

## Introduction to Internet of Things: Providing Services Using Smart Devices, Wearables, and Quantified Self Mini-track

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Organizations face many challenges as they seek to provide services to end-users through wearable or autonomous mobile devices using the emerging Internet of Things (IoT) platform. The IoT allows connectivity of billions of mobile devices that can perform physical, sensing, and analytical services to users. Many of these devices exist in physical proximity of the user making up part of the user's personal area network (PAN). Others are wearable devices that sense and track metrics about the quantified self and make up the user's body area network (BAN). Finally, other mobile devices are semi-autonomous or autonomous and can move and actuate on their surroundings in an effort to provide services to users who may or may not be in physical proximity of the devices. These scenarios create business opportunities for organizations seeking to provide services to these users. This mini-track provide a forum for researchers addressing these types of issues.

The first paper entitled "Digital Transformation Through Internet of Things Services" provides a framework for addressing the key drivers and challenges organizations face when using the IoT to provide services. Here, Tayfun Keskin and Burcu Tan Erciyes propose four technological components of the IoT including "Things", the Internet, hardware that enables the "Things", and the platform that provides the intelligence for making use of these "Things". They focus on the multi-sided platform associated with the IoT and examine four ownership models and strategies of these models. Making use of a Hotelling analytical model they propose that cross-market externalities impact the market leader's ability to gain benefits and charge prices for services.

In the second paper, "Evolution of Format Preserving Encryption on IoT Devices: FF1+", Alessandro Baccarini and Thair Hayajneh take on the critical IoT issue of maintaining security for low-power sensing devices. They introduce a novel cryptosystem named Format Preserving Encryption

(FPE) that takes advantage of the lightness of symmetric algorithms but still provides several unique features. They test the FPE algorithm FF1 on a Raspberry Pi 3 to simulate encryption on IoT devices and compare the results with several symmetric and asymmetric algorithms. The results indicate a promising cryptosystem for IoT devices.

To connect IoT devices, Bluetooth Low Energy (LE) beacons can provide location-based services. Yaxing Yao, Yun Huang, and Yang Wang examine how people perceive and understand the use of Bluetooth beacon systems in "Unpacking People's Understandings of Bluetooth Beacon Systems—A Location-Based IoT Technology." In their study, they conducted 22 semi-structured interviews where they provided participants with three typical hypothetical scenarios where beacons have been used to provide users with alerts: in a shopping mall, on a university campus, and in a smart home. The results indicate that information flows and who owns the beacons are crucial factors that influence peoples' perceptions of beacon systems. The authors discuss how misunderstandings about the technology are critical for adoption, usage and how smart devices should be designed and promoted.

In the final paper of the mini-track entitled "The Effects of Social and Spatial Presence on Engagement in a 3D Virtual Reality Environment: An Empirical Investigation", authors Fone Pengnate, Fred Riggins, and Limin Zhang examine how social presence and spatial presence are impacted in a VR environment. We should expect to see more use of wearable VR and augmented reality devices in retail, entertainment, and industrial settings as this technology continues to mature. Being able to interact with robots and virtually interact with objects using hand sensors promises to make these VR settings much more engaging and fun for users. The results of an experiment using the Oculus Rift technology show that social presence and spatial presence can improve hedonic value in these settings.