



IEEE-GHTC 2021

11th IEEE Global Humanitarian Technology Conference



October 19-22, 2021

Virtual from Seattle, Washington, USA



IEEE GHTC 2021

11th IEEE Global Humanitarian Technology Conference

Virtual Event | October 19 - 23, 2021 |

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It is my pleasure to welcome you to the 2021 IEEE Global Humanitarian Technology Conference (GHTC). GHTC has become a flagship annual venue for academics, for-profit and non-profit businesses, and governmental and non-governmental organizations to identify the present and future humanitarian needs and present their work to create influential, novel, and accessible humanitarian technologies. GHTC is an excellent opportunity to network, share, learn, and establish collaborations to build innovative and accessible humanitarian technologies.

GHTC 2021 aims to:

- Foster exchange of information, networking, and cooperation in Sustainable Development, Humanitarian Technology, ICT4D (Information and Communication Technologies for Development), and Disaster Recovery spaces.
- Focus attention on organizations that enable or leverage technologies and engineering expertise in support of Sustainable Development and the UN Sustainable Development Goals (SDGs)
- Provide a forum where practitioners can share solutions or identify solutions or potential partners when addressing specific societal challenges
- Impact in positive and meaningful ways the lives of disadvantaged billions of people around the world
- Attract young people to these professional fields by exploring Science, Engineering, Technology, and Math (STEM) solutions addressing the world's vulnerable communities

The Technical Program Committee has prepared an excellent program to cover a wide range of topics related to humanitarian needs and technologies. These sessions include topics such as Medical Technologies, Role of Web-based Services and Social Media Channels During Global Pandemics, Supporting Stakeholder Engagement in Healthcare Applications, Data Transmission and Communication during Disasters, Off-grid Electrification, Sustainable Grid Technologies, Human-centered Design of Energy Applications, Energy Conversion and Storage for Humanitarian Applications, Technology Adoption in Agriculture, Online Service Learning, Professional Preparation of Social Entrepreneurs.

We will have multiple plenary panels on topics related to technologies for healthy aging, sustainable development, and the impact of social media on public health. We also host multiple plenary talks that highlight practical development approaches and present directions to develop technologies for the benefit of humanity. Our speakers are Dr. Deborah Estrin (Cornell Tech), Dr. Elizabeth Belding (University of California, Santa Barbara), Dr. Octav Chipara (The University of Iowa), Dr. Anna Forster (University of Bremen), Dr. Farid Farahmand (Sonoma State University), Aline McNaull (IEEE-USA), and Grayson Randall (IEEE MOVE Operations Lead). There will be four workshops during the first day of the conference. Well-established professionals will instruct these workshops in the fields of humanitarian technologies.

I want to thank:

- the authors for submitting their influential papers,
- speakers and panelists for accepting our invitation to participate and present at this venue,
- the Technical Program Committee and track chairs for their excellent job on reviewing the papers and preparing the scientific program,
- the publication team for preparing the conference proceedings, and
- the program team and steering committee for their sustained support and orchestrating this year's events.



Behnam Dezfouli, General Chair, GHTC 2021

A Cairde,

Céad Míle Fáilte romhaibh go léir to the 11th annual IEEE Global Humanitarian Technology Conference. We hope you enjoy the IEEE GHTC Program and take advantage of the opportunity to network and share knowledge with peers from around the world.

Over the past 11 years IEEE GHTC has established itself as a leading conference on Sustainable Development and Humanitarian Technology. Researchers, academics, practitioners and students from around the world have leveraged this platform to share knowledge and experiences and learn from colleagues about innovative ways to leverage and develop appropriate technologies to support development in different scenarios.

The past eighteen months have been challenging from a research, education, health, societal and economic perspective, forcing the uptake of new communication channels and new methods to support engagement with communities. We would like to congratulate all the authors of papers for sharing their results and continuing to move forward the Sustainable Development and Humanitarian Technology agenda.

The Scientific Program incorporates 68 presentations across 18 parallel thematic sessions addressing Agriculture, Communications, Education, Energy, Disaster Mitigation, Healthcare, Water and Sanitation. This is complemented by thematically focused panels and pre-conference workshops and a range of plenary presentations.

We would like to thank the Track chairs (Prof. Henry Louie, Seattle University, USA - Energy; Prof. Darelle Van Greunen, Nelson Mandela University, South Africa - Agriculture; Prof. Silvia Figueira, Santa Clara University, USA - Water and Sanitation; Prof. Anna Förster, University of Bremen, Germany - Communications; Dr. Adil Usman, University of California Santa Cruz, USA; Miriam Cunningham, IST-Africa Institute, Ireland - Health; Prof Pritpal Singh, Villanova University, USA - Education; Prof. Paul Cunningham, IST-Africa Institute, Ireland - Societal Implications of Technology) and technical reviewers for IEEE GHTC 2021 for the significant time and expertise they invested in reviewing papers and providing authors with constructive, actionable feedback to assist in improving their quality and impact.

We invite you to actively engage in networking during thematic sessions and networking breaks. Enjoy IEEE GHTC 2021.

Miriam Cunningham
 Technical Program Chair
 Dublin, Ireland

Prof. Paul M Cunningham
 Technical Program Chair
 Dublin, Ireland

Prof. Silvia Figueira
 Plenary/Panels
 Santa Clara, USA

CONFERENCE COMMITTEE

GHTC 2021 Organizing Committee

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Vice-Chair Operations Ed Perkins
Finance Chair / Treasurer Titus Lo
Technical Program Chair Miriam Cunningham
Technical Program co-Chair Paul Cunningham
Plenary/Keynote/Panels Silvia Figueira
Tutorials/Workshops Behnam Dezfouli
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R6 Humanitarian Chair Nirupama Prakash Kumar
Engineering For Change Grace Burleson
IEEE SSIT Jay Pearlman
IEEE-USA Tom Coughlin
IEEE-SA Rudi Schubert

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Advisor, R6 Director Tim Lee
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Program Committee

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Technical Program co-Chair Paul Cunningham, IST-Africa Institute

Track Chairs

Affordable & Clean Energy Henry Louie, Seattle University, USA

Agriculture & Food Security Darelle Van Greunen, Nelson Mandela University, South Africa

Clean Water & Sanitation Silvia Figueira, Santa Clara University, USA

Connectivity & Communication in Support of Development Prof Anna Förster, University of Bremen, Germany

Disaster Mitigation, Preparedness, Response & Recovery Adil Usman, University of California Santa Cruz

Good Health and Well Being Miriam Cunningham, IST-Africa Institute, Ireland

Quality Education Pritpal Singh, Villanova, USA

Technology Impacts on Societal Evolution Paul Cunningham, IST-Africa Institute, Ireland

Reviewers

IEEE GHTC 2021 would like to acknowledge the following reviewers who blind peer reviewed papers submitted for consideration and provide authors with actionable feedback.

Title	Given name	Surname	Affiliation	Country
Mr.	Hakiri	Akram	Laboratoire d'Architecture et d'Analyse des Systèmes	France
Dr.	Fungai	Bhunu Shava	Namibia University of Science and Technology	Namibia
Mr.	Bai	Blyden	N/a	USA
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Dr.	Hatice	Ceylan Koydemir	University of California, Los Angeles	USA
Mr.	Tinashe	Chizema	Centre for Community Technologies	South Africa
Ms.	Miriam	Cunningham	IST-Africa Institute	Ireland
Prof.	Paul	Cunningham	IST-Africa Institute	Ireland
Mr.	Charles	Delahunt	Global Health Labs	USA
Dr.	Behnam	Dezfouli	Santa Clara University	USA
Dr.	Sreeram	Dhurjaty	Dhurjaty Electronics Consulting LLC	USA
Ms.	Phumla	Dlamini	Nelson Mandela University	South Africa
Dr.	Xavier	Fernando	Ryerson University	Canada
Prof.	Anna	Förster	University of Bremen	Germany
Prof.	Silvia	Figueira	Santa Clara University	USA
Dr.	Kenneth	Foster	Univ of PA	USA
Mr.	Agyei	Fosu	Walter Sisulu University	South Africa
Dr.	Peter	Freere	Nelson Mandela University	South Africa
Mr.	Dave	Goldsmith	KiloWatts for Humanity	USA
Dr.	Japie	Greeff	NWU	South Africa
Mr.	Felix	Holl	University of California	Germany
Mr.	Iain	Hunt	Villanova University	USA

Ms.	Nikita	Jalodia	Waterford Institute of Technology	Ireland
Prof.	Nobert	Jere	Walter Sisulu University	South Africa
Dr.	Stella	Kabiri	National Agricultural Research Council	Ireland
Mr.	Mayank	Kejriwal	University of Southern California	USA
Dr.	Albert	Ko	Lingnan University	USA
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Dr.	Pritpal	Singh	Villanova University	USA
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Prof.	Aaron	St. Leger	West Point	USA
Dr.	Mohit	Taneja	Walton Institute of Information and Communication Systems Science	Ireland
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Prof.	Darelle	Van Greunen	Nelson Mandela University	South Africa
Dr.	Wenbo	Wang	Global Health Labs	Canada
Mr.	Srihari	Yamanoor	Self	USA

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Our vision is to serve the U.S. IEEE member by being the technical professional's best resource for achieving lifelong career vitality and by providing an effective voice on policies that promote U.S. prosperity.



IEEE Engineering Medicine & Biology Society



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Power & Energy Society™



IEEE Standards Association (IEEE SA) provides a neutral and open environment that empowers innovators – across borders and disciplines – to develop standards and solutions that shape and improve technology for the benefit of industry, society and humanity.

PLENARY SPEAKERS

Meet the Editors: Thinking About Publishing for a Transdisciplinary Outlet: What do you need to know?

Tuesday, October 19, 2021 | 3:00 PM — 3:45 PM (PT)

Katina Michael, founding Editor in Chief and Roba Abbas, co-editor, the *IEEE Transactions on Technology and Society*.

Katina Michael is the founding Editor in Chief of the IEEE Transactions on Technology and Society. Katina works closely with five co-editors Roba Abbas, Rafael Calvo, George Roussos, Eusebio Scornavacca and Samuel Fosso Wamba to service the IEEE and broader community of academicians and practitioners on topics that explore all things technology and society. Come along and learn more about the scope of the journal, what's expected from submissions in content and format, and how to get the most out of the review process. The first 15 minutes will be dedicated to a broad introduction, and then 30 minutes to Q&A from participants.

Journal Scope: The IEEE Transactions on Technology and Society publishes research papers on the interactions among technology, science, and society; on the impact of such interactions on individuals and society; and on the ethical, professional and social responsibility in the practice of science, technology, engineering and mathematics. Within this scope, the Transactions covers a broad range of topics in such areas as energy, information and communication, health and safety, life sciences, economic issues, engineering education, environmental implications, and social effects of emerging technologies and innovations. It also addresses issues surrounding professional practice and responsibility, regulation and public policy, technology and the future of work, philosophy of technology, engineering and biotechnical ethics, and sustainability. The Transactions communicates to a wide array of readers from multiple disciplines involved in the societal impact of technology. It is multidisciplinary with joint perspectives from individuals such as engineers, scientists, technologists, ethicists, public policy experts, lawyers, health practitioners, economists, and sociologists. Emphasis is on high quality research and empirical studies, applications and technological issues, and theoretical arguments supported by evidence or proof.



Katina Michael BIT, MTransPriv, PhD is a professor at Arizona State University, a Senior Global Futures Scientist in the Global Futures Laboratory and has a joint appointment in the School for the Future of Innovation in Society and School of Computing and Augmented Intelligence. She is 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. 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. www.katinamichael.com



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 of Geographers, the American Association for the Advancement of Science (AAAS), Arizona State University and Ostfalia University of Applied Sciences. Roba 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. https://scholars.uow.edu.au/display/roba_abbas

Widening Access to Applied Machine Learning with TinyML

Wednesday, October 20, 2021 | 9:00 AM — 9:45 AM (PT)

Vijay Janapa Reddi, Harvard University and MLCommons

Tiny machine learning (TinyML) is a fast-growing field at the intersection of ML algorithms and low-cost embedded systems. TinyML enables on-device analysis of sensor data (vision, audio, IMU, etc.) at ultra-low-power consumption (<1mW). Processing data close to the sensor allows for an expansive new variety of always-on ML use-cases that preserve bandwidth, latency, and energy while improving responsiveness and maintaining privacy. This talk introduces the vision behind TinyML and showcases some of the novel humanitarian applications that TinyML is enabling in the field, from wildlife conservation to supporting public health initiatives. Yet, there are still numerous challenges to address. Tight memory and storage constraints, hardware/software heterogeneity, and a lack of relevant large-scale datasets still pose a substantial barrier to developing TinyML applications. To this end, the talk also touches upon some of the key challenges and opportunities for unlocking the full potential of TinyML for social good.

Vijay Janapa Reddi is an Associate Professor at Harvard University, VP and a founding member of MLCommons (mlcommons.org), a nonprofit organization aiming to accelerate machine learning innovation for everyone. He also serves on the MLCommons board of directors and is a Co-Chair of the MLCommons Research organization.



Before joining Harvard, he was an Associate Professor at The University of Texas at Austin in the Department of Electrical and Computer Engineering. His research sits at the intersection of machine learning, computer architecture and runtime software. He specializes in building computing systems for tiny IoT devices, as well as mobile and edge computing.

Dr. Janapa-Reddi is a recipient of multiple honors and awards, including the National Academy of Engineering (NAE) Gilbreth Lecturer Honor (2016), IEEE TCCA Young Computer Architect Award (2016), Intel Early Career Award (2013), Google Faculty Research Awards (2012, 2013, 2015, 2017, 2020), Best Papers at the 2020 Design Automation Conference (DAC), 2005 International Symposium on Microarchitecture (MICRO), 2009 International Symposium on High-Performance Computer Architecture (HPCA), IEEE's Top Picks in Computer Architecture awards (2006, 2010, 2011, 2016, 2017, 2021).

Internet Coverage is Not Binary

Wednesday, October 20, 2021 | 9:45 AM — 10:30 AM (PT)

Elizabeth M. Belding, University of California, Santa Barbara

Access to information and communications technologies plays a pivotal role in the socio-economic development of any community. Currently, there are more than 4 billion people with Internet access, representing about half of the world population. Connectivity efforts typically focus on the remaining half of the population. At the same time, discrepancies in access for the 4 billion who do use the Internet are daunting. In this talk, we will examine digital inequality amongst those who do have Internet access, dissecting the Internet experience within the US and abroad in detail.



Elizabeth M. Belding is a Professor in the Department of Computer Science at the University of California, Santa Barbara. Prof. Belding's research focuses on mobile and wireless networking, including network performance analysis, and information and communication technologies for development (ICTD). Prof. Belding applies her wireless network expertise to a wide range of contexts, and is particularly interested in improving Internet and cellular accessibility in developing and resource-challenged communities worldwide. Her ICTD projects have included work in Zambia, South Africa, Mongolia, and refugee camps. Most recently, she has been working with Native

American communities around the US. She is the founder and director of the Mobility Management and Networking (MOMENT) Laboratory.

Prof. Belding is the author of over 150 technical papers on wireless networking and has served on over 80 conference technical program committees. She was Vice Chair of the UCSB Computer

Science department 2009-15 and 2017-19. She is currently an Associate Dean and Faculty Equity Advisor in the UCSB College of Engineering.

Prof. Belding is the recipient of an NSF CAREER Award, and a 2002 MIT Technology Review 100 award, awarded to the world's top young investigators. She is an ACM Fellow, AAAS Fellow and IEEE Fellow. She is particularly proud of receiving the UCSB Outstanding Graduate Mentor Award in 2012 and the NCWIT Harrold and Notkin Research and Graduate Mentoring Award in 2015 for her mentorship of graduate students.

IEEE MOVE Disaster Relief Program

Wednesday, October 20, 2021 | 2:00 PM — 2:30 PM (PT)

Grayson Randall, IEEE MOVE

As climate change continues to have an impact throughout the world, the IEEE MOVE program continues to respond to supply power and communications at disaster events. The IEEE-USA MOVE program celebrates its 5th anniversary. MOVE continues to grow with great support from the members and the donation of a second satellite response vehicle. IEEE MOVE has also started an expansion into the international space with programs in India and the Caribbean. This talk will discuss why the program continues to grow worldwide.



Grayson Randall is an IEEE senior member and the IEEE MOVE Operations lead. Grayson is responsible for the IEEE MOVE truck and associated equipment that is deployed to disasters to support emergency communications. Grayson is also on the IEEE Future Directions Committee and is active in Region 3 activities. Grayson has a background in digital communications, robotics, public safety and emergency response.

Public Interest Tech: Educating Impact-focused Scholars and Practitioners

Thursday, October 21, 2021 | 9:00 AM — 9:40 AM (PT)

Deborah Estrin, Cornell Tech

The profound societal and economic impacts of digital technology have engendered a growing interest in innovations that intentionally serve societal good. Public Interest Tech is an emerging scholarly and professional field that is defined by the deployment of technological expertise in service of public needs—from consumer rights, criminal justice, and trustworthy information ecosystems, to education, public health, and the environment. In this presentation we will describe our efforts to educate the next generation of impact-focused scholars and practitioners through novel Public Interest Tech (PiTech) interventions: PiTech Studio, Impact Fellowships, and Visiting Practitioners programming. A strong diversity of perspectives and experiences is critically important to building effective

PiTech, and we work to reflect this priority across our programs.



Deborah Estrin is a Professor of Computer Science at Cornell Tech where she holds The Robert V. Tishman Founder's Chair, serves as the Associate Dean for Impact, and is an Affiliate Faculty at Weill Cornell Medicine. Estrin's research activities include technologies for caregiving, immersive health, small data, participatory sensing, and Public Interest Technology.

Before joining Cornell University Estrin was the Founding Director of the NSF Center for Embedded Networked Sensing (CENS) at UCLA; pioneering the development of mobile and wireless systems to collect and analyze real-time data about the physical world. Estrin co-founded the non-profit startup, Open mHealth, and has served on several scientific advisory boards for early-stage mobile health startups. She is currently an Amazon Scholar (2019-present).

Estrin is an elected member of the National Academy of Engineering, National Academy of Medicine, and was chosen as a 2018 fellow of the MacArthur Foundation.

Making Sense of Sensing Applications for Agricultural Applications

Thursday, October 21, 2021 | 9:45 AM — 10:30 AM (PT)

Anna Förster, University of Bremen

This talk will first introduce MoleNet, which is a self-developed and maintained hardware platform for underground and other challenged environments, developed mostly for agricultural applications. We will explore together our experience with the system itself and with its deployments. The focus of the talk is however on what to do from this data: how to make the next step from sensing to making sense of the data. What are the users' expectations? What are the challenges? What is needed to make such applications truly useful and help us reach the Sustainable Development Goals.



Anna Förster obtained her MSc degree in computer science and aerospace engineering from the Free University of Berlin, Germany, in 2004 and her PhD degree in self-organising sensor networks from the University of Lugano, Switzerland, in 2009. She also worked as a junior business consultant for McKinsey&Company, Berlin, between 2004 and 2005. From 2010 to 2014, she was a researcher and lecturer at SUPSI (the University of Applied Sciences of Southern Switzerland). Since 2015, she leads the Sustainable Communication Networks group at the University of Bremen.

Her main research interests lie in self-organising and autonomous

sensor and opportunistic networks. She applies various artificial intelligence techniques, like machine learning and swarm intelligence, to various aspects of wireless communication protocols and applications. Furthermore, she is active in designing and developing simulation models and benchmarks for wireless networks. Her research group is especially focused on how to achieve better sustainability of communication networks on one side and how to boost everyday sustainability by innovative applications.

Hearing Aids and Internet-of-Things Ecosystem

Friday, October 22, 2021 | 9:00 AM — 9:40 AM (PT)

Octav Chipara, University of Iowa

Over the last decade, researchers have successfully improved the performance of hearing aids by leveraging the increasing capabilities of hardware platforms, which enabled sophisticated signal processing algorithms. In contrast, I expect that further improvements will not be driven primarily by better hardware but rather by the integration of hearing aids into the Internet of Things (IoT) ecosystem. The IoT ecosystem is composed of resource-constrained devices such as phones, smart glasses, or Internet-enabled doorbells. As an example of this trend, I present two benefits of integrating smartphones and hearing aids. First, I will discuss how smartphones helped improve our understanding of the performance of hearing aids in the real world. Next, I will explain how smartphones can help better personalize hearing aids to meet a user's individual hearing needs. Finally, I will conclude with a vision of hearing aids in which they are tightly integrated into the IoT ecosystem.



Octav Chipara is an Associate Professor of Computer Science at the University of Iowa. His research is interdisciplinary, focusing on using systems and machine learning techniques to mobile health problems. Over the last decade, he has used ecological momentary assessments delivered using mobile apps to better the interactions between hearing amplification techniques and the real-world environments in which they are used. More recently, he has been investigating new methods of increasing access to hearing care personalizing over-the-counter hearing aids with the help of audiologists.

Dr. Chipara received his B.S. from Indiana University Bloomington and his Ph.D. from Washington University in St. Louis. He is a recipient of an NSF Career Award in 2018. In addition, he received the best paper awards at IEEE/ACM Middleware 2015 and IEEE International Symposium on Computer-Based Medical Systems (CBMS 2013). His interdisciplinary research on hearing aids was recognized with the Editor's Award for the Best Published Article in Ear and Hearing in 2019.

Innovations and challenges in developing Medical Devices

Friday, October 22, 2021 | 9:45 AM — 10:30 AM (PT)

Farid Farahmand, Sonoma State University in California

In this brief talk we explore the building blocks and applications of the Internet of Medical Things (IoMT). We talk about technical challenges of developing IoMT and its tremendous value for patient care. We also briefly examine the logistical hurdle in developing novel medical devices, including navigating FDA regulations.



Dr. Farid Farahmand is currently the Chair of the Engineering Science Department (Electrical Engineering) at Sonoma State University in California, U.S.A. He is also the director of Advanced Internet Technology in the Interests of Society Laboratory. Since 2018 he has been a visiting faculty at Lawrence Berkeley National Laboratory (Berkeley Lab). Prior to his academic position at Sonoma State, Dr. Farahmand worked as the research scientist at Alcatel-Lucent Corporate Research and was involved in development of terabit optical routers.

Farid has received multiple Fulbright Fellowships, and he has been a Fulbright Scholar since 2014. Dr. Farahmand holds multiple international patents, numerous reference conference articles and journal publications, and several book chapters, on the subjects of wireless communications, optical networking, green networking, and delay tolerant networks.

His most recent patent aimed at treatment of respiratory conditions by patients with Coronavirus Disease 2019 (COVID-19) in hospital settings. Farid has also authored many educational papers focusing on eLearning and Active Learning in classrooms.

Federal Policies, Programs and Funding Opportunities on Humanitarian Engineering

Friday, October 22, 2021 | 2:10 PM — 3:00 PM (PT)

Aline McNaull, Senior Legislative Representative, IEEE-USA

The federal government organizes many programs, through the Department of State, USAID and other research agencies, that support humanitarian engineering projects. This talk will provide an overview of these programs and funding opportunities and will offer a brief overview of how IEEE-USA is working with these agencies to ensure that the United States can address humanitarian needs in a manner that is sustainable and technology-based. From ensuring the sustainability of our oceans to collaborating with developing nations on remote sensing and

environmental monitoring, IEEE-USA members have been at the forefront of developing technological solutions to global challenges. Ensuring refugees access to electric grids and that they have access to clean water are just some of the many issues that IEEE engineers address through humanitarian programs. Lastly, this talk will provide a summary of how IEEE-USA can be helpful in working with the federal government, Congress and the administration to ensure robust support for the federal programs that support technical work in humanitarian fields.



Aline McNaull works on energy, space, defense and research policy on behalf of IEEE-USA members and is the staff lead for IEEE-USA's research and development policy committee, the committee on aerospace and transportation, as well as the energy policy committee. She collaborates closely with the Coalition for National Security Research, Energy Sciences Coalition, Coalition for National Science Funding and the Task Force on American Innovation. As an advocate for IEEE-USA members, she has influenced legislation on issues and programs at DOD, DOE, NASA, NIST, and NSF. Previously, she was a semiconductor engineer at Raytheon and a patent examiner for the U.S. Patent

and Trademark Office. She holds a BA in physics from Bryn Mawr College.

WORKSHOPS

GHTC 2021 features a set of four interactive workshops on Tuesday October 19, from 9AM-Noon. The workshops are included with full conference registration.

- **Frugal Innovation and the Design Thinking Process**, by Frugal Innovation Hub (SoE of Santa Clara University) and Latin America Frugal Innovation Network
- **Application of IoT During Pre- and Post-COVID 19 Pandemic** (A Humanitarian Services Workshop)
- **Fundamentals of Off-Grid Electrical Systems**, with Prof. Henry Louie, Kilowatts for Humanity and Seattle U
- **Distributed Energy meets Humanitarian Needs**, by IEEE Standards

Frugal Innovation and the Design Thinking Process

October 19th, 2021 – 9AM to 12 PM (PST)

Frugal Innovation Hub (SoE of Santa Clara University) and Latin America Frugal Innovation Network

Despite the advancements in water purification systems, water remains inaccessible to 1.1 million people globally; moreover, 5.000 people die worldwide every day due to illnesses associated with unclean water (OCDE).

Very commonly, socio-technological projects such as water purification projects fail to positively impact a population due to the lack of understanding of the social ecosystem where the need emerges from. Frugal Innovation is a frame of work ideal for engineers interested in improving the sustainability and replicability of their solutions by utilizing a human-centric design approach and by visualizing non-technical factors that directly impact the design process of your solution.

Join Santa Clara University's Frugal Innovation Hub and the Latin America Frugal Innovation Network ESAN University (Peru) on learning how to use Frugal Innovation and the Design Thinking Process to help solve a real-world water challenge in Perú at a local scale.

Workshop outcomes:

- Get participants familiarized with the Design Thinking Process, Frugal Innovation and Frugal Design
- Push participants to apply and design in a practical manner an engineering solution to a social challenge
- Expose participants to social, economic and environmental factors that can impact the sustainability and replicability of their technological solution

Activities:

- Engage the participants with the challenge through documentation
- Design a solution using prototype/flow diagram tools

- Teamwork discussions
- Business elevator pitch
- Sharktank panel (investment challenge)

Number of participants: 25 (5 groups of 5)

Level and technical skills expected from the attendees: Water as many other global challenges is an interdisciplinary challenge within engineering. To be part of this workshop, all you need is to be ready to learn a new approach from the social sciences and business disciplines to reframe socio-technological challenges.

Instructors:



Christian J. Briceño Weiss is an Industrial Engineer with a Master's degree in Marketing and in Marketing Science. Experience in consulting, technical-commercial management, B2B marketing, innovation and sustainability. Focused on seeking challenges in the educational and social fields. NGOs. University professor of design thinking, innovation and entrepreneurship courses. Executive Director in Frugal Lab. Mentor in Incubadora Startup UNI. Member of the Latin America Frugal Innovation Network.

Naldi S. Carrion Puelles has a Masters in Project Management and Masters in Management Science Research, with bachelor degrees in Civil, and Sanitary Engineering. Phd candidate with research focus on innovation strategies in resource-constrained environments. General coordinator at Universidad ESAN's Technology Innovation Center on digital fabrication and 3D modeling. Agualimpia NGO, and ESAN InnovationHub's Board of Directors Member. Latin American Frugal Innovation Network's Founder member. Peruvian Fab Labs Network's manufacturing team leader. Undergraduate and postgraduate professor. Twenty years of professional experience within private, social, academic, and governmental organizations, focused on providing an innovative way of thinking to strengthen organizations' capabilities to do it better with fewer resources and specialized in Territorial Planning, Landscape, Nature Protection.



Allan A. Báez Morales is a Sociologist with a minor in Geography and an M.Sc. in Geology with an emphasis in Management of Natural Disasters. In the U.S, Allan worked as a consultant for the United States Geological Survey, and for 8 years Mr. Báez worked for social ventures in the Silicon Valley focusing on the implementation and sustainability of technologies designed for people in vulnerable conditions and in alliance with companies such as Google, CISCO, the Tech Museum, Vodafone and Twitter.

Currently, Mr. Báez is the Director of Programs and Associations of the Frugal Innovation Hub of the University of Santa Clara, Ca. where he facilitates and manages international and local projects using frugal innovation as a framework.

Application of IoT During Pre- and Post-COVID 19 Pandemic (A Humanitarian Services Workshop)

October 19th, 2021 – 9AM to 12 PM (PST)

Shivakumar (Shiva) Mathapathi and Dr. Farid Farahmand

IoT is a rapidly evolving research area with unprecedented growth potential in application domains that range from environmental monitoring, manufacturing, energy management, healthcare, home automation to transportation and infrastructure management. The IoT revolution is reshaping modern healthcare solutions for implementing technology and economic social prospectus. The current ongoing global challenge of the COVID 19 caused by the novel severe respiratory syndrome coronavirus effected global health crisis.

Scientists and medical doctors embarked on a race to produce safe and effective coronavirus vaccines in record time. IoT innovator and engineers can help these scientists to enable faster track of monitoring quality and logistics of the vaccination supplies. As per Center for Disease Control and Prevention (CDC) quote: “Heat, Cold or light exposure can damage vaccines, resulting in reduced potency. Once potency is lost, it cannot be restored”. The CDC states that improper storage – mainly temperature conditions – is the most common cause for loss of vaccine potency and effectiveness they experience.

This workshop provides theory and tutorials on how to build IoT systems to monitor temperature of vaccination at all stages from vaccine manufacturer, and shipment logistics up to all the way to the last stop of delivery at hospitals and clinics. Participants have an opportunity to learn complete design aspects of IoT solutions for monitoring temperature at all levels as described above. The workshop also intended to learn in designing IoT enabled solutions for hospital/clinic settings for access to information of vaccine storage conditions, route information and patient dashboard to increase trust and reliability between patients and facilities administering the vaccine. The workshop also covers the topics of how to send real time measured data from temperature sensor to web enabled SMS services, PM tools and social media networking platform such as twitter.

The learning objectives of this workshop are as described below:

- Learn building blocks for constructing an IoT project
- Learn various protocols for IoT platforms
- Write python code and firmware for reading sensor temp values
- Learn IoT connectivity protocols from sensors to the cloud
- Evaluate temp readings at all stages of supply chain for COVID 19 vaccination use case.
- Practice data analytics within the Thingspeak IoT platform
- Utilize cloud features to send data to twitter, cellular web platforms (SMS messaging) and other project management tools.
- Develop package and publish real time values to the local health organization/ community
- Create a user-friendly dashboard to monitor the output parameters as required by the CDC and health officials.

Instructors:

Shivakumar (Shiva) Mathapathi has over 25 years of experience in product development, design, and faculty. Shiva is a seasoned technologist, instructor and practitioner on the Internet of Things (IoT) with extensive experience as lead faculty, lab practice and mentorship in executing smart city, smart agriculture, assisted living and other IoT-related projects. Shiva has contributed to build the ecosystem and establish innovation pathways for the OpenIoT project, a blueprint and awarded Open Source project in the Internet of Things for Smart Cities sponsored by the European Commission. Shiva's research and teaching areas include, IoT, Data Analytics and Artificial Intelligence. He is currently teaching at UC San Diego Extn and Ohlone College California.

Dr. Farid Farahmand is currently the Chair of the Engineering Science Department (Electrical Engineering) at Sonoma State University in California, U.S.A. He is also the director of Advanced Internet Technology in the Interests of Society Laboratory. Since 2018 he has been a visiting faculty at Lawrence Berkeley National Laboratory (Berkeley Lab). Prior to his academic position at Sonoma State, Dr. Farahmand worked as the research scientist at Alcatel-Lucent Corporate Research and was involved in development of terabit optical routers. Farid has received multiple Fulbright Fellowships, and he has been a Fulbright Scholar since 2014. Dr. Farahmand holds multiple international patents, numerous reference conference articles and journal publications, and several book chapters, on the subjects of wireless communications, optical networking, green networking, and delay tolerant networks.



Fundamentals of Off-Grid Electrical Systems

October 19th, 2021 – 9AM to 12 PM (PST)

Prof. Henry Louie, Seattle University

This half-day tutorial covers the contextual, technical, and practical implementation aspects of off-grid electrical systems in developing countries. These off-grid systems include mini-grids, micro-grids, energy kiosks, solar home systems and solar lanterns. System architectures and components, including small-scale solar, wind, hydro, biomass and conventional generation sets, batteries and converters are covered. The mini/micro-grid design process is discussed. Pre-implementation best practices, including site assessment and considerations for business model development are discussed. The instructor draws upon his firsthand experience and contemporary research to provide attendees with the foundational knowledge needed to implement or study off-grid systems. The tutorial is based on the book “Off-Grid Electrical Systems in Developing Countries”.

Dr. Henry Louie received his B.S.E.E. degree from Kettering University in 2002, his M.S. degree from the University of Illinois at Urbana-Champaign in 2004 and his PhD in Electrical Engineering



from the University of Washington in 2008. He is a Professor in the Department of Electrical and Computer Engineering at Seattle University. In 2015 Dr. Louie was Fulbright Scholar to Copperbelt University in Kitwe, Zambia.

He is the President and Co-founder of KiloWatts for Humanity, a non-profit organization providing off-grid electricity access and business opportunities in sub-Saharan Africa. Dr. Louie is an Associate Editor for Energy for Sustainable Development and is a founding member of the IEEE PES Working Group on Sustainable Energy Systems for Developing Communities. Dr. Louie is recognized as an IEEE Distinguished Lecturer for his expertise on energy poverty. He is a Senior Member of the IEEE and was a registered professional engineer in Zambia. He previously served as Vice President of Membership & Image of the IEEE Power & Energy Society.

Distributed Energy meets Humanitarian Needs

October 19th, 2021 – 9AM to 12 PM (PST)

Mark Siira, Wayne Stec, IEEE Standards Association SCC 21 and Panos Moutis, CMU

The emphasis is now shifting toward a more decentralized energy infrastructure, where a mix of dispersed and low-carbon, renewable energy sources such as solar, wind, geothermal, fuel cell, and battery installations – collectively called distributed energy resources (DER) – are integrated with the large centralized power plants in the power grid.

Several trends are driving this transformation. Society's desire for more sustainable ways to produce energy have spurred R&D advances, and many new products for DER applications, along with growing use of these systems, are already deployed in the market. In turn, their greater performance and expanding functionality have led to new regulations which have created compelling new business opportunities.

More recent focus on Stand-alone or remote systems or electric power in areas that do not have reliable electric delivery. These areas include application tiers, microgrids and DC systems.

Workshop topics:

The Core Standards

- IEEE 1547 - 2018: IEEE Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces
 - The technical specifications for, and testing of, the interconnection and interoperability between utility electric power systems (EPSs) and distributed energy resources (DERs) are the focus of this standard.
- IEEE 2030-2011 - IEEE Guide for Smart Grid Interoperability of Energy Technology and Information Technology and the IEEE Smart Grid Interoperability Reference Model (SGIRM)

- IEEE Std 2030 provides alternative approaches and best practices for achieving smart grid interoperability. It is the first all-encompassing IEEE standard on smart grid interoperability providing a roadmap directed at establishing the framework in developing an IEEE national and international body of standards based on cross-cutting technical disciplines in power applications and information exchange and control through communications.

Standards Under development:

Interconnection

- IEEE P1547.2 - Application Guide for IEEE Std 1547(TM), IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems
- IEEE P1547.9 - Draft Guide to Using IEEE Std 1547(TM) for Interconnection of Energy Storage Distributed Energy Resources with Electric Power Systems
- IEEE P1547.3 - Guide for Cybersecurity of Distributed Energy Resources Interconnected with Electric Power Systems

Interoperability

- IEEE 2030.5TM-2018 - a protocol that has been instrumental in integrating interoperability into California regulations, and is critical to establishing vehicle-to-grid energy-transfer protocols.
- IEEE P2030.4; Guide for Control and Automation Installations Applied to the Electric Power Infrastructure
- IEEE 2030.7-2017; Standard for the Specification of Microgrid Controllers
- IEEE 2030.8-2018; Standard for the Testing of Microgrid Controllers
- IEEE 2030.9-2019 Recommended Practice for the Planning and Design of the Microgrid
- IEEE P2030.11 Guide for DERMS

General

- IEEE P2030.10 IEEE standard for DC microgrids for rural and remote electricity access applications
- IEEE P2030.10.1 Standard for Electricity Access Requirements with Safety Extra Low Voltage (SELV) Tier II and Tier iii (ESMAP) Multi-tier Framework for Household Electricity Supply
 - Development of Application Classes Application of World Bank Group ESMAP Tiers to consider Stand-Alone locations without T&D or reliable power
- Grid Forming Inverters – Advanced Inverters.

Presenters:

Mark Siira is a senior member of IEEE and currently active as a leader in several standards making organizations. Concurrent leadership roles related to standards include:

- Chair of IEEE Standards Coordinating Committee 21 – IEEE Coordinating Committee on Interconnection and Smart Grid Interoperability
- Chair of IEEE P2030 – Guide for Smart Grid Interoperability, IEEE 2030.2-2015 – Guide for Energy Storage Interoperability, Vice-Chair for IEEE1547 Interconnection

Standard Revision.

- Mark is also an active participant in the IEEE Power Systems Relaying Committee, including K10 Liaison, C26 Protection Testing.
- Mark is a member of the UL Standards Technical Panels 1741 (Inverters), UL2200 (Generators) and 3001 (Systems).

Mark has a Bachelor of Mechanical Engineering Degree from GMI Engineering and Management Institute (now Kettering University), and an MBA from Harvard Business School.



Wayne Stec is Principal at Distregen LLC, Flower Mound, Texas which he founded in 1999. Wayne's consulting roles include providing guidance for the interconnection of renewable energy, battery storage, and other DER to the electric power system. Clients include national laboratories, research organizations, electric utilities, equipment and service providers, and project developers.

Wayne received his B.S. Degree in Electrical Engineering from Illinois Institute of Technology in 1977, and his MBA from DePaul University in 1988. He has over 45 years of experience in the electrical transmission and distribution industry and in consulting including protection systems, distribution systems, transmission systems, generation systems, storage systems, and advanced metering systems. He has been Principal at Distregen LLC, Indianapolis, Indiana, since 1999. Before that he was Director at R.W. Beck, Manager – Information Technology & Automation at ABB Power T & D, Sales Manager – Protection, Meters & Power System Studies at GE Energy, and Project Manager/Application Engineer/Power Systems Engineer at General Electric.

Wayne currently is active in the several standards organizations: IEEE SCC21 – Vice-Chair in Standards Coordinating Committee 21 that oversees the development of standards in the areas of fuel cells, photovoltaics, dispersed generation, and energy storage, IEEE 1547.2 – Working group chair of IEEE 1547.2 application guide for IEEE 1547, and IEEE PSRC – Active contributor in several Power Systems Relay Committee standards and task force documents.

Panayiotis (Panos) Moutis, PhD, has been Special Faculty with the Scott Institute for Energy Innovation at Carnegie Mellon University (CMU) since August 2018 (postdoc at Electrical & Computer Engineering, CMU, 2016-18). His recent grants include one from the national system operator of Portugal, REN, for the development of a transmission expansion planning platform, and another from the moonshot factory of Google, X, for the digital twin of the electrical grid. Between 2018-20 he served as a Marie Curie Research Fellow with DEPsys, Switzerland, on distribution grid synchronized measurements and state estimation. In 2014 he was awarded a fellowship by Arup UK (through the University of Greenwich), on the “Research Challenge of Balancing Urban Microgrids in Future Planned Communities”. In 2013 he won the “IEEE Sustainability 360o



Contest” on the topic of Power. Throughout 2007-15, as part of Prof. Nikos Hatziargyriou’s research group he contributed to over a dozen R&D projects funded by the European Commission.

Panos received both his diploma (2007) and his PhD (2015) degrees in Electrical & Computer Engineering at the National Technical University of Athens, Greece, and has published more than 30 papers and contributed to 5 book chapters. He has accumulated over 10 years of industry experience on projects of Renewable Energy Sources and Energy Efficiency, and serves in energy start-ups as advisor and executive. He is a senior member of multiple IEEE societies, member of the IEEE-USA Energy Policy Committee and NASPI, associate editor of IEEE & IET scientific journals, active contributor to IEEE standards working groups, chair of the IEEE Smart Grid Publications Committee and editor-in-chief of the “IEEE Smart Grid Newsletter”. Personal Website for more information: <https://panaylot1s.com/>

PANELS

Social Media Disinformation and its Impact on Public Health During the COVID-19 Pandemic

Wednesday October 20, 2021 | 1-2 PM (PT)

Moderator: Yuhong Liu, Associate Professor of Computer Science and Engineering, Santa Clara University

Panelists:

- **Laura Robinson:** Affiliated faculty at the Harvard Berkman Klein Center, and an associate professor in the Department of Sociology at Santa Clara University.
- Étienne Brown: Assistant Professor in the Department of Philosophy at San Jose State University
- **Subramaniam Vincent:** Director, Journalism and Media Ethics, Markkula Center for Applied Ethics, Santa Clara University

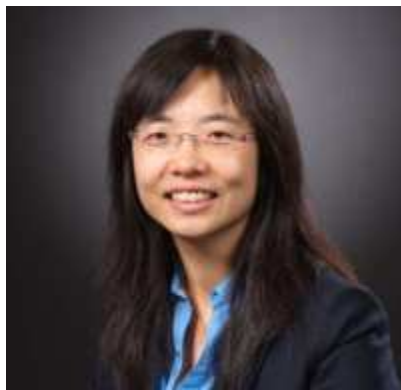
Attempts to influence people's beliefs through misinformation have a long history. Recently, the pervasiveness of social media makes the massive propagation of misinformation much cheaper and influential, raising great concerns from the public. During the COVID-19 pandemic, however, the circulation of false or misleading claims is more dangerous than ever. Beyond the possibility of physical harm, what is its impact on people's political opinions, emotions, physical safety and personal autonomy? What factors may influence people's resistance against misinformation? Is it possible and desirable to control misinformation spread by regulating it? More specifically, before the COVID-19 pandemic, the election of Donald Trump (2016) and Jair Bolsonaro (2018) have witnessed a dramatic historical period animated by the rise of misinformation, right-wing populism, and ever-widening ideological divides in the U.S. and Brazil. Add to this the COVID-19 global pandemic with the U.S. and Brazil leading in global cases and mortalities. When these phenomena converge, can we provide parallel interpretation of information and misinformation as it is co-constructed in real time by Brazilian and American participants in the digital commons during the COVID-19 pandemic?



Laura Robinson is affiliated faculty at the Harvard Berkman Klein Center and an associate professor in the Department of Sociology at Santa Clara University. She earned her PhD from UCLA, where she held a Mellon Fellowship in Latin American Studies and received a Bourse d'Accueil at the École Normale Supérieure. In addition to holding a postdoctoral fellowship on a John D. and Catherine T. MacArthur Foundation funded project at the USC Annenberg Center, Robinson has served as Visiting Assistant Professor at Cornell University and the Chair of CITAMS (formerly CITASA) for 2014-2015. Her research has earned awards from CITASA, AOIR, and NCA IICD. Robinson's current multi-year study examines digital and informational inequalities. Her other leadership positions include Series Co-Editor of Emerald Studies in Media & Communications; Editorial Board Member of Sociological

Methodology, *Revue Française de Sociologie*, *Interpretive Lenses in Sociology*, and the *Journal of Information, Communication & Ethics in Society*; North American Coordinator of the Brazil-U.S. Colloquium on Communication Research; Latin American Organizer of the Partnership for Progress on the Digital Divide International Conference; Section Chair 2014-2015 of the Communication, Information Technologies, and Media Sociology Section of the ASA; Steering Committee Member Digital Sociology Thematic Group of the ISA; and Organizing Committee Member of the Media Sociology Symposium.

Étienne Brown is an Assistant Professor in the Department of Philosophy at San Jose State University since August 2019. Previously, he was a postdoctoral fellow at the University of Oxford and the Université de Montréal. He has also taught philosophy at the Sorbonne (Paris-IV), where he completed his Ph.D. in 2016. Broadly His research interests are within the philosophy of technology, political philosophy and ethics, with a current focus on political epistemology and the ethics of online interaction.



Yuhong Liu, Associate Professor at Department of Computer Engineering Santa Clara University, received her B.S. and M.S. degree from Beijing University of Posts and Telecommunications in 2004 and 2007 respectively, and the Ph.D. degree from University of Rhode Island in 2012. She is the recipient of the 2019 Researcher of the Year Award at School of Engineering, Santa Clara University, and the 2013 University of Rhode Island Graduate School Excellence in Doctoral Research Award. Her research interests include trustworthy computing and cyber security of emerging applications, including online social media and Internet-of-

things. She has published over 60 papers on prestigious journals and peer reviewed conferences. Her papers have been selected as the best paper at the IEEE International Conference on Social Computing 2010 (acceptance rate = 13%) and the 9th International Conference on Ubi-Media Computing (UMEDIA 2016).

Subramaniam (Subbu) Vincent is director for the Journalism and Media Ethics program at the Markkula Center for Applied Ethics, at Santa Clara University. Subbu's focus is on developing tools and frameworks to help advance new norms in journalism practice, ethical news product design and new vocabulary and signals to help the public process and demand ethical media. During 2017-18, Subbu was Tech Lead for The Trust Project at the Markkula Center. Prior to working for the Center, he was a 2016 John S Knight Journalism fellow at Stanford University. In his media career, he was publisher and editor-in-chief for two news magazines in Bangalore, India. Prior to that, he was a software engineer in Silicon Valley.



Tech Innovations for Healthy Aging

Thursday October 21, 2021 | 1-2 PM (PT)

Moderator: Joseph Wei, Managing Director, Technology Ventures Group; Past-sponsorship Chair, GHTC, Advisor/Past-chair of IEEE SCV Section

Panelists:

- **Steve Ewell:** Executive Director, Consumer Technology Association Foundation
- **Michael Philips:** Technology Strategy and Relationships Director, AARP

The United Nations General Assembly declared **2021-2030** the Decade of Healthy Aging that brings together governments, civil society, international agencies, professionals, academia, the media, and the private sector to improve the lives of older people, their families. Both AARP and CTA Foundations have common goals of linking older adults with technologies that enhance their lives. In this panel discussion, the speakers will share past and on-going programs they have been working on that bring innovative solutions to the older adults.

Michael Philips, Director of Technology and Partnerships, AARP



Michael Philips is the Director of Technology and Partnerships at AARP and is dedicated to supporting AARP's important social mission through technology inclusion. Michael has led internal and external technology initiatives at AARP for over 18 years, including tech industry partnerships, community education programs, strategic planning, and AARP's innovation prototyping lab. He is passionate about addressing the growing societal issue of digital equity and empowering adults with the skills and information needed to take full advantage of these amazing times and advocating for all generations within the technology industry.

Steve Ewell, Executive Director, Consumer Technology Association Foundation

Steve Ewell is the executive director of the Consumer Technology Association (CTA) Foundation, a charitable foundation with the mission of linking seniors and people with disabilities with technology that enhances their lives. They support programs providing independence, purpose and vital connections for people across the country. Steve graduated from Drew University with a Bachelor of Arts and earned his MBA and Master of Science in information and telecommunications systems from Johns Hopkins University's Carey Business School. He serves as co-chair of the Forum on Aging, Disability and Independence at the National Academies of Sciences, Engineering and Medicine, the Advisory Council for the Center for Inclusive Design and Engineering (CIDE) at the University of Colorado and the External Advisory



Board of the Enhance Center RERC, a consortium between Weill Cornell Medicine, Florida State University and the University of Illinois at Urbana-Champaign.

Joseph Wei, Managing Director, Technology Ventures Group, LLC



Joseph Wei is the Managing Director at Technology Ventures Group (TVG) which advises startups and corporations on business strategy and product innovations. Previously, he led enterprise businesses at Inventec Corp., NEC, Silicon Graphics Inc., and DEC (acquired by HP). He is a IEEE Senior Member, a HKN member, an advisor/past-chair for the Santa Clara Valley Section, the past-chair for Central Area and SFBA Consumer Technology Society. He is a planning committee member of the Vision Innovation Challenge Summit and Award Ceremony, served as the past-sponsorship chair for GHTC and past-advisor to WIE-ILC. Most recently, he focuses on partnerships with startups, VCs, corporations, non-profit and NGOs in developing innovative solutions for the older adults market. Joseph graduated from Tufts University with a BS in Electrical Engineering and completed professional courses in startup entrepreneurship from Stanford University.

**Advancing IEEE Leadership Through New Initiatives on Sustainable
Development and Energy Transformation
Thursday October 21, 2021 | 2-3 PM (PT)**

Moderator: Rudi Schubert, Director, New Initiatives for the IEEE Standards Association

Panelists:

- **Maïke Luiken, IEEE Vice President – Member & Geographic Activities**
- **Juan Carlos Montero, Part-Time Lecturer Professor at the University of Costa Rica**
- **Sampath Veeraraghavan, Global Chair, IEEE Humanitarian Activities Committee**

Sustainability has a global focus at the United Nations, national and local levels, along with multiple facets that are highly interrelated. While Affordable and Clean Energy is a UN SDG itself, it also provides the infrastructure supporting goals for health, education, clean water and many more elements of international focus. This session will provide an overview of IEEE initiatives and leadership in sustainable development. IEEE has a wide breadth of programs ranging from global perspectives to local level projects and communities working towards a more sustainable world. Recently, IEEE has embarked on amplifying its visibility in sustainability through cross-organizational efforts, as well as external engagement in key global alliances on renewable energy. As IEEE communities of interest continue to grow and accelerate, this session will highlight key programs and opportunities for greater participant engagement in support of sustainability.



Rudi Schubert is the Director, New Initiatives for the IEEE Standards Association, and lead for its Energy Practice. He leads the IEEE Industry Connections program, operating consensus building interest groups across a portfolio of emerging issues and topics including sustainability, renewable energy, and many others. Before joining the IEEE, Rudi was a principal engineer for EnerNex, providing technical expertise on technology standards and testing programs to the National Institute of Standards and Technology (NIST). He also spent twenty years in progressively expanding leadership roles with Telcordia Technologies (formerly Bellcore) establishing technical criteria and implementation methodologies that become a mandated compliance and certification standard used by US telecom carriers for technology deployment. He holds bachelors and masters degrees in mechanical engineering from Stevens Institute of Technology, Hoboken, New Jersey.

Maike Luiken, PhD, SMIEEE, IEEE-HKN, FEIC, is 2021 IEEE Vice President – Member & Geographic Activities. She served as President of IEEE Canada in 2018 – 2019 and, in 2018, as Chair, Policy Track, IEEE Internet Initiative. Currently Adjunct Research Professor at Western University, she was the founding Director of the Bluewater Technology Access Centre (now Lambton Manufacturing Innovation Centre) following eight years as Dean at Lambton College with a number of portfolios: School of Technology and Applied Sciences, Business Development, Sustainable Development and Applied Research. Her strategic leadership in the development of the applied research & innovation capacity and portfolio led to Lambton College becoming one of the three top Research Colleges in Canada.



Her areas of interest and expertise span diverse technical areas from ICT, energy and water to advanced manufacturing and nanotechnologies as well as technology design principles, ethics in design and policy associated with their implementation. She has particular interest in how progress in one area, e.g., in ICT, enables advances in other disciplines and in how deployment of various technologies contributes – or not – to achieving sustainable development.

Maike Luiken has experience in the public and private sectors in Canada and has worked in the USA and Germany. She owns a small technology consulting practice and is a co-owner and a managing director at a start-up company.



Juan Carlos Montero is the Former IEEE Power & Energy Society Vice President of Membership & Image. He has previously held several other volunteer leadership roles within the IEEE Power & Energy Society at the local and international levels. Mr. Montero received the Bachelor and Licentiate degree on Electrical Engineering from the University of Costa Rica. He is the Electrical Operational Planning Coordinator in the Costa Rican National Power Control Center (CENCE). He is also Part-Time Lecturer Professor at the University of Costa Rica. Mr. Montero is a Senior Member of the IEEE.

Sampathkumar Veeraraghavan is a globally renowned technologist best known for his technological innovations in addressing global humanitarian and sustainable development challenges. He is a seasoned technology and business leader with over 16 years of experience in Top 500 Fortune companies. Throughout his career, he has led business critical strategic programs and successfully delivered cutting-edge technologies in areas of conversational Artificial Intelligence (AI), Natural Language Understanding, cloud computing, enterprise systems, infrastructure technologies, assistive and sustainable technologies. Sampath served as an expert in the 2020 Broadband Commission working group on school connectivity co-chaired by UNESCO, UNICEF and ITU to drive “GIGA,” a Global School Connectivity Initiative. He is the founder and president of “The Brahman,” a humanitarian program delivering next-generation social innovations to achieve sustainable development goals and benefit marginalized communities globally. Over a decade, he has launched large-scale transformational global initiatives that brought together academic institutions, industry leaders and Government agencies to address pressing global challenges faced by children with disabilities, impoverished women and students from marginalized communities in developing nations.



Sampath serves as the Global Chair of the 2021 IEEE Humanitarian Activities Committee (IEEE HAC) of the world’s largest technical professional organization “The Institute of Electrical and Electronics Engineers (IEEE), USA. In this role, he spearheads the global strategy and portfolio of sustainable development and humanitarian engineering programs to deliver impactful programs to engage and benefit 400K+ IEEE members at grass root-level in 160 countries. He is credited with launching several novel global programs in humanitarian engineering which successfully inspired and engaged students and young professionals in sustainable development activities globally. Sampath was the Global Chair (2019-2020) of IEEE Special Interest Group on Humanitarian technologies (SIGHT), leading the program to record-breaking growth through high-impact, technology-driven sustainable programs benefiting members in 119+ countries. He is the founding chair for the IEEE SIGHT day (2020) and SIGHT week (2019), a global program that showcases the impactful IEEE technology-based humanitarian programs. He currently leads the IEEE Standard’s 2021 corporate sustainability working group. As an active IEEE and IEEE-

HKN member, Sampath has spearheaded more than 20+ global committees and has made significant contributions in advancing technology for the benefit of humanity.

Sampath is accredited with numerous global awards and media mentions for his leadership excellence and technological innovations in addressing global sustainable development challenges. He was recently honored with one of the top global awards “2020 IEEE Theodore W. Hissey Professional Award”. He has delivered 250+ invited talks in International forums, premier technology conferences and industry panels organized by UN, IEEE, ITU, World IoT forum and Top universities around the globe.

He has authored and published 30+ research publications and thought leadership articles in leading global conferences, journals and magazines. His technological innovations and leadership excellence were featured in cover stories of global media such as IEEE TV, IEEE spectrum, USA today, E-week, AI-news and IEEE transmitter, The Bridge and ACM-News. He received an M.S. degree in Electrical Engineering from Tufts University, Massachusetts, USA (2010) and B.E. degree in Computer Science and Engineering from Anna University, India (2005). He currently works as a senior technology and program management leader in the conversational Artificial Intelligence industry where he spearheads a portfolio of science and engineering programs to advance spoken language innovations.

Think Global, Act Local: Fostering Engineering Knowledge and Capacity for Impact

Friday October 22, 2021 | 1-2 PM (PT)

Moderator: Iana Aranda, Director, Engineering Global Development, ASME and President, Engineering for Change

Panelists:

- **Nishant Agarwal**, Founder & CEO, Life and Limb (P) Ltd., (India)
- **Abdul Rashid Mussah**, Graduate Assistant at the University of Missouri-Columbia (USA)
- **Valentina Ospira**, Architect (Colombia)
- **Brandon Simons**, Graduate Assistant at Villanova University (USA)



Iana Aranda (Moderator) is the Director of the Engineering Global Development Department at the American Society of Mechanical Engineers (ASME) where she sets the business strategy of a portfolio of programs and platforms that advance knowledge, workforce and hardware-led social innovation to improve the quality of life of underserved communities. Iana also serves as the President of Engineering for Change, LLC (E4C) – a knowledge organization and global community of over 1 million individuals dedicated to design and delivery of essential technologies advancing sustainable development. In

both roles, Iana is driving an agenda for a multidisciplinary and human-centered approach to international development enabled by a prepared engineering workforce, sustainable technology, cross-sector partnerships and robust innovation ecosystems. Iana has 15 years of experience in academic, research and nonprofit sectors focusing on the intersection of engineering design, business strategy and social impact.

Nishant Agarwal concluded his MS with a specialization in Manufacturing Sciences at the Indian Institute of Technology [IIT] Kanpur in 2018. He has been associated with ASME Engineering for Change since 2019. During the fellowship, Nishant was a part of the research around engineering response to COVID-19 where the team curated a reference list of resources to mitigate negative health outcomes worldwide. He founded Life and Limb in the year 2020 – to develop cost-effective myoelectric upper limb prostheses considering the socio-economic sphere of the amputees in the low-resource settings. The startup was amongst the top three winners at the ASME ISHOW India 2021.



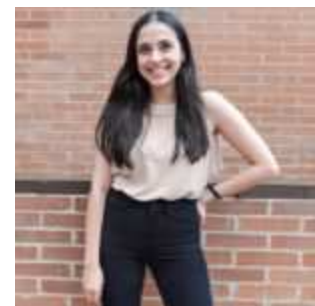
Linkedin: <https://www.linkedin.com/in/anishant/>



Abdul Rashid Mussah is a PhD student specializing in big data, machine learning and artificial intelligence for transportation engineering applications. He is originally from Ghana, West Africa where he earned his BSc. in Civil and Environmental Engineering, before moving to the USA to earn his MSc. in Transportation Engineering at the University of Tennessee in Knoxville. His work and research experience spans many fields from engineering design, to human factors analysis, and currently spatio-temporal network systems optimization. As an E4C Research Fellow in 2021, Abdul worked with Bridges to Prosperity to evaluate the data and start understanding the impact of trail bridges on the built environment in rural communities in Africa and beyond.

Linkedin: <https://www.linkedin.com/in/abdul-rashid-kanda-mussah-51197560/>

Valentina Ospina is an architect recently graduated from the Javeriana University of Colombia. Passionate about her career, in search of knowledge that allows her to create tools that can help transform the world so that we can all inhabit the planet in the best conditions. In the future she seeks to have a master's degree in sustainable design and architectural heritage intervention. As an E4C Research Fellow in 2021, her research focused on developing improved automation of BIM workflows for Retrofitting Projects for Build Change.



Linkedin: www.linkedin.com/in/valentina-ospina-11a7b7186



Brandon Simons graduated from Illinois Tech with a Bachelor's in Electrical Engineering. Post-graduation, he served in the US Peace Corps in Southern Zambia, focusing in agriculture, youth development, HIV education, appropriate technology, and rural solar electrification. Currently, he is a graduate assistant at Villanova University pursuing a Master's in Sustainable Engineering with a focus in International Development and Renewable Energy. His academic projects look at the recovery of Toyota Prius NiMH batteries for solar home systems in Fiji and solar WiFi hotspots for educational resource availability in rural Cambodian schools. . As an E4C Research Fellow in 2021, he worked with SolarBuddy to design and engineer FamilyBuddy, a cost-effective, modular and easy-to-assemble solution for lighting, charging devices, cooking and cooling through solar energy.

Linkedin: <https://www.linkedin.com/in/brandonsimons/>

GHTC 2021 PROGRAM GRID

NOTE: All Times are Pacific Time - Add 3 hours for ET and 7 hours for GMT

Tuesday, October 19, 2021				
Time (Pacific Time)	Plenary	Track 1	Track 2	Track 3
9:00 AM - 12:00 PM	<p style="text-align: center;">Workshop Frugal Innovation and the Design Thinking Process (Allan Baez Morales, Frugal Innovation Hub, Santa Clara University)</p>	<p style="text-align: center;">Workshop Fundamentals of Off- Grid Electrical Systems (Henry Louie)</p>	<p style="text-align: center;">Workshop Application of IoT During Pre- and Post- COVID 19 Pandemic (Shiva Mathapathi, CEO, Dew Mobility; Farid Farahmand, Sonoma State U)</p>	<p style="text-align: center;">Workshop <i>Distributed Energy meets Humanitarian Needs</i> (Mark Siira, Wayne Stec, IEEE SA SCC 21; Panos Moutis, CMU)</p>
12:00 – 1:00 PM	Lunch Break & Networking Session			
3:00 – 3:45 PM	Thinking About Publishing for a Transdisciplinary Outlet: What do you need to know?			
3:45 – 4:00 PM	Break/Networking Session			
4:00 – 6:00 PM	Student Poster Competition			
6:00 – 6:15 PM	Poll: Who did the Best Job?			

Wednesday, October 20, 2021			
Time (PT)	Track 1	Track 2	Track 3
8:45 – 9 AM	Opening Remarks		
9:00-9:40 AM	Plenary Talk: Widening Access to Applied Machine Learning with TinyML (Dr. Vijay Janapa Reddi, Harvard University)		
9:40-9:45 AM	Break		
9:45-10:30 AM	Plenary Talk: Internet Coverage is Not Binary (Dr. Elizabeth M. Belding, University of California, Santa Barbara)		
10:30-10:40 AM	Break		
10:40 AM – 12 PM	Healthcare 1: Applications Supporting Visual Impairments	Disaster Mitigation 1: Role of Web-based Services and Social Media Channels During Global Pandemic Situations	Energy 1: Off-Grid Electrification
12 PM – 1 PM	Lunch Break & Networking Session: Agriculture, Healthcare, Education, Connectivity, Energy, Water		
1 – 1:50 PM	Panel: Social Media Disinformation and its Impact on Public Health During the COVID-19 Pandemic (Moderator: Dr. Yuhong Liu, Santa Clara University)		
2 – 2:30 PM	Plenary Presentation: Lessons Learned from MOVE (Moderator: Grayson Randall, IEEE MOVE Team Operations Lead)		
2:30 – 2:40 PM	Break		
2:40 – 4:00 PM	Healthcare 2: Medical Technology	Disaster Mitigation 2: Data Transmission and Communication During Disasters	Energy 2: Sustainable Grid Technologies
4:30 PM – 5 PM	Networking Session: Agriculture, Healthcare, Education, Connectivity, Energy, Water		

Thursday, October 21, 2021			
Time (Pacific Time)	Track 1	Track 2	Track 3
9:00-9:40 AM	Plenary Talk: Public Interest Tech: Educating Impact-focused Scholars and Practitioners (Dr. Deborah Estrin, Cornell Tech)		
9:40-9:45 AM	Break		
9:45-10:30 AM	Plenary Talk: Making Sense of Sensing Applications for Agricultural Applications (Dr. Anna Forster, University of Bremen)		
10:30- 10:40 AM	Break		
10:40 AM – 12 PM	Agriculture 1: Technology Adoption in Agriculture	Healthcare 3: Supporting Stakeholder Engagement	Education 1: Online Service Learning
12 PM -1 PM	Lunch Break & Networking Session: Agriculture, Healthcare, Education, Connectivity, Energy, Water		
1 – 1:50 PM	Plenary Panel: Tech Innovations for Healthy Aging (Moderator: Joseph Wei, Technology Ventures Group)		
2 – 2:50 PM	Plenary Panel: Advancing IEEE Leadership Through New Initiatives on Sustainable Development and Energy Transformation (Moderator: Rudi Schubert, IEEE Standards)		
2:50 – 3:00 PM	Break		
3:00 – 4:30 PM	Agriculture 2: Technology Adoption in Agriculture	Disaster Mitigation 3: Aerial Monitoring System for disaster response and recovery	Education 2: Professional Preparation of Social Entrepreneurs
4:30 PM – 5 PM	Networking Session: Agriculture, Healthcare, Education, Connectivity, Energy, Water		

Friday, October 22, 2021			
Time (Pacific Time)	Track 1	Track 2	Track 3
9:00-09:40 AM	Plenary Talk: Hearing Aids and Internet-of-Things Ecosystem (Dr. Octav Chipara, The University of Iowa)		
9:40-9:45 AM	Break		
9:45-10:30 AM	Plenary Talk: Innovations and challenges in developing Medical Devices (Dr. Farid Farahmand, Sonoma State University)		
10:30 – 10:40 AM	Break		
10:40 AM – 12 PM	Agriculture 3: Technology Adoption in Agriculture	Communications based Applications and Issues	Energy 3: Human-Centered Design of Energy Applications
12 PM -1 PM	Lunch Break & Networking Session: Agriculture, Healthcare, Education, Connectivity, Energy, Water		
1 – 2 PM	Plenary Panel: Think Global, Act Local: Fostering Engineering Knowledge and Capacity for Impact (Moderator: Iana Aranda, Director, Engineering Global Development, ASME and President, Engineering for Change)		
2:10 – 3 PM	Plenary Talk: Federal Policies, Programs and Funding Opportunities on Humanitarian Engineering (Aline McNaull, Senior Legislative Representative, IEEE-USA)		
3:10 – 4:20 PM	Education 3	Water and Sanitation Applications and Issues	Energy 4: Energy Conversion and Storage for Humanitarian Applications
4:30 – 5 PM	Closing Session and Best Papers Awards		

PROGRAM

Special Sessions

Workshops (Tuesday Oct. 19, 900 - 1200 (PT), 1200 - 1500 (ET), 1600 - 1900 (GMT))

GHTC 2021 features a set of four half-day interactive workshops which are included with full conference registration.

- Frugal Innovation and the Design Thinking Process, by Frugal Innovation Hub (SoE of Santa Clara University) and Latin America Frugal Innovation Network
- Application of IoT During Pre- and Post-COVID 19 Pandemic (A Humanitarian Services Workshop)
- Fundamentals of Off-Grid Electrical Systems, with Prof. Henry Louie, Kilowatts for Humanity and Seattle U
- Distributed Energy meets Humanitarian Needs, by Mark Siira, Wayne Stec, IEEE Standards Association SCC 21 and Panos Moutis, CMU

Meet the Editors: Thinking About Publishing for a Transdisciplinary Outlet: What do you need to know? (Tuesday, Oct. 19, 1500 - 1545 (PT), 1800 - 1845 (ET), 2200 - 2245 (GMT))

Katina Michael, founding Editor in Chief and Roba Abbas, co-editor, the *IEEE Transactions on Technology and Society* will discuss the journal's submission process and answer questions.

Student Poster Competition (Tuesday Oct. 19, 1600 - 1800 (PT), 1900 - 2000 (ET), 2300 - 0100 (GMT))

GHTC 2021 invited undergraduate students to submit abstracts for the Student Poster Competition. Students were invited to send in ideas or designs for developing projects/products supporting the Key focus areas of GHTC 2021.

Attend the Student Poster Competition and vote for the best poster for the People's Choice Award.

Opening Session (Wednesday Oct. 20, 845 - 900 (PT), 1145 - 1200 (ET), 1545 - 1600 (GMT))

Must attend Overview of the GHTC 2021 Virtual Program, technical sessions and navigation mechanics with Conference Chair Behnam Dezfouli and Technical Program Chair Miriam Cunningham.

Closing Session (Friday Oct. 22, 1630-1700 (PT), 1930-2000 (ET), 2330-0000 (GMT))

Closing Session and Best Papers Awards, Poster Competition winners announced.

Plenary Panels

- Social Media Disinformation and its Impact on Public Health During the COVID-19 Pandemic (Wednesday October 20, 1300-1350 (PT), 1600-1650 (ET), 2000-2050 (GMT))

- Tech Innovations for Healthy Aging (Thursday Oct. 21, 1300-1350 (PT), 1600-1650 (ET), 2000-2050 (GMT))
- Advancing IEEE Leadership Through New Initiatives on Sustainable Development and Energy Transformation (Thursday Oct. 21, 1400-1450 (PT), 1700-1750 (ET), 2100-2150 (GMT))
- Think Global, Act Local: Fostering Engineering Knowledge and Capacity for Impact (Friday, October 22, 13:00-14:00 (PT), 1600-1700 (ET), 2000-2100 (GMT))

Keynote Talks and Presentations

- Widening Access to Applied Machine Learning with TinyML (Wednesday, Oct. 20, 900 - 940 (PT), 1200 - 1240 (ET), 1600 - 1640 (GMT))
- Plenary Presentation: Internet Coverage is Not Binary (Wednesday, Oct. 20, 945 - 1030 (PT), 1245 - 1330 (ET), 1640 - 1730 (GMT))
- Lessons Learned from MOVE (Wednesday, Oct. 20 1400 - 1430 (PT), 1700 - 1730 (ET), 2100 - 2130 (GMT))
- Public Interest Tech: Educating Impact-focused Scholars and Practitioners (Thursday, Oct. 21, 900 - 940 (PT), 1200 - 1240 (ET), 1600 - 1640 (GMT))
- Making Sense of Sensing Applications for Agricultural Applications (Thursday, Oct. 21, 945 - 1030 (PT), 1245 - 1330 (ET), 1640 - 1730 (GMT))
- Hearing Aids and Internet-of-Things Ecosystem (Friday, Oct. 22, 900 - 940 (PT), 1200 - 1240 (ET), 1600 - 1640 (GMT))
- Innovations and challenges in developing Medical Devices (Friday, Oct. 22, 945 - 1030 (PT), 1245 - 1330 (ET), 1640 - 1730 (GMT))
- Federal Policies, Programs and Funding Opportunities on Humanitarian Engineering (Friday, Oct. 22 1410 - 1500 (PT), 1710 - 1800 (ET), 2110 - 2200 (GMT))

Tuesday, October 19

Tuesday, October 19 0900 - 1200 (PT), 1200 - 1500 (ET), 1600 - 1900 (GMT)

W1: Frugal Innovation and the Design Thinking Process

Room: Plenary

Frugal Innovation Hub (SoE of Santa Clara University) and Latin America Frugal Innovation Network

Join Santa Clara University's Frugal Innovation Hub and the Latin America Frugal Innovation Network ESAN University (Peru) on learning how to use Frugal Innovation and the Design Thinking Process to help solve a real-world water challenge in Perú at a local scale.

Workshop outcomes:

- Get participants familiarized with the Design Thinking Process, Frugal Innovation and Frugal Design
- Push participants to apply and design in a practical manner an engineering solution to a social challenge
- Expose participants to social, economic and environmental factors that can impact the sustainability and replicability of their technological solution

Activities:

- Engage the participants with the challenge through documentation
- Design a solution using prototype/flow diagram tools
- Teamwork discussions
- Business elevator pitch
- Sharktank panel (investment challenge)

Number of participants: 25 (5 groups of 5)

W2: Fundamentals of Off-Grid Electrical Systems

Room: track1

Prof. Henry Louie, Seattle University

This half-day tutorial covers the contextual, technical, and practical implementation aspects of off-grid electrical systems in developing countries. These off-grid systems include mini-grids, micro-grids, energy kiosks, solar home systems and solar lanterns. System architectures and components, including small-scale solar, wind, hydro, biomass and conventional generation sets, batteries and converters are covered. The mini/micro-grid design process is discussed. Pre-implementation best practices, including site assessment and considerations for business model development are discussed. The instructor draws upon his firsthand experience and contemporary research to

provide attendees with the foundational knowledge needed to implement or study off-grid systems. The tutorial is based on the book "Off-Grid Electrical Systems in Developing Countries".

W3: Application of IoT During Pre- and Post-COVID 19 Pandemic
(A Humanitarian Services Workshop)

Room: track2

Shivakumar (Shiva) Mathapathi and Dr. Farid Farahmand

This workshop provides theory and tutorials on how to build IoT systems to monitor temperature of vaccination at all stages from vaccine manufacturer, and shipment logistics up to all the way to the last stop of delivery at hospitals and clinics. Participants have an opportunity to learn complete design aspects of IoT solutions for monitoring temperature at all levels as described above. The workshop also intended to learn in designing IoT enabled solutions for hospital/clinic settings for access to information of vaccine storage conditions, route information and patient dashboard to increase trust and reliability between patients and facilities administering the vaccine. The workshop also covers the topics of how to send real time measured data from temperature sensor to web enabled SMS services, PM tools and social media networking platform such as twitter.

W4: Distributed Energy meets Humanitarian Needs

Room: track3

Mark Siira, Wayne Stec, IEEE Standards Association SCC 21 and Panos Moutis, CMU

The emphasis is now shifting toward a more decentralized energy infrastructure, where a mix of dispersed and low-carbon, renewable energy sources such as solar, wind, geothermal, fuel cell, and battery installations - collectively called distributed energy resources (DER) - are integrated with the large centralized power plants in the power grid.

Several trends are driving this transformation. Society's desire for more sustainable ways to produce energy have spurred R&D advances, and many new products for DER applications, along with growing use of these systems, are already deployed in the market. In turn, their greater performance and expanding functionality have led to new regulations which have created compelling new business opportunities.

More recent focus on Stand-alone or remote systems or electric power in areas that do not have reliable electric delivery. These areas include application tiers, microgrids and DC systems.

Tuesday, October 19 12:00 - 13:00 (PT), 1500 - 1600 (ET), 1900 - 2000 (GMT)

TU-LB: Lunch Break & Networking Session

Room: Plenary

Tuesday, October 19 15:00 - 15:45 (PT), 1800 - 1845 (ET), 2200 - 2245 (GMT)

**TU-ME: Meet the Editors: Thinking About Publishing for a Transdisciplinary Outlet:
What do you need to know?**

Room: Plenary

Chair: Jay Pearlman, IEEE SSIT

Katina Michael, founding Editor in Chief and Roba Abbas, co-editor, the *IEEE Transactions on Technology and Society*

Katina Michael is the founding Editor in Chief of the IEEE Transactions on Technology and Society. Katina works closely with five co-editors Roba Abbas, Rafael Calvo, George Roussos, Eusebio Scornavacca and Samuel Fosso Wamba to service the IEEE and broader community of academicians and practitioners on topics that explore all things technology and society. Come along and learn more about the scope of the journal, what's expected from submissions in content and format, and how to get the most out of the review process. The first 15 minutes will be dedicated to a broad introduction, and then 30 minutes to Q&A from participants.

Journal Scope: The IEEE Transactions on Technology and Society publishes research papers on the interactions among technology, science, and society; on the impact of such interactions on individuals and society; and on the ethical, professional and social responsibility in the practice of science, technology, engineering and mathematics. Within this scope, the Transactions covers a broad range of topics in such areas as energy, information and communication, health and safety, life sciences, economic issues, engineering education, environmental implications, and social effects of emerging technologies and innovations. It also addresses issues surrounding professional practice and responsibility, regulation and public policy, technology and the future of work, philosophy of technology, engineering and biotechnical ethics, and sustainability. The Transactions communicates to a wide array of readers from multiple disciplines involved in the societal impact of technology. It is multidisciplinary with joint perspectives from individuals such as engineers, scientists, technologists, ethicists, public policy experts, lawyers, health practitioners, economists, and sociologists. Emphasis is on high quality research and empirical studies, applications and technological issues, and theoretical arguments supported by evidence or proof.

Tuesday, October 19 15:45 - 16:00 (PT), 1845 - 1900 (ET), 2245 - 2300 (GMT)

TU-AB: Break/Networking Session

Room: Plenary

Tuesday, October 19 16:00 - 18:00 (PT), 1900 - 2100 (ET), 2300 - 0100 (GMT)

SPC: Student Poster Competition

Room: Plenary

Chair: Mostafa Mortezaie (DeVry University, USA)

Tuesday, October 19 18:00 - 18:15 (PT), 2100 - 2115 (ET), 0100 - 0115 (GMT)

SPCW: Poll: Who did the Best Job?

Room: Plenary

Recap of presentations

Wednesday, October 20**Wednesday, October 20 8:45 - 9:00 (PT), 1135 - 1200 (ET), 1545 - 1600 (GMT)****WE-OS: Opening Session**

Room: Plenary

Chair: Behnam Dezfouli (Santa Clara University, USA)

General Chair: Behnam Dezfouli

Technical Program: Miriam Cunningham

Wednesday, October 20 9:00 - 9:40 (PT), 1200 - 1240 (ET), 1600 - 1640 (GMT)**WE-P1: Plenary Presentation: Widening Access to Applied Machine Learning with TinyML**

Room: Plenary

Vijay Janapa Reddi, Associate Professor at Harvard University, VP and founding member of MLCommons

Tiny machine learning (TinyML) is a fast-growing field at the intersection of ML algorithms and low-cost embedded systems. TinyML enables on-device analysis of sensor data (vision, audio, IMU, etc.) at ultra-low-power consumption (<1mW). Processing data close to the sensor allows for an expansive new variety of always-on ML use-cases that preserve bandwidth, latency, and energy while improving responsiveness and maintaining privacy. This talk introduces the vision behind TinyML and showcases some of the novel humanitarian applications that TinyML is enabling in the field, from wildlife conservation to supporting public health initiatives. Yet, there are still numerous challenges to address. Tight memory and storage constraints, hardware/software heterogeneity, and a lack of relevant large-scale datasets still pose a substantial barrier to developing TinyML applications. To this end, the talk also touches upon some of the key challenges and opportunities for unlocking the full potential of TinyML for social good.

Wednesday, October 20 9:45 - 10:30 (PT), 1245 - 1330 (ET), 1645 - 1730 (GMT)**WE-P2: Plenary Presentation: Internet Coverage is Not Binary**

Room: Plenary

Elizabeth M. Belding, Professor, Department of Computer Science, University of California, Santa Barbara

Access to information and communications technologies plays a pivotal role in the socio-economic development of any community. Currently, there are more than 4 billion people with Internet access, representing about half of the world population. Connectivity efforts typically focus on the remaining half of the population. At the same time, discrepancies in access for the 4 billion who

do use the Internet are daunting. In this talk, we will examine digital inequality amongst those who do have Internet access, dissecting the Internet experience within the US and abroad in detail.

Wednesday, October 20 10:30 - 10:40 (PT), 1330 - 1340 (ET), 1730 - 1740 (GMT)

WE-B2: Break

Room: Plenary

Wednesday, October 20 10:40 - 12:00 (PT), 1340 - 1500 (ET), 1740 - 1900 (GMT)

WE-DM1: Disaster Mitigation 1: Role of web-based services and social media channels during global pandemic situations

Room: track2

Chair: Adil Usman (University of California Santa Cruz, USA)

10:40 Vehicle detection using YOLO and mobility tracking during COVID-19 pandemic lockdowns

[Marion Ivan Tan](#), [Clyde Calgo](#) and [Sheanne Eric Cabantac](#) (Ateneo de Manila University, Philippines); [Jaime Luis E Honrado](#) (Ateneo de Manila University & Skyeye, Inc., Philippines); [Nathaniel Libatique](#) (Ateneo de Manila University, Philippines); [Gregory Tangonan](#) (Ateneo Innovation Center, Philippines)

11:00 Understanding COVID-19 Public Sentiment Towards Public Health Policies Using Social Media Data

[Olivia Figueira](#), [Yuka Hatori](#), [Liyang Liang](#), [Christine Chye](#) and [Yuhong Liu](#) (Santa Clara University, USA)

11:20 Evaluation of rule-based, CountVectorizer, and Word2Vec machine learning models for tweet analysis to improve disaster relief

[Radhika Goyal](#) (Lynbrook High School, USA)

11:40 Deploying Kalahok 1.0: Profiling Disaster-Stricken Communities Towards Intervention Initiatives

[Joseph Marvin Imperial](#) and [Manolito Octaviano](#) (National University, Philippines); [Jesvir Zuniega](#) (Bicol University, Philippines); [Angelica De La Cruz](#) and [Rachel Edita Roxas](#) (National University, Philippines)

WE-EN1: Energy 1: Off-Grid Electrification

Room: track3

Chair: Henry Louie (Seattle University, USA)

10:40 SESDC Pre-Feasibility Toolkit Economic Validation For Microgrids In Developing Countries

[Robert Nutter](#) (IEEE PES SES DC Working Group, USA); [Jaspreet Singh](#) (IEEE PES, USA); [Peter Dauenhauer](#) (University of Strathclyde & Snohomish County PUD, USA)

11:00 A Rural Microgrid Field Pilot in India Ensuring Reliable Electricity Supply and Social Upliftment

[Shiv Kumar Singh](#) (Indian Institute of Technology, Kanpur, India); [Ankush Sharma](#) (Indian Institute of Technology Kanpur, India); [Santanu Mishra](#) (Indian Institute of Technology, Kanpur, India); [Suresh Chandra Srivastava](#) (Indian Institute of Technology Kanpur, India); [Deep Mukherjee](#) (IIT Kanpur, India); [Anurag. K Srivastava](#) (West Virginia University, USA); [Noel Schulz](#) (Washington State University, USA)

11:20 An Approach Towards a Sustainable Urban City - Utilization of Existing Rooftop Solar Energy Panels by Making Use of DC Appliances

[Ashir Hamim Rifat](#) and [Muckbul Hossain](#) (Brac University, Bangladesh); [Rifatul Islam Abir](#) and [Shoud Noman](#) (BRAC University, Bangladesh); [Tahmidul Ashraf](#) and [A. K. M Abdul Azad](#) (Brac University, Bangladesh)

11:40 Energy-Efficient Programming Languages for Mobile Applications

[Shashikala Mahadevappa](#) and [Silvia Figueira](#) (Santa Clara University, USA)

WE-H1: Healthcare 1: Healthcare Applications Supporting Visual Impairments

Room: track1

Chair: Miriam Cunningham (IIMC / IST-Africa, Ireland)

10:40 Application for Measuring Eyelid Weakness in Individuals with Myasthenia Gravis

[Shixin Qin](#), [Germaine Y Ng](#), [Hua Lo](#), [Yanzhang Li](#) and [Ami Cuneo](#) (University of Washington, USA); [Matthew Preston](#) (UW Medicine, USA); [Nicholas Ames](#) and [John Raiti](#) (University of Washington, USA)

11:00 Inexpensive Voice Assisted Smart Eyewear for Visually Impaired Persons in Context of Bangladesh

[Md. Mahmudul Kabir Peyal](#), [Quazi Md. Ahnaf Ul Haque](#) and [Tashfia Tahiat](#) (Brac University, Bangladesh); [Sadia Habib](#) (BRAC University, Bangladesh); [Al Noor](#) and [A. K. M Abdul Azad](#) (Brac University, Bangladesh)

11:20 Wearable Device Using Depth Sensor for the Visually Impaired

[Sophia L Zhou](#), [Jon Cili](#), [Jay Nagpaul](#) and [Rutvik Parikh](#) (Worcester Polytechnic Institute, USA)

11:40 Effatá: Obstacle Identification System to help the Blind in Urban Displacement

[Lukas Bergengruen](#), [Diego Duran](#) and [Rafael Sotelo](#) (Universidad de Montevideo, Uruguay)

Wednesday, October 20 12:00 - 13:00 (PT), 1500 - 1600 (ET), 1900 - 2000 (GMT)

WE-LB: Lunch Break & Networking Session

Room: Plenary

Wednesday, October 20 13:00 - 13:50 (PT), 1600 - 1650 (ET), 2000 - 2050 (GMT)

**WE-P3: Plenary Panel: Social Media Disinformation and its Impact on Public Health
During the COVID-19 Pandemic**

Room: Plenary

Moderator: Yuhong Liu, Associate Professor of Computer Science and Engineering, Santa Clara University

Panelists:

- Laura Robinson: Affiliated faculty at the Harvard Berkman Klein Center, and an associate professor in the Department of Sociology at Santa Clara University.
- Subramaniam Vincent: Director, Journalism and Media Ethics program at Santa Clara University
- Étienne Brown: Assistant Professor in the Department of Philosophy at San Jose State

Attempts to influence people's beliefs through misinformation have a long history. Recently, the pervasiveness of social media makes the massive propagation of misinformation much cheaper and influential, raising great concerns from the public. During the COVID-19 pandemic, however, the circulation of false or misleading claims is more dangerous than ever. Beyond the possibility of physical harm, what is its impact on people's political opinions, emotions, physical safety and personal autonomy? What factors may influence people's resistance against misinformation? Is it possible and desirable to control misinformation spread by regulating it?

Wednesday, October 20 14:00 - 14:30 (PT), 1700 - 1730 (ET), 2100 - 2130 (GMT)

WE-P4: Plenary Presentation: Lessons Learned from MOVE

Room: Plenary

Grayson Randall, IEEE MOVE Team Operations Lead

As climate change continues to have an impact throughout the world, the IEEE MOVE program continues to respond to supply power and communications at disaster events. The IEEE-USA MOVE program celebrates its 5th anniversary. MOVE continues to grow with great support from the members and the donation of a second satellite response vehicle. IEEE MOVE has also started an expansion into the international space with programs in India and the Caribbean. This talk will discuss why the program continues to grow worldwide.

Wednesday, October 20 14:30 - 14:40 (PT), 1730 - 1740 (ET), 2130 - 2140 (GMT)

WE-B3: Break

Room: Plenary

Wednesday, October 20 14:40 - 16:00 (PT), 1740 - 1900 (ET), 2140 - 2300 (GMT)

WE-DM2: Disaster Mitigation 2: Data Transmission and Communication During Disasters

Room: track2

Chair: Paul M Cunningham (IIMC / mHealth4Afrika / IST-Africa Institute, Ireland)

14:40 Network Hazard Flow for Multi-Tiered Discriminator Analysis Enhancement with Systems-Theoretic Process Analysis

[Acklyn Murray](#) and [Danda B. Rawat](#) (Howard University, USA)

15:00 Fixing Mobile Emergency Call Geo-Location Once and For All

[Ghassan Al-Nuaimi](#) (Flinders University, Australia); [Matthew Lloyd](#) (New Zealand Red Cross, New Zealand); [Hlekiwe Kachali](#) (Hanken School of Economics, Finland); [Saeed Ur Rehman](#) and [Paul Gardner-Stephen](#) (Flinders University, Australia)

15:20 NetSkylines: Digital Twins for Evaluating Disaster Communication

[Tobias Meuser](#) (Technical University of Darmstadt, Germany); [Lars Baumgärtner](#) (Technische Universität Darmstadt, Germany); [Benjamin Becker](#) (Technical University of Darmstadt, Germany)

15:40 Designing a LoRa-based Smart Helmet to Aid in Emergency Detection by Monitoring Biosignals

[Marcus Choi](#), [Guanting Li](#), [Ross Todrzak](#), [Qian Zhao](#) and [John Raiti](#) (University of Washington, USA); [Paul B Albee](#) (Vulcan Inc., USA)

WE-EN2: Energy 2: Sustainable Grid Technologies

Room: track3

Chair: Henry Louie (Seattle University, USA)

14:40 DeLorean Energy: The potential of Asynchronous V2G Fleets as Peak Shaving Units

[Jordan Randleman](#), [Chris Pitterle](#), [Pranav Rao](#), [Arjun Chimni](#) and [Navid Shaghaghi](#) (Santa Clara University, USA)

15:00 A New Approach to Developing Community Solar Projects for LMI Communities in ERCOT's Competitive Electricity Markets

[Tam Kemabonta](#) (Arizona State University, USA); [Erick Jones](#) (University of Texas at Arlington, USA); [Dana Harmon](#) (Texas Energy Poverty Research Institute, USA); [Jason Pittman](#) (Big Sun Solar, USA)

15:20 Investigation of the Electric Power System for San Cristobal Island in the Galapagos Archipelago

[Nicole E Fronsdahl](#) and [Pritpal Singh](#) (Villanova University, USA)

15:40 Condition Monitoring of Electric Vehicle Drives deployed in Rural Electric Transportation

[Adil Usman](#) (University of California Santa Cruz, USA); [Bharat Singh Rajpurohit](#) (IIT Mandi, India); [Muhammad Safeer Khan](#) (Arkansas Tech University, USA); [Michael Akbar](#) (Numerica Solutions, India)

Wednesday, October 20 14:40 - 16:30 (PT), 1740 - 1930 (ET), 2140 - 2330 (GMT)

WE-H2: Healthcare 2: Medical Technology

Room: track1

Chair: Miriam Cunningham (IIMC / IST-Africa, Ireland)

14:40 Demonstration of a low-cost EEG system providing on-demand communication for locked-in patients

[Dongho Koo](#) and [Hernan Felipe Herrera Polanco](#) (University of Washington, USA); [Michael C Cross](#) (University of Washington, USA & Tsinghua University, China); [Yeon Hee Rho](#), [Nicholas Ames](#) and [John Raiti](#) (University of Washington, USA)

15:00 A Low-cost, Automated, Portable Mechanical Ventilator for Developing World*

[Saad Pasha](#) (Ujala Technologies, Pakistan); [Eesha Tur Razia Babar](#) (UET & None, Pakistan); [Jack Schneider](#), [John Heithaus](#) and [Muhammad Mujeeb-U-Rahman](#) (Ujala Technologies, USA)

15:20 Improving the Use of Surgical Suction Pumps in Sierra Leone

[Asja Mucha](#) (TU Delft, The Netherlands); [Jan Henk Dubbink](#) (Masanga Hospital, Sierra Leone); [Stefan Persaud](#) and [Adithyan Senthil Athiban](#) (TU Delft, The Netherlands); [Jan-Carel Diehl](#) (Delft University of Technology, The Netherlands)

15:40 Heart Lung Health Monitor: Remote At-Home Patient Surveillance for Pandemic Management

[Shereena Shaji](#) (Amrita University, India); [Rahul Krishnan Pathinarupothi](#) (Amrita Vishwa Vidyapeetham, India); [Ekanath Rangan](#) (Amrita University, India); [K. A. Unnikrishna Menon](#) (Amrita Vishwa Vidyapeetham, India); [Maneesha Ramesh](#) (Amrita University, India)

16:00 Clinical investigation as an iteration tool for the design of low-risk medical devices: A case study of an IV drip monitoring system

[Kavyashree Venkatesh](#), [Deval Karia](#) and [Manish Arora](#) (Indian Institute of Science, India)

Wednesday, October 20 16:30 - 17:00 (PT), 1930 - 2000 (ET), 2330 - 0000 (GMT)

WE-NS: Networking Session: Agriculture, Healthcare, Education, Connectivity, Energy, Water

Room: Plenary

Thursday, October 21**Thursday, October 21 9:00 - 9:40 (PT), 1200 - 1240 (ET), 1600 - 1640 (GMT)****TH-P1: Plenary Presentation: Public Interest Tech: Educating Impact-focused Scholars and Practitioners**

Room: Plenary

Dr. Deborah Estrin, Cornell Tech

The profound societal and economic impacts of digital technology have engendered a growing interest in innovations that intentionally serve societal good. Public Interest Tech is an emerging scholarly and professional field that is defined by the deployment of technological expertise in service of public needs--from consumer rights, criminal justice, and trustworthy information ecosystems, to education, public health, and the environment. In this presentation we will describe our efforts to educate the next generation of impact-focused scholars and practitioners through novel Public Interest Tech (PiTech) interventions: PiTech Studio, Impact Fellowships, and Visiting Practitioners programming. A strong diversity of perspectives and experiences is critically important to building effective PiTech, and we work to reflect this priority across our programs.

Thursday, October 21 9:45 - 10:30 (PT), 1245 - 1330 (ET), 1645 - 1730 (GMT)**TH-P2: Plenary Presentation: Making Sense of Sensing Applications for Agricultural Applications**

Room: Plenary

Dr. Anna Forster, University of Bremen

This talk will first introduce MoleNet, which is a self-developed and maintained hardware platform for underground and other challenged environments, developed mostly for agricultural applications. We will explore together our experience with the system itself and with its deployments. The focus of the talk is however on what to do from this data: how to make the next step from sensing to making sense of the data. What are the users' expectations? What are the challenges? What is needed to make such applications truly useful and help us reach the Sustainable Development Goals.

Thursday, October 21 10:30 - 10:40 (PT), 1330 - 1340 (ET), 1730 - 1740 (GMT)**TH-B2: Break**

Room: Plenary

Thursday, October 21 10:40 - 12:00 (PT), 1340 - 1500 (ET), 1740 - 1900 (GMT)

TH-AG1: Agriculture 1: Technology Adoption in Agriculture

Room: track1

Chair: Darelle Van Greunen (Nelson Mandela University, Ireland)

10:40 Ecosystem approach to sustainable aquaculture for smallholder farmers

[Nataraj Kuntagod](#) (Accenture, India); [Sanjay Podder](#), [Rambhau Rote](#) and [Satya Sai Srinivas](#) (Accenture Solutions Pvt Ltd, India); [Neelkanth Mishra](#) and [Ayush Chopra](#) (Center for Aquatic Livelihood Jaljeevika, India)

11:00 AI-Based Crop Rotation for Sustainable Agriculture Worldwide

[Julius Schöning](#) (Osnabrück University of Applied Sciences, Germany); [Mats Richter](#) (Osnabrück University, Germany)

11:20 Optimal Deployment Planning to Maximize Coverage of Agricultural Operations with Effective Resource Utilization

[Swagatam Bose Choudhury](#) (Tata Consultancy Services Limited, India); [Sanat Sarangi](#) and [Srinivasu Pappula](#) (Tata Consultancy Services, India)

11:40 Digital Display Recognition towards Connected Sensing Systems for Precision Agriculture

[Sanket Junagade](#), [Prachin Jain](#), [Sanat Sarangi](#) and [Srinivasu Pappula](#) (Tata Consultancy Services, India)

TH-ED1: Education 1: Online Service Learning

Room: track3

Chair: Pritpal Singh (Villanova University, USA)

10:40 Global STEM Education through e-Service Learning in the Time of COVID-19: A Case Study

[Grace Ngai](#), [Kenneth Wai Kwan Lo](#), [Stephen Chi Fai Chan](#) and [Shuheng Lin](#) (The Hong Kong Polytechnic University, Hong Kong)

11:00 Reconceptualizing Online Experiential Learning: Case Study of a Tele-engineering Project

[Shuheng Lin](#), [Kenneth Wai Kwan Lo](#), [Grace Ngai](#), [Stephen Chi Fai Chan](#), [Artemis Mei Ling Kuo](#) and [Anson Chun Wong](#) (The Hong Kong Polytechnic University, Hong Kong)

11:20 Upgrading the Digital Intranet in the Galapagos Islands

[Javier Urquizo](#), [Olivia Lajeunesse](#), [Paige Bonvallet](#) and [Michael Carrigan](#) (Villanova University, USA); [Nathaly Simuy Sanchez Chan](#) (Chalmers University of Technology, Sweden); [Pritpal Singh](#) (Villanova University, USA); [David Lansdale](#) (Beyond Chacay Foundation & USFQ, Ecuador); [Cesar Martin](#) (Escuela Superior Politécnica del Litoral, Ecuador)

11:40 The Impact of the Deaf Community on Student Learning in a Service-learning Study Abroad Experience

[Nusaybah Abu-Mulaweh](#) and [William Oakes](#) (Purdue University, USA)

TH-H3: Healthcare 3: Supporting Stakeholder Engagement

Room: track2

Chair: Miriam Cunningham (IIMC / IST-Africa, Ireland)

10:40 Peer and Non-Peer Academic Scientists and Peer Support Specialist Community of Practice: Stakeholder Engagement to Advance the Science of Peer Support

[Karen Fortuna](#) (Dartmouth College, USA); [Mbita Mbao](#) (Simmons University, USA); [Arya Kadakia](#) (Dartmouth College, USA); [Amanda Myers](#) (Rivier University, USA); [Daniel Fischer](#) (National Empowerment Center, USA); [Sandi Macdonald](#) (International Association of Pre-Menstrual Disorders, Canada); [Sheila Brunchet](#) (International Association of Pre-Menstrual Disorders, Canada); [Iga Hintz](#) (National Empowerment Center, Poland); [Rebecca Rossom](#) (HealthPartners Institute, USA); [Jessica Brooks](#) (University of Wisconsin-Madison, USA); [Joseph Kalisa](#) (University of Rwanda, Rwanda); [Claver Haragirimana](#) (Opromamer, Rwanda); [Marianne Storm](#) (University of Stavanger, Norway & Molde University College, Norway); [George Mois](#) (University of Georgia, USA); [Emre Umucu](#) (University of Texas at El Paso, USA); [Margaret Almeida](#) (Harvard University, USA & The Mental Health Cntr of Greater Manchester, USA); [Jennifer Rivera](#) (Boston College, USA); [Yaara Zisman Ilani](#) (Temple University, USA); [Maria Venegas](#) (Veterans Affairs, USA); [Robert Walker](#) (Department of Mental Health, USA)

11:00 Stakeholders' Perspectives on Partnering to Inform the Software Development Lifecycle of Smartphone Applications for People with Serious Mental Illness

[Marianne Storm](#) (University of Stavanger, Norway & Molde University College, Norway); [Amanda Myers](#) (Heller School for Social Policy and Management at Brandeis University); [Maria Venegas](#) (Veterans Affairs, USA); [Jessica Brooks](#) (University of Wisconsin-Madison, USA); [Alyssa Gocinski](#) (Boston College, School of Social Work, USA); [Karen Fortuna](#) (Dartmouth College, USA)

11:20 Designing an interactive real-time web-mapped dashboard to visualise conflict ceasefires data over COVID-19 infection rates: facilities and the way ahead

[Devanjan Bhattacharya](#), [Sanja Badanjak](#), [Christine Bell](#), [Fiona Knäussel](#), [Laura Wise](#), [John Allison](#) and [Benjamin Bach](#) (University of Edinburgh, United Kingdom (Great Britain))

Thursday, October 21 12:00 - 13:00 (PT), 1500 - 1600 (ET), 1900 - 2000 (GMT)

TH-LB: Lunch Break & Networking Session

Room: Plenary

Thursday, October 21 13:00 - 13:50 (PT), 1600 - 1650 (ET), 2000 - 2050 (GMT)

TH-P3: Plenary Panel: Tech Innovations for Healthy Aging

Room: Plenary

Moderator: Joseph Wei, Managing Director, Technology Ventures Group; Past-sponsorship Chair, GHTC, Advisor/Past-chair of IEEE SCV Section

Panelists:

- Steve Ewell: Executive Director, Consumer Technology Association Foundation
- Michael Philips: Technology Strategy and Relationships Director, AARP

The United Nations General Assembly declared 2021-2030 the Decade of Healthy Aging that brings together governments, civil society, international agencies, professionals, academia, the media, and the private sector to improve the lives of older people, their families. Both AARP and CTA Foundations have common goals of linking older adults with technologies that enhance their lives. In this panel discussion, the speakers will share past and on-going programs they have been working on that bring innovative solutions to the older adults.

Thursday, October 21 14:00 - 14:50 (PT), 1700 - 1750 (ET), 2100 - 2150 (GMT)

TH-P4: Plenary Panel: Advancing IEEE Leadership Through New Initiatives on Sustainable Development and Energy Transformation

Room: Plenary

Moderator: Rudi Schubert, Director, New Initiatives for the IEEE Standards Association

Panelists:

- Maïke Luiken, IEEE Vice President - Member & Geographic Activities
- Juan Carlos Montero, Part-Time Lecturer Professor at the University of Costa Rica
- Sampath Veeraraghavan, Global Chair, IEEE Humanitarian Activities Committee

Sustainability has a global focus at the United Nations, national and local levels, along with multiple facets that are highly interrelated. While Affordable and Clean Energy is a UN SDG itself, it also provides the infrastructure supporting goals for health, education, clean water and many more elements of international focus. This session will provide an overview of IEEE initiatives and leadership in sustainable development. IEEE has a wide breadth of programs ranging from global perspectives to local level projects and communities working towards a more sustainable world. Recently, IEEE has embarked on amplifying its visibility in sustainability through cross-organizational efforts, as well as external engagement in key global alliances on renewable energy. As IEEE communities of interest continue to grow and accelerate, this session will highlight key programs and opportunities for greater participant engagement in support of sustainability.

Thursday, October 21 14:50 - 15:00 (PT), 1750 - 1800 (ET), 2150 - 2200 (GMT)

TH-B3: Break

Room: Plenary

Thursday, October 21 15:00 - 16:30 (PT), 1800 - 1930 (ET), 2200 - 2330 (GMT)

TH-AG2: Agriculture 2: Technology Adoption in Agriculture

Room: track1

Chair: Darelle Van Greunen (Nelson Mandela University, Ireland)

15:00 Lessons learnt from deploying an IoT sensing system for e-Agriculture in South Africa

[Yemisi Oyedele](#) and [Phumla Dlamini](#) (Nelson Mandela University, South Africa);
[Darelle Van Greunen](#) (Nelson Mandela University, Ireland); [Tinashe R Chizema](#) (Centre
for Community Technologies & Tinashe Chizema, South Africa)

15:20 Towards Building a Data-Driven Framework for Climate Neutral Smart Dairy Farming Practices

[Mohit Taneja](#) (Walton Institute of Information and Communication Systems Science &
Telecommunications Software and Systems Group, Ireland); [Nikita Jalodia](#) (Waterford
Institute of Technology & Walton Institute for Information and Communication Systems
Science, Ireland); [Behnam Dezfouli](#) (Santa Clara University, USA)

15:40 Innovating Solar Charging Kiosks for Shambatek's Agricultural Business in Kenya

[Dane Nicklaus](#) (Penn State University, USA); [John Gershenson](#) (The Pennsylvania State
University, USA)

16:00 GrapeSense: A Grape Aging Classifier Using Residual Transfer Learning On Drone Images

[Maanit Sharma](#) (St. Ignatius College Preparatory, USA); [Navid Shaghaghi](#) (Santa Clara
University, USA)

TH-DM3: Distaster Mitigation 3: Aerial Monitoring System for disaster response and recovery

Room: track2

Chair: Adil Usman (University of California Santa Cruz, USA)

15:00 UAV 3D-Draping System for Sharing Situational Awareness from Aerial Imagery Data

[Toru Yamanouchi](#) (LLC. Spatial Architects, Japan); [Go Urakawa](#) (University of Hyogo,
Japan); [Shigeru Kashihara](#) (Osaka Institute of Technology, Japan)

15:20 Calling Ground Support: Cooperative DTNs for Improved Aerial Monitoring Systems

[Julian Zobel](#) and [Tobias Meuser](#) (Technical University of Darmstadt, Germany); [Ralf
Steinmetz](#) (Technische Universität Darmstadt, Germany)

TH-ED2: Education 2: Professional Preparation of Social Entrepreneurs

Room: track3

Chair: Pritpal Singh (Villanova University, USA)

15:00 Academic Social Entrepreneurship in Higher Education and its Impact on Students Entering the Workforce

[Erica Blaze](#), [Nicole Cingolani](#), [Adira Nair](#) and [Nicholas Vescera](#) (Penn State University, USA); [John Gershenson](#) (The Pennsylvania State University, USA)

15:20 Recent Advances in Socially Relevant Computing: Status and Perspectives

[Acklyn Murray](#) and [Danda B. Rawat](#) (Howard University, USA)

15:40 Humanitarian Technologists as Prototypical V-Shaped Professionals

[Daniel B Oerther](#) (Missouri University of Science and Technology, USA)

16:00 Attributes Based Ranking and Selection of Vending Carts using Fuzzy TOPSIS

[Suraj Bhat](#) (Indian Institute of Technology, India); [Subir Saha](#) (Indian Institute of Technology Delhi, India); [Vinay Gupta](#) (IEC College of Engineering, India)

Thursday, October 21 16:30 - 17:00 (PT), 1930 - 2000 (ET), 2300 - 0000 (GMT)

TH-NS: Networking Session: Agriculture, Healthcare, Education, Connectivity, Energy, Water

Room: Plenary

Friday, October 22**Friday, October 22 9:00 - 9:40 (PT), 1200 - 1240 (ET), 1600 - 1640 (GMT)****FR-P1: Plenary Presentation: Hearing Aids and Internet-of-Things Ecosystem**

Room: Plenary

Dr. Octav Chipara, The University of Iowa

Over the last decade, researchers have successfully improved the performance of hearing aids by leveraging the increasing capabilities of hardware platforms, which enabled sophisticated signal processing algorithms. In contrast, I expect that further improvements will not be driven primarily by better hardware but rather by the integration of hearing aids into the Internet of Things (IoT) ecosystem. The IoT ecosystem is composed of resource-constrained devices such as phones, smart glasses, or Internet-enabled doorbells. As an example of this trend, I present two benefits of integrating smartphones and hearing aids. First, I will discuss how smartphones helped improve our understanding of the performance of hearing aids in the real world. Next, I will explain how smartphones can help better personalize hearing aids to meet a user's individual hearing needs. Finally, I will conclude with a vision of hearing aids in which they are tightly integrated into the IoT ecosystem.

Friday, October 22 9:45 - 10:30 (PT), 1245 - 1330 (ET), 1645 - 1730 (GMT)**FR-P2: Plenary Presentation: Innovations and challenges in developing Medical Devices**

Room: Plenary

Dr. Farid Farahmand, Sonoma State University

In this brief talk we explore the building blocks and applications of the Internet of Medical Things (IoMT). We talk about technical challenges of developing IoMT and its tremendous value for patient care. We also briefly examine the logistical hurdle in developing novel medical devices, including navigating FDA regulations.

Friday, October 22 10:30 - 10:40 (PT), 1330 - 1340 (ET), 1730 - 1740 (GMT)**FR-B2: Break**

Room: Plenary

Friday, October 22 10:40 - 12:00 (PT), 1340 - 1500 (ET), 1740 - 1900 (GMT)

FR-AG3: Agriculture 3: Technology Adoption in Agriculture

Room: track1

Chair: Paul M Cunningham (IIMC / mHealth4Afrika / IST-Africa Institute, Ireland)

10:40 Offloading an Energy Efficient IoT Solution to the Edge: A practical Solution for Developing Countries

[Gibson Kimutai](#) (University of Rwanda & Moi University, Rwanda); Alexander Ngenzi (Jain University, Rwanda); Said Ngoga (University of Rwanda, Rwanda); Anna Förster (ComNets, University of Bremen, Germany)

11:00 Optimization of Generational Grain Spawn and Mushroom Production In Tropical Environments

Asgar Ali, David Tauman, Belle Sullivan and [Khanjan Mehta](#) (Lehigh University, USA)

11:20 Data to Donations: Towards In-Kind Food Donation Prediction across Two Coasts

[Esha Sharma](#) (North Carolina State University, USA); Lauren Davis (North Carolina A&T State University, USA); Julie Ivy and [Min Chi](#) (North Carolina State University, USA)

11:40 Ground Clutter Mitigation and Insect Signature Detection for Polarimetric C-Band Doppler Weather Radar

[Maniraguha Fidele](#) (African Center of Excellence in IoT, University of Rwanda, Rwanda & Rwanda Meteorology Agency, Rwanda); Anthony Vodacek (Rochester Institute of Technology, USA); Emmanuel Ndashimye (Carnegie Mellon University Africa & University of Rwanda, Rwanda); Gerard Rushingabigwi (African Center of Excellence in IoT, University of Rwanda, Rwanda)

FR-CM: Communications based Applications and Issues

Room: track2

Chair: Yuhong Liu (Santa Clara University, USA)

10:40 Escaping the Dead Zone: a Bottleneck in Humanitarian Ionospheric Radio Communications

[Ben A. Witvliet](#) (University of Twente, The Netherlands)

11:00 coreemu-lab: An Automated Network Emulation and Evaluation Environment

[Lars Baumgärtner](#) (Technische Universität Darmstadt, Germany); Tobias Meuser (Technical University of Darmstadt, Germany); Bastian Bloessl (TU Darmstadt, Germany)

11:20 Is Social Diversity Related to Misinformation Resistance? An Empirical Study on Social Communities

I Chang, Orion Sun, Jasper Ahn and [Yuhong Liu](#) (Santa Clara University, USA)

11:40 Model for Humanitarian-Centered Technology for Micro, Small, Medium Enterprises (MSME), United Nations SDGs 8 & 10

[LaVonne Reimer](#) (Descant Labs, USA)

FR-EN3: Energy 3: Human-Centered Design of Energy Applications

Room: track3

Chair: Henry Louie (Seattle University, USA)

10:40 Kashmiri Hamam: An Exploration of Technical Design Within Traditional Architecture and Culture

[Sabahat Sakinah](#) and [Mahshida Hamid](#) (Islamic University of Science and Technology, India); Paarth Chopra (University of California- Berkeley, USA); Afshan Anjum Baba (Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir & India, India); Asad H. Sahir (Indian Institute of Technology Ropar, India); Daniel Sweeney (Massachusetts Institute of Technology, USA)

11:00 A theory of change for cleaner cooking: building a health belief model for service design starting with the slums of Kathmandu

[Brita Fladvad Nielsen](#) (Norwegian University of Science and Technology, Norway); Paras Khanal (NTNU, Norway)

11:20 Analysis of Agricultural Waste Briquettes as a Sustainable Charcoal Substitute in Kenyan Markets

Xiaochen Yuan (Penn State University, USA); [John Gershenson](#) (The Pennsylvania State University, USA)

11:40 Micro-controllers, Sunlight, and Educators from Two Continents: The Genesis of Mutually Beneficial Techno-cultural Relations

[Geraldine Light](#) (Walden University, USA); Jorge Santiago-Aviles (University of Pennsylvania, USA); Meredith J Bolen (Energy Institute High School, USA); Tashweena Heeramun and Aavo I Reinvald (University of Pennsylvania, USA); Promise O Adebayo-Ige (University of Tennessee, Knoxville, USA); Erin Brown (University of Pennsylvania, USA)

Friday, October 22 12:00 - 13:00 (PT), 1500 - 1600 (ET), 1900 - 2000 (GMT)

FR-LB: Lunch Break & Networking Session

Room: Plenary

Friday, October 22 13:00 - 14:00 (PT), 1600 - 1700 (ET), 2000 - 2100 (GMT)

FR-P3: Plenary Panel: Think Global, Act Local: Fostering Engineering Knowledge and Capacity for Impact

Room: Plenary

Moderator: Iana Aranda, Director, Engineering Global Development, ASME and President, Engineering for Change

Panelists:

- **Nishant Agarwal**, Founder & CEO, Life and Limb (P) Ltd., (India)
- **Abdul Rashid Mussah**, Graduate Assistant at the University of Missouri-Columbia (USA)
- **Valentina Ospira**, Architect (Colombia)
- **Brandon Simons**, Graduate Assistant at Villanova University (USA)

Friday, October 22 14:10 - 15:00 (PT), 1710 - 1800 (ET), 2110 - 2200 (GMT)

FR-P4: Plenary Presentation: Federal Policies, Programs and Funding Opportunities on Humanitarian Engineering

Room: Plenary

Aline McNaull, Senior Legislative Representative, IEEE-USA

The federal government organizes many programs, through the Department of State, USAID and other research agencies, that support humanitarian engineering projects. This talk will provide an overview of these programs and funding opportunities and will offer a brief overview of how IEEE-USA is working with these agencies to ensure that the United States can address humanitarian needs in a manner that is sustainable and technology-based. From ensuring the sustainability of our oceans to collaborating with developing nations on remote sensing and environmental monitoring, IEEE-USA members have been at the forefront of developing technological solutions to global challenges. Ensuring refugees access to electric grids and that they have access to clean water are just some of the many issues that IEEE engineers address through humanitarian programs. Lastly, this talk will provide a summary of how IEEE-USA can be helpful in working with the federal government, Congress and the administration to ensure robust support for the federal programs that support technical work in humanitarian fields.

Friday, October 22 15:10 - 16:20 (PT), 1810 - 1920 (ET), 2210 - 2320 (GMT)

FR-ED3: Education 3

Room: track1

Chair: Pritpal Singh (Villanova University, USA)

15:10 An English to Punjabi Educational Video Translation Pipeline for Supporting Punjabi Mother-Tongue Education

[Navid Shaghghi](#), [Smita Ghosh](#) and [Raghav Kapoor](#) (Santa Clara University, USA)

15:30 Automating Translation of Educational Material to Promote Global Education

[Devesh Katta](#), [Revanth Thantepudi](#), [Hannah Kareti](#), [Vedya Konda](#), [Mahalakshmi Nagulapati](#), [Maria Joseph Israel](#) and [Navid Shaghghi](#) (Santa Clara University, USA)

15:50 Investigating the Economic Feasibility of Community-Scale Plastic Recycling Facilities

[Susan H Cheng](#), [Laura E. Marsiglio](#), [Kelly M Mulvaney](#), [Brian C Slocum](#), [Donald Morris](#), [Ganesh Balasubramanian](#) and [Khanjan Mehta](#) (Lehigh University, USA)

FR-EN4: Energy 4: Energy Conversion and Storage for Humanitarian Applications

Room: track3

Chair: Henry Louie (Seattle University, USA)

15:10 Fuzzy Logic Based MPT Algorithm for Reconfigurable Photovoltaics

[Rakeshkumar Mahto](#), [Nate Ruppert](#), [Aaron Nguyen](#) and [Gaurav Kalotra](#) (California State University, Fullerton, USA)

15:30 A Prototype Small Utility-Scale Joint Vertical Axis Wind Turbine and Solar Energy System (VAWT/SES) to Provide Water Pumping in Remote Areas of Uganda

[Jacquelyne Hernandez](#) (Energy Storage Technologies, USA); [Samuel J Roberts-Baca](#) (University of Denver & Sandia National Laboratories, USA); [Gabriel Gurule](#) (Sandia National Laboratories, USA)

15:50 Design and ideation workshop for ejector-based refrigeration system with disaster relief applications

[Kartik V Bulusu](#) (The George Washington University, USA)

FR-WS: Water and Sanitation Applications and Issues

Room: track2

Chair: Yuhong Liu (Santa Clara University, USA)

15:10 Guidelines for the design of digital knowledge: Empowering Bangladeshi communities to improve their water safety

[Nayantara Thomas](#) (TU Delft, The Netherlands); [Annemarie Mink](#) (Delft University of Technology, The Netherlands); [Abhigyan Singh](#) (TU Delft, The Netherlands); [Bilqis Amin Hoque](#) (EPRC, The Netherlands); [Doris Van Halem](#) (TU Delft, The Netherlands); [Jan-Carel Diehl](#) (Delft University of Technology, The Netherlands)

15:30 Mobile Application to Distribute Water Quality and Weather Information in Rural Nicaragua

[Angela Musurlian](#), [Allan Morales](#), [Rachael Freitag](#), [Alexa Grau](#), [Justin Ling](#), [Sarah Ortiz-Jones](#) and [Greta Seitz](#) (Santa Clara University, USA)

15:50 Design and development of Air to Water Generator for the Village in Kerala, India

[Harish P](#), [Sayee R](#), [Pranesh S](#) and [Sumedh Degaonkar](#) (Amrita Vishwa Vidyapeetham, India); [Sara Kaya](#) and [Omar Kiwan](#) (Saxion University of Applied Sciences, The Netherlands); [Renjith Mohan](#) and [Sowndaram C S](#) (Amrita Vishwa Vidyapeetham, India)

Friday, October 22 16:30 - 17:00 (PT), 1930 - 2000 (ET), 2300 - 0000 (GMT)

FR-CL: Closing Session and Best Papers Awards

Room: Plenary

Closing remarks; Best Paper Award; Poster Competition winners announced.
GHTC 2022 Introduction.