The Future of IoT in Hospitality

By Ajay "AJ" Aluri, Ph.D.

When consumers perceive value from using the Internet of Things devices and applications, the trend will quickly create a new market.

The term Internet of Things or simply IoT first appeared on the Web around 2004, but reached the height of its popularity by the end of 2013 *(Google Trends, 2016)*. Recently, these search terms have declined in popularity on the general Web, but gained more momentum among businesses and consumers. Oxford Dictionaries even included the definition of IoT as "the interconnection via the Internet of computing devices embedded in everyday objects, enabling them to send and receive data." The idea and concept behind IoT is not a new thing; it evolved from the Machine to Machine (M2M) systems and what a few companies called the Industrial Internet *(Lopez, 2015)*. Currently, IoT applications are everywhere, from smart homes, smart connected cars and smart cities, to smart businesses and environments. IoT is not only about new technological devices or platforms, such as sensors, integrated systems and embedded systems, but according to IBM Watson *(2016)*, it is the ability to "collect data from things and make value from it" for both businesses and consumers. What is the future of IoT? Is there any new market? If any, what is the impact of IoT in the hospitality industry?

Is IoT Still a Buzz Word?

A study conducted among consumers by The Acquity Group found that 87 percent of consumers have

Ajay "AJ" Aluri, Ph.D. (Ajay.Aluri@mail.wvu.edu) is an assistant professor of hospitality and tourism management at West Virginia University in Morgantown, West Virginia.

not heard of the term "Internet of Things" *(Accenture, 2014)*. In contrast, in the business world, Gartner's *(2015a) Hype Cycle for Emerging Technologies* specified that IoT is at the top of the curve when it comes to business expectations, at the peak of inflated expectations and high levels of interest, and will soon reach the disillusionment stage, with a potential for significant impact on the future of business in the next five to 10 years. Therefore, there is clearly a discrepancy between businesses and consumers regarding the future of IoT. According to Cisco, the number of things connected to the Internet exceeded the number of people on earth during 2008, and is projected to reach 50 billion things by 2020 *(Evans, 2011)*. Alternatively, Gartner's *(2015b)* research forecasted that there would be 6.4 billion connected things in 2016 and that number will reach 20.8 billion devices by 2020. Whether it's 50 or 20 billion, these connected things will not only simplify the number of devices individuals will need to use in the future, but also enhance the way one device can work with the network of interconnected things. Furthermore, a study conducted by the Pew Research Center stated that the Internet of Things will thrive by 2025 and will be part of the digital life of most consumers *(Anderson & Rainie, 2014)*. Hence, IoT platforms can revolutionize the way businesses connect with customers and collect data to create experiences and value, and provide new ways for customers to configure their devices and communicate with businesses and the world around them.

What is the Future of IoT?

Before we explore the future of IoT, we need to examine current business trends. Cearley *(2016)* of Gartner Research identified two technology trends: the Digital Business (DB), self-described as "merging real and virtual worlds to deliver new and advanced services to internal users and customers," and Algorithmic Business (AB), "an extended version of DB, using algorithms to encapsulate knowledge and analysis of data." IBM researchers identified another trend Gartner did not mention, what they call Cognitive Business (CB), the ability to "create new customer experiences, reinventing operations and transforming business" *(IBM Watson, 2016)*. While CB focuses more on the relationship between man and machine, there is a final critical trend sector that is missing, one that I would call the Behavioral Business (BB), the ability to interpret consumer behavior in society and with the environment in both human-human (HHI) and human-computer (HCI) interactions. In fact, BB would bridge the gap and bring insights into current and future consumer behavior that is enhanced through the data provided by digital, algorithmic, and cognitive business. It has the potential to create unique customer value apart from experiences. In summary, all four quadrants of business (AB, BB, CB and DB) are necessary to foresee the success of IoT in the future.

The research on IoT is still in its infancy; however, there are a couple of major studies regarding consumer intentions to purchase IoT devices and industry projections in the IoT market. According to The Acquity Group, the top three IoT devices consumers are expected to purchase include smart thermostats, connected security systems and smart refrigerators *(Accenture, 2014)*. The other connected devices mentioned in this study, as they appear, include wearable fitness devices, smartwatches, self-driving vacuum cleaners, wearable heads-up displays and smart clothing. As wearable fitness devices and smart watches are catching on among the mainstream consumers, these other IoT devices are expected to be completely adopted in the next five to 10 years. In the wearable market in the next two years, Bluetooth headsets, smartwatches and wristbands are projected to sell more units in the market *(Gartner, 2016)*. Other devices that are expected to sell successively include sports watches, other fitness monitors, chest straps, head-mounted displays, smart garments and body-worn cameras. Most of these devices for both consumers and businesses are designed to either integrate with mobile smart phones or just connect to individ-

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IoT

Internet of Things

The Internet of Things extends Internet connectivity beyond traditional devices like desktop and laptop computers, smart phones and tablets to a diverse range of devices and everyday things that utilize embedded technology to communicate and interact with the external environment, all via the Internet.

(Webopedia; www.webopedia.com)

uals to monitor specific information. Nevertheless, the stand-alone IoT devices and applications will significantly impact IoT adoption in the near future.

Then again, consumers have raised several concerns that will hinder the future of IoT. For instance, regarding the smart home, some of the barriers to the adoption of IoT include lack of perceived value, concerns about price and concerns of privacy *(Accenture, 2014)*. As another example, smart glasses have the potential to connect with other IoT devices not only for personal use, but also as a way consumers connect to businesses. As Virtual Reality (VR) devices are getting more affordable, the focus has been increasingly on Augmented Reality (AR), because these devices can transform the way users connect to the IoT devices and compute. For instance, AR offers hands-free and simple voice commands that allow users to integrate multiple devices, connect and access multiple IoT devices around them in a 3D platform. A study conducted by Aluri *(2015)* at HITEC 2014, uncovered that a significant number of consumers are concerned with the cost of the device (88 percent), battery life (74 percent), lack of personalized AR apps (63 percent), the physical discomfort of wearing the device (63 percent) and privacy issues (52 percent). In the next few years, AR devices with built-in neuro-science interfaces will be stand-alone devices such as smart glasses, and will allow users to integrate and connect to multiple devices and IoT applications. Consequently, consumers may be willing to use IoT devices and connect them through stand-alone wearables, whether smart watches or smart glasses, when value-added experiences can be had with the built-in artificial intelligence.

IoT in the Hospitality Industry

In the hospitality industry, IoT applications should be embraced among businesses, and building this platform is necessary for innovators and early explorers of IoT devices to adopt them. Using the data from the early adopters, hospitality businesses can create value from it by offering unique experiences through the IoT services and products. The first step to the future of IoT among businesses is to embrace the Internet and Wi-Fi as the source of valuable consumer data for creating new customer experiences, no longer just for customer personal use. Using IoT devices requires reinventing operations and transforming business processes to customize and personalize products and services to individual customers. In the next two years, most smart phones will be capable of accessing Super Wi-Fi, that is, the TV white space network which uses unused TV broadcast frequencies. It is important that hospitality businesses embrace Super Wi-Fi, which is more affordable and offers big bandwidth, a 1,400 foot range, four times the distance, and 16 times the coverage area when compared to regular Wi-Fi *(Belcher, 2016)*. Also, Super Wi-Fi offers up to a five mile range at a higher power, with signals that effectively navigate physical obstructions and provide in-building penetration. This Super Wi-Fi platform will change the way hotels, restaurants, theme-parks and tourism destinations offer free Wi-Fi, collect user data and create value-added experiences.

According to a study conducted by the Pew Research Center, "the internet will become like electricity that is less visible, yet more deeply embedded in people's lives for good and ill" *(Anderson & Rainie, 2014)*. Wearables have the capability to change the way we compute — a solution to integration of multiple devices in a Super Wi-Fi platform. This Super Wi-Fi platform will enable every connected device in the IoT platform to access everything from one wearable device without the need to change devices or networks, and will be able to seamlessly embed and integrate multiple devices and applications, and connect with other IoT devices to send, receive and share information. Consequently, users will be able to use stand-alone wearable devices driven by a neuroscience interface, connect with IoT devices that are built-in with artificial intelligence, and integrate devices seamlessly for value added experiences. On the other hand, hospitality businesses will be able to use data from IoT devices to create new customer experiences, reinvent operations by merging real and virtual data, and use algorithms to encapsulate knowledge and analysis of data to deliver new and advanced services to both employees and customers *(Cearley, 2016; IBM Watson, 2016)*. In fact, the IoT platform is the answer to scientific management in the digital life — a "shortcut" to get things done efficiently and effectively for both consumers and businesses.

Imagine this scenario: guests will access devices in a connected smart home, and as they near the hotel, their connected smart car will share personal information with the guest services. Then guest services will use this data to offer personalized services, share room information and access, and allow guests access to the room seamlessly with their personal wearable device and customize their experience with the guest room and IoT devices. Furthermore, depending on the guest's personal settings and updates from the calendar, an

alarm clock will be set to the right time simultaneously. When the guest wakes up in the morning, the blinds will open automatically, when the guest completes their shower, the coffee maker starts automatically, and when the coffee is picked up, the television starts with the guest's favorite news channel (if television sets are still around). The term multi-tasking was first used in the '90s for the Windows computer, but perhaps in the world of the IoT platform, computers and applications will do the multi-tasking while the humans fulfill their purpose on this earth. When consumers perceive value from using IoT devices and applications, and when the prices of these devices drop, this IoT trend will quickly create a new market made up of mainstream consumers who are generally willing to choose convenience over concerns about privacy.

IoT in an Hotel Environment

A thread that keeps guests connected with a hotel's services.

Devices connected to guest services will share preferences to customize room environment and provide access.

Updates from the guest's calendar will set the alarm clock to the right time spontaneously.

When the guest wakes up in the morning, the blinds will open automatically.

When the guest completes a shower, the coffee maker starts automatically.

When the coffee is picked up, the television starts with the guest's favorite news channel (if television sets are still around).

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