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INTERNET OF THINGS (IOT): TRENDS, USE CASES, AND EMERGING SOLUTIONS

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Abstract: The broadband Internet is becoming more extensively accessible and the cost of connecting to it is also declining. New devices are being developed with Wi-Fi and sensors potentiality. Technology costs are also decreasing and the smartphone access is escalating. The entirety of these things is generating a perfect scenario for the Internet of Things (IoT) technology. This paper therefore, discusses Internet of Things (IoT) technology, its advantages and applications to the society. It also made some recommendations for individuals, organizations and industries to align themselves to the IoT technology in order to tap into its benefits that will help ease their everyday routine activities.

Keywords: Devices; Internet of Things; Interconnectivity; Smart environment; Technology

Introduction

The internet is gradually encompassing our everyday life. Virtually every of our daily activities have a branch or tap on the internet. Several billions of people are now connected to the internet and many more are connecting themselves to it. This has resulted into a world of interconnectivity and smart environment. All our things are now internet based and we now have smart things.

The **Internet of things (IoT)** is the network of physical and tangible devices, vehicles, home and office appliances and other objects integrated with electronics, software, sensors, actuators, and connectivity that make these objects able to connect and exchange data (Brown, 2016). Everything is distinctively recognizable using its embedded computing system but is capable to inter-operate inside the existing Internet infrastructure. It is also a system of interconnected computing devices, both mechanical and digital machines, items, animals or individuals that are issued with identifiers that are unique to the bearer and have the capability to transmit data over a network devoid of human-to-human or human-tocomputer interaction (Rouse, 2016).

Components of Internet of Things

Internet of Things (IoT) is the idea of primarily linking any device with an "ON" and "OFF" control to the Internet (and/or to each other). This includes everything like cell phones, wrist watches, eye glasses coffee makers, washing machines, dish washers, headphones, lamps, wearable devices and almost everything else one can think, which include also parts of devices (Jacob, 2014). Extensively, the term IoT covers everything that are connected to the internet, however, it is more and more being used to describe objects that communicate with each other (Matt, 2018). The Internet of Things, or IoT, deals with billions of substantial/physical devices in the world that are currently connected to the internet and collect and share data. Internet of Things (IoT) is primarily used for devices that would not typically be normally likely to have an internet connection, which can communicate with

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the network autonomously of human intervention and actions. A PC and a smartphone, because of the above reason are not normally regarded as IoT devices but a smart watch or a fitness band may be regarded as an IoT device (Steve, 2018).

The "Thing" in the Internet of Things, can be a person that has a heart monitor implant, blood pressure monitor implant, a domestic animal with a biochip transponder, a car that has builtin sensors to alert the driver when tire under inflated or over inflated, or any other object that can be assigned an Internet Protocol (IP) address and enhanced the capability to transmit data over a network. The IoT has developed from the merging of wireless technologies, microelectromechanical systems (MEMS), micro services and the internet. This merging has aided to break down the tall walls between operational technology (OT) and information technology (IT), thus, giving access to unstructured machine-generated data to be studied for understanding that will trigger advancements (Rouse, 2016).

The Internet of Things (IoT) was originally offered at the last part of the last century and is gaining grounds in recent times in several fields of technology. Currently, IoT is enabling many applications and services in academic and industrial disciplines spanning from environment to healthcare and medical fields (Al-Turjman, 2016).

Smart Phones, smart toasters, connected rectal thermometers and fitness collars for dogs are presently several of the everyday items being connected to the web as component of the Internet of Things (IoT). Connected devices and objects in industries present the prospect for a "fourth industrial revolution", and experts forecast that more than half of emerging businesses will run on the IoT by 2020 (Matt, 2018).

Fig. 1: Diagram depicting Internet of Things (IoT).
Source: http://www.wired.co.uk/article/internet-of-things-what-is-explained-iot
Characteristics of Internet of Things (IoT)

According to Tarun (2015), the characteristics of Internet of Things include artificial intelligence, active engagement, connectivity, sensors and the use of small devices.

AI – Internet of things mostly makes nearly everything "smart". This implies that it improves all components of life with the influence of networks, data collection, and artificial intelligence algorithms.

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Small Devices – Devices as expected have developed into reduced, cheap, and more powerful ultimately. Internet of Things utilizes purpose-constructed small devices to bring its precision, versatility and scalability.

Sensors – Internet of Things drops its distinction in the absence of sensors. Sensors work as key tool which transform IoT from a standard passive network of devices into an active system efficient by real-world integration.

Connectivity –Networks can take place on a lot reduced and lesser scale while still being practical. IoT produce these little networks between its system devices.

Active Engagement – These days, communication with related technology occurs through passive engagement. IoT offers a new prototype for active products, content, or service engagement.

Advantages of Internet of Things (IoT)

There are several advantages of Internet of Things (IoT) and according to Tommy (2017), these advantages include:

✓ **Communication:** IoT motivates the communication between devices, which is also referred as Machine-to-Machine (M2M) communication. The physical devices are able to remain connected and consequently, the entire transparency is accessible with less significant inefficiencies and better value.

✓ **Automation and Control:** As a result of the physical things being digitally and centrally connected and controlled with wireless infrastructure, there is a great deal of automation and control in their operations. The machines are also able to communicate with each other in the absence of human intervention leading to faster and timely output.

✓ **Information:** It is evident that with more information, better decisions are made. Knowledge is power and therefore, more knowledge is better.

✓ **Monitor:** Another essential advantage of IoT is monitoring. Monitoring expiration of products, printer ink level, and room temperature can aid in improving life and reduce stress.

✓ **Time:** The amount of time conserved due to IoT can be pretty much. In today's contemporary world, time is very precious and we cannot do without time.

✓ **Money:** The major benefit of IoT is reducing cost. If the cost of the tagging and monitoring device is lesser than the money saved, then Internet of Things will be generally embraced. IoT essentially happens to be very supportive to individuals in their everyday routines. This is by designing the devices to communicate to each other in an efficient way, thus, conserving cost and energy. Enabling data to be communicated and distributed among devices and then translating it into our required mode, makes the systems efficient.

✓ **Automation of daily tasks leads to enhanced monitoring of devices:** IoT enables you to automate and control the tasks that are done every day, without human interference. Machine-to-machine (M2M) communication helps to sustain precision
in the operations. It also leads to consistency in the tasks done. It also maintains the quality of service. It can also enable us to take necessary action should any emergency arises.

✓ **Improved Quality of Life:** Every applications of the IoT technology climaxes in better comfort, ease, and enhanced management, as a result, improving the quality of life.

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Areas of Applications
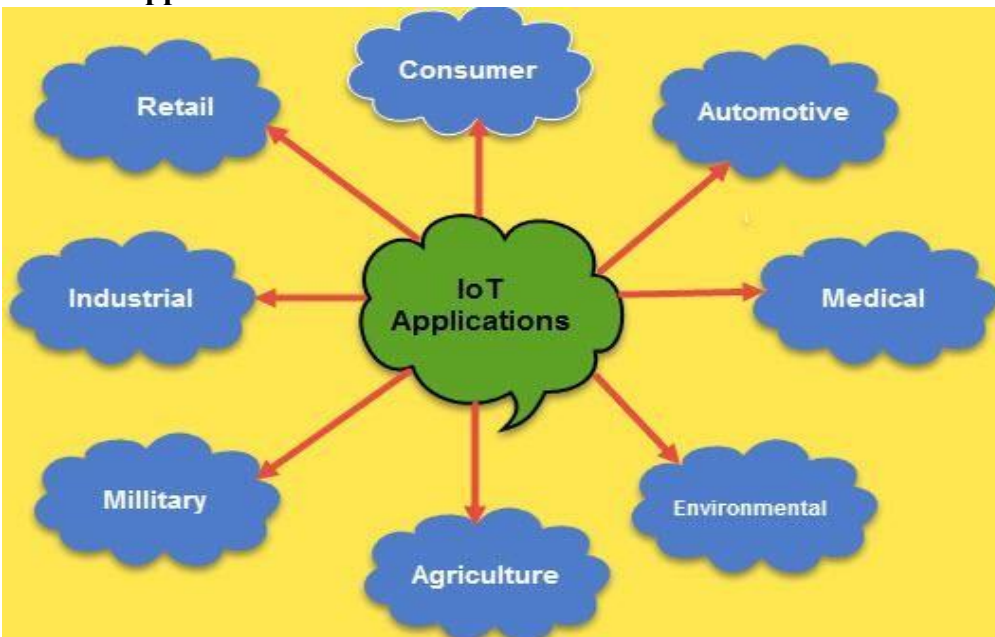
Fig. 2: Internet of Things (IoT) Applications
Source: https://www.elprocus.com/future-technology-internet-of-things/

According to Tarun (2015), Swati (2016) and Tommy (2017), there are several Internet of Things (IoT) applications as it touches every aspect of our lives, and they include;

➢ **Building & Home Automation:** From security improvement to declining costs of energy and maintenance, several companies presents an extensive variety of sophisticated IoT technologies for smart homes and intelligent buildings control and monitoring.

➢ **Smart Cities:** Reducing the charge and resource utilization of IoT products for surveillance, lighting, centralized and also integrated and access system control.

➢ **Wearables:** With the widest range in the industry, IoT offers very proficient low power solutions for the wearable's market. Theses wearable's solutions include; Entertainment, Fitness, Smart Watch, Location and Tracking

➢ **Health care:** Several industries are modelling technology to improve the ease of access and the worth of digital products that are changing the health and fitness industries.

➢ **Smart Manufacturing:** The advantages of many industrial IoT products consist of tools, software and hardware that simplify and hasten design time for the ensuing smart developed application.

➢ **Automotive:** From headlights to the rear lights and all systems in the automotive compartment, various industries present an ample array of advanced technologies for the modern automobile.

➢ **Smart Environment:** Detecting pollution and natural disaster is a very significant application of IoT. Emissions from vehicles and factories can be monitored to reduce air pollution. Release of dangerous chemicals and wastes into rivers or sea can be monitored. By doing so, curtailing water pollution and its effects. Others include; keeping touch on the quality of our drinking water, getting warnings for earthquakes and tsunamis, keeping surveillance of water levels of dams and rivers to prevent flood and detecting forest fire.

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Conclusion and Recommendation

The "Internet of things" (IoT) is turning into a more and more increasing subject of discussion in the places of work, business organizations, entertainment and other places. It is a perception that has the capacity to influence both how we live and also how we work. Every modern technology encounters several challenges in its early stage of life but eventually overcomes them. Internet of Things (IoT) also presents various critical difficulties, which requires to be tackled effectively so as to exploit its complete potential. The Internet of Things (IoT) is also changing the way companies, business organizations, industries, endusers and consumers go about their daily routine across the globe. The IoT technology that underlies this whole piece is developing rapidly and it is very vital that we strike on the exact spots to in order to make this technology work the best for everyone.

With all the abundant benefits of the Internet of Things (IoT) in various facets of our lives, it is however recommended that individuals, corporate organizations, industries should key in to the streamline of the fast developing technology. People and industries should also be encouraged to use this technology so as to tap into its amazing benefit and ease their daily routines and work.

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