International Journal of Advanced Research Methodology in Engineering & Technology,
Volume 1, Issue 2, March 2017, ISBN 978-1-63535-889-6

INTERNET OF THINGS

Keerthana M[1] and Ashika Parveen S[2]
Department of computer science and engineering
Vivekanandha institute of engineering and technology for women
Email-id: keerthana07kiru@gmail.com

ABSTRACT

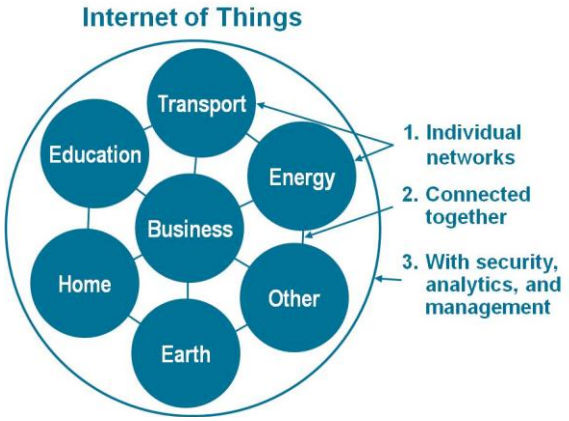
The Internet of Things (IoT), sometimes referred to as the Internet of Objects, will change everything including ourselves. This may seem like a bold statement, but consider the impact the Internet already has had on education, communication, business, science, government, and humanity. Clearly, the Internet is one of the most important and powerful creations in all of human history.
Now consider that IoT represents the next evolution of the Internet, taking a huge leap in its ability to gather, analyze, and distribute data that we can turn into information, knowledge, and, ultimately, wisdom. In this context, IoT becomes immensely important. Already, IoT projects are under way that promise to close the gap between poor and rich, improve distribution of the world's resources to those who need them most, and help us understand our planet so we can be more proactive and less reactive. Even so, several barriers exist that threaten to slow IoT development, including the transition to IPv6, having a common set of standards, and developing energy sources for millions even billions of minute sensors.
However, as businesses, governments, standards bodies, and academia work together to solve these challenges, IoT will continue to progress. The goal of this paper, therefore, is to educate you in plain and simple terms so you can be well versed in IoT.

1. INTRODUCTION

IoT's roots can be traced back to the Massachusetts Institute of Technology (MIT), from work at the Auto-ID Center. Founded in 1999, this group was working in the field of networked radio frequency identification (RFID) and emerging sensing technologies. The labs consisted of seven research universities located across four continents. These institutions were chosen by the Auto-ID Center to design the architecture for IoT the first time in history Bureau, Cisco IBSG estimated the number of connected devices per person .Refining these numbers further, Cisco IBSG estimates IoT was "born" sometime between 2008 and 2009. Today, IoT is well under way, as initiatives such as Cisco's Planetary Skin, smart grid, and intelligent vehicles continue to progress. The Internet of Things Was "Born" Between 2008 and 2009 Looking to the future, Cisco IBSG predicts there will be 25 billion devices connected to the Internet by 2015 and 50 billion by 2020. It is important to note that these estimates do not take into account rapid advances in Internet or device technology; the numbers presented are based on what is known to be true today.
Additionally, the number of connected devices per person may seem low. This is because the calculation is based on the entire world population, much of which is not yet connected to the
Internet. By reducing the population sample to people actually connected to the Internet, the number of connected devices per person rises dramatically. For example, we know that 2 billion people use the Internet today.8 Using this figure, the number of connected devices per person jumps to 6.25 in 2010, instead of 1.84.
Of course, we know nothing remains static, especially when it comes to the Internet. Initiatives and advances, such as Cisco's Planetary Skin, HP's central nervous system for the earth (CeNSE), and smart dust, have the potential to add millions—even billions—of sensors to the Internet.9 As cows, water pipes, people, and even shoes, trees, and animals become connected to IoT, the world has the potential to become a better place.
"With a trillion sensors embedded in the environment—all connected by computing
Systems, software, and services—it will be possible to hear the heartbeat of the Earth,
impacting human interaction with the globe as profoundly as the Internet has revolutionized communication."
Currently, IoT is made up of a loose collection of disparate, purpose-built networks. Today's cars, for example, have multiple networks to control engine function, safety features, communications systems, and so on. Commercial and residential buildings also have various control systems for heating, venting, and air conditioning (HVAC); telephone service;

security; and lighting. As IoT evolves, these networks, and many others, will be connected with added security, analytics, and management capabilities (see Figure 2). This will allow of networking. In the late 1980s and early 1990s, Cisco, for example, established itself by bringing disparate networks together with multi-protocol routing, eventually leading to IP as the common networking standard. With IoT, history is repeating itself, albeit on a much grander scale.

2. Why Is IoT Important?



Before we can begin to see the importance of IoT, it is first necessary to understand the
differences between the Internet and the World Wide Web (or web)—terms that are often used interchangeably. The Internet is the physical layer or network made up of switches, routers, and other equipment. Its primary function is to transport information from one point to another quickly, reliably, and securely. The web, on the other hand, is an application layer that operates on top of the Internet. Its primary role is to provide an interface that makes the information flowing across the Internet usable. Evolution of the Web Versus the Internet The web has gone through several distinct evolutionary stages:
Stage 1. First was the research phase, when the web was called the Advanced Research
Projects Agency Network (ARPANET). During this time, the web was primarily used by academia for research purposes.
Stage 2. The second phase of the web can be coined "brochureware." Characterized by the domain name "gold rush," this stage focused on the need for almost every company to share information on the Internet so that people could learn about products and services.
Stage 3. The third evolution moved the web from static data to transactional information, where products and services could be bought and sold, and services could be delivered.
During this phase, companies like eBay and Amazon.com exploded on the scene. This phase also will be infamously remembered as the "dot-com" boom and bust.
Stage 4. The fourth stage, where we are now, is the "social" or "experience" web, where companies like Facebook, Twitter, and Groupon have become immensely popular and profitable (a notable distinction from the third stage of the web) by allowing people to communicate, connect, and share information (text, photos, and video) about themselves with friends, family, and colleagues.

3. IOT Example

Example of objects that can fall into the scope of internet of things include connected security systems , thermostats, cars, electronic appliances, lights in household and commercial environments, alarm clocks, speaker systems, vending machines and more.

Business can leverage IoT applications to automate safety tasks (for example, notify authorities when a fire extinguisher in the building is blocked) to perform real-world A/B testing using networked cameras and sensors to detect how customers engage with products

4. Future of IoT

As far as the reach of the Internet of Things, there are more than 12 billion devices that can currently connect to the Internet, and researchers at IDC estimate that by 2020 there will be 26 times more connected things than people.

According to Gartner, consumer applications will drive the number of connected things, while enterprise will account for most of the revenue. IoT adoption is growing, with manufacturing and utilities estimated to have the largest installed base of Things by 2020

5. IoT Applications

What Cows, Water Pipes, and People Have in Common When we crossed the threshold of connecting more objects than people to the Internet, a huge window of opportunity opened for the creation of applications in the S communication. In fact, the possibilities are almost endless. The following examples highlight some of the ways IoT is changing people's lives for the better.
In the world of IoT, even cows will be connected. A special report in The Economist titled "Augmented

Business" described how cows will be monitored Sparked, a Dutch start-up company, implants sensors in the ears of cattle. This allows farmers to monitor cows' health and track their movements, ensuring a healthier, more plentiful supply of meat for people to consume. On average, each cow generates about 200 megabytes of information a year.

Mumbai: A Tale of Two Cities

While greater efficiencies and new business models will have a positive economic impact, the human aspect, in many ways, will provide the most important benefit of IoT. One of the areas where IoT can make a significant difference is in closing the poverty gap. Dr. C.K. Prahalad's book, The Fortune at the Bottom of the Pyramid: Eradicating Poverty Through Profits, provides some mind-boggling statics comparing Dharavi (the poorest neighborhood in Mumbai) to Warden Road (the better side of the city just blocks away).

The amount people from Dharavi pay for municipal-grade water is $1.12 per cubic meter. This compares to for residents of Warden Road. The injustice is clear: the poor people ofMumbai pay 37 times more for water (a basic human necessity).

The main source of the disparity is the higher cost of delivering utility services to poorer neighborhoods because of infrastructure inefficiencies, problems such as leaks, and theft. According to an article in The Wall Street Journal, "Seven years ago, more than 50 percent of the power distributed by North Delhi Power Ltd. wasn't paid for by customers. A key challenge for power companies is reducing theft by India's poor." Electric Utility Inefficiencies in India. IoT, because of its ubiquitous sensors and connected systems, will provide authorities with more information and control in order to identify and fix these problems. This will allow utilities to operate more profitably, giving them extra incentive to improve infrastructures in poorer neighborhoods. More efficiency will also allow for lower prices, which, in turn, will encourage those taking services for free to become paying customers.

Better Quality of Life for the Elderly

The world's population is aging. In fact, approximately 1 billion people age 65 and older will be classified as having reached "non-working age" by the middle of the century. Significantly improve quality of life for the surging number of elderly people. For example,

Imagine a small, wearable device that can detect a person's vital signs and send an alert to a healthcare professional when a certain threshold has been reached, or sense when a person has fallen down and can't get up. Several barriers, however, have the potential to slow the development of IoT. The three largest are the deployment of IPv6, power for sensors, and agreement on standards.

Deployment of IPv6. The world ran out of IPv4 addresses in February 2010. While no real impact has been seen by the general public, this situation has the potential to slow IoT's progress since the potentially billions of new sensors will require unique IP addresses. In addition, IPv6 makes the management of networks easier due to auto configuration capabilities and offers improved security features. For IoT to reach its full potential, sensors will need to be self-sustaining.

Imagine changing batteries in billions of devices deployed across the planet and even into space. Obviously, this isn't possible. What's needed is a way for sensors to generate electricity from environmental elements such as vibrations, light, and airflow. In a significant breakthrough, scientists announced a commercially viable nanogenerator a flexible chip that uses body movements such as the pinch of a finger to generate electricity at the 241st National Meeting & Exposition of the American Chemical Society."This development [the nano generator represents a milestone toward producing portable electronics that can be powered by body movements without the use of batteries or electrical outlets. Our nanogenerators are poised to change lives in the future. Their potential is only limited by one's imagination."While much progress has been made in the area of standards, more is needed, especially in the areas of security, privacy, architecture, and communications. IEEE is just one of the organizations working to solve these challenges by ensuring that IPv6 packets can be routed across different network types. It is important to note that while barriers and challenges exist, they are not insurmountable. Given the benefits of IoT, these issues will get worked out. It is only a matter of time as often happens, history is repeating itself. Just as in the early days when tagline was "The Science of Networking Networks," IoT is at a stage where disparate networks and a multitude of sensors must come together and interoperate under a common set of standards. This effort will require businesses, governments, standards organizations, and academia to

work together toward a common goal.

6. Conclusion IoT represents the next evolution of the Internet. Given that humans advance and evolve by turning data into information, knowledge, and wisdom, IoT has the potential to change the world as we know it today—for the better. How quickly we get there is up to us.

7. References:

[1] K. Ashton, that ‘‘Internet of Things’’ thing, RFiD Journal (2009).
[2] H. Sundmaeker, P. Guillemin, P. Friess, S. Woelfflé, Vision and challenges for realising the Internet of Things, Cluster of European Research Projects on the Internet of Things—CERP IoT, 2010.
[3] J. Buckley (Ed.), The Internet of Things: From RFID to the Next-Generation Pervasive Networked Systems, Auerbach Publications, New York, 2006.
[4] M. Weiser, R. Gold, The origins of ubiquitous computing research at PARC in the late 1980s, IBM Systems Journal (1999).
[5] Y. Rogers, Moving on from Weiser’s vision of calm computing: engaging ubicomp experiences, in: UbiComp 2006: Ubiquitous Computing, 2006.
[6] R. Caceres, A. Friday, Ubicomp systems at 20: progress, opportunities, and challenges, IEEE Pervasive Computing 11 (2012) 14–21.
[7] I.F. Akyildiz, W. Su, Y. Sankarasubramaniam, E. Cayirci, Wireless sensor networks: a survey, Computer Networks 38 (2002) 393–422.
[8] L. Atzori, A. Iera, G. Morabito, The Internet of Things: a survey, Computer Networks 54 (2010) 2787–2805.
[9] J. Belissent, Getting clever about smart cities: new opportunities require new business models, Forrester Research, 2010.
[10] Gartner’s hype cycle special report for 2011, Gartner Inc., 2012. http://www.gartner.com/technology/research/hype-cycles/.
[11] Google Trends, Google (n.d.). http://www.google.com/trends