Panel: Evolving IoT Tech Enables Aging in Place

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Panel Topic

U.S. Census Bureau reports, by the year 2035, citizens of 65 and older will outnumber those under the age of 18 for the first time in U.S. history which will be approximately 78 million in number versus 76 million under the age of 18. Along with this projected demographic shift will come new challenges for the U.S. healthcare system for older adults who prefer living at home to uprooting themselves to an assisted-living facility. To accommodate the needs and desires of these valued adults, the healthcare space will need to rethink how it delivers care.

Ageing in Place is a concept whereby older people are able to continue live in their own homes as they age despite changes to their health and mobility. Smart technologies and the Internet of Things (IoT) have the potential to play a significant role in enabling older people to age in place. Connected devices and data provide an immense opportunity to expand the way we provide healthcare to older populations—all the way from clinical research to ongoing care to emergency interventions.

Many severe aggravations in a variety of diseases—muscular degeneration, breathing disorders, etc.—are usually preceded by a gradual decline in function over a period of days or weeks. Monitoring and detecting these early indicators through in-home monitoring will allow doctors to intervene when they see a high risk of exacerbation (and) before severe adverse health events occur. The ability to facilitate proactive intervention is the IoT's greatest promise for healthcare and, in particular, aging in place. In terms of ongoing care, sensors can provide physicians with fine-grained and objective measures of patients' health outside of clinic visits—a huge improvement from patients' self-reporting, which doctors rely on today. Wearables and other sensors can act as a caretaker's eyes and ears to observe what is going on in an older individual's home at any time, but it's what is done with this information that can make the data particularly valuable. The IoT can become a virtual 'helpful roommate or caregiver' for elderly people living alone in their homes. Cognitive-assistance technologies could possibly detect mood or detect potential risk or notice a change in a behavior with sensors and use actuators to engage devices or robots, doing something as simple as turning on a light to help you see or a favorite song to change your mood or as life-saving as calling for help.

Although, existence of the many opportunities of smart commodity sensors, research in the field of IoT development and evaluation has recognised a number of challenges and limitations associated with smart technology developments to support Ageing in Place, calling for user centeredness and better integration with broader systems. Among the others, older adults' unwillingness to learn a new technology, lack of confidence on IoT, inability to maintain the technology, not being able to afford to continue to maintain or replace the technology etc. are the majors which can be exaggerated by the risks of safety, privacy and security of IoT enhanced cares.

This panel session will be a perfect platform to discuss about the current limitations, risks and challenges of evolving IoT to enable aging in place and what clinical, technological and ethical advancements are needed for researchers in developing an IoT-aided age-friendly community.

Moderator

Mohammad Arif Ul Alam

Dr. Alam is an assistant professor in the Computer Science department at University of Massachusetts Lowell, where he leads the Cognitive Ubiquitous Computing and Systems (CUBICS) laboratory. He received his PhD in Information Systems from University of Maryland Baltimore County in 2017. He worked at IBM T. J. Watson Research Center for 2 years as a Research Staff Member under MIT-IBM Watson AI Lab and served as a Research Affiliate at MIT Media Lab as part of his role at IBM. His research interests cover ubiquitous computing and applied AI on human cognition that leverages a network of connected biomedical devices, sensors and AI aided cognitive systems to help people with disabilities. He is a Co-PI of Canada's Aging and Technology Network (AGE-WELL NCE) grant which aims to develop a mobility self-monitoring tool for older adults and their caregivers. He is a member of technical program committee of IEEE PerCom (Industry), PerIoT, SmartComp and ICDCS (edge computing).

PANELISTS

Nabil Alshurafa

Dr. Alshurafa is an Assistant Professor of Preventive Medicine and of Computer Science at Northwestern University. He received his Ph.D. in Computer Science at the University of California Los Angeles (UCLA) in 2015, where his dissertation was awarded the Computer Science outstanding graduating student award, and the Symantec outstanding research award. In 2015, Popular Science magazine highlighted his research on designing a wearable neck-worn sensor WearSens to distinguish between solid and liquid foods consumed. He currently directs the HABits Lab at Northwestern, which aims to bridge between computer science and behavioral science research. His current research seeks to transform our understanding of health constructs by designing objective verifiable wearable sensor measures, to more effectively design interventions that improve lifestyle habits. In 2018, he was awarded a five-year NIDDK NIH Career award, to develop expertise in obesity-related research and advance passive sensing of problematic eating behaviors. He is currently directing the SenseWhy study, which aims to lay the foundation for studying overeating behaviors among participants with obesity through passive wearable sensors.

Ahmad Salman

Dr. Salman is an Assistant Professor at James Madison University. He has interest in cryptography for secure communications in IoT and lightweight devices as well as techniques for conserving battery power in those devices. He is particularly known for his work on Elliptic-Curve Cryptography, Pairing-Based Cryptography, and other Public-Key Cryptography algorithms. He also researches Post-Quantum Cryptography algorithms for high speed and lightweight applications. Project include using drones to securely collect data from Wireless Sensor Nodes in different applications. He also explores the security and privacy concerns in tracking devices used in hospitals to track patients and hospital staff as they move from location to location. Salman received doctoral and master's degrees in computer engineering from George Mason University and a bachelor's degree in computer engineering from the Arab Academy for Science and Technology.

Abhishek Mukherji

Dr. Mukherji is a Data Mining and Machine Learning researcher with 10+ years of industry experience in data-driven research and product development. He is a Principal Research Scientist at Accenture Operations Thought Leadership and Innovation. Prior to that, he worked at Cisco Systems in Enterprise Networking (EN) applying ML to networking data for a variety of customer use cases and solutions ranging indoor location technologies, IoT and Software quality of Cisco EN products. He also worked in Samsung R&D where he contributed to the Android and Tizen OS context framework, mobile user context mining and Samsung smartwatch wrist-based activity recognition research. Dr. Mukherji holds Ph.D. and M.S. degrees in Computer Science from Worcester Polytechnic Institute (WPI), MA. He is broadly interested in data mining, machine learning, human behavior and intent prediction, natural language processing, sensor/stream data management and information visualization. He is an inventor of 15+ granted and pending patents. Few of Dr. Mukherji's notable achievements are the Best Industry Track Paper Award at IEEE PerCom 2019 and the Best paper nominee (top 5%) award at ACM UbiComp 2014. At Samsung, he contributed to the team that won the Gold medal and merit certificate at Samsung Best Paper Awards 2015 and 2016, respectively.

Hiro (Hironobu) Takagi

Dr. Takagi is the senior manager of the Accessibility & Healthcare research team at IBM Research - Tokyo. He joined IBM Research in 1999 and received his Ph.D. in computer science from the University of Tokyo in 2000. He has been investigating Web-accessibility, crowd-sourcing, elderly-care, and real-world accessibility technologies. He is currently leading the indoor navigation project and the collaboration with Carnegie Mellon University for real-world accessibility research. He received best paper awards at ACM ASSETS 2002 and 2009 and won an achievement award from the Japanese Ministry of Education, Culture, Sports, Science and Technology in 2011. He is a member of the IBM Academy of Technology and ACM.