binary points, this paper seeks to respond to the question of how the use of this app delivers public interest in India. Results show that to do this a definition of what Public Interest could mean in India should happen first and further research to assess the app in these terms can take place after.

**Keywords:** Public Interest in Technology, India, COVID19 Contact tracing app

---

**Question Answering with Deeper Reasoning and Unanswerable Questions for COVID-19**

Nickolas Dodd  
School of Computing, Informatics, and Decision Systems Engineering Arizona State University Tempe, AZ, USA  
E-mail: ndodd@asu.edu

The World Health Organization declared the COVID-19 outbreak a global pandemic in March 2020. In addition to being a major public health concern, the pandemic has adversely affected billions of people around the globe both socially and economically. Due in part to the novelty of the virus, and the uncertainty brought about in the aftermath of the lockdowns, online misinformation regarding treatments, characteristics, and policies regarding the virus have been widespread. Misinformation regarding COVID-19 is a public health concern as it can potentially result in harm at both the individual and community level. In addition, the spread of false rumors and conspiracies can lead to politicization of the pandemic, hindering recovery. Techniques from Natural Language Processing (NLP) have been used in recent years to detect and track the spread of misinformation in social networks, monitor sentiment regarding policies and events, and develop online collaborative systems that provides real-time information interactively. A promising method within NLP for combating online misinformation is via the utilization of Question Answering (QA) systems. In this paper, we detail a framework for QA systems that can be used in conjunction with other NLP approaches to combat misinformation online regarding COVID-19. We first discuss a preparation strategy that calls out the need for developing QA systems that encompass deeper reasoning capabilities, and crucially, incorporates unanswerable questions during training to enable the system to know what it doesn’t know. We discuss some ideas towards synthetic data generation of unanswerable questions towards this end which we hope will be explored in future research. Secondly, we discuss a framework for utilizing QA systems for mitigation in the midst of an emerging pandemic such as the COVID-19 outbreak.

**Keywords:** Covid-19, Natural language processing, Question answering, Reasoning, Unanswerable questions
Design Futures For Electrical Engineering Undergraduate Course

Marta Clara Sousa Magalhães and Jalberth Fernandes de Araújo

E-mail: a clara@ieee.org, b jalberth@dee.ufcg.edu.br

Based on the lack of futures studies for professionals who wish to innovate and create solutions that will bring an economic and social impact, this paper helps the entire university community to prepare and create a desirable future based on Human-Centered Design. The final product meets the expectations of a sustainable world, from the perspective of the United Nations Sustainable Development Goals. The analysis was based on a design futures process, within the realization of interviews with the groups of interest, the evaluation, and treatment of data obtained through them. In addition, there was a debate on alternatives for futures that are not commonly seen, provoking speculation and breaking out of common thought, and the realization of a mini co-creative forum inviting them to create futures through drawings and newspaper headlines, then was possible to investigate the motivation and intentions behind these visions. With the results, statistical and ethnographic studies were made to obtain a future forecast. From the analysis it was possible to create the definition of the Future Intention and future alternatives based on the Future Cone, Polarity Map and finally, creation of a Minimum Viable Future. It was also possible to project future perspectives of the Undergraduate major in Electrical Engineering at the Federal University of Campina Grande, PB, Brazil, creating future scenarios of the course and proposing solutions in order to improve everyone’s experience and the technological impact in the Brazilian political-economic scenario.

Keywords: Education, Futurism, Human centered design, Social implications of technology, Sustainable development, Technology forecasting

Taiwan’s Ability to Reduce the Transmission of COVID-19: A Success Story

Haowen Fan

Fulton Schools of Engineering Arizona State University Tempe, AZ, United States E-mail: Haowen.Fan@asu.edu

Taiwan is known for its effective responses to COVID-19, with only 799 confirmed cases by the end of 2020. Based on the previous research, this article identifies three major technical approaches used in Taiwan to prevent the community spread of COVID-19: (1) Digital fence and entry quarantine system to track close contacts and force 14 days of home quarantine; (2) Evolving face mask distribution policy and system to ensure fair allocation of the limited face mask resources; and (3) Open-source software co-developed by the government and tech community to share real-time COVID-19 related information and conduct location history based contact tracing. The combat against COVID-19 in Taiwan is a success in digital governance, with great synergy between the government and every citizen.

Keywords: COVID-19, Digital Governance, Taiwan, Cellphone tracking, Face mask policy, Contact tracing

The Historical and Ideological Chasm between Engineering and Development

Eric Stribling

Institut Supérieur des Sciences et Technologies, l’Université des Montagnes Banekan, Cameroon School for the Future of Innovation in Society, Arizona State University Phoenix, USA E-mail: es@esitubou.edu

Societal well-being is increasingly impacted by the social implications of new technologies, which are beyond the expertise of the global development scholars who study and craft regulations around them. The common solution of including engineers in the policymaking process is not enough to bridge these two knowledge fields due to their conflicting historical developments and resulting epistemologies. Global development originates from rebuilding Europe after WWII and “modernizing” the recently independent countries of the Global South. After incorporating critiques, development studies have shifted away from engineering, they are largely subjective in orientation, and they focus on poverty alleviation and social inclusion. Engineering has origins in military and business operations. Heavily scientific in orientation, it tends to exclude social metrics in the design process. Transdisciplinary concepts and emergent disciplines, such as humanitarian engineering and ICT4D, offer a way forward where scholars from disparate disciplines cross over to fully appreciate the unique contributions that the other side can offer.

Keywords: Engineering education, Global development, History, Humanitarian engineering, ICT4D, Social inclusion
Discussion with Baroness Susan Greenfield about Screen Culture and Stare Into The Lights My Pretties
Jordan Brown1 and Susan Greenfield2
1Filmmaker United States E-mail: this@jore.cc
2House of Lords United Kingdom

Jordan Brown speaks with Baroness Susan Greenfield as part of a reflection on his award-winning documentary Stare Into The Lights My Pretties from 2017. Baroness Greenfield is a pioneering neuroscientist, research scientist, author, and broadcaster, focusing on the study of consciousness and the physical basis of the mind. Her research in neuroscience has seen her author 10 books, spanning different aspects of the brain and the mind, as well as the personal and social impacts of screen culture and digital technologies.

Keywords: Technology, Brain, Addiction, Mind change, Neuroscience, Tantrum, Ipad, Toddler, Screen time, Gaming, Video games, Computers, Attention span, Distraction

The Spectacle to Distract
Jordan Brown
Film maker Australia E-mail: this@jore.cc

The Spectacle to Distract is an original composition by Jordan Brown in the Album titled, "Some Kind of Anthropocene". Available for listening here: https://jore.cc/w/some-kind-of-anthropocene/the-spectacle-to-distract/ The song is in part about the "Society of the Spectacle".

Keywords: Distraction, Anthropocene, Spectacle
“Cry havoc and let slip the dogs of war?”

Kobi Leins
University of Melbourne Australia E-mail: kleins@unimelb.edu.au

In 1600, ordering havoc meant an order to destroy or pillage, or create chaos, disorder or confusion. The dogs of war reference was to the soldiers, who were to go forth and cause as much damage as they could. Now, no one cries out, and the dogs are more often than not technological platforms that do the bidding of their masters. Who is in charge now and what are the risks? What should technologists be thinking about to minimize dual use, misuse and hostile use? How do we regulate the technological chaos that appears to reign? These questions and many more I will raise but not necessarily answer, calling for a different kind of cry, one of defiance to the systems currently being used, in response to the situation in which we find ourselves now.

Keywords: Chaos, Disorder, Confusion, Soldiers, Technological platforms, Regulation, Systems

A future-oriented consideration of pathways to a high-tech, low-vulnerability society

Lindsay Robertson
Massey New Zealand E-mail: lindsay@tech-vantage.com

Previous work, summarized in this presentation, has investigated the vulnerability of individuals to a large technological systems, clarifying that many facilities for the supply of essential goods and services currently incur high levels of technological exposure. This presentation reports more recent work that has extended the application of the “technological exposure” concept to populations of individuals. The analysis of the technological exposure of populations has generated specific insights: It has revealed specific cases where large populations have high levels of technological exposure. It has also allowed the identification of some general categories of high population-exposure. In summary, the recent work has highlighted the extent to which centralized (private interest) technology systems have created population vulnerabilities Historical drivers, including minimal capital investment levels, economies of scale, asymmetric consequences and needs for broad acceptability can be identified as foundational to many current high-exposure situations. In some cases, the relevance of those drivers has changed. Paradoxically, some recent technological advances could actually decrease the level of population technology exposure.

The longer-term implications of these are yet to emerge but options are examined. Fundamental technological, economic and philosophical issues present challenges to a transition from a high-exposure, high-tech, highly-centralised society to a high-tech, low-exposure, decentralised society. These issues are outlined, and the role of public interest technology is considered.

Keywords: Technology, Vulnerability, Risk, Exposure

Tesseract Optimization for Data Privacy and Sharing Economics

Shubhadeep Ray1, Tharangini Palanivel2, Norbert Herman3 and Yixuan Li4
1IBM Corporation New Jersey, USA, E-mail: shubhadeep-ray@gmail.com
2IBM Corporation New York, USA E-mail: tpalan@ibm.com
3IBM Corporation Colorado, USA E-mail: norberth@gmail.com
4Wunderman Thompson New Jersey, USA E-mail: liyixuan2361@gmail.com

As human beings, we have the inherent bias towards our likes and dislikes. These likes and dislikes are influenced by our psychographic attributes, morals, values, beliefs and societal networks in both circles of influence and circles of concern. We continuously consume products, services as well as produce products and services for others to consume. Due to our inherent bias of likes and dislikes, we unintentionally or intentionally end up liking products and/or services that are personalized for us, or somehow unintentionally match our likes. This personalization makes our lives easier and more comfortable as it may save time, and/or enable us to achieve desired experiences. This personalization is influenced by the data gathered about us directly or indirectly. The richer the data is about us, the more personalized products and services we receive, thereby saving us time and money whilst meeting our desired goals for experience or exchange of value for the offers we are wanting.
We remain forever concerned about the direct or accidental use of our data that can fall into the hands of nefarious users of the dark web, or criminals who can cause us all kinds of harm using the data we share. Herein lies the paradox of personalization and privacy. To solve this paradox, we acknowledge that there has to be a trade-off between data privacy and personalization, and an optimized match between trust and value perceptions specific to an individual, and in context of the trust we place on the data controller, processor or buyer entity with which we share and entrust our data for the exchange of value provided.

Keywords: Data privacy controls, Data wealth asset management, Personalization and services from data, Sociotechnical systems, Participatory design, Human-technology interaction, Experiment with values, Sociotechnical systems, Participatory design, Human-technology interaction, Experiment with values, Data sharing marketplace, data locker, Data wallet.

Recovering Human Genome Information from Wastewater: The Need for an Ethical Framework
Danielle Jacobs1, Troy McDaniel1, Arvind Varsani2,3, Rolf U. Halden4, Stephanie Forrest3,4, and Heewook Lee5,6
1The School of Computing, Informatics, and Decision Systems Engineering Arizona State University Tempe, Arizona
E-mail: danielle.z.jacob@asu.edu, troymcdaniel@asu.edu
2The Polytechnic School Arizona State University Mesa, Arizona
E-mail: arvind.varanasi@asu.edu
3The Biodesign Center for Environmental Health Engineering and Applied Microbiome Arizona State University Tempe, Arizona
E-mail: arvind.varanasi@asu.edu, steph@asu.edu
4The Biodesign Center for Environmental Health Engineering and Applied Microbiome Arizona State University Tempe, Arizona
E-mail: rolf.halden@asu.edu
5The Biodesign Center for Fundamental and Applied Microbiomics Arizona State University Tempe, Arizona
E-mail: danielle.z.jacob@asu.edu, heewook.lee@asu.edu

Modern biotechnology allows for rich data extraction from unlikely sources. One example is Wastewater-based epidemiology (WBE), which studies human health by analyzing the chemical and biological compounds found in wastewater. Recent wastewater studies have even been able to recover genetic information from samples. The technology is rapidly advancing but still in the early stages, providing an opportunity to proactively engage questions around ethics, application, privacy, and policy.

This paper explores the information gained from sewage water-including genetic information-as part of a growing public health field. We consider what these new capabilities for WBE allow and focus on ethical consequences. Genetic information is a form of personally identifiable information and has such important implications that it requires extra consideration. A robust discussion on the state of research, policies, and ethics around wastewater-based analysis and genetics is necessary. We must understand the risks associated with the information flowing through our pipes. This paper calls attention to hazards emerging in WBE and highlights privacy-enhancing technology and ethical practices to address these concerns. We propose a framework to enable those working on wastewater-based studies to weigh ethical and privacy tradeoffs.

Keywords: Waste water-based epidemiology, Sewage, Wastewater, Genetic, Privacy-enhancing technologies, Personally identifiable data, Ethical and Privacy framework.
Hope Gardens
Amulya Prakash
UNSW Australia E-mail: amulyaprakash01@gmail.com

Canada Water is located in the South East of London, famous for its freshwater lake and wildlife refuge. The Masterplan is a partnership between British Land, Southwark Council and the local community to develop a new urban town centre. The Masterplan covers 53 acres, with the aim of providing jobs, homes, offices, shops and public spaces. Team Perivallon’s innovative project, Hope Gardens helps tackle and solve the problems associated with the lack of dementia friendly parks and public spaces. Alongside this, Hope Gardens provides solutions to the lack of dementia awareness, education and the prevalence of loneliness and social isolation associated with ageing.

Keywords: Dementia friendly, Outdoor space, Innovative thinking.

Arbiter: Improved Smart City Operations through Decentralized Autonomous Organization
Francis Mendoza1 and Hans Walter Behrens2
Arizona State University Tempe, AZ, USA
E-mail: 1mendoz7@asu.edu, 2hwb@asu.edu

Smart cities have emerged as one of the most promising applications of cyber-physical systems (CPS), carrying the potential to serve the various interests of the public and private sectors at large. However, contemporary smart city infrastructure commonly uses heavily-centralized network architectures, reducing failure resilience and application flexibility. This centralization also imposes high barriers to entry for public access, limiting usage and oversight opportunities. To address these limitations, we describe Arbiter, a novel fog- and edge-based communication architecture based on the concept of a Decentralized Autonomous Organization (DAO).

Arbiter aims to improve the socioeconomic equity of the local citizenry by (1) acting as a management layer for citywide CPS assets, (2) providing a compliance layer for managing human capital, and (3) offering a data protection layer to ensure that citizens retain full control of their personal data. We then analyze in detail the technical, socioeconomic, and ethical implications of Arbiter, and contextualize its role in the modern smart city.

Keywords: Cyber-physical systems, Edge computing, Internet of Things, Decentralized control.

Smart Cities though the Eyes of Criminals and Terrorists
Josh Massad
Arizona State University Tempe, AZ
E-mail: Massadjosh@gmail.com

A smart city can mean many different things to many different people. A smart city to a criminal or terrorist could be a new environment to steal, cheat, destroy, kill, or start a new criminal organization, because they can utilize technology for nefarious reasons faster than police can catch up. Throughout history criminals have always been early adopters of technology. Smart cities will be no different as a multitude of tools will be available to them within this hyperconnected environment. These tools and situations include creating a traffic gridlock and panic utilizing autonomous vehicles, everyday crime like drug dealing, criminal organizations like the mafia, the viability of cybersecurity, attacking a power plant, as well as emerging technologies; drones, 3D printing, fingerprint and iris scanners, synthetic biology and DNA printing. At the end, this paper will recommend on how to mitigate these risks through established examples such as Project Greenlight in Detroit, understanding the Crime Triangle, Crime Prevention Through Environmental Design (CPTED), and current high ranking safety cities such as Tokyo.

Keywords: Smart cities, Crime triangle, Criminals, CPTED, Mafia, Cybersecurity.
Sustainability Means Inclusivity: Engaging Citizens In Early Stage Smart City Development

Katherine Harrison\textsuperscript{1,},\textsuperscript{a} Desirée Enlund\textsuperscript{1,},\textsuperscript{b} Ahmet Börütecene\textsuperscript{2,} Rasmus Ringdahl\textsuperscript{3,} Jonas Löwgren\textsuperscript{2,} and Vangelis Angelakis\textsuperscript{3,} \textsuperscript{f}

\textsuperscript{1}Gender studies Department of Thematic Studies Linköping University Linköping, Sweden E-mail: katherine.harrison@liu.se, desiree.enlund@liu.se

\textsuperscript{2}Media and Information Technology Department of Science and Technology Linköping University Campus Norrköping, Sweden E-mail: ahmet.borutecene@liu.se, jonas.lowgren@liu.se

\textsuperscript{3}Communication and Transport Systems Department of Science and Technology Linköping University Campus Norrköping, Sweden E-mail: rasmus.ringdahl@liu.se, vangelis.angelakis@liu.se

The challenge of how cities can be designed and developed in an inclusive and sustainable direction is monumental. Smart city technologies currently offer the most promising solution for long-term sustainability. However, smart city projects have been criticized for ignoring diverse needs of the local population and increasing social divides. A sustainable urban environment depends as much on creating an inclusive space that is safe, accessible and comfortable for a diverse group of citizens as it does on deploying “smart” technologies for energy efficiency or environmental protection. This is because citizens will be more likely to adopt technologies promoting sustainability if they are well-aligned with their lived needs and experiences.

In this paper, we present the rationale behind an ongoing interdisciplinary research project that aims to address exactly the problem outlined above by using a participatory design approach. Focusing on a smart city test site in Sweden where sensors are currently being deployed to collect data on noise, particles, vehicle numbers and types (amongst other), the goal is to bring local residents and government representatives into dialogue with technical developers by adopting a “meet-in-the-middle” approach. This paper comprises a brief presentation of early findings and a reflection on this approach.

Keywords: Smart city, IoT, Participatory design, Inclusivity, Interdisciplinarity, Living Lab.

The Role of Smart Flood Management in the Ancient Blue-Green Infrastructure

Marzieh Rezaei Ghaleh\textsuperscript{1} and Maryam Rezaei Ghaleh\textsuperscript{2}

\textsuperscript{1}The Design School Arizona State University Tempe, The United States E-mail: m.rezaeighaleh@asu.edu

\textsuperscript{2}Architecture and Urban Planning Tabriz Art University Tabriz, Iran E-mail: m.rezaeig@tabriziau.ac.ir

Regarding the current circumstances, climate change and environmental problems affect most countries globally, some more than others. Adapting to climate change impacts is not only an issue of the future cities but a worrying situation of the present. For most local governments of water sensitive cities in the Middle East, adapting to extreme weather events and mitigating climate change are important issues. Moreover, ancient cities in the Middle East, like Qazvin, are outstanding samples of flood adaptation and mitigation that are still in use. This paper demonstrates how well the ancient blue-green infrastructure in Qazvin provides a base for taking advantage of floods and how the system can adapt to future climate change. Therefore, the results present how ancient blue-green infrastructure can manage flash floods and how they can be seen as a context for smart flood management. During flash floods, the blue-green infrastructure collects floodwater as well as distribute it at the same time. Thus, the system not only can mitigate the adverse effects of seasonal floods but also adapt to climate change through drought conditions. The blue-green infrastructure in Qazvin is an excellent example of ancient science implemented to mitigate climate change. The research method is evidence-based and case-specific. This paper presents a practical integrated solution as a base for smart water management. Exploring ancient science and implementing our ancestors’ ideas and techniques can pave our way toward future smart and sustainable cities and give us more effective solutions to smart flood management.

Keywords: Blue-green infrastructure, Flood management, Ancient science, Information, and Communication Technology, Climate change.
What's Betwixt Us? Zanie.App
Lyssa Mandel¹ and Jumana Abu-Ghazaleh²

1Zanie App, United States E-mail: lyssa.mandel@zanie.app,
2Pivot For Humanity, United States E-mail: jumana@pivotforhumanity.com

Conversation is the key to building trust, developing empathy and fostering healthy workplace culture. This is the backbone of zanie, an app for Slack founded by Jumana Abu-Ghazaleh to deepen authentic connection in remote workspaces, human to human, regardless of where they may be working. When we learn about each other, when we expand our understanding of each other, everyone wins.

That’s the underlying insight that powers What’s Betwixt Us: Stories of Working While Human, a podcast designed to expand our understanding of how empathy works, at work. Through a series of conversations with folks from across a variety of industries, we dive into the messiness and the specificity of being human on the job, how empathy isn’t just a nice-sounding buzzword for company PR, it’s a rebellious act of remembering that we’re Human First, Everything Else After. Meet podcast host Lyssa Mandel, comedian, actor, writer, and zanie’s Conversation Engineer. More at zanie.app. What’s Betwixt Us is on Apple Podcasts, Spotify, Anchor, or wherever you listen.

Keywords: Empathy, Conversations, Being human, Humanistic values, Zanie.app

Taiwan’s Entry Quarantine System
Ryan Wickham
School of Computing and IT, University of Wollongong, Wollongong, Australia E-mail: r455@uowmail.edu.au

This paper describes the COVID-19 automated contact tracking application in Taiwan, known as the Entry Quarantine System. The research conducted is composed of qualitative data analysis from articles and government websites in regard to the implementation of the Entry Quarantine System. The study is organized as the value chain, the working of the technical system, and social-technical legal issues revolving around the system.

Keywords: COVID-19, Location Tracking, Cell ID, Taiwan, Scio-technical Issues

“Self-Quarantine Safety Protection” Mobile App in South Korea-Monitoring Those in Quarantine
Ni Putu Intan Maharani
University of Wollongong, Wollongong, Australia E-mail: nptm550@uowmail.edu.au

This paper explores how South Korea utilizes a location-based system to monitor those in quarantine. The researcher conducted qualitative data analysis from articles and government website in regard to the implementation of “Self-Quarantine Safety Protection” mobile app.

The study is organized in location-based system perspective which includes, the value chain stakeholders, the technical system, technical issues, social issues, and legal issues of the app deployment. It is recommended in the implementation of the app to obtain maximum stakeholder adoption, improve the accuracy level, and to maintain public trust and obedience.

Keywords: South Korea, COVID-19, Quarantine, Location-based system, Mobile app

Stare into the Lights my Pretties
Jordan Brown¹, Roger Clarke², Katina Michael³
¹Filmmaker, Australia E-mail: this@jore.cc
²Xamax Consultancy, Australia E-mail: Roger.Clarke@xamax.com.au
³Arizona State University, United States E-mail: katina.michael@asu.edu

A documentary by Jore Brown on the Screen Culture. https://www.youtube.com/watch?v=Q5qJjNM2Kx0. Live reflections on Jore Brown’s awarded winning documentary!

Keywords: Screen culture, Reflections, Documentary
Population ageing is cited by the United Nations (2019) as a significant global consideration affecting and exerting pressure on social, health and political systems given the continued growth in the population aged 65 and over. Ageing can affect an individual’s mobility, independence and consequently their ability to perform daily tasks and functions autonomously, and this overall lack of mobility can adversely affect an individual’s quality of life. Assistive devices in particular exoskeletons and wearable robotic devices can potentially enhance quality of life through increased autonomy, mobility and ability to independently accomplish daily activities (Shore et al. 2018). The purpose of this presentation is to define, in the first instance and from an engineering perspective, the value of passive lower limb exoskeletons, and the technical challenges and opportunities pertaining to their design. This will be followed by an account of the shift from an engineering based design process to a user centered design (UCD) approach (Abbas et al. 2004), demonstrating the latter in the context of a real world project funded by the University of Wollongong, Australia, Global Challenges program. Preliminary findings from the UCD effort will be shared and future research directions will be articulated.

**Keywords:** Wearable robotics, Assistive device, Lower limb Exoskeleton, User centred design

---

**Embodied Computing, AI, and Socio-ethical Implications**

Isabel Pedersen
Ontario Tech University Canada
E-mail: Isabel.Pedersen@ontariotechu.ca

Embodied Computing involves devices that are worn, implanted, ingested, and integrated with ambient data environments. As humans increasingly incorporate computer devices on, in and around the body, questions of ethics, social implications, and human rights issues need consideration, more than ever before. Society is in the midst of a body-centric turn in computing after twenty years of mobile device usage in post-internet society.

Bodies are now contextualized through cloud computing, big data, the Internet of Things, and most significantly the rise of Artificial Intelligence. Yet, there is a general lack of trust and fear for how humans will fare in light of AI. Pew Research reported in 2018 that “experts predict that AI will threaten human autonomy, agency and capabilities.” And that “Advances in AI will affect what it means to be human, to be productive, and to exercise free will.” Large technology companies are currently planning for further innovation in embodied computing, in combination with AI advancements. This talk will argue that the need to address the impact of these technologies is now. It will bring ethical implications to the fore and consider social, political, and design-based solutions.

**Keywords:** Embodied computing, Innovation, Social, Political, Design, Solutions, Social implications, Ethics

---

**Embody Computing Wearables, Implantables, Embeddables, Ingestible**

Andrew Iliadis
Temple University United States
E-mail: andrew.iliadis@temple.edu

Practitioners and scholars explore ethical, social, and conceptual issues arising in relation to such devices as fitness monitors, neural implants, and a toe-controlled computer mouse. Body-centered computing now goes beyond the “wearable” to encompass implants, bionic technology, and ingestible sensors—technologies that point to hybrid bodies and blurred boundaries between human, computer, and artificial intelligence platforms. Such technologies promise to reconfigure the relationship between bodies and their environment, enabling new kinds of physiological interfacing, embodiment, and productivity. Using the term embodied computing to describe these devices, this book offers essays by practitioners and scholars from a variety of disciplines that explore the accompanying ethical, social, and conceptual issues. The contributors examine technologies that range from fitness monitors to neural implants to a toe-controlled mouse. They discuss topics that include the policy implications of ingestibles; the invasive potential of body area networks, which transmit data from bodily devices to the internet; cyborg experiments, linking a human brain directly to a computer; the evolution of the ankle monitor and other intrusive electronic monitoring devices; fashiontech, which offers users an aura of “cool” in exchange for their data; and the “final frontier” of technosupremacism: technologies that seek to read our minds.

---

**Track 1 (Sydney) 155 2.00 pm AZ / 2.30 pm AZ**

### Embodied Computing, AI, and Socio-ethical Implications

Isabel Pedersen
Ontario Tech University Canada
E-mail: Isabel.Pedersen@ontariotechu.ca

Embodied Computing involves devices that are worn, implanted, ingested, and integrated with ambient data environments. As humans increasingly incorporate computer devices on, in and around the body, questions of ethics, social implications, and human rights issues need consideration, more than ever before. Society is in the midst of a body-centric turn in computing after twenty years of mobile device usage in post-internet society.

Bodies are now contextualized through cloud computing, big data, the Internet of Things, and most significantly the rise of Artificial Intelligence. Yet, there is a general lack of trust and fear for how humans will fare in light of AI. Pew Research reported in 2018 that “experts predict that AI will threaten human autonomy, agency and capabilities.” And that “Advances in AI will affect what it means to be human, to be productive, and to exercise free will.” Large technology companies are currently planning for further innovation in embodied computing, in combination with AI advancements. This talk will argue that the need to address the impact of these technologies is now. It will bring ethical implications to the fore and consider social, political, and design-based solutions.

**Keywords:** Embodied computing, Innovation, Social, Political, Design, Solutions, Social implications, Ethics

---

**Track 1 (Sydney) 198 2.00 pm AZ / 2.30 pm AZ**

### Embodied Computing Wearables, Implantables, Embeddables, Ingestible

Andrew Iliadis
Temple University United States
E-mail: andrew.iliadis@temple.edu

Practitioners and scholars explore ethical, social, and conceptual issues arising in relation to such devices as fitness monitors, neural implants, and a toe-controlled computer mouse. Body-centered computing now goes beyond the “wearable” to encompass implants, bionic technology, and ingestible sensors—technologies that point to hybrid bodies and blurred boundaries between human, computer, and artificial intelligence platforms. Such technologies promise to reconfigure the relationship between bodies and their environment, enabling new kinds of physiological interfacing, embodiment, and productivity. Using the term embodied computing to describe these devices, this book offers essays by practitioners and scholars from a variety of disciplines that explore the accompanying ethical, social, and conceptual issues. The contributors examine technologies that range from fitness monitors to neural implants to a toe-controlled mouse. They discuss topics that include the policy implications of ingestibles; the invasive potential of body area networks, which transmit data from bodily devices to the internet; cyborg experiments, linking a human brain directly to a computer; the evolution of the ankle monitor and other intrusive electronic monitoring devices; fashiontech, which offers users an aura of “cool” in exchange for their data; and the “final frontier” of technosupremacism: technologies that seek to read our minds.

---

**Track 1 (Sydney) 129 2.00 pm AZ / 2.30 pm AZ**

### Passive Wearable Assistive Robotic Device (WeARoP): From Engineering Based to User Centred Design

Rahim Mutlu¹ and Roba Abbas²
¹Faculty of Engineering and Information Sciences, University of Wollongong
²Faculty of Business and Law University of Wollongong

Population ageing is cited by the United Nations (2019) as a significant global consideration affecting and exerting pressure on social, health and political systems given the continued growth in the population aged 65 and over. Ageing can affect an individual's mobility, independence and consequently their ability to perform daily tasks and functions autonomously, and this overall lack of mobility can adversely affect an individual's quality of life. Assistive devices in particular exoskeletons and wearable robotic devices can potentially enhance quality of life through increased autonomy, mobility and ability to independently accomplish daily activities (Shore et al. 2018). The purpose of this presentation is to define, in the first instance and from an engineering perspective, the value of passive lower limb exoskeletons, and the technical challenges and opportunities pertaining to their design. This will be followed by an account of the shift from an engineering based design process to a user centered design (UCD) approach (Abbas et al. 2004), demonstrating the latter in the context of a real world project funded by the University of Wollongong, Australia, Global Challenges program. Preliminary findings from the UCD effort will be shared and future research directions will be articulated.

**Keywords:** Wearable robotics, Assistive device, Lower limb Exoskeleton, User centred design
Taken together, the essays show the importance of considering embodied technologies in their social and political contexts rather than in isolated subjectivity or in purely quantitative terms. Contributors: Roba Abbas, Andrew Illidis, Gary Genisso, Sunel Jethani, Deborah Lupton, Katina Michael, M. G. Michael, Marcel O’Gorman, Maggie Orth, Isabel Pedersen, Christine Perakslis, Kevin Warwick, Elisabeth Wissinger.

Keywords: Embodied computing, Wearables, Implantables, Embeddables, Ingestibles.

**Session 32**

**Author Track**

**Day/Date**
Sunday, 15 November
2:30 pm Arizona (MST), 4:30 pm EST, 9:30 pm UTC
Monday, 16 November
8:30 am Sydney

**Zoom**
[https://asu.zoom.us/j/81166609535](https://asu.zoom.us/j/81166609535)

**The Effect of Tracking and Reflecting on Study Habits on Study Behavior and Grades**

Donghee Yvette Wohnt and Michael J. Lee

Department of Informatics, New Jersey Institute of Technology
Newark, NJ, USA. E-mail: *a@njit.edu, b@njit.edu*

Many college students struggle to adjust academically because they never learned how to study effectively. In our first study, we developed a web-based application that enabled students to record when and how long they were studying. 29 college undergraduates used this tracking application for two weeks, then reflected on how the app affected their self-awareness and/or behavior. Analyses of participant diaries and application logs indicate that tracking application are far from accurate, but the act of tracking itself, paired with analysis of one’s own data through reflection, enables students to have stronger self-awareness of their studying habits. Our second study, a 13-week long field experiment with 162 first-year students participating in 5 groups with varying combinations of tracking and reflection, showed that the tracking + self-reflection group scored significantly higher on their final exam than tracking with social reflection.

**Keywords**: Self reflection, Diary, Education, Study habits, Tracking.

**One Laptop Per Child 2.0 - The Lessons We Did Not Learn: Education, Technology, and COVID-19**

Damita Kaloostian*, Brittany M. McCall and Nalini Chhetri

School for the Future of Innovation in Society, Arizona State University Tempe, USA. E-mail: *dkaloos@asu.edu, bmccall@asu.edu, nalini.chhetri@asu.edu*

The rapid onset of COVID-19 brought unprecedented changes to K-12 schools throughout the United States, requiring many schools to immediately transition to distance learning. COVID-19 significantly altered the delivery and learning of core and entrepreneurial competencies and previous studies on distance learning showed a greater benefit to students who have more robust academic support systems. In addition, COVID-19 required an increased reliance on technology to deliver education in ways that many educational infrastructures were ill-prepared to do. Some schools in the U.S. distributed computers and WiFi hotspots to students to facilitate access to distance learning platforms. This distribution of computers to students during the pandemic harkens back to One Laptop Per Child. This study peers into current achievement gaps for core and entrepreneurial competencies, assessing whether the technology-reliant distance education prompted by COVID-19 further entrenches existing, or creates additional gaps for students. The theoretical frameworks underpinning this research include principles of Information, Communication, and Technology (ICT); distance education; digital divide; technological determinism; technological optimism and entrepreneurial mindset. The research leverages a secondary and thematic analysis of survey data that assessed the distance learning experiences of families in the Paradise Valley School District (Phoenix, Arizona) during COVID-19. Parent-guardian perceptions were intentionally selected for this study as this group now plays a different, more prominent role in students’ education.

**Keywords**: COVID-19, Technological determinism, Entrepreneurial mindset, Achievement gap, Social implications of technology
Constructing a Visualization Dashboard to Improve Educational Standards in Arizona Legislative Districts

Justin Colyar

Barrett, the Honors College, Arizona State University, Tempe, USA
E-mail: jcolyar@asu.edu

Education has been at the forefront of many issues in Arizona over the past several years with concerns over lack of funding sparking the Red for Ed movement. However, despite the push for educational change, there remain many barriers to education including a lack of visibility for how Arizona schools are performing at a legislative district level. While there are sources of information released at a school district level, many of these are limited and can become obscure to legislators when such school districts lie on the boundary between 2 different legislative districts. Moreover, much of this information is in the form of raw spreadsheets and is often fragmented between government websites and educational organizations. As such, a visualization dashboard that clearly identifies schools and their relative performance within each legislative district would be an extremely valuable tool to legislative bodies and to the Arizona public. Although this dashboard and research is still in development, it would ideally increase transparency regarding public information about these schools and allow legislators to utilize the dashboard as a tool for greater understanding and more effective policymaking.

Problematization in Machine Learning - On What it Means to ‘Dot One’s Eyes’

Razvan Amironesei, Emily Denton and Alex Hanna

1 USF Center for Applied Data Ethics, USA, 2Google, USA

This paper discusses the relevance of problematization as an interpretive practice of inquiry for machine learning. However, this practice runs counter to what we call an ethos of speed understood as an infrastructural condition of contemporary technological innovation. Our task today is not simply to intellectualize problems or to disqualify careful thought in the name of groundbreaking actions. In what follows, we show that problematization in machine learning (ML) should emerge from a new articulation in which empirical and conceptual thought functions as an ethical condition of possibility of action and not the other way around. To this effect, we propose problematization as a practice of conceptual design to analyze problem formulation in ML, which occurs in highly contingent contexts of situated ambiguity. Also, we will distinguish here between problem formulation and problematization as a way to show how problematization works as an interpretive method to ethically shape the outcomes of current practices of problem formulation. This paper aims to contribute to the development of ethical and epistemological standards of analysis and practice by understanding the role of conceptual interpretation in problem formulation within machine learning communities at the level of metrics optimization in algorithmic design. To do so, we analyze one example of problem formulation for LinkedIn practitioners.

Keywords: Problematization, Problem Formulation, Machine Learning, Conceptual Design, Interpretation Metrics.

Fairness of Machine Learning Algorithms for the Black Community

Souontongnoma Martial Anicet Kiemde and Ahmed Doogy Kora

Laboratory E-Inov Ecole Supérieure Multinationale des Télécommunications Dakar, SENEGAL
E-mail: a.kiemde.anicet@gmail.com

This paper seeks to study the limits of the definitions of algorithmic fairness in relation to a protected variable, namely skin color. Discrimination towards the black community have existed for a long time. ML algorithms have only amplified or revealed existing discrimination. AI is a mirror that reflects the reality of our societies. The lack of a universal definition of algorithmic fairness makes it difficult to detect cases of discrimination in machine learning algorithms. We believe that independent or sensitive variables such as skin color are benchmarks that could be used to decide whether or not a decision is fair. We also recommend avoiding the use of proxy data.

Keywords: Algorithms, Black community, Ethics, Fairness.
The economic impacts of COVID-19 on the United States economy have been devastating for many Americans, but have been especially damaging for Native Americans, tribal governments, and tribal enterprises. On-reservation Native Americans especially have struggled as their governments lose revenue from casinos and other enterprises while attempting to address social and health needs of their citizens. COVID-19 has forced increased adoption of automation in the workplace that will heavily impact Native Americans, due to their increased exposure to the effects of automation in the leisure, transportation, education, and health industries. This paper highlights the unique position that Native Americans and tribal governments face during COVID-19 economic recovery and beyond as well as policy options tribes can implement to mitigate the looming threat of automation on their tribal citizens.

Keywords: COVID-19, Economic impacts, Indigenous, Tribal government, Universal jobs, Tribal workforce, Forced automation.

COVIDFREE App: The User-Enabling Contact Prevention Application
Edgard Musafiri Mimo and Troy McDaniel
The Polytechnic School, Arizona State University Mesa, USA
E-mail: emusafiri@asu.edu, troy.mcdaniel@asu.edu

Governments all over the world are considering employing mobile contact tracing applications to automatically manage, trace, and investigate recent interactions of newly tested COVID-19 infected individuals.

The prospective use of such applications has produced several debates surrounding confidentiality, security, data supervision, closeness approximation algorithms, and cyber-attack susceptibility. This paper discusses these concerns in the context of a novel smartphone application architecture, proposed here, that gives users more control and privacy during contact tracing. The proposed application is termed COVIDFREE App, which is aimed at enhancing users’ situational awareness through communication of safe and unsafe locations. An overview of the app’s architectural design and functionality are presented, including a newly developed Overall Risk Density Safety Factor calculation inspired by COVID-19 density risks and factors of users based on health requirements and several customizable user-specific scenarios. Finally, the paper outlines the benefit to funding and developing contact tracing apps, such as the COVIDFREE App, and discusses advantages of such applications including citizen awareness, relief, and preparedness.

Keywords: COVIDFREE App, Location-based services, Social distancing, Contact tracing, COVID-19, Location tracking.

Mixed-Initiative Flexible Autonomy in Drone Swarms for COVID-19 Applications
Parth Khopkar
School of Computing, Informatics, and Decision Systems Engineering, Arizona State University Tempe, USA
E-mail: pkhopkar@asu.edu

Drone swarms have been utilized for various tasks during the COVID-19 pandemic. While most of these drones were controlled by human operators, research related to control algorithms of drone swarms has shown that autonomously controlled drones outperform human operators in a variety of tasks. This paper lays the foundation of a framework that utilizes flexible autonomy in control of drones during pandemic missions to boost performance efficiency. It also outlines the factors that need to be considered when designing mixed-initiative systems for switching between autonomous and human control during a mission. Flexible autonomy ensures that humans who understand the social dimensions of the pandemic are present in the control loop.

Keywords: Human Swarm Interaction (HSI), Drone swarms, Flexible autonomy, Human aware AI, Pandemic, COVID-19.
Addressing Complex Challenges of Managing Data Protection at Universities

K. Royal\textsuperscript{1} and Paul Breitbarth\textsuperscript{2}

\textsuperscript{1}Arizona State University, United States
E-mail: ms.kroyal@gmail.com
\textsuperscript{2}TrustArc Netherlands E-mail: pbreitbarth@trustarc.com

K Royal, live in “Serious Privacy” at IEEE ISTAS20. “Serious Privacy” is tailored for people who are interested in the hottest field in a technology world. Whether you are a professional who wants to learn more about privacy or someone who just finds this fascinating, we have topics for you. In-depth information on serious privacy topics. This podcast will feature open, unscripted discussions with global privacy professionals (those kitchen table or back porch conversations) where you hear the opinions and thoughts of those who are on the front lines working on the newest issues in handling personal data. Real information on your schedule - because the world needs serious privacy.

Keywords: TrustArc, Privacy, Data protection, Universities, Complexity, Data management

Mapping the Poverty Incidence in Bali and Its Determinants using GIS

Ni Putu Intan Maharani
University of Wollongong, Wollongong, Australia E-mail: npim550@uowmail.edu.au

In this report, poverty incidence causes in Bali, Indonesia is analyzed, and the visualization of the poverty data and its determinants are generated. Regression slope test is used to determine whether the chosen independent variables as potential poverty determinants has a statistically significant association with the poverty incidence which is executed in R software. The correlation coefficient of each potential poverty determinant with the poverty incidence is also calculated using R software to see the direction of the association (positive or negative). QGIS software is used to visualize the data into a map. This will enable the easy understanding of the data and to detect pattern or trends of the data easily. From the regression slope test, it is found that human development index, average duration of attending school, university enrolment ratio, literacy rate, GRDP and number of hotels have significant association with the poverty incidence at 5% significant level. The thematic maps of poor people percentage by regency/municipality and the significantly associated variables are generated as the visualization of data by using QGIS software in which the join between the map data (base map) and the tabular data is conducted. Spatial vector layers such as points and lines are also analyzed in relation with poverty incidence. The satellite image of Bali is also presented to see the general overview of Bali island from the above. In conclusion, poverty reduction strategies can be enhanced by also focusing on the significantly associated variables/factors and the visualization of poverty related data is useful to easily discover the pattern or trends of the data.

Keywords: Poverty, Bali, Poverty determinants, Geographic information system
Session 34  Author Track  
Day/Date: Sunday, 15 November  
5.30 pm Arizona (MST), 7.30 pm EST, Monday, 16 November  
00.30 am UTC, 11.30 am Sydney  
Zoom: https://asu.zoom.us/j/84317050041

Track 1 (Sydney) 168 5.30 pm AZ  

Autism: Awareness, acceptance and public interest  
Sandra Jones  
Australian Catholic University  
Australia  
E-mail: sandra.jones@acu.edu.au

Professor Sandra Jones is the Pro Vice-Chancellor, Engagement at the Australian Catholic University. She is also an autistic woman, and a passionate advocate for the inclusion of autistic people in all aspects of society. In this session she will provide an overview of some of the challenges and strengths of autistic people and how - as friends, colleagues and employers - we can build a more inclusive community.  
Source: https://www.autisticprofessor.com/.  

Keywords: Autism, Awareness, STEM, Public interest technology

Session 35  Author Track  
Day/Date: Sunday, 15 November  
5.30 pm Arizona (MST), 7.30 pm EST, Monday, 16 November  
00.30 am UTC, 11.30 am Sydney  
Zoom: https://asu.zoom.us/j/81166609535

Track 1 (Sydney) 195 5.30 pm AZ  

IEEE SSIT Publications  
Terri Bookman¹, Katina Michael² and Reba Abbas³  
¹IEEE TSM, United States  E-mail: terri.bookman@gmail.com  
²Arizona State University, United States  E-mail: katina.michael@asu.edu  
³University of Wollongong, Australia  E-mail: reba@uow.edu.au

Publishing can be scary. It’s a good thing we are here to guide you through the process…  
Keywords: IEEE SSIT, IEEE TSM, IEEE TTS, IEEE SSIT Blog, Publishing, peer review process, Volunteering, roles

Session 35  Author Track  
Day/Date: Sunday, 15 November  
5.30 pm Arizona (MST), 7.30 pm EST, Monday, 16 November  
00.30 am UTC, 11.30 am Sydney  
Zoom: https://asu.zoom.us/j/81166609535

Track 1 (Sydney) 008 5.30 pm AZ  

In Search of a Pattern and Algorithmic Code for COVID-19: A Participant Self-Customized Awareness Systems for Diagnostics, Simulation, Tracking and Pattern Matching  
Alireza Ebrahimi  
School of Business The State University of New York at Old Westbury, Old Westbury, NY, USA,  
E-mail: ebrahimia@oldwestbury.edu

The COVID-19 pandemic has become a challenge to our lives and affects us differently under certain circumstances. This project invites and assists participants in developing their awareness systems for COVID-19. The system comes with a set up consisting of standard information and the necessary coding explained to the participant. The findings are open and shared through an honor system.
The awareness system consists of four embedded subsystems known as diagnostics systems, simulation, tracing, and pattern-matching systems. The diagnostic system uses inference rules to generate an outcome by diseases with the same symptoms related to COVID-19. The skeleton for the simulation system works as a game, depicting how the virus enters and interacts with the body’s cells with different four scenarios such as involved in defeating the body’s cell, defeating the virus, neutral coexistence of the virus and enclosure, and at best, turning into a positive virus. At that stage of defeating the body’s cell, the virus will replicate itself by an assigned degree with a recursive behavior. The tracing system traces the COVID-19 and the participant’s health using red, green, and blue (RGB) colors. The combination of RGB creates more than 16 million using 24 bits in binary or hexadecimal. The red color reserves for COVID-19, with 16 shades of red for a symptom with a 16 degree of severity. The pattern-matching system’s skeleton provides four databases for asymptomatic, mild, severe, and fatal cases. The digitized information will quickly identify the pattern. One database may compare with another database for similarities or differences. The transfer of learning from one system can flow into another, ultimately resulting in a solution pattern. This project’s implication will guide others to initiate their participant system to find a way and formulate a solution.

Keywords: Public education, Social implications, Technology, COVID-19, Diagnostic system, Simulator, Contact tracing, Knowledge base, Pattern matching algorithm.

Algorithms that Empower? Platformization in U.S. Intelligence Analysis
Matthew Schmidt1,2 and Kathleen M. Vogel2
1Laboratory of Analytic Sciences, North Carolina State University, Raleigh, USA E-mail: mcschmid@ncsu.edu
2School for the Future of Innovation in Society, Arizona State University Tempe, USA E-mail: kanglt@asu.edu

This paper discusses a computational architecture called the Analytic Component System (ACS), which aims to provide intelligence analysts with a service-oriented computational platform. This platform is designed to empower intelligence analysts by improving the integration of people, algorithms, software, tools, and manual work in the production of time-pressured intelligence assessments. Combining the perspectives of the ACS computer science design team and an embedded social scientist, this paper will use ACS to discuss the “platformization” of intelligence analysis and what this means for how we might think about and plan for reflexive design in future computational intelligence analytic systems.

Keywords: Platforms, Intelligence Analysis, Socio-Technical Systems.

A Recommendation Algorithm using Adaptive Aggregation of Binary Ratings
Bidur Subedi1 and Stephanos Mavromoustakos2
1School of Computer Science, University of Windsor, Windsor, ON, Canada E-mail: subedib@uwindsor.ca
2School of Computer Science, Indiana Institute of Technology, Fort Wayne, IN, USA E-mail: smavromoustakos@IndianaTech.edu

In this paper, we describe a novel application area of recommendation systems; helping people with disabilities find accessible Point-of-Interest (POI) using binary ratings on various accessibility criteria based on crowd-sourced data. We discuss an adaptive aggregation technique based on time fading aggregation for binary rating stream to predict the current state or confidence of each accessibility criteria for POIs. The confidence along with the user profile is used to calculate personalized accessibility score for the POI. The proposed method can be used with other POI recommendation criteria to recommend accessible places to users. We evaluate our model using synthesized datasets of different size that simulate the change of accessibility confidence over time. On comparison of the results with widely used adaptive, as well as non-adaptive aggregation techniques, we found that the proposed technique significantly improves the accuracy.

Keywords: Artificial intelligence, Public, Interest, Accessibility, Recommender systems

Cyber, Social and Communication Failures in the Implantable Medical Device Ecosystem
Josh Massad
Arizona State University Tempe, Arizona E-mail: massadjo@gmail.com

The aim of this paper is to bring to light the issues of internet connected implantable medical devices and the ecosystem around them that cause the failure of communication and ultimately the security of these devices. Private medical device companies creating internet connected devices for patients are part of what this paper is terming the “neoliberal IMD conveyor belt”. This paper examines IMD hacks, IMD market pressures, and implements the crime triangle into the IMD ecosystem.

Keywords: Platforms, Intelligence Analysis, Socio-Technical Systems.
In addition, this paper presents the story of failure that led to the Medtronic wireless pacemaker issue that forced Homeland Security CISA to announce that 750,000 Medtronic pacemakers were susceptible to low level skill exploits.

Keywords: Crime triangle, Ecosystem, hacking, Neoliberal conveyor belt, Implantable medical device.

Track 2 (Gong) 063 5.30 pm AZ

Implantable Medical Device Database: Improving Consumer Access to Post-Market Device Performance

Peter Pohorily
School for the Future of Innovation in Society, Arizona State University, Tempe, Arizona E-mail: peterpohorily@gmail.com

Each year, complications and harms occur in thousands of implantable medical devices (IMDs). Currently, challenges are found in post-market data collection and retraction of harmful IMDs. This paper outlines what challenges are faced in the U.S. regulatory system and explains the history of this governance issues. Additionally, it proposes an experiment to create a new database for patients and doctors to use to share their firsthand experiences.

Keywords: Medical Implants, FDA, Governance, Database, Emerging technology.

Track 2 (Gong) 025 5.30 pm AZ

Techno-Economic Entanglement, 2020

Ahmed Abbas
Independent Researcher, Australia E-mail: ahmed@abbas.id.au

Entire economies have now been built on imagination rather than science and facts. Romancing what is possible, with what is reality. Just as it once was in the ancient scripted days of the deceivers known as; jesters, magicians and necromancers. The true success of sciences once again abducted by story tellers, injecting mass irrationality. It never lasts, always ends in disaster.

Keywords: Story tellers, Science, Techno-economics, Imagination
Child violence is one of the most heinous crimes prevailing in our society. Any form of abuse or violence to a child does matter and cannot be overlooked. It affects the mental health of a child so deeply that it influences his later life. So, taking proper measurements for saving every child from any sort of violence is a must. This paper proposes a modified deep learning-based violence detection framework that will be able to detect and alert child exploitation in real-time without any privacy breach. The proposed framework is designed to work indoor, so primarily it can be installed in homes and educational institutions. The mechanism of the system is as such firstly, the surveillance video streams will be optimized using a modified convolutional neural network (CNN). Secondly, a sequence of frames will be passed through CNN for feature extraction and transferred to the long short-term memory (LSTM), which will act as a classifier. A softmax layer also has been introduced for the probabilistic distribution. Finally, the age and activities of a specific person will be detected. If there is any violent activity, an alert will be sent to the guardian through the system. We intend to ensure our proposed framework will be implied for automatic violence detection in a quick and safe approach.

Keywords: Child violence, 3D-Convolutional neural network, Alert system, Indoor, Deep learning.
While COVID-19 brought most of America improvements in air quality, a return of species, fewer carbon emissions, the pandemic also brought to the forefront the fact that indigenous people and people of color are more likely to fall ill and die from the disease. As one educator states, “This increased risk is not incidental but is itself linked to cumulative environmental burdens that have compromised the immune systems and health of people living in communities often treated as sacrifice zones by our majority-white society.” During our panel, we will discuss how environmental and social injustices go deeper than just pollution and how public interest technology’s intersection with justice issues can bring equality to all.

Today, some of the best PIT-centered work is being launched from academia. Undergraduate and graduate students are putting PIT into practice and making real change in the world. During this panel we will hear from five graduate students who are having success using PIT as their starting point. We will discuss: - Why they decided to focus on PIT in their post-grad work; - What kinds of questions and PIT issues they are exploring; - How they are working with people in the public, private, NGO and NfP sectors to gain experience and insights; - What kinds of new approaches, theories and methods are challenging the status quo; - What they learned pursuing their projects in science and technology policy, human and social dimensions, innovation and global development, responsible innovation - What’s next for them when they complete their programs; and - Which tips or practices were most successful for them when they first got started.
Embedding Humanistic Values in STEM Education - PITUN/IEEE ISTAS20

Larry Ragan, Ariel Anbar, Punya Mishra, Richard Pitt and Roba Abbas. Larry, Ariel and Punya

Dr Lawrence Ragan will moderate a panel on humanistic values in STEM education. Ariel Anbar and Punya Mishra will discuss the state of play in STEM and the fact that we are underprepared at multiple levels for the economic, environmental, and societal disruptions that accompany the advance of global civilization and technology. With the assistance of Richard Pitt, Associate Professor of Sociology at the University of California San Diego, the panel will ask the question whether humanistic knowledge of values is what will remedy this problem and Roba Abbas, Lecturer in Digital Business will discuss engaging students in the research-teaching nexus, to ensure learning-by-doing. Humanistic knowledge includes attributes that provide a learner with a vision and narrative of the self within social contexts, scaling from local to global.
IEEE SSIT ISTAS 20
International Symposium on Technology and Society
November 12 - 15, 2020
Public Interest Technology

Snaps from IEEE ISTAS20

[Images of various technology-related activities and presentations]

What words come to mind when you think of the word ‘affordable’?

The Future Substance of STEM Education
IEEE HAC Final Report — ISTAS20

Humanitarian Activities Committee

Closing Report to IEEE Humanitarian Activities Committee for

IEEE International Symposium on Technology and Society 2020

Theme: Public Interest Technology

12-15 November 2020

Host:
School for the Future of Innovation in Society
Tempe, Arizona State University, USA

https://attend.ieee.org/istas-2020/
Betsy Toland  
IEEE Humanitarian Activities Committee (HAC)

31 December 2020  
Re: IEEE ISTAS 2020, 12 - 15 November 2020, Tempe, AZ (Virtual Conf)

Dear Betsy,

It is with deep gratitude that I submit this final report to IEEE HAC on the last day of December 2020. It has been a trying time, to say the least, and we are extremely grateful for your team’s patience, commitment and trust in IEEE SSIT.

We began the year with the hope that we would be assembling a one-of-a-kind event in Tempe, Arizona and as a result of COVID-19 disruptions some time in May 2020 we decided to go virtual. This meant that our original plans for our approved HAC Budget had to be revised; we resubmitted our grant with an amendment and sometime in late October received the incredible news that the full amount we originally requested would still be available. We never deviated from our plan and because of your support we can declare the following summary:

- 208 submitted papers (inclusive of full peer reviewed papers and short papers; and abstracts)
- 366 contributing authors
- Over 100 student registrations
- 27 countries represented by authors and delegates
- 249 registrations (note, our previous best ISTAS turnout was about 120 delegates)
- significant student turnout (undergraduate and postgraduate, and PhD candidates)
- great diversity in discipline (not just technology/engineering)
- inclusivity demonstrated at the conference on a number of levels

It was a decision we did not take lightly to continue with a virtual conference—how were we to host an event of this magnitude and scope over the ether— but also allow for a significant workshop student training opportunity to take place physically in Arizona at the height of a COVID outbreak. We soldiered on, knowing we had the full support of IEEE HAC, and what eventuated was extremely special. Further evidence will be provided in the form of visual proceedings, and for that, we are excited that we will be releasing special talks from HAC representatives, and other humanitarian activity ISTAS talks into 2021.

Please find below the final report for ISTAS 2020 included a summary of how the funding of $15,000 provided by IEEE HAC was applied to support participation.
How the HAC Grant was Utilized:
Below is a brief summary of how the HAC Grant was utilized. In the revised budget there were two main aims: (1) fund the SolarSPELL Workshop hosted by ASU’s Associate Professor Dr Laura Hosman; and (2) register 55 students to submit work a topic related to humanitarian activities. I am happy to report that both these goals were achieved.

SolarSPELL Workshop:
The SolarSPELL workshop was hosted on the 14th November 2020 at the ASU Polytechnic campus training 20 students, faculty and volunteers. The students were trained to build a SolarSPELL from scratch using dozens of components. They were also mentored about conducting humanitarian activities abroad in developing nations and their individual responsibility in engaging in projects such as this. Dr Hosman and students spent time brainstorming about the type of information that would be stored in the SolarSPELL Library for particular locations, and what information was most needed. SolarSPELL runs on solar energy, and renewable energy sources were also implicitly covered in the Workshop. Here is a short video so that the HAC can see what the process entailed.

Figure 1 Workshop Delegates at the SolarSPELL Build Day
In addition to faculty, staff, Workshop delegates, and ASU’s biomedical engineering technicians (BMET) students (who have been working hard on that digital library for the last 12 months), volunteer LanetteRiggins from Boeing co-led the Workshop, by first providing everyone with a walk through of the process and then guiding them through as questions arose.

There were different stations and workshop delegates were rotated so that everyone got the chance to try out a different step of the process, like:

- putting the case together
- drilling holes into the waterproof plastic case
- cutting/stripping wires
- peeling and putting velcro on the batteries and the Raspberry Pi
- doing all the final gluing
- adding the finishing touches to the SolarSPELL Library

Throughout the day and at the end, continual feedback was gathered on how future Build Days could be enhanced and improved through participation, physical and remote.

Now that the units have all been put together and have had time to rest with all the various components put together, allowing the adhesive to set for a while so everything could set and the batteries could be charged up, there is the remaining quality assurance process to begin afresh. During this process the team begins to start testing whether the libraries have been assembled properly and whether the units charge up as they should. The SD cards are also plugged into the Raspberry Pi to make sure the computer boots up and everything is working properly and as planned.

This latest HAC funded workshop build, has come at a time that we’ve been encouraged to begin a process of redesigning the SolarSPELL device and will soon have a beta version to test. The design is much different, as you can see in the image on the previous page. Dr Hosman anticipates continuing to hold Build Days where SolarSPELL hardware is assembled, but Build Days will certainly look considerably different in the future!

Post COVID-19 when our students and volunteers can travel again, Dr Hosman and the team, look forward to travelling to the field again, but in the meantime, the team will continue to find ways to be creative and still benefit the communities they serve around the world! One outcome was also to consider how the future SolarSPELL might well be used to service everyday Americans who find themselves in disadvantaged situations.

This was truly a unique opportunity for local Arizonan delegates to become a part of an incredible humanitarian engineering exposure activity. I am delighted to report, that all the undergraduate volunteers who came to the Build Day were female ☺. Thank you, Dr Hosman for inspiring the next generation of women in engineering and technology. From everyone at the SolarSPELL team – thank you also HAC! Twenty-five new SolarSPELLs were built and ready to be distributed to those in need. The activity used approximately one third of the total grant monies afforded to IEEE SSIT for ISTAS20.
Target: 55 student registrations in the Humanitarian Engineering and Tech Space

Our original aim was to include papers in the space of Humanitarian Engineering and Public Interest Technology from about 55 students; it is with joy I report that we almost doubled that number. Indeed, the fact that we had access to registrations for students in the areas of research, meant we were able to attract high caliber submissions:

- humanitarian activities
- public interest technology pedagogy
- working in global development and technology
- inclusivity and values in systems design
- women and youth, human rights and technological development
- under-represented minorities and social justice and injustices through technology
- environmental justice and the utilization of technology to promote issue of disparity
- the impact of artificial intelligence on human rights
- the need for the social sciences and humanities in humanitarian technology activities

I want to also emphasize that many of the students submitting their work to the conference have been pleasantly surprised that a second outcome has also been made available to them; the inclusion of a short or extended paper in the following flagship IEEE SSIT Publications:

- IEEE Transactions on Technology and Society

There were a number of students who submitted abstracts for the entry into the conference but just wished to participate and not present. And there was plenty to do as the conference ran across time zones; for four days (between 12-16 hour days); and three parallel tracks throughout. Students got involved in volunteering their time as Q&A facilitators, MCs, timekeepers, ensuring smooth virtual transition between speakers and more.

It should be emphasized that about 70 percent of the students who were attracted to the International Symposium came from a single institution, Arizona State University inclusive of:

- Arizona State University - School for the Future of Innovation in Society
  - PhD Program HSD (Human and Social Dimensions of Technology)
  - PhD Program IGD (Innovation and Global Development)
  - Masters Program GTD (Global Technology Development)
  - Masters Program STP (Science and Technology Policy)
  - Masters Program FIT (Public Interest Technology)
- Arizona State University - School of Computing, Informatics and Decisions Systems Engineering
- Florida International University
- University of Florida
- VirginiaTech

Other support that should be noted was granted to delegates from: Cameroon, Senegal, Afghanistan, Mexico, Peru, China, Iran, India, Bangladesh, Lebanon who would never have been able to afford attending ISTAS.
Towards an Extended Definition of Humanitarian Activities

One of the most unexpected things to come out of ISTAS20 was the extended definition of “humanitarian activities”. The ISTAS20 Committee is convinced that the extended definition or perhaps even nascent “redefinition” of the term “humanitarian” must acknowledge “public interest technology”. In some way, the charter of IEEE SSIT has remained unchanged for its 50 years since its establishment; IEEE’s tagline Advancing Humanity is also pertinent. But more than anything else the decision to work with the New America Public Interest Technology – University Network, was a powerful acknowledgment that “humanitarian” is inclusive to the public interest; and technology must extend its charter through methodologies that espouse Value Sensitive Design in its framework.

It is with great joy that we present the visual proceedings of the second day of IEEE ISTAS/PIT UN here.

The program on November 13th was as follows:

Figure 2. In Blue are IEEESSIT Co-Organised Events at PIT-UN

The panel presentations that we felt were stand-out in relation to HAC included:

- Age Appropriate Published Terms for Children (led by SRights)
- Social and Environmental Justice Panel
- Best Practice in PIT and Graduate Student Led PIT
- Embedding Humanistic Values in STEM Education
- Creating an Antiracist Future

These panels may not be traditional style HAC panels; but they provide access to stabilizing underlying conditions that allow for the humanitarian context to thrive. We invite the HAC to tune in to these high quality productions. Our hope is to make the remaining ISTAS videos as easy to watch.
“Humanitarian” Session Highlights from the Program
These are just a short number of highlights that were specifically related to the humanitarian part of the conference at IEEEISTAS20. As much as possible the program committee tried to weave together the talks to streamline them thematically. Here are several sessions of the total of 36 that took place.

Excerpt of the Program below:
- For a complete program please see the attachment.
- 9:00 - 9:30am AZ Innovations in Refugee Camps: A Case Study of the Rohingya from Myanmar Faheem Hussain
- 9:30 - 10:00am AZ Advancing Innovative Approaches to Climate Adaptation, Netra Chhetri
- 10:00 - 10:30am AZ SolarSPELL, Laura Hosman
- 10:30 - 11:30am AZ IEEE HAC & SIGHT Response to COVID-19, Kartik Kulkami, Sampath Veeraraghavan, John Funso, Pia Torres
- 11:30 - 12:00pm AZ Greetings from the Field, Jason Sargent
- 12:00 - 1:00pm AZ Non-digital citizens: unmapped, unbanked and unknown, Jason Sargent, Paul Scifleet and Mohamed Ibrahim
- 1:00 - 1:30pm AZ Citizen Participation in GlobalGovernance of the Internet, Mahmud Farooque
- 1:30 - 2:00pm AZ HASTAC: Changing the Way We Teach and Learn, Jacqueline Wernimont
- 2:00 - 2:30pm AZ A Long, Long Game: The Philosophy of Engineering and Culture Change in Engineering Practice, Zachary Pirtle

“Killing Two Birds with One Stone”? A Case Study of Development Use of Drones for Medical Delivery, Ning Wang
9:00 - 9:40am AZ Engineers and Scientists in Community-based Collaborations: Incentives, Barriers, and Potential, Jean Boucher, Anthony Levenda, Jorge Morales-Guerrero, Madison Macias and Darshan Karwat

9:45 - 10:45am AZ Can we design socially-focused enterprises to address environmental, climate, and energy justice challenges? Darshan Karwat, Jared Byrne and Jean Boucher

10:50 - 11:20am AZ When Mental Walls Lead to Physical Walls: Using Art to Investigate the Social Responsibility of Engineers, Madison Macias, Peter Pohorily, Jorge Morales-Guerrero and Darshan Karwat

Additional highlights include the participation of speakers by companies such as IBM, non-government organizations such as those dedicated to gender-based violence, groups linked to BLM in the USA, disability advocates, start-ups like PivotforHumanity and GreaterThanLearning, and much more.

IEEE TECHETHICS were also gracious in incorporating an event just for ISTAS20 on the topic proposed by the Committee on Technology and -isms:

Figure 4 Panel on technology and -isms

There were some outstanding panels at the ISTAS event, including one on humanistic values that relates directly to HAC. In addition to students panels that were self-organized at several Australian universities including, Wollongong University and Swinburne University of Technology within Information Systems disciplines.

One of the ways that ISTAS20 conducted outreach and generated awareness and support for the Conference was a fortnightly Colloquium which ran for two hours every Wednesday with pertinent speakers from the Public Interest Technology Space. These videos some of which received hundreds of impressions on social media were hosted by SFIS, ASU and the Colloquium will now run into 2021 with several podcast spinoffs planned among presenters and the committed student body that is growing. We would love to invite HAC to one of those PIT Colloquiums.

We had between 7 and 40 people at each session during ISTAS20. We estimate about 600 people attending the event throughout the Conference from numerous international communities.
Relevant Titles, Abstract, Authors in the HAC/PIT Space

The following papers are related either directly or indirectly to humanitarian activities and public interest technology via:

- Pertaining to an area under global development (e.g. traditionally known as lesser developed nations including Peru, Cameroon, Afghanistan, the global South etc)
- Pertaining to a methodology related to HAC (e.g. value sensitive design, virtue ethics, well-being, collective intelligence etc)
- Pertaining to a theme related to under-represented minority groups (e.g. racism, access, disability, discrimination)
- Pertaining to a theme of human rights, humanitarian hopes, ethics, privacy, security and trust
- Pertaining to a theme on social and environmental justice, particularly First Nations People
- Pertaining to a theme on climate change, renewable sources of energy and/or the future of work
- Pertaining topically to the fight against COVID-19 pandemic in application, critique, technology (including frameworks), vaccine responses etc.
- Pertaining to the use of emerging technologies in HAC (e.g. drones, swarm intelligence etc)
- Pertaining to critical infrastructure (e.g. cyberphysical systems, dams, floods and flood management, disease, health systems)

Below is a curated list of abstract from the 208 submissions received, that were identified. In “yellow” font you will find the linkages with the themes above (one per abstract).
Author Index

A
Abbas, Ahmed  62
Abbas, Reka  14, 35, 39, 55, 60
Abdott, Mark  45
Alajeelh, Jarunah  30, 54, 64
Achary, Vasudev  42
Aiglo, Alexandra  44
Alexandrina Aiglo  8
Alex Orchard  5
Akhmadzoe, Kuna  16, 62, 64
Alkayid, Khuloud  18
Alpesh Shah  7
Alrawashdeh, Khaled  39
Althawasheif, Khaleed  58
Anbar, Ariel  65
Anderson, Thomas  60
Andrews, Maryann  1
Andrus, Clinton J.  28
Anuza, T.  53
Angelakis, Angelis  53
Angelis Ferraro  3, 6
Arzato, Jaliberth Fernandes-de  48
Arvain, Farah Najar  47, 64
Arun  65
Ari-Nasar  9
Armstrong, William  26

B
Bonticoune, Ahmet  55
Bambauer, Jane  33
Barikzai, Safia  35
Barton, Chris J.  40
Beck, Angela  46
Beck, Kelvin  7
Belliard, Hans Walter  52
Ben Shinshelman  3
Bertoin, Michael J.  17
Boswell, Judith  32
Bird, Yazique  32
Blywe, Martin  26
Booman, Terri  37, 60
Boucher, Jean  45
Boucher, Justin L.  43
Bowen, Jaisma D.  35
Booth, Paul  59
Brooks, Catherine  33
Brown, Jordan  49, 54
Bruce, Laura  58
Byrne, Jared  43

C
Cajamarca, Mario  54
Call, Brittany M.  56
Caru, Yergis  46
Cardenas, Soraya  20
Carvalho, Joseph  20
Catterson, Dylan  26
Chhibber, Nalini  56
Chhibber, Neera  20

Choudhury, Shreya  23
Christine Peralta  2
Chu, Prathamesh  43
Clarke Roger  54
Cooper, Justin  57
Commes, Martin Pérez  37, 64
Cook-Dorgan, Robert  64
Covery, Ben  42
Cranefield, Stephen  24

D
Dateman, Sam  23
Dames, Priya  16
Davison, Karine  8
Dean, Sarah  12
Demko, Megan  32
Dentos, Lauren  26, 52
Denton, Emily  46, 57
Deane, Steven  43
Dessi, Nadine  25
Dondelma, Julian  42
Dowd, Danny  42
Dreifuss-Serrano, Cristina  25
Dung, Pristine  26

E
Elbridge, Almeida  50
Elbridge, Ruby  23
Elbridge, Georges  5
Elba, Hafid  5
Emamdie, Michelle  16
Enish, Deem  53
Epper, Euphemia  7
Erich, Agustín  7
Eusebio Scornavacca  7

F
Fahim, Hadi  8
Fahim, Hadi  48
Farid-Nazir Arsalu  48
Farrokh, Mahmoud  27
Farthing, Stu  32, 64
Fatima Zahrae Chibh Alaoui  2
Faizy, Chibh  4
Ferry, Erik  64
Ferrero, Stefano  51
Friso, Mark  39
Frits, John  27

G
Gary, Matthew  46
Ghah, Maryam Rezaei  19
Ghah, Maryam Rezaei  19
Gilbert, Juan  16
Yu, Wenjing  22
Yvette Pearson  4

Z
Zaveri, Shivam  15
Zhang, Chengmeng  22
Zick, Tom  12
After thirty years serving as Managing Editor of IEEE Technology & Society Magazine, this December 2020 issue of TSM was Terri Bookman’s last issue in this position. Since 1990, Terri has applied her phenomenal editorial skills, her commitment to the cause of understanding the impact of technology on society, her encyclopedic knowledge, her attention to detail, her appreciation of aesthetics in production, her vast social network of friends, and her fabulous sense of humor, to help a series of Editors-in-Chief produce the artifact you are reading today.

As part of ISTAS2020, held virtually via Zoom Nov. 12-15, 2020, Katina Michael organized a surprise session of former (and current) TSM EICs and IEEE SSIT past and present leadership, including Clint Andrews, Joe Herkert, John Impagliazzo, Luis Kan, Keith Miller, Jay Pearlman, Jeremy Pitt, Jeffrey Robbins, Howard Wolfman, and Greg Adamson, who all joined Katina in reflecting on their history of working with Terri in producing the Magazine, and in paying tribute to the phenomenal work that Terri has done for so long, so tirelessly, so well, and with such great humor.

Terri, on behalf of every author, editor, reviewer, and reader of IEEE TSM for 30 years—thank you very much.

Katina Michael and Jeremy Pitt