INTERNET OF THINGS

Summary

The Internet of Things is an increasing number of objects that historically have not required the Internet to function, but are now integrating Internet connectivity in an attempt to form a more connected world. This article discusses the history of the Internet in order to frame the emergence of the Internet of Things. Some unique Internet of Things applications are provided to show the potential for these new Internet-connected devices. However, there are many obstacles that remain in the way of the Internet of Things. With the help of Electrical and Computer Engineers, these obstacles must be overcome before the Internet of Things can become truly mainstream.

Introduction

Have you ever walked out of your house, only to discover that you left your keys behind? What usually follows is a frantic search of pockets, bags, car seats and couch cushions. What you need is a smart key ring. Simply clip an extra fob to your key ring and the next time your keys go missing, you only need to pull out your smartphone. Your phone can then tell you how close you are to your keys or even make the key ring fob beep to help you find your keys quickly and with as little stress as possible.

In recent years there has been a trend of simple items and appliances being replaced with new "smart", Internet-connected versions of themselves. This key ring is a perfect example of a "dumb" object, the classic metal key ring, being replaced by a "smart" object, the key ring that helps you find it.

This trend is known as the rise of the Internet of Things and it's not just limited to key rings. There are smart devices that help you monitor your health, heat your home and even track the state of the environment.

Despite the promise of these new objects, there still remain significant challenges that prevent them from becoming truly ubiquitous. Many of these challenges lie in the fields of Electrical and Computer Engineering and will be solved by what students are learning today.

History of the Internet of Things

The concept of the Internet of Things (IoT) has been around since 1984, when it was first described by Ken Sakamura (Zhou, 2013), but it did not get its name until 1999 when Kevin Ashton officially coined the term (Mukhopadhyay, 2014). However to fully understand the Internet of Things it is first necessary to understand the history of the Internet. The Internet's history can be split into three separate time periods, frequently referred to as the three waves of the Internet (Zhou, 2013). The first wave, the Internet of computers, is what many still think of as the Internet today. The Internet of computers is the system that has connected over a billion desktop computers together since the 1990s (Goldman Sachs, 2014). Then, technology advanced and computers began to be embedded into things that did not traditionally contain computers. This was the second wave of the Internet, now available on new devices such as mobile phones. These two waves focused on connecting 2.2 billion people (in 2011) together via the Internet, but the third wave of the Internet will take the next step: it will connect devices without requiring any human interaction (Mukhopadhyay, 2014; Zhou, 2013). This third wave is known as the Internet of Things.

The Internet of Things describes the network formed by "smart devices", such as the smart key ring described at the start of this article. A smart device will usually have some sensors, a microprocessor and potentially a user interface, if human interaction is sometimes required. These devices also must have a method of connecting to the Internet. Frequently this will be a wireless technology, like WiFi or Bluetooth, but some smart devices also connect via wired technologies, such as Ethernet. It is the job of ECE engineers to determine how to design these new components and combine them into these new "smart devices".

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