2022 IEEE Global Humanitarian Technology Conference (GHTC 2022)

Santa Clara, California, USA
8 – 11 September 2022

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Thursday, September 8 12:30 - 15:30 (America/Los_Angeles)

W1: **Workshop: Machine Learning for Social Good**

Rakshit Agrawal, Vice President of Research & Development, Camio Inc. and Charles Delahunt, Senior Research Scientist, GH Labs

Room: SCDI 2302

This session will focus on topics around the applications of machine learning in the social good domains. We will discuss a framework centered around identifying the important societal challenges where problems can be defined for ML capabilities. We then describe the process to develop machine learning models and deploy them in the real world. We will also include case studies of ML driven systems actively being used in real-world scenarios.

W2: **Workshop: Building wireless sensing systems using PSoC-6**

Patrick Kane and Vikram Ramanna

Room: SCDI 1301

In this workshop, you learn how to use low-cost and energy efficient IoT devices for sensing and communication purposes. You will be building sample applications to collect environmental information and transmit them wireless. This three-hour hands-on IoT and sensor workshop will feature the ultra-low power PSoC™ 6(Programmable System on Chip) and ModusToolbox™ software. The workshop will consist of an overview of Infineon's technology portfolio and continue with hands-on exercises programming the PSoC™ 6 to interface with various sensors and Bluetooth® via your mobile device.

W3: **Workshop: GHTC and IEEE Consulting Network Synergies**

Organizers:

Joel Kent, IEEE-CNSV Board Member, IEEE Consultants' Network of Silicon Valley (IEEE-CNSV) and
Kim Parnell, Ph.D., P.E. (Parnell Engineering & Consulting (PEC) & IEEE-CNSV Board Member)

Room: SCDI 1302

Consultants' Network of Silicon Valley (CNSV) is a network that promotes the skills of its consultants, fosters collaboration among its members, creates alliances with other IEEE chapters, and provides educational opportunities in Silicon Valley. With a membership of nearly 200 consulting engineers, IEEE-CNSV is a premier source of high-tech consulting talent. This session will discuss how CNSV can work with the GHTC community. For example, initiatives by people and organizations in the GHTC community may find help from technology experts within CNSV. Also, people in the GHTC community may speak at CNSV meetings to expand awareness of their work.

Panelists:
• Andrew Wolfe, Ph.D., Wolfe Consulting and Board Member, IEEE Consultants' Network of Silicon Valley (IEEE-CNSV)
• Daniel K. Lottis, Ph.D., head of CLSE Consulting, member of CNSV since 2019
• Thomas M. Coughlin, Ph.D., IEEE Life Fellow, President, Coughlin Associates, digital storage analyst and business and technology consultant

Thursday, September 8 16:00 - 18:00 (America/Los_Angeles)

NWS: Networking Social

Thursday, September 8 18:00 - 21:00 (America/Los_Angeles)

CNSV: CNSV Meeting: Diversity in the Workplace: Retaining Early Career Women and Minority Engineers

IEEE-CNSV organized free event. Separate registration required
Pizza @ 6pm; session starts @ 7pm

Moderator: Erin Shelby, Shelby HR Solutions
Facilitators for this session include: Erin Shelby, PHR, Shelby HR Solutions, Claire Wemp, Ph.D., Thermal Applications Engineer, DuPont, Juan Vargas, M.S., Senior Project Engineer, Devcon Construction, and Jeewika Ranaweera, Ph.D., Principal Hardware Engineer, Oracle.

Organized by: Kim Parnell, Ph.D., P.E., Parnell Engineering & Consulting & IEEE-CNSV Board Member
Rooms: SCDI 1302, SCDI 1308

Separate registration required
Gender equality is one of the UN Sustainable Development Goals on which GHTC is focused. Additionally, the technology industry is increasingly aware of the need to include a variety of backgrounds and capabilities in the workforce. This session will be an open discussion on challenges and opportunities facing young engineers, women in engineering, and minorities in academia and industry. Topics to be covered include opportunities for networking, mentoring, and finding role models.

Friday, September 9

Friday, September 9 8:00 - 8:45 (America/Los_Angeles)

BKF: Breakfast

Friday, September 9 8:45 - 9:00 (America/Los_Angeles)

OP: Opening Remarks

Dr. Behnam Dezfouli and Dr. Elizabeth Belding
Room: SCDI 1302

Friday, September 9 9:00 - 9:30 (America/Los_Angeles)

K3: Keynote: To Care, and How We Get There

Neha Kumar, Associate Professor, Georgia Tech, USA
Rooms: SCDI 1302, SCDI 1308

Care shows up in many ways and forms in technology research, design, and practice, and increasingly so. Touching upon some of these wide-ranging manifestations of care in technological interactions, this talk will consider also what futures of care work might look like. It will conclude with some lessons for futures of work more broadly, and how we might infuse these with care.

Friday, September 9 9:35 - 10:05 (America/Los_Angeles)

K2: Keynote: Technology's True Promise Lies in the Good we can Do

Janice Zdankus, Vice President, Tech Strategy and Innovation for Social Impact Office of the CTO, Hewlett Packard Enterprise, USA

Rooms: SCDI 1302, SCDI 1308

Why and how can we as leaders in industry and academia better 'connect the dots' between innovation and improved societal outcomes? Students of engineering and technology disciplines often express their reason for choosing their field of study and careers is because of their interest and motivation to design the improvements in the world in which we all live and work. Statistics show that many who chose to leave the field did not feel fulfilled in this vision. Yet, most major improvements in our world over the last twenty plus years were conceived of and driven by innovations in engineering, technology and science. Many companies design "tech for good" initiatives to demonstrate core values, retain and motivate talent, partnerships, and systems thinking. With an eye towards creating positive impact and to better prepare for disruptions through the pace of digital transformation, examples of designing and implementing best practices for tech for good programs are shared. And, hear more about how the critical role of at least one explosive area-the role of data-will drive significant advancement in building a more sustainable and equitable world.

Friday, September 9 10:10 - 10:40 (America/Los_Angeles)

P1: Plenary: Federal humanitarian engineering: what programs are out there?

Aline D. McNaull, Senior Legislative Representative, IEEE-USA

Rooms: SCDI 1302, SCDI 1308

The pandemic has brought with it a global discussion of broadband access for services ranging from at home learning to telehealth. Throughout the federal government, an awareness of communication challenges has risen to the forefront of societal issues as offices work from home. This focus has led to a growth in resources to improve communication and access to computer-based resources. As the engineering community looks to address global challenges including improving health technology and access to health services, strengthening electric grids in isolated areas, and providing internet access, there are many opportunities at the federal level for funding and resources for these projects. The pandemic has highlighted the need for some of these projects and as such the federal research agencies are continuously adjusting funding for projects based on these needs. This talk will provide an overview of programs at the Department of Energy, USAID, NIST, NSF and other research agencies that look to address areas of humanitarian need. The recently passed CHIPS Act included authorizations for the National Science Foundation, National Institute of Standards and Technology, as well as some portions of the Department of Energy. Other recent congressional actions on energy and international aid will also be discussed. This talk will address how some of the program changes within these federal agencies could benefit the humanitarian engineering community.

Friday, September 9 10:40 - 11:00 (America/Los_Angeles)

B1: Break

Room: SCDI 1302

Friday, September 9 11:00 - 12:00 (America/Los_Angeles)

FTS1: Connectivity & Communication in Support of Development

Room: SCDI 3302

Chair: Elizabeth Belding (UCSB, USA)

11:00 *Ageism and Its Impact on Information and Communications Technology Usage and Design...1*
Kim T Nguyen (Alumna, University of Southern California, USA)

11:25 *The Challenge & Value of Dashboard Development during the COVID19 Pandemic...9*
Kenny Meesters (Tilburg University, The Netherlands); Mats Visser (Vrije Universiteit, The Netherlands); Joris Wijnen (Tilburg University, The Netherlands); Kees Boersma (Vrije Universiteit, The Netherlands)

FTS2: Good Health and Well Being (SDG3)

Room: SCDI 2302

Chair: Michele Parker (Santa Clara University, USA)

11:00 *A usability study of an innovative optical device for the diagnosis of schistosomiasis in Nigeria...17*
Michel Bengtson (LUMC, The Netherlands); Adeola Onasanya (Researcher, The Netherlands); Prosper Oyibo (TU Delft / University of Lagos, The Netherlands); Brice Meulah (LUMC, The Netherlands); Karlheinz Tondo Samenjo and Ingeborg Braakman (Delft University of Technology, The Netherlands); Wellington Aghoghovwia Oyibo (University of Lagos, Nigeria); Jan-Carel Diehl (Delft University of Technology, The Netherlands)

11:25 *EcoRealms: Improving Wellbeing and Enhancing Productivity Through Incorporating Nature Into the Workplace...23*
Evy M. Rahmey, Giavanna Gast, Sebastian R. Wick, Tram U. H. Vo, Margaret A. McLaughlin, Jonathan Osika, Brian C Slocum, Nicholas Sawicki and Khanjan Mehta (Lehigh University, USA)

FTS3: Agriculture & Food Security (SDG2)

Room: SCDI 2301

Chair: Adil Usman (National Renewable Energy Laboratory, USA)

11:00 *Modular Methods for Oyster Mushroom Cultivation in Low-Resource Settings...30*
William Yaeger, Muzammil Jawed, David Tauman, Philip T Ho, Asgar Ali, Naakesh N Gomanie and Khanjan Mehta (Lehigh University, USA)

11:25 *Assessment of Emissions with Carbon-smart Farming Practices and Participatory Sensing in Rice...38*

Rushikesh Dattatraya Kulat, Mariappan Sakkan, Prachin Jain, Sanat Sarangi and Srinivasu Pappula (Tata Consultancy Services, India)

FTS4: Disaster Mitigation, Preparedness, Response & Recovery

Room: SCDI 1301

Chair: David M Snyder (42TEK, USA)

11:00 *User-driven flood response & monitoring information - Key findings of the Data4Human project...46*

Anne Schneibel, Nina Merkle and Marc Wieland (German Aerospace Center, Germany); Konstanze Lechner (German Aerospace Center (DLR), Germany); Seyedmajid Azimi, Fabian Henkel, Corentin Henry, Ralph Kiefl, Monika Gaehler and Xiangtian Yuan (German Aerospace Center, Germany)

11:25 *ULAT: Deployment of Dense and Nationwide Lightning Detection Network for Weather Forecasting in the Philippines...54*

Glenn Vincent Lopez, Jerico Orejudos and Adrian Aristotle Dellagas (Advanced Science and Technology Institute, Philippines)

FTS5: Technologies that promote gender equality and the empowerment of women and girls (SDG5)

Room: SCDI 3301

Chair: Kathleen A Kramer (University of San Diego, USA)

11:00 *Brilliance Bias in GPT-3...62*

Juliana Shihadeh, Margareta Ackerman, Ashley Troske, Nicole Lawson and Edith Gonzalez (Santa Clara University, USA)

11:25 *A gender-smart simulator to reduce the financing gap for female entrepreneurs in emerging markets...70*

Misha Rawal and Jona Repishti (Massachusetts Institute of Technology (MIT) D-Lab, USA)

Friday, September 9 12:00 - 13:00 (America/Los_Angeles)

L1: Lunch

Friday, September 9 13:00 - 13:50 (America/Los_Angeles)

PNL1: **Panel: Quality education online and the way forward**

Moderator: Patrick Kane - Director of University Alliance Program, Infineon (formerly Cypress)
Panelists:
David Parent (Professor of Electrical Engineering, SJSU)

C. Wang (Director, DigiKey Academic Program)
Rooms: SCDI 1302, SCDI 1308

This panel will bring together industry and academic experts to discuss "quality education: a post-pandemic view." Panelists will describe how they were able to carry on teaching during the pandemic and what lessons and methods they learned that they will continue using going forward.

Friday, September 9 13:50 - 14:00 (America/Los_Angeles)

B2: Break

Friday, September 9 14:00 - 14:30 (America/Los_Angeles)

P2: Plenary: One Week Wonder - Emergency PPE Delivery via A Global Humanitarian Collaboration of Makers

Kelly Yamanishi and Eric Hess, Maker Nexus, a nonprofit Makerspace in Sunnyvale, CA, USA
Rooms: SCDI 1302, SCDI 1308

When the state of California shut down all but essential services on March 19, 2020, Maker Nexus was not quite a year in business as a non profit organization offering a community makerspace. Based at the time on a membership use model, 100% in person, Maker Nexus suddenly faced an existential crisis. One week later, Maker Nexus was delivering hospital approved, sterilizable and reusable face shields, as well as other PPE at no charge directly to grateful, exhausted, medical professionals. A prototype was developed in less than 24 hours based on a global open source collaboration. During the next 48 hours, Maker Nexus delivered prototypes to local hospitals, allowing us to iterate and refine the design. Hospital approval achieved, a committed group of staff, members and volunteers swung into action to deliver. Over the next few weeks the delivery network spread out across the country and even outside the US borders. In the end, Maker Nexus and its team of volunteers directly manufactured and delivered over 85,000 reusable face shields at no charge to medical professionals throughout the UNited States. Maker Nexus' design and shared resources, including staff and members, combined with other local manufacturing companies as they were able to come up to speed to deliver over 300,000 additional face shields at no charge before the need could be met by traditional manufacturing. Having experienced the power of the open source, nonprofit maker space model in rapid response to a global emergency, Maker Nexus can share an entirely different perspective on the value of the maker movement community and local makerspaces to responses to global humanitarian crises.

Friday, September 9 14:35 - 15:05 (America/Los_Angeles)

P3: Plenary: Introducing the West Coast IEEE MOVE Truck

Tim Lee, IEEE Region 6 Director
Rooms: SCDI 1302, SCDI 1308

MOVE Community Outreach, an IEEE-USA Initiative, is an emergency relief program committed to assisting victims of natural disasters with short-term communications, computer, and power solutions. These temporary emergency relief provisions help those affected stay connected and make sure they can access the help they need. Services include phone charging, internet & communications support, and lighting to disaster victims.

Friday, September 9 15:05 - 15:20 (America/Los_Angeles)

B3: Break

Friday, September 9 15:20 - 17:30 (America/Los_Angeles)

FTS10: Other Related United Nations Sustainable Development Goals

Room: SCDI 3301

Chair: John Gershenson (The Pennsylvania State University, USA)

15:20 *Multiple disciplinary research collaboration in an academic environment: the university as a driver for frugal innovation...72*

Tine Van Lommel (KU Leuven, Belgium); Herman Bruyninckx (Katholieke Universiteit Leuven, Belgium)

15:45 *Detecting the destruction of populated sites in northeastern Nigeria from Sentinel-2 satellite imagery by EfficientNet...80*

Yunya Gao (Paris Lodron University of Salzburg, Austria)

16:10 *Comparing the robustness of U-Net, LinkNet, and FPN towards label noise for refugee dwelling extraction from satellite imagery...88*

Yunya Gao, Stefan Lang, Dirk Tiede, Getachew Gella and Lorenz Wendt (Paris Lodron University of Salzburg, Austria)

16:35 *Determining which Carbon Capture Method and Application are Most Beneficial for Social Entrepreneurs in Kenya...95*

Matthew Costanzo and Zara Meyer (Penn State University, USA); John Gershenson (The Pennsylvania State University, USA)

17:00 *Motorcycle and Vehicle Detection for Applications in Road Safety and Traffic Monitoring Systems...102*

Gerson Gerard L. Cruz, Alysia Noreen P San Juan, Aaron Litonjua and Nathaniel Libatique (Ateneo de Manila University, Philippines); Jaime Luis E Honrado (Ateneo de Manila University & Skyeye, Inc., Philippines); Marion Ivan Tan (Ateneo de Manila University, Philippines)

FTS6: Connectivity & Communication in Support of Development

Room: SCDI 3302

Chair: Elizabeth Belding (UCSB, USA)

15:20 *Social Media Data-Driven Sentiment Analysis for COVID-19 and COVID-19 Vaccines...106*

Ghaida Alorini and Danda B. Rawat (Howard University, USA)

15:45 *Deep Learning-Based Path Loss Prediction Model for 5G mmWave...114*

Simon Karanja Hinga (Santa Clara University, USA); Oluwaseun Ajayi (Illinois Institute of Technology,

USA); Tokunbo Ogunfunmi (Santa Clara University, USA)

16:10 *Massive RF Simulation Applied to School Connectivity in Malawi...121*

Ermanno Pietrosemoli (ICTP & Fundacion EsLaRed, Italy); Marco Rainone (ICTP, Italy); Marco Zennaro (ICTP - The Abdus Salam International Centre for Theoretical Physics, Italy); Chomora Mikeka (Directorate of Science, Technology and Innovation, Malawi & Ministry of Education, Malawi)

16:35 *RuralSync: Providing Digital Content to Remote Communities in the Philippines through Opportunistic Spectrum Access...125*

Julian III Eballa (Department of Science and Technology - Advanced Science and Technology Institute, Philippines); Philip A. Martinez (Department of Science and Technology - Advanced Science and Technology Institute & Electrical and Electronics Engineering Institute, Philippines); Jean Jay J Quitayen (Advanced Science and Technology Institute & Department of Science and Technology, Philippines); Ramon Vann Cleff B. Raro (Department of Science and Technology - Advanced Science and Technology Institute & University of the Philippines Diliman, Philippines)

17:00 *Quantifying cost-benefit in emergency telecommunications investments: how pre-disaster preparedness pays...129*

Ria Sen (United Nations World Food Programme, Italy)

FTS7: Good Health and Well Being (SDG3)

Room: SCDI 2302

Chair: Cristina Mayr (Universidad de Montevideo & Cristina Lucia Mayr Trentini, Uruguay)

15:20 *A Smart Prevention Management in Gestational Diabetes Mellitus...130*

Nattacha Palawat, Supaporn Kiattisin and Theeraya Mayakul (Mahidol University, Thailand)

15:45 *Towards Generating Contextual and Empathetic Response for Covid-related Queries...137*

Sowmya Rasipuram (Technology R&D Associate Principal, India & Accenture Labs, unknown); Anutosh Maitra (Accenture Services Pvt. Ltd., INDIA, India); Bishal Shaw (IIT Patna, India); Sriparna Saha (IIT Patna & Department of CSE, India)

16:10 *A Comparative Analysis Of Regression Algorithms With Genetic Algorithm In The Prediction Of Breast Cancer Tumors...143*

Joyce Ayoola and Tokunbo Ogunfunmi (Santa Clara University, USA)

16:35 *quEASY: A tilting interface to alleviate vehicle-induced motion sickness in passengers...150*

Vinitha Erusu, Soojin Hwang, Sebastian Kuhn, Manasa Sama and John Raiti (University of Washington, USA)

17:00 *Finite State Automata for Real-Time Health Electronic Record Update: A survey...154*

Jose M Ruiz Mejia, Atul Rawal and Danda B. Rawat (Howard University, USA)

Friday, September 9 15:20 - 17:00 (America/Los_Angeles)

FTS8: Agriculture & Food Security (SDG2)

Room: SCDI 2301

Chair: Adil Usman (National Renewable Energy Laboratory, USA)

15:20 *Market demand analysis and validation of Ace Aquatec Seal Detection system for protecting salmonids from predation in fish farms...162*

Md Arif Reza Anwary (Edinburgh Napier University & Ace Aquatec Ltd, United Kingdom (Great Britain)); Arnina Goodlad, Donald Sutherland and Nathan Pyne-Carter (Ace Aquatec Ltd, United Kingdom (Great Britain)); Amir Hussain (Edinburgh Napier University, United Kingdom (Great Britain))

15:45 *Micronutrient-Fortified Drinks: Commercial Products and Compelling Opportunities...168*

David Tauman, Philip T Ho, Naakesh N Gomanie, William Yaeger, Muzammil Jawed and Khanjan Mehta (Lehigh University, USA)

16:10 *Peanut maturity classification by features extracted from selected hyperspectral components...176*

Sree Nirmillo Biswash Tushar (University of Tennessee, Knoxville, USA); Soma Sarker, William Stapleton and Damian Valles (Texas State University, USA)

16:35 *Design and Testing of a Low-Cost Wheel-Driven Crop Sprayer...184*

Tatenda C Mashongedza and Heather R Beem (Ashesi University, Ghana)

FTS9: Affordable & Clean Energy (SDG7)

Room: SCDI 1301

Chair: Tam Kemabonta (Arizona State University, USA)

15:20 *IEEE Smart Village Testbed Micro-grids and Sensors...188*

Shultz A Hartgrove IV and Kellen B Kennedy (University of Colorado at Boulder, USA); Zane R McMorris (University of Colorado Boulder, USA); Sam W Siemer (University of Colorado, Boulder, USA); Brad Oren (University of Colorado Boulder, USA); Alan Mickelson (University of Colorado at Boulder, USA)

15:45 *Accelerating Mini-grid Feasibility Assessments with Rapid Engineering and Business Model Evaluation...196*

Tam Kemabonta, Elena A van Hove, Nathan G Johnson and Abdulrahman Alsanad (Arizona State University, USA)

16:10 *The repurposing of nickel metal hydride hybrid electric vehicle batteries for solar energy storage applications in rural Pacific Island communities...204*

Brandon K Simons, Pritpal Singh, Iain Hunt and Jordan Ermilio (Villanova University, USA)

16:35 *SEMFI: A Software-Based and Real-Time Energy Monitoring Platform for WiFi IoT Devices...212*

Aastha Chawla, Nidusha Kannan, Sreya Goyalia, Vikram Ramanna, Jaykumar Sheth and Behnam Dezfouli (Santa Clara University, USA)

Friday, September 9 15:30 - 17:00 (America/Los_Angeles)

MOVE: Demo: Exhibiting the MOVE Truck

Leavy Center Lot Parking
Room: Leavey

Friday, September 9 18:00 - 21:00 (America/Los_Angeles)

SS: **Panel: Communications, computing, and power during disaster response**

IEEE-CNSV organized free event. Separate registration required
Pizza @ 6pm; session starts @ 7pm

Moderator: David Snyder of 42TEK LLC and Board Secretary for the IEEE Consultants' Network of Silicon Valley
Panelists:
Dustin Li, Special Programs Director, Information Technology Disaster Resource Center
Kevin Cox, CEO & Founder, Hope Crisis Response Network - Disaster Resource Village
Dave H. Crocker, Volunteer, Silicon Valley Chapter, Information & Planning Coordinator, American Red Cross, principal with Brandenburg InternetWorking, and Senior Member of IEEE
Paul Shmotolokha, New Use Energy, USA
William Torre, IEEE MOVE WEST Operations Lead
Rooms: SCDI 1302, SCDI 1308

In conjunction with the presence of the MOVE Community Outreach truck at the conference, this is a panel discussion among representatives from organizations involved with emergency response and disaster recovery. Besides providing onsite services for disaster recovery, MOVE also offers educational outreach regarding Science, Technology, Engineering and Mathematics (STEM). The focus will be on communications, computing, and power during disaster response, but may expand from there. After a brief description of the MOVE truck, the emphasis will be on stories about what works and lessons learned.

Saturday, September 10

Saturday, September 10 8:00 - 9:00 (America/Los_Angeles)

BKSA: Breakfast

Saturday, September 10 9:00 - 9:30 (America/Los_Angeles)

PAHP: **Plenary: Academic Programs in Humanitarian Engineering**

Moderator: Pritpal Singh, Villanova University; Allan Baez Morales, Santa Clara University; KhanJan Mehta, Lehigh University
Rooms: SCDI 1302, SCDI 1308

Discussion on academic programs in humanitarian engineering with Frugal Innovation Hub of Santa Clara University and Montaintop Initiative of Lehigh University.

Saturday, September 10 9:35 - 10:05 (America/Los_Angeles)

K4: **Keynote: IT for Sustainability**

Puneet Sharma, Distinguished Technologist, Hewlett Packard Labs, USA
Rooms: SCDI 1302, SCDI 1308

Humanity is exposed with decades of unresponsible behaviour, resulting in dramatic need for decarbonization and preventing climate change. Consumption of fossil- and other carbon-based fuels and generation of electricity from unsustainable energy sources propagates in every facet of our life. In IT, we are uniquely positioned to measure sustainability of our solutions and cradle-to-cradle, from production to disposal, of equipment and service usage. By making IT sustainable, we can expand it to the rest of enterprises and eventually all vertical markets and to our daily life. In this talk, I will showcase how we at Hewlett Packard Labs develop IT Technologies for Sustainability, contributing to humanity and planet earth. I will discuss megatrends and present some solutions.

Saturday, September 10 10:10 - 10:40 (America/Los_Angeles)

P4: **Plenary: Revolutionizing the Retail Informal Sector in Africa: Use Case of the Smart Kibanda Project**

Kithinji Muriungi and Chris Murimi, Moi University in Nairobi, Kenya
Rooms: SCDI 1302, SCDI 1308

A Kibanda is an open-fronted cubicle structure used for informal business. About 80% of retails in Kenya operates a kibanda: meaning for every 100m distance, there is a high probability of having at least one Kibanda. It is estimated that the retail informal sector contributes about 55% of GDP in the sub - Saharan Africa. The kibanda owners live near their business location because they have to move business commodities to and from their residences to business locations. The profit margins are small and highly variable. Kibandas do not support a 24 hour business environment. A Smart Kibanda is a project that aims to solve the major problems in traditional retail outlets in an affordable, secure, convenient, employing great aesthetics, and provision of renewable energy and storage units. The smart kibanda project is fully funded by IEEE Special Interest Group on Humanitarian Technology (SIGHT) / Humanitarian Activities Committee (HAC). Four fully functional units have been designed, developed, and deployed in Eldoret, Kenya as pilots. The presentation highlights lessons learnt, challenges encountered, principles in local problem solving using technologies, accomplishments, engineering design principles, recommendations, replicability, and the importance of working with the community to facilitate user-centered design for sustainability and scalability purposes.

Saturday, September 10 10:40 - 11:00 (America/Los_Angeles)

B5: Break

Saturday, September 10 11:00 - 12:00 (America/

Los_Angeles)

SATS1: Quality Education (SDG4)

Room: SCDI 3302

Chair: Juliana Shihadeh (Santa Clara University, USA)

11:00 *A Machine Learning-Based Automatic Feedback System to Teach Cybersecurity Principles to K-12 and College Students...219*

Eric M Dillon and Craig Carpenter II (Marshall University, USA); John Cook (Marhsall University, USA); Thomas Wills and Husnu S Narman (Marshall University, USA)

11:25 *The Cybersecurity Packet Control Simulator: CSPCS...226*

Neil Loftus, Cameron Green and Husnu S Narman (Marshall University, USA)

SATS2: Good Health and Well Being (SDG3)

Room: SCDI 2302

Chair: Priscilla Law (Santa Clara University, USA)

11:00 *How WhatsApp is Transforming Healthcare Services and Empowering Health Workers in Low-and Middle-Income Countries...234*

Noah Weaver, Anneke Roy, Skyler J Martinez, Naakesh N Gomanie and Khanjan Mehta (Lehigh University, USA)

11:25 *Use of Voluntary Cough Sounds and Deep Learning for Pulmonary Disease Screening in Low-Resource Areas...242*

Ashley Mo and Emma Gui (University of Toronto Schools, Canada); Richard Fletcher (MIT, USA & Massachusetts General Hospital, USA)

SATS3: Agriculture & Food Security (SDG2)

Room: SCDI 2301

Chair: Tine Van Lommel (KU Leuven, Belgium)

11:00 *Mitigation Intermediary Transactions within Kenya's Agricultural Supply Chain...250*

John Gershenson (The Pennsylvania State University, USA); David Moyer and Megan Ostertag (Penn State University, USA)

11:25 *Enhancing Stress Prediction Models for Rice with Ambient and Field Data in Rabi 2019-20...257*

Prachin Jain, Swagatam Bose Choudhury, Sanat Sarangi and Srinivasu Pappula (Tata Consultancy Services, India)

SATS4: Disaster Mitigation, Preparedness, Response & Recovery

Room: SCDI 1301

Chair: Tim Lee (IEEE MTT-S, USA)

11:00 *Prioritizing emergency evacuations under compounding levels of uncertainty...265*

    Lisa J Einstein, Robert J Moss and Mykel J Kochenderfer (Stanford University, USA)

11:25 *Blockchain-based Data Access Environment for Disaster Risk Reduction...273*

    Neil H Wasserman (George Washington University & Timewave Analytics, LLC, USA)

SATS5: Other Related United Nations Sustainable Development Goals

Room: SCDI 3301

Chair: Allan Morales (Santa Clara University, USA)

11:00 *Terrorism Detection and Approaches to Fairness: A Brief Literature Review...277*

    Cesa Salaam and Danda B. Rawat (Howard University, USA)

11:25 *Connecting the Gold Supply Chain and SDGs: Communal Processing Plants as Sociotechnical Ensembles to Reduce Mercury Pollution and Empower Artisanal Gold Mining Communities...283*

    Mateo F Rojas (Colorado School of Mines); Juan Lucena (Colorado School of Mines & Humanitarian Engineering, USA); Jessica Smith (Colorado School of Mines, USA); Oscar Restrepo Baena (Universidad Nacional de Colombia, Colombia); Thomas J. Phelan (United States Air Force Academy, USA)

Saturday, September 10 12:00 - 13:00 (America/ Los_Angeles)

L2: Lunch

Saturday, September 10 13:00 - 13:40 (America/ Los_Angeles)

P5: **Plenary: Introduction to EPICS in IEEE**

Stephanie Gillespie, EPICS in IEEE Committee Chair, and Associate Dean from Tagliatela College of Engineering of University of New Haven

Rooms: SCDI 1302, SCDI 1308

EPICS in IEEE is a committee within the IEEE Educational Activities Board that believes that service-learning can positively impact our students and our communities. We believe in empowering engineers and technical professionals to impact communities, both local and global. In this workshop, the audience will receive a brief introduction to service learning pedagogy, our committee's funding priorities, and the proposal process to receive funds from our committee. We will include a summary of best practices for project proposals as well, to increase the likelihood of selection for funding from our committee. There will be time for questions and answers at the end, or you can review our materials online at www.epics.ieee.org.

Saturday, September 10 13:45 - 14:30 (America/Los_Angeles)

PNL2: Panel: Advancing DEI in Journalism with Tech: Opportunities and Guardrails

Moderator: Subbu Vincent. Markkula Center for Applied Ethics, SCU
Panelists:

Lisa Armstrong, Associate Dean and Professor, UC Berkeley Graduate School of Journalism

Yi Fang, Associate Professor, Department of Computer Science and Engineering, Santa Clara University

Subbu Vincent, Director of Journalism and Media Ethics, Markkula Center for Applied Ethics, Santa Clara University

Rooms: SCDI 1302, SCDI 1308

Diversity, equity, and inclusion (DEI) are fundamental to promoting robust journalism that supports a healthy society, by fostering well-researched, complex stories that explore different perspectives and voices. News stories can be audited for how often they are quoting people around a diversity categorization, e.g., gender, race/ethnicity, expertise, etc. DEI audits are high touch and expensive to do manually. Not surprisingly, they are usually done only once a year and retroactively by a few well funded, large news organizations. But for everyday reporters and editors who are part of large and small newsrooms, there is no "everyday system" to monitor their own quoting patterns and nudge themselves towards DEI norms. To start addressing this gap with human-augmented technology, the Markkula Center for Applied Ethics and the School of Engineering at SCU joined hands to prototype an on-demand DEI audit toolkit for US newsrooms based on AI and NLP technologies, funded partly by the Google News Initiative and Facebook Research. This panel will discuss the "What, So What, and Now what" of technology solutions for DEI audits from an opportunities and guardrails perspective.

Saturday, September 10 14:35 - 15:05 (America/Los_Angeles)

K5: Keynote: Minimizing the Ecological Footprint using Machine Learning

Vishnu S. Pendyala, San Jose State University
Rooms: SCDI 1302, SCDI 1308

Ecological footprint is a measure of the use of all forms of nature, including energy, for humans to continue their day-to-day living. Ecological footprint per capita is one of the most widely recognized indicators of environmental sustainability and the world today is concerned about this sustainability. Machine Learning has been significantly applied in the critical areas of ecological sustainability and social innovation. This talk will highlight some of these applications such as to predict and analyze the ecological footprint, optimizing transportation logistics, and waste management. Societies rely heavily on energy as it aids in human sustainability. Carbon footprints make up a large part of the ecological footprint primarily because of energy consumption. Energy consumption and associated CO_2 emissions around the world have increased rapidly in the past few decades due to the rising population and living standards. The talk will also focus on how Machine Learning is used in the renewable energy sector, which is critical to sustainable progress. The talk will conclude with some possible future directions.

Saturday, September 10 15:05 - 15:20 (America/ Los_Angeles)

B6: Break

Saturday, September 10 15:20 - 17:30 (America/ Los_Angeles)

SATS6: Quality Education (SDG4)

Room: SCDI 3302

Chair: Pritpal Singh (Villanova University, USA)

15:20 *Technology Applications in Teaching at the Right Level Programs...285*

John Gershenson (The Pennsylvania State University, USA); Edward Amoah (Penn State University, USA); Mumbe Mwangangi (Nyansapo, USA); Tanish Rastogi, Emily Snow and Lauren Werner (Penn State University, USA)

15:45 *Community Capacity Building: A Renewable Energy Workshop as an Investment in Sustainable Businesses in the Galapagos Islands...292*

Viviana Villavicencio, Javier Urquizo and Pritpal Singh (Villanova University, USA); David Lansdale (Beyond Chacay Foundation & USFQ, Ecuador); Cesar Martin (Escuela Superior Politécnica del Litoral, Ecuador)

16:10 *Save Tuba: A Gamified App for Children to Explore Environmental Issues and Develop Sustainable Behaviors...299*

Allan F Santana, Trevor A Lachman, Dariia Tyshchenko, Samir Hassan, Arlan J Dawdy, Artur Poole, Nada Stojanovic and Naakesh N Gomanie (Lehigh University, USA); Ekaterina Abramova, Tamirlan Kabetov, Karina Kabiyeva, Yuliana Kolossova, Rumilya Kurbanova, Karina Kadyrbulat and Aigerim Muratbekova (Almaty Management University, Kazakhstan); Khanjan Mehta (Lehigh University, USA)

16:35 *Design and Deployment of Content Stacks and Portable Asynchronous Learning Platforms for Socially Distanced Learning in a Pandemic or Post Disaster Situation...307*

Joselito Christian Paulus M. Villanueva (Ateneo De Manila University, Philippines); Mark Anthony Melendres, Catherine Genevieve Lagunzad, Nathaniel Joseph C Libatique and Carlos Oppus (Ateneo de Manila University, Philippines); Jaime Luis E Honrado (Ateneo de Manila University & Skyeye, Inc., Philippines); Gregory Tangonan (Ateneo Innovation Center, Philippines); Mikaella Salud, Martin Jose Arandia and Paul Raphael Libatique (Ateneo de Manila University, Philippines)

17:00 *Mobile based social networking platform for remote school ecosystem in resource-constrained areas - An Indian case study...315*

Vijayalakshmi B (Centre for Development of Advanced Computing (CDAC), India)

SATS7: Good Health and Well Being (SDG3)

Room: SCDI 2302

Chair: Noah Weaver (Lehigh University, USA)

15:20 *The Impact of Social Media Use on Young Adults' Quality of Life During the COVID-19 Pandemic in South India...318*

Johanna Sophie von Lieres (Amrita Vishwa Vidyapeetham, India); Gopakumar Cauvery (Amrita Vishwa Vidyapeetham, Amritapuri, India)

15:45 *On-Device Prediction for Chronic Kidney Disease...325*

Alex Whelan and Soham Phadke (Santa Clara University, USA); Alessandro Bellofiore (San Jose State University, USA); David C Anastasiu (Santa Clara University, USA)

16:10 *The Impact of Ebola and COVID on the Provider-Patient Relationship in Sierra Leone's Maternal Health Care System: Cues for Technology Innovation...333*

Masuma Moravej, Isabelle Glazer, Naakesh N Gomanie and Khanjan Mehta (Lehigh University, USA)

16:35 *A Narrative Review of Demand Generation Strategies for Family Planning in Low- and Middle - Income Countries...341*

Matthew T Rivera, Kayla Miller, Naakesh N Gomanie and Khanjan Mehta (Lehigh University, USA)

17:00 *Gaia VR: A Virtual Reality-based Neuro and Biofeedback Meditation Application...349*

Szu-Yun Wang, Hyeon-Seok Bang, Yiding Liu, Minjee Kim and John Raiti (University of Washington, USA)

Saturday, September 10 15:20 - 17:00 (America/ Los_Angeles)

SATS8: Agriculture & Food Security (SDG2)

Room: SCDI 2301

Chair: Adil Usman (National Renewable Energy Laboratory, USA)

15:20 *Remote Crop Disease Detection Using Deep Learning with IoT...353*

Ivy Chung, Anoushka Gupta and Tokunbo Ogunfunmi (Santa Clara University, USA)

15:45 *Empowering Middle-Aged Women to Bolster Food Security in their Communities...361*

Maya Neumann, Ella Varano, Shreya Chawla, Naakesh N Gomanie and Khanjan Mehta (Lehigh University, USA)

16:10 *Smallholder farmer-centric integration of IoT and Chatbot for early Maize diseases detection and management in pre-visual symptoms phase...369*

Theofrida Julius Maginga (University of Rwanda & Sokoine University of Agriculture, Rwanda); Jimmy Nsenga (Self-employed & Jimmy NSENGA, Belgium); Pierre Bakunzibake and Emmanuel Masabo (University of Rwanda, Rwanda)

16:35 *UAV-assisted Multi-modal Detection and Severity Assessment for Red Spider Mites in Tea...373*

Swagatam Bose Choudhury, Sanket Junagade, Sanat Sarangi and Srinivasu Pappula (Tata Consultancy Services, India)

SATS9: Decent Work and Economic Growth (SDG8)

Room: SCDI 1301

Chair: Thomas Coughlin (Coughlin Associates, USA)

15:20 *Promoting Inclusive Work with Digital Assistance Systems: Experiences of Cognitively Disabled Workers with In-Situ Assembly Support...377*

Mario Heinz-Jakobs (OWL University of Applied Sciences and Arts, Germany); Anja Große-Coosmann (Wertkreis Gütersloh gGmbH, Germany); Carsten Röcker (OWL University of Applied Sciences and Arts, Germany)

15:45 *Humanitarian Technology Due Diligence, Part II, United Nations SDGs 5 (gender equity) and 8 and 10 (economic equality)...385*

LaVonne Reimer (Descant Labs, USA)

16:10 *A sociotechnical analysis of interventions to promote safer working conditions in informal e-waste recycling settings...387*

Sofia Lara Schlezak (Colorado School of Mines, USA); Juan Lucena (Colorado School of Mines & Humanitarian Engineering, USA); Alina Handorean (Colorado School of Mines, USA); Luciana Antolini (Autoridad de Cuenca Matanza-Riachuelo (ACUMAR), Argentina); Richard Neitzel (University of Michigan, USA); Oscar Restrepo Baena (Universidad Nacional de Colombia, Colombia)

Saturday, September 10 18:00 - 21:00 (America/Los_Angeles)

BQ: Conference Banquet

Remarks: SCU Speaker; IEEE R6 Speaker; IEEE SCV Speaker; Stephanie Gillespie (IEEE EPICS); Tom Coughlin (IEEE CNSV), Infineon Speaker; Puneet Sharma (HPE);

Room: Locatelli

Sunday, September 11

Sunday, September 11 8:00 - 9:00 (America/Los_Angeles)

BKSU: Breakfast

Sunday, September 11 9:00 - 9:30 (America/Los_Angeles)

K6: **Keynote: Does Gender Impact Startup Funding Success? A Data-Driven Perspective**

Maya Ackerman, Assistant Professor of Computer Science and Engineering, Santa Clara University

Rooms: SCDI 1302, SCDI 1308

Research has long demonstrated the benefits of diversity for team performance, including startup success. Nevertheless, investors remain less likely to invest in women compared to their male counterparts. This talk will share data-driven research findings that shed light on the nature and extent of gender bias in venture capital allocation. Solutions for lasting change will be discussed.

Sunday, September 11 9:35 - 10:05 (America/Los_Angeles)

K7: **Keynote: How the Internet Improves Humanity**

Eric Goldman, Professor of Law, Santa Clara University
Rooms: SCDI 1302, SCDI 1308

Given the time and energy we spend worrying about the Internet's flaws, it's easy to forget how the Internet makes our lives better in many ways. This talk will highlight one underappreciated aspect: how the Internet has the capacity to improve the human species by increasing pro-social interactions and reducing anti-social ones. The talk will also show how this scenario probably won't be realized because of misguided regulatory efforts to "fix" the Internet.

Sunday, September 11 10:10 - 10:50 (America/Los_Angeles)

PNL3: **Panel: Web3 and Human Rights**

Moderator: Michael Kleinman, Director, Silicon Valley Initiative, Amnesty / AIUSA
Panelists:
Lia Holland (Campaigns and Communications Director, Fight for the Future)
Mai Ishikawa Sutton (Co-founder and editor of COMPOST, an online magazine about the digital commons, as well as a Digital Commons Fellow with the Commons Network and a contributor to the Internet Archive's work on the decentralized web)
Nathan Schneider (Assistant Professor, Media Studies at the University of Colorado Boulder and Director, Media Enterprise Design Lab)
Rooms: SCDI 1302, SCDI 1308

The internet in the West today is dominated by a handful of companies, including Amazon, Apple, Google, Meta (Facebook), Microsoft, TikTok, and Twitter. Each company sets the terms and conditions for how individuals engage with their platform and can potentially ban them according to those terms, including for their speech. In return for free access to these platforms, individuals provide personal information and effectively lose control over that information. In some countries, governments have pressured tech companies to censor and provide information on individuals and groups that the government disfavors.

Web3 - sometimes called the Distributed Web - potentially represents a fundamental change in this dynamic, especially as regards the question of control. The number "3" implies a specific historical view of how the web evolved, from an initial "open" state in the 1990s and early 2000s (web1) towards ever greater corporate centralization and power, leading to the dominance of a handful of Big Tech corporations today (web2). It posits web3 as the next step in this evolution, towards a more decentralized future, in which our online experience is not shaped (or not only shaped) by these companies.

This panel will examine the positive and negative implications that web3 has for human rights, including access and equity, privacy, social mobilization online, and other issues.

Sunday, September 11 10:50 - 11:00 (America/Los_Angeles)

B7: Break

Sunday, September 11 11:00 - 12:00 (America/Los_Angeles)

SUTS1: Quality Education (SDG4)

Room: SCDI 3302

Chair: Pritpal Singh (Villanova University, USA)

11:00 *LATAM Intelligent Filter for Education (LIFE): A Modular Water Purification and STEM Education Tool...391*

Linnea Y Rothi, Nicole Mossing, Emily Nakata, Jordyn Quesenberry, Cinthya Jauregui, Andrew Lemus, Daniel McCann-Sayles, Jonathan Woo, Edison Yang, Michele Parker, Jes Kuczenski and Kourosh Pahlavan (Santa Clara University, USA)

11:25 *Implementation of the STEAM Method to motivate and inspire primary and secondary school students in Colombia to pursue space science research, NASA Human Exploration Rover Challenge (HERC) 2020, 2021, 2022 Project Case Study...393*

Tito Alberto Nuncira Gacharna, Erick David Daleman Amaya, John Alvaro Rueda Forero, Joaquin Jose Avila Pallares, Wendy Avila, Miguel Reyes Parra, Catalina Marcela Rodriguez, Leidy Soler Arias, Yeison Javier Fonseca Rojas, Fanhor Navia Forero, Nicolas Carvajal Restrepo, Augusto Cubillos Cuadros, Manuel Arturo Gonzalez Parra, Ruben Dario Lozano Quecan, Julio Andres Salgado Reyes, Manuel Amezquita Pulido, Samuel Alejandro Nuncira Lopez, Juan Pablo Morales Arias, Nelson Alberto Forero Rincon and Maria Eugenia Lambertinez Rivera (Universidad ECCI, Colombia)

SUTS2: Good Health and Well Being (SDG3)

Room: SCDI 2302

Chair: Eric Rasmussen (Infinitum Humanitarian Systems & School of Public Health, University of Washington, USA)

11:00 *Santé le Match: A mobile health game application to educate the youth of Senegal...397*

Shelby Tadaki, Reha Shah, Michele Parker, Krizia Araracap, Evan Chou, Matthew Tolosa, Silvia Figueira, Carly Kellner and Kristina Yin (Santa Clara University, USA)

11:25 *Deep learning-based models combined with different optimization methods for the automatic diagnosis of melanoma skin cancer...399*

Radhika Goyal (Lynbrook High School, USA)

SUTS3: Technologies that promote gender equality and the empowerment of women and girls (SDG5)

Room: SCDI 2301

Chair: Kathleen A Kramer (University of San Diego, USA)

11:00 *Animalogy: Learning through Analogy and Technology...403*

    Naomi-Tida Essers, Dries Rutten and Syed Jaffar Mujtaba (KU Leuven, Belgium)

11:25 *Empowering Women in Low-income Communities in Colombia by Recycling Construction and Demolition Waste...405*

    Jaime E Styer (Colorado School of Mines, USA); Juan Lucena (Colorado School of Mines & Humanitarian Engineering, USA); Lori Tunstall and Elizabeth Reddy (Colorado School of Mines, USA); Jason Ideker (Oregon State University, USA)

SUTS4: Affordable & Clean Energy (SDG7)

Room: SCDI 1301

    Chair: Kellen B Kennedy (University of Colorado at Boulder, USA)

11:00 *Experimental Design for Measuring the Effect of Soiling on Power Production of Solar Panels in Ghana...407*

    Takudzwa Kampira (Ashesi University, Ghana); Stewart Isaacs (Massachusetts Institute of Technology, USA); Heather R Beem (Ashesi University, Ghana)

11:25 *Design, Fabrication, and Aerodynamic Testing of a Vertical Axis Wind Turbine (VAWT) for Berekuso, Ghana...411*

    Trish A Maduche and Heather R Beem (Ashesi University, Ghana)

Sunday, September 11 12:00 - 13:00 (America/Los_Angeles)

L3: Lunch

Sunday, September 11 13:00 - 13:50 (America/Los_Angeles)

PNL4: **Panel: IEEE HAC Capacity Building**

Moderator: Pritpal Singh, IEEE Humanitarian Activities Committee
Panelists:
Sampathkumar Veeraraghavan, Global Chair, IEEE Humanitarian Activities Committee
Lwanga Herbert, Chair, IEEE SIGHT Steering Committee
Rooms: SCDI 1302, SCDI 1308

This session will present various global programs offered by HAC and the best practices for the design and development of the IEEE HAC/SIGHT sustainable development program. The audience will have an opportunity to network and learn about the successfully implemented HAC projects.

Sunday, September 11 14:00 - 14:30 (America/Los_Angeles)

P6: **Plenary: Clean energy solutions replacing portable fossil**

fuel generators: Technology and lessons from Ukraine and Hurricane Ida

Paul Shmotolokha, New Use Energy
Rooms: SCDI 1302, SCDI 1308

This presentation will show the progress of highly mobile alternatives to using portable fossil fuel generators in disaster or humanitarian relief efforts to provide critical power when the grid is down or where it does not exist. First I will examine the use cases and dynamics of where power is commonly needed citing disaster relief and medium term support after Hurricane Ida. We will then examine humanitarian assistance examples in Ukraine supporting both internal and international refugees as well as communications, medical, municipal and relief organizations. From a technology perspective, it will focus on safe and energy dense Lithium Ion batteries, generation options with a focus on lightweight solar, refrigeration, weatherization, power conversion, and ability to scale towards larger longer lasting microgrids. The difference between portability and mobility, Cost models, Speed of deployment, re-use and Logistics lessons will be covered.

Sunday, September 11 14:30 - 14:50 (America/Los_Angeles)

CLS: Closing Remarks and GHTC 2023 Preview

Dr. Behnam Dezfouli and Dr. Elizabeth Belding, Dr. Pritpal Singh
Rooms: SCDI 1302, SCDI 1308

Sunday, September 11 14:50 - 15:10 (America/Los_Angeles)

B8: Break

Sunday, September 11 15:10 - 17:00 (America/Los_Angeles)

SUTS5: Clean Water & Sanitation (SDG6)

Room: SCDI 3302

Chair: Avery J Lu (IEEE Consumer Technology Society, Santa Clara Valley - Silicon Valley & Aventurine Capital Management, LLC, USA)

15:10 *A Community Water System Mapping (CWSMap) Platform for Supporting Rural Water Operators...415*

Andy Florian Irakoze and Flavio Esposito (Saint Louis University, USA); Andrew Schranck (Global Health Engineering, USA); Lee Voth-Gaeddert (University of the Witwatersrand, USA)

15:35 *Water Access in the Unhoused Setting of Portland, Oregon: Overlooked and Impactful...419*

Emma F. Chapman (Colorado School of Mines, USA)

16:00 *M3MLF: Mapping, Measuring and Monitoring Using the Machine Learning Framework for Dynamic Water Source Classification...421*

Amritanand S (Amrita Vishwa Vidyapeetham, India); Ashwin Shenoy (Amria Vishwa Vidyapeetham, India); Megha C (Amrita Vishwa Vidyapeetham, India); A S Reshma (Amrita School for Sustainable Development, Amrita Vishwa Vidyapeetham, India); Rekha P (Amrita Vishwa Vidyapeetham, India)

Sunday, September 11 15:10 - 17:20 (America/Los_Angeles)

SUTS6: Good Health and Well Being (SDG3)

Room: SCDI 2302

Chair: Taylor Winship (IEEE SCV SSIT, USA)

15:10 *Design of an affordable lower limb bionic prosthesis...429*

Maximiliano N Palay and Rafael Sotelo (Universidad de Montevideo, Uruguay)

15:35 *Detection and Low-Latency Notification of Improper Backpack Posture using Deep Learning...433*

Hsin-Ya Hung and Garrett Millaway (University of Washington, USA); Saif Mustafa (University of Washington & Global Innovation Exchange, USA); Haonan Peng, Avi Geiger and John Raiti (University of Washington, USA)

16:00 *A Wearable Device For Postoperative Breast Cancer Rehabilitation With Machine Learning For Motion Tracking...437*

Yunfan Zhao, Carl-Michael Adams, Tantai Davis and Jiaxin Zhao (University of Washington & Global Innovation Exchange, USA); Niall O'Rourke (Western Washington University, USA); Haonan Peng, Avi Geiger and John Raiti (University of Washington, USA)

16:25 *A Gamified Approach to Cognitive Assessment with Machine Learning Based Predictions...441*

Alexander C Simpson, Yongjie An, Jacob Estep, Abhijeet Saraf and John Raiti (University of Washington, USA)

16:50 *Assisted Mobility: an application to help the blind to use public transport...445*

Victoria Tejera, Valentina Kunze and Stephanie Mendonça (Universidad de Montevideo, Uruguay); Cristina Mayr (Universidad de Montevideo & Cristina Lucia Mayr Trentini, Uruguay)

Sunday, September 11 15:10 - 17:00 (America/Los_Angeles)

SUTS7: Technology Impacts on Societal Evolution

Room: SCDI 2301

Chair: Ananya Gopal (Santa Clara University, USA)

15:10 *Pedal 'n Spin Foot-cranked Washing Machine Innovation...449*

Kai Goodall, David Oyedokun and Pitambar Jankee (University of Cape Town, South Africa)

15:35 *Slums in Smart Cities - Rethink the Standard...457*

John Friesen and Martin Pietsch (TU Darmstadt, Germany)

16:00 *Extraction of Reliable and Actionable Information from Social Media During Emergencies...461*

Mohmammadbagher Fotouhi, Wei Cheng and Payman Arabshahi (University of Washington, USA); Haixun Wang (Instacart, USA)

16:25 *Climate-Focused Field Research Within the Kwajalein Atoll Sustainability Laboratory...465*

Eric Rasmussen (Infinitum Humanitarian Systems & School of Public Health, University of

Washington, USA); Gregg Nakano (Infinitum Humanitarian Systems, USA); Kitlang Kabua (Minister of Education, Marshall Islands); Alex Hatoum (Infinitum Humanitarian Systems, USA)

SUTS8: Affordable & Clean Energy (SDG7)

Room: SCDI 1301

Chair: Kellen B Kennedy (University of Colorado at Boulder, USA)

15:10 *Selection of multicriteria decision analysis methods for electrification projects in rural Sub-Sahara Africa - A case study in Niger...469*

Julian Huwer (Cologne University of Applied Sciences & University of Saarland, Germany)

15:35 *Installing Solar for Haitian Civil Society with Emphases on Maintenance and Empowerment...473*

Brian Thomas and Kayla Garrett (Baylor University, USA)

16:00 *Optimizing Renewable Energy Share in Remote Areas Microgrids and Its Trade-off to Cost...477*

Ilman Sulaeman, Amalia Suryani and Niek Moonen (University of Twente, The Netherlands); Jelena Popovic (University of Twente & Klimop Energy, The Netherlands); Frank Leferink (University of Twente, The Netherlands)

16:25 *Design of a Dust Cleaning Machine to Reduce Dust Soiling on Solar PV Panels in Ghana...481*

Issahaku Walaman-i (Ashesi University, Ghana); Stewart Isaacs (Massachusetts Institute of Technology, USA); Heather R Beem (Ashesi University, Ghana)

Sunday, September 11 18:00 - 20:00 (America/Los_Angeles)

CSSCV: **IEEE CS SCV Chapter Presentation (co-located event)**

Safety for Autonomous Vehicles: Addressing Interoperability and Dependability Challenges with IEEE P2851 [Separate Registration]

The IEEE P2851 standard defines a dependability lifecycle of products with focus on interoperable activities related to functional safety and its interactions with reliability, cybersecurity, SOTIF (Safety of the intended functionality) and real time. The standard also describes methods, description languages, data models, and databases that have been identified as necessary or critical, to enable the exchange/interoperability of data across all steps of the lifecycle encompassing activities executed at IP, SoC, system and item levels, in a technology independent way across application domains such as automotive, industrial, medical and avionics safety critical systems. The speaker, who is the chair of the working group on the standard will provide more insights into the topic.