



## 2018 IEEE International Symposium on Technology and Society (IEEE ISTAS 2018)

School of Engineering and Applied Science of  
The George Washington University

13 - 14 November 2018

### IEEE ISTAS 2018 Support Organizations





ISTAS 2018 Program  
The George Washington University, 800 22nd Street, NW, Washington, D.C.

## Welcome

It is my great pleasure to welcome you to Washington D.C. for the 24th annual IEEE International Symposium on Technology and Society (ISTAS), the flagship event of the IEEE Society on Social Implication of Technology.

The IEEE International Symposium on Technology and Society (IEEE ISTAS 2018) is a multi-disciplinary and interdisciplinary forum for engineers, policy makers, entrepreneurs, philosophers, researchers, social scientists, technologists, practitioners and polymaths to collaborate, exchange experiences, and discuss sustainable development and the social implications of technology.

There is clear alignment with the Sustainable Development Goals (SDGs), which aims to end extreme poverty and tackle climate chaos by the year 2030 and the 2015 Paris Climate Conference (COP21), which will for the first time in over 20 years of UN negotiations, aim to achieve a legally binding and universal agreement on climate.

IEEE ISTAS provides a strategic platform to facilitate community building between stakeholders from a variety of different disciplines around the world, with a view to ensuring the necessary knowledge sharing and greater collaboration and coordination to truly achieve the objective of IEEE - Advancing Technology for Humanity.

IEEE ISTAS 2018 brings together a wide range of stakeholders from around the world to share insight and experience across many of the issues addressed by SSIT.

As in previous years, this IEEE ISTAS 2018 showcases the breadth and depth of the IEEE SSIT community complements through expert panels sharing insight and perspective to stimulate dialogue during and after the conference. This year's plenary panels focus on issues related to the importance of community led sustainable development, creating ethically informed standards, technology policy and strengthening science, technology and engineering related education.

These plenary panels are complemented by a mix of paper and discussion sessions addressing ethics and sustainable development, geospatial data and Internet of Things (IoT), health and social inclusion, cyber-security and social impacts of technology.

I hope you enjoy the IEEE ISTAS 2018 Proceedings.

I would like to acknowledge the valuable contribution of the International Programme Committee (IPC) who provided authors with actionable feedback during the blind peer review process to help them strengthen the impact of their papers for publication. I would also like to acknowledge the encouragement and support of IEEE Humanitarian Activities Committee, The George Washington University, IEEE-USA and the IEEE Standards Association.

Paul M. Cunningham

Chair, IEEE ISTAS 2018

## Committees

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# IEEE Society on Social Implications of Technology (SSIT)

IEEE Society on Social Implications of Technology (SSIT) focuses on five major areas

- Sustainable Development and Humanitarian Technology;
- Ethics, Human Values and Technology;
- Technology Benefits for All;
- Future Societal Impact of Technology Advances; and
- Protecting the Planet and Sustainable Technology

As well as having local Chapters coordinating member events around the world, IEEE SSIT organizes and contributes to international conferences, has an active Standards Committee and IEE SSIT IST-Africa SIGHT, publishes the award-winning IEEE Technology and Society Magazine and is launching a new IEEE Transactions on Technology and Society.

The IEEE SSIT Standards Committee has been very active since its establishment and is taking a leadership position in the new IEEE P7000 standards series. This provides a platform of great exposure and influence in key fields including autonomous vehicles and artificial intelligence.

In addition to IEEE ISTAS, the annual SSIT Flagship event, IEEE SSIT organizes the bi-annual Norbert Wiener Conference and co-organizes the IEEE Ethics Conference. It is also a Co-Sponsor of the IEEE Global Humanitarian Technology Conference (IEEE GHTC).

The IEEE SSIT IST-Africa SIGHT has focused on digital literacy capacity to strengthen primary healthcare delivery in resource constrained environments, and established trust relationships with Ministries of Health and local universities in Northern Ethiopia, Western Kenya, Southern Malawi and Eastern Cape, South Africa. Based on progress to date, Bungoma County Ministry of Health is providing access to over 20 new health centres which they have equipped, and we are in similar discussions with the Amhara Region Health Bureau in Ethiopia. The credibility SSIT volunteer activities have established in the global sustainable development space provides an important opportunity to receive recognition for supporting global engagement by IEEE in this space, scale SSIT activities and build long-term strategic relationships beyond IEEE.

The IEEE Transactions on Technology and Society (which will publish its first issue in 2020) will provide an important global platform for research across all IEEE disciplines related to societal implications of technology and ethical, professional and social responsibility in the practice of STEM (Science, Technology, Engineering and Mathematics). Equally importantly, it will facilitate engagement with prospective SSIT members both across and beyond IEEE.

If you are interested in volunteering, or if you would like to recommend someone, please contact Paul Cunningham ([pcunningham@ieee.org](mailto:pcunningham@ieee.org)) - (Subject: Volunteer for IEEE SSIT – <name>)

For more information about IEEE SSIT, please visit <http://technologyandsociety.org>

**Tuesday 13 November 2018**

08:45	<p><b>Welcome</b> Paul Cunningham, IEEE SSIT President James A Jefferies, IEEE President Candy Robinson, IEEE-USA President Dr. Can Korman, Associate Dean of Research and Graduate Studies and Professor, School of Engineering and Applied Science, The George Washington University Murty Polavarapu, Chair, Local Organizing Committee, IEEE SSIT</p>	
09:00	<p><b>Plenary 1: A Partnership Approach to Community led Sustainable Development</b> <i>Moderator: Paul Cunningham, IEEE SSIT President</i> <i>Panelists:</i> James A Jefferies, IEEE President Khanjan Mehta, Vice Provost for Creative Inquiry, Lehigh University, USA Kevin M. Andrezejewski, Senior Program Manager, Engineering Service Corps, Engineers Without Borders, USA</p>	
10:15	Coffee Break & Networking	
10:45	<p><b>Plenary 2: Creating Ethically Informed Standards</b> <i>Moderator: John Havens, Executive Director, IEEE Global Initiative</i> <i>Panelists:</i> Aurelie Jacquet, Founder of Ethics for AI and Automated Decision Making Konstantinos Karachalios, Managing Director, IEEE Standards Association and IEEE Management Council Member Ross Noduft, VP Risk Management, OWI</p>	
12:00	Lunch & Networking	
	<b>Auditorium A</b>	<b>Auditorium B</b>
1:00pm	<p><b>Panel 1: The Value of Geo-Information in Decision-Making</b> <i>Moderator: Jamie Kruse, East Carolina University, USA</i> <i>Panelists:</i> Christoph Aubrecht, Senior Geospatial Strategist, European Space Agency representative to the World Bank Yusuke Kuwayama, Senior Research Fellow at Resources for the Future Emily Pindilli, lead for the Natural Resource Economics theme at the U.S. Geological Survey's Science and</p>	<p><b>Session 1: Sustainable Development</b> <i>Moderator: Paul Cunningham, IEEE SSIT</i> <i>Community Microgrids to Increase Local Resiliency</i> Efraín O'Neill-Carrillo, University of Puerto Rico-Mayaguez, USA <i>Local Socio-Economic Development through Community-Based Distributed Energy Resources</i> Emmanuel Mercado, University of Puerto Rico-Mayaguez, USA</p>

	<p>Decisions Center, USA Carl Shapiro, Senior Economist, Energy and Minerals, and Environmental Health, USGS, USA</p>	<p><i>Synthetic Baseload and Intermediate Decarbonization</i> Steven Kimbrough, University of Pennsylvania, USA</p>
2:00pm	<p><b><i>Panel 2: Fostering Ethical Cultures through the Work of the National Academies</i></b> <i>Moderator: Deborah G. Johnson, University of Virginia, USA</i> <i>Panelists:</i> Tom Arrison, Program Director National Academies of Sciences, Engineering, and Medicine (NASEM), USA Frazier Benya, Women In Science, NASEM, USA Rosalyn Berne, Center for Engineering Ethics and Society, National Academy of Engineering, USA Karin Ellison, Life Sciences Ethics Program, Arizona State University</p>	<p><b><i>Session 2: Sustainable Development</i></b> <i>Moderator: Robert Dent, IEEE SSIT</i> <i>The Development Impact of Smart City Programs. A Case Study: Istanbul's Smarter City Initiative</i> Linda Bower, Consultant, U.S.A. <i>Financial Literacy Education and Responsibilities in Developing Countries Using a Computer Application</i> Patrick J. Jung, Milwaukee School of Engineering, USA <i>mHealth4Afrika – Challenges when Co-designing a Cross-Border Primary Healthcare Solution</i> Paul Cunningham, IIMC / IST-Africa, Ireland</p>
3:00pm	Coffee Break & Networking	
	<b><i>Auditorium A</i></b>	<b><i>Auditorium B</i></b>
3:30pm	<p><b><i>Panel 3: LSTC Workshop: Health and Public Health Delivery Challenges and Ethics in the Information Age</i></b> <i>Moderator: Luis Kun, IEEE SSIT</i> <i>Health and Public Health Delivery Challenges in the Information Age: Prevention a Key</i> Luis Kun, Distinguished Professor Emeritus of National Security Affairs, CHDS/NDU, USA <i>Opportunities for applying artificial intelligence in medicine to benefit underserved populations</i> Sameer Antani, National Library of Medicine, National Institutes of Health, USA</p>	<p><b><i>Session 3: Ethics and Human Values</i></b> <i>Moderator: Paul Cunningham, IEEE SSIT</i> <i>Achieving Trust in Artificial Intelligence</i> Greg Adamson, University of Melbourne, Australia <i>Ethical Dilemmas for Engineers in the Development of Autonomous Systems</i> Beth-Anne Schuelke-Leech, University of Windsor, Canada <i>The Unforeseen in Unmanned Vehicles</i> Michael Nowatkowski, Augusta University, USA</p>

	<p><i>Standardization for Life Sciences Technologies: Why do Standards Matter?</i> Carole C. Carey, IEEE Engineering in Medicine and Biology Society</p> <p><i>Technology is Not Above All. People and Their Needs Are</i> Nahum Gershon, Senior Principal Scientist MITRE, USA</p>	
4:30pm	<p><b><i>Session 4: Societal Impacts of Technology I - Internet of Things</i></b></p> <p><i>Moderator: Ken Foster, University of Pennsylvania, USA</i></p> <p><i>Achieving Security in the Internet of Things Through Expansion of the Partnership Model</i> William Diehl, Virginia Tech, USA</p> <p><i>Evolution of Human Society and of Things Assisted by IoT</i> Giuseppe Parise, formerly Sapienza University of Rome, Italy</p> <p><i>Discussion</i></p>	<p><b><i>Session 5: Ethics and Human Values II</i></b></p> <p><i>Moderator: Joseph R. Herkert, North Carolina State University, USA</i></p> <p><i>The Hope and Challenge of Synthetic Biology</i> Jay Schnitzer, MITRE, USA</p> <p><i>Social Agents of Technological Change: Dynamics and Divergence of Meanings and Expectations, Sentiments of Emerging Technologies</i> Phuong Nguyen, Stony Brook University, USA</p> <p><i>Human Values as the Basis for Sustainable Software Development</i> Till Winkler, Vienna University of Economics and Business, Austria</p>
5:30pm	<p><b><i>Networking Reception</i></b> supported by IEEE Humanitarian Activities Committee</p>	



**Wednesday 14 November 2018**

09:00	<p><b>Plenary 3: Current Challenges in Technology Policy</b>  <i>Moderator: Katherine Pratt, University of Washington, USA</i>  <b>Panelists:</b>          Nathan White, Access Now, USA          Camille Stewart, Deloitte, USA          Bukky Adebayo, Congressional Innovation Fellow, TechCongress, USA</p>	<p><b>IEEE Humanitarian Activities Committee Participatory Workshop</b>  <i>Moderator: Paul Cunningham, Chair, IEEE HAC</i></p> <p><i>This participatory workshop organized by the IEEE Humanitarian Activities Committee (HAC) will provide an opportunity to discuss the opportunities and challenges associated with developing, adapting and deploying technology in resource-constrained environments at home and abroad. It will provide an opportunity to reflect on socio-cultural, ethical and process related issues that need to be considered and provide a platform for participants to discuss their perspectives and experiences.</i></p> <p><i>This <b>free workshop</b> is open to IEEE ISTAS 2018 conference delegates and other stakeholders interested in sustainable development and humanitarian technology related activities. Pre-registration is required.</i></p>
10:30	<p>Coffee Break &amp; Networking</p>	
11:00	<p><b>Plenary 4: Technology, Society and Engineering Education</b>  <i>Moderator: Joseph R. Herkert, Associate Professor of Science, Technology, and Society, Emeritus, North Carolina State University</i>  <b>Panelists:</b>          Louis Bucciarelli, Professor of Engineering and Technology Studies, Emeritus, MIT          Deborah Johnson, Anne Shirley Carter Olsson Professor of Applied Ethics, Emeritus, University of Virginia          Richard K. Miller, President, Olin College of Engineering</p>	<p><b>IEEE Humanitarian Activities Committee Participatory Workshop</b>  <i>Moderator: Paul Cunningham, Chair, IEEE HAC</i></p>
12:15	<p>Lunch &amp; Networking</p>	



	<i><b>Auditorium A</b></i>	<i><b>Auditorium B</b></i>
1:00pm	<p><b><i>Panel 4: Gender equity and social inclusion in renewable energy programs</i></b>  <i>Moderator: Greg Adamson, University of Melbourne, Australia</i>  <i>Panelists:</i>  Reihana Mohideen, University of Melbourne, Australia  Francesco Tornieri, Asian Development Bank, Philippines  Robert Dent, IEEE SSIT and IEEE Power Engineering Society</p>	<p><b><i>Session 6: Ethics &amp; Societal Impacts of Technology II</i></b>  <i>Moderator: Jay Pearlman, IEEE France / Four Bridges</i>  <i>Comparative Ethics of Consent to Computing</i>  Meg Jones, Georgetown University, USA  <i>Engineers' Ability to Participate in Decision Making Within Public Organizations: A Theory Development</i>  Ange-Lionel Toba, Old Dominion University, USA  <i>Records of Engagement and Decision Tracking for Adaptive Management and Policy Development</i>  Pierre David Glynn, U.S. Geological Survey, USA</p>
2:00pm	<p><b><i>Panel 5: Human-Robot Interaction: Examining Ethical Issues in Three Contexts</i></b>  <i>Moderator: Jason Borenstein, Georgia Institute of Technology, USA</i>  <i>Panelists:</i>  Yvette Pearson, Philosophy &amp; Religious Studies, Old Dominion University, USA  Joseph R. Herkert, Associate Professor Emeritus of Science, Technology, and Society, North Carolina State University, USA  Keith Miller, Endowed Professor for Lifeline Learning, University of Missouri, USA</p>	<p><b><i>Session 7: Societal Impacts of Technology III - Cyber Security</i></b>  <i>Moderator: Luis Kun, IEEE SSIT</i>  <i>Cybersecurity for Civil Society</i>  Pavan Jagalur, Amida Technology Solutions, USA  <i>Cyberbullying in institutions of higher learning in developing countries: Evidence from Kenya</i>  Joshua Ndiege, United States International University - Africa, Kenya  <i>What Computer Scientists Can Learn From Social Scientists: On The Significance of an Interdisciplinary Research Agenda for Shaping Digitalization and its Social Implications</i>  Kilian Dorner, Freie Universität Berlin, Germany</p>
3:00pm	Coffee Break & Networking	

	<i><b>Auditorium A</b></i>	<i><b>Auditorium B</b></i>
3:30pm	<p><b><i>Panel 6: How should engineering professionals respond to the rapid deployment of AI in our society?</i></b></p> <p><i>Moderators: Meg Jones, Georgetown University, USACM &amp; Simson Garfinkel, USACM, USA</i></p> <p><i>Panelists:</i></p> <p>Peter Asaro, Associate Professor, School of Media Studies, The New School, Campaign to Stop Killer Robots, USA</p> <p>Megan Finn, Assistant Professor, Information School, University of Washington, USA</p> <p>Molly Sauter, Vanier Scholar and PhD candidate, Communication Studies, McGill University, USA</p> <p>Meg Young, PhD candidate, Information School, University of Washington, USA</p> <p>Lorraine Kisselburgh, CERIAS Fellow, Purdue University, USA</p>	<p><b><i>Session 8: Societal Impacts of Technology IV</i></b></p> <p><i>Moderator: Jay Pearlman, IEEE France / Four Bridges</i></p> <p><i>Project Hindsight Reconsidered: Reflecting on how engineers can study the sources of innovation</i></p> <p>Zachary Pirtle, NASA, USA</p> <p><i>Is Technology a Parasite Masquerading as a Symbiont? And if so...</i></p> <p>Jeff Robbins, Rutgers University, USA</p> <p><i>Bayesian Reasoning Based Malicious Data Discovery on Gulf-Dialectical Arabic Tweets</i></p> <p>Dema Alorini, Howard University, USA</p>
4:30pm	<p><b><i>Panel 7: How should engineering professionals respond to the rapid deployment of AI in our society?</i></b></p> <p><i>Moderators: Meg Jones, Georgetown University, USACM &amp; Simson Garfinkel, USACM, USA</i></p> <p><i>Session 2: Participant discussion</i></p>	<p><b><i>Session 9: Societal Impacts of Technology V</i></b></p> <p><i>Moderator: Greg Adamson, IEEE SSIT</i></p> <p><i>Location-based Social Media Use in Families: Qualitative Outcomes from Participant Observations</i></p> <p>Katina Michael, Arizona State University, USA</p> <p><i>Excitement and Concerns about Machine Learning-Based Chatbots and Talkbots: A Survey</i></p> <p>Pablo Rivas, Marist College, USA</p> <p><i>Twitter Analytics: Are the United States Coastal Regions Prepared for Climate Change?</i></p> <p>Sydney Singleton, Appalachian State University, USA</p>
5:30pm	End of Sessions	