IOT and Wearable Computer: A Review

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Abstract

In 2008, the number of connected devices surpassed that of connected humans, and is expected to reach 50 billion by 2020. A sprawling Internet of Things (IOT) ecosystem is emerging to facilitate the process of connecting physical objects such as buildings, roads, household appliances, and human bodies to the Internet via sensors and microprocessor chips that record and transmit data such as sound waves, temperature, movement, and other variables. The proliferation of Internet-connected sensors has resulted in the emergence of new categories of technological competence and application. Increased granularity in 24/7 quantified monitoring enables a more complete picture of the internal and exterior environments faced by people. As people adapt to the diverse types of data flows provided by the IOT, new data literacy behaviours such as correlation analysis, anomaly identification, and high-frequency data processing are emerging. Four fundamental functional phases comprise the IoT ecosystem: data production, information production, meaning development, and action taking. This article gives an in-depth examination of the Internet of Things ecosystem, both as it exists now and as it quickly evolves (IOT).

Keywords: IOT, Wearable Device, Data.

Introduction

The Internet of Things is defined differently by several sources (IOT). One example that illustrates the term's present use is supplied by the United States National Intelligence Council: “The “Internet of Things” is a broad concept that encompasses any devices, particularly ordinary items, that are readable, recognised, locatable, accessible, and controlled over the Internet - whether by RFID, wireless LAN, wide-area network, or other ways [1].” While computers such as laptops, servers, smartphones, and tablets (e.g., iPads) are the most recognised Internet-connected devices, the IOT idea encompasses a far larger range of gadgets. Everyday things, in example, that previously did not seem to be electronic are becoming connected through integrated sensors and microprocessors and talking with one another and with the Internet. This category contains food, clothes, home appliances, materials, components, subassemblies, commodities, luxury goods, landmarks, structures, and roads. Microprocessors are presently incorporated in around 5% of human-constructed things [2]. These little computer processors and sensors capture and send data about sound waves, temperature, movement, and other characteristics. Other synonyms for the Internet of Things include Internet-connected devices, smart-connected devices, wireless sensor networks, wirelessly communicating machines and gadgets, ubiquitous computing, ambient intelligence, and smart matter.

One method to categorise the IOT is by market sector, which may be divided into three broad categories: monitoring and managing the performance of houses and buildings, automotive and transportation

applications, and health self-tracking and personal environment monitoring. Temperature monitoring, security, building automation, remote HVAC activation, peak and off-peak energy management, and smart power metres are just a few of the fundamental IOT applications occurring in the linked home and building. The global deployment of smart energy metres is estimated to increase from 130 million in 2011 to 1.5 billion by 2018 [3]. Several of the many automotive and transportation IOT applications include the Internet-connected automobile (for synchronising productivity, information, and entertainment apps), traffic control, directing drivers to available parking spaces, and electric vehicle charging. 90% of new cars delivered in 2018 are expected to have on-board connection platforms, up from 10% in 2012 [3]. Train operators such as Union Pacific monitor the temperature and condition of train wheels using IoT infrared sensors, ultrasonic, and microphones [4]. Individual health measurements are one of the fastest growing areas of the Internet of Things, with self-tracking devices, clinical remote monitoring, wearable sensor patches, Wi-Fi scales, and a variety of other biosensing applications. Two high-profile prizes in this area are intended to stimulate innovation: the $10 million Qualcomm Tricorder X Prize for the development of a handheld device capable of non-invasively monitoring and diagnosing health conditions in real time [5], and the $2.25 million Nokia X Challenge for sensor technology that enables new ways to monitor, access, and improve consumer health [6].

Figure 1 illustrates the IOT's fast expansion by comparing the number of Internet-connected devices to the number of Internet-connected persons. In 2008, linked gadgets overtook linked humans. By 2018, Cisco anticipates that there will be 50 billion connected devices, or seven times the world's population [7]. Similarly, the Connected Life initiative, sponsored by the GSMA (GSM Association, an industry association for global mobile operators), discovered that there were 9 billion total Internet-connected devices in 2011 (compared to a total human population of less than 7 billion), of which two-thirds (6 billion) were mobile, and predicts that there will be 24 billion total Internet-connected devices in 2018. Additionally, it is anticipated that these 24 billion Internet-connected gadgets would provide an economic effect of more than $4.5 trillion by 2018 [8].

Hardware

One of the primary drivers of the IOT is the growing availability of low-cost sensors with a variety of diverse functions. Standard sensors include those that detect movement (through an accelerometer), sound, light, electrical potential (through a potentiometer), temperature, moisture, position (through GPS), heart rate and heart rate variability, and GSR (galvanic skin response or skin conductivity). Additional sensors include ECG/EKG (electrocardiography and electromyography, respectively), EMG (electromyography and electromyography, respectively), EEG (electroencephalography and electroencephalography, respectively), and PPG (electroencephalography and electroencephalography, respectively) (photoplethysmography to measure blood flow volume).

These sensors are integrated into a diverse range of devices and systems. The trend is toward multisensor systems with several sensing units. For example, it looks that the norm for the next generation of individualised self-tracking goods will include a combination of an accelerometer, GSR sensor,

temperature sensor, and maybe a heart rate sensor (from which heart rate variability may be calculated). The Fitbit, myZeo, BodyMedia, MapMyRun, RunKeeper, MoodPanda, Nike Fuelband, and The Eatery are among well-known first-generation quantified tracking devices and apps. The Brain Trainer developed by Luminosity, as well as the NeuroSky and Emotiv brain-computer interfaces (BCI).

Mobile Platform

The mobile platform serves as the foundation for a variety of activities, originally for communication, then for computing, and now for quantified tracking. As of October 2012, the US has a smartphone penetration rate of 78 percent, behind other nations such as Singapore (92%) [26]. One explanation for this is that certain markets have jumped ahead of technological rollouts in order to provide continuous Internet connection by smartphone for the first time. Even simple speech capabilities combined with automated algorithms enables important next-generation Internet of Things predictive applications, such as Parkinson's illness diagnosis. The Parkinson's Speech Initiative claims to have a 98 percent successful phone-based voice diagnosis. The user dials and says 'aaaaah.' To determine the existence and severity of Parkinson's disease, a machine learning software examines several speech features in the sample, including vocal tremor, strength, breathiness, and changes in the jaw, tongue, and lips [27].

Conclusion

While acknowledging the inherent difficulties in forecasting, it is nevertheless a beneficial exercise to speculate about what could happen in the near future. Numerous applications are in the works. Improved biophysical monitoring is one area that has demand, funding resources, and a known pain issue. Numerous work tasks, such as astronauts, pilots, military members, and fire fighters, need astronauts, pilots, and military people to evaluate their tiredness, weariness, and physical and mental performance. Biosensor Internet of Things technologies have the potential to significantly improve upon present technologies. A new degree of biophysical monitoring also enables a second application area: the redefining of peak performance fitness training for a broad market that includes professional and amateur athletes, as well as anybody who exercises. One possibility is for more detailed real-time performance feedback, moving away from the familiar target heart rate zone readout and toward a more detailed stratification of output levels such as warm-up, aerobic exercise, anaerobic exercise, and VO2 max, all of which can be integrated with a real-time exhaustion metre.

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