

A Survey on Internet of Things [IOT]

Mr. Somnath Machindra Shinde¹ Mr. Parag Sunil Patil² Mr. Sushil Santosh Upadhyay³

^{1,2,3}Department of Information Technology

^{1,2,3}Sharad Institute of Technology Polytechnic, Yadrav, India

Abstract— As we know that we are entering in the new future of computing technology in the IoT means Internet of Things. Machine to machine, machine to infrastructure, machine to environment, the Internet of Everything, the Internet of Intelligent Things, intelligent Systems call it what you want, but it's happening, and its potential is huge. As the IoT has millions of smart technologies connected to "THINGS" (a sorted of "universal global neural network" in the cloud) that will encompasses every aspect of lives or lively things. IoT is compressed of smart technologies, machines, object communicating and interacting with other machines and infrastructures. Hence, their huge amount of data abstraction and generation of data are being processed into the useful actions which can "command & control" things to make our day to day lives easier and protectful and also to reduce our impact on the environment. The creativity of this era is an unbreakable bound with amazing technologies and potentiality to improve our lives and our upcoming future. The following thesis is an extensive reference to the possibilities, utility, applications and the evolution of the Internet of Things.

Keywords: Internet of Things (IOT), Bluetooth and BLE

I. INTRODUCTION

Today, Internet application development demand is very high. So IoT is a major technology by which we can produce various useful internet applications.

Basically, IoT is a network in which all physical objects are connected to the internet through network devices or routers and exchange data. IoT allows objects to be controlled remotely across existing network infrastructure. IoT is a very good and intelligent technique which reduces human effort as well as easy access to physical devices. This technique also has autonomous control feature by which any device can control without any human interaction.

The Internet of things (IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction

A. Definition

In simple terms, the Internet of Things (IoT) refers to an ongoing trend of connecting all kinds of physical objects to the internet, especially ones that you might not expect. This can mean everything from common household objects like refrigerators and lightbulbs, to business assets like shipping labels and medical devices, to unprecedented wearables, smart devices, and even smart cities that only exist because of IoT.

More specifically, IoT refers to any system of physical devices that receive and transfer data over wireless networks without human intervention. This is made possible

by integrating simple computing devices with sensors in all kinds of objects. For instance, a "smart thermostat" ("smart" usually means "IoT") can receive location data from your smart car while you are commuting, which it uses to adjust your home's temperature before you arrive. This is achieved without your intervention, and produces a more desirable result than if you manually adjusted the thermostat before leaving for the day or after you returned

II. HISTORY OF IOT

The concept of a network of smart devices was discussed as early as 1982, with a modified Coca-Cola Vending Machine at Carnegie Mellon University becoming the first Internet-connected appliance, able to report its inventory and whether newly loaded drinks were cold or not. Mark Weiser's 1991 paper on ubiquitous Computing, "The Computer of the 21st Century", as well as academic venues such as UbiComp and PerCom produced the contemporary vision of the IoT. In 1994, Reza Raji described the concept in IEEE Spectrum as "[moving] small packets of data to a large set of nodes, so as to integrate and automate everything from home appliances to entire factories" Between 1993 and 1997, several companies proposed solutions link Microsoft's at Work or Novell's NEST. The field gained momentum when Bill Joy envisioned device - to-device communication as a part of his "Six Webs" framework, presented at the World Economic Forum at Davos in 1999.

A. Diagram



Fig. 1: Internet of Things.

III. TYPES OF IOT

A. LPWANs

Low Power Wide Area Networks (LPWANs) are the new phenomenon in IoT. By providing long-range communication on small, inexpensive batteries that last for years, this family of technologies is purpose-built to support large-scale IoT networks sprawling over vast industrial and commercial campuses.

LPWANs can literally connect all types of IoT sensors – facilitating numerous applications from remote monitoring, smart metering and worker safety to building

controls and facility management. Nevertheless, LPWANs can only send small blocks of data at a low rate, and therefore are better suited for use cases that don't require high bandwidth and are not time-sensitive.

B. Cellular (3G/4G/5G)

Well-established in the consumer mobile market, cellular networks offer reliable broadband communication supporting various voice calls and video streaming applications. On the downside, they impose very high operational costs and power requirements.

While cellular networks are not viable for the majority of IoT applications powered by battery-operated sensor networks, they fit well in specific use cases such as connected cars or fleet management in transportation and logistics. For example, in-car infotainment, traffic routing, advanced driver assistance systems (ADAS) alongside fleet telematics and tracking services can all rely on the ubiquitous and high bandwidth cellular connectivity.

C. Bluetooth and BLE

Defined in the category of Wireless Personal Area Networks, Bluetooth is a short-range communication well-positioned in the consumer marketplace. The new Bluetooth Low-Energy, also known as Bluetooth Smart is further optimized for Consumer IoT applications thanks to low power consumption.

BLE-enabled devices are mostly used in conjunction with electronic devices – often smartphones – that serve as a hub for transferring data to the cloud. Nowadays, BLE is widely integrated in fitness and medical wearables (e.g. smartwatches, glucose meters, pulse oximeters etc.) as well as Smart Home devices (e.g. door locks) – whereby data is conveniently communicated to and visualized on smartphones. In retail contexts, BLE can be coupled with beacon technology for enhanced customer services like in-store navigation, personalized promotions, and content delivery.

D. Wi-Fi

There is virtually no need to explain Wi-Fi (IEEE 802.11a/b/g/n), given its pervasiveness in both enterprise and home environments. However, in the IoT world, Wi-Fi plays a less significant role.

Except for few applications like digital signages and indoor security cameras, Wi-Fi is not often a feasible solution for connecting IoT end devices because of its major limitations in coverage, scalability and power consumption. Instead, the technology can perform as a back-end network for offloading aggregated data from a central IoT hub to the cloud, especially in the Smart Homes. Critical security issues often hinder its adoption in industrial and commercial use cases.

IV. HOW IOT WORKS

An IoT ecosystem consists of web-enabled smart devices that use embedded systems, such as processors, sensors and communication hardware, to collect, send and act on data they acquire from their environments. IoT devices share the sensor data they collect by connecting to an IoT gateway or other edge device where data is either sent to the cloud to be

analysed or analysed locally. Sometimes, these devices communicate with other related devices and act on the information they get from one another. The devices do most of the work without human intervention, although people can interact with the devices -- for instance, to set them up, give them instructions or access the data.

The connectivity, networking and communication protocols used with these web-enabled devices largely depend on the specific IoT applications deployed.

IoT can also make use of artificial intelligence (AI) and machine learning to aid in making data collecting processes easier and more dynamic.



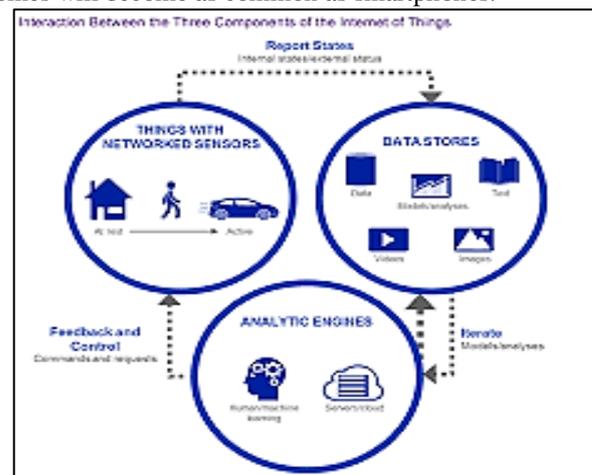
Fig. 2: Working of Internet of Things.

V. APPLICATION OF IOT

A. Smart Home:

Wouldn't you love if you could switch on air conditioning before reaching home or switch off lights even after you have left home? Or unlock the doors to friends for temporary access even when you are not at home. Don't be surprised with IoT taking shape companies are building products to make your life simpler and convenient.

Smart Home has become the revolutionary ladder of success in the residential spaces and it is predicted Smart homes will become as common as smartphones.



The cost of owning a house is the biggest expense in a homeowner's life. Smart Home products are promised to save time, energy and money. With Smart home companies like Nest, Ecobee, Ring and August, to name a few, will become household brands and are planning to deliver a never seen before experience.

B. Smart Cities:

Smart city is another powerful application of IoT generating curiosity among world's population. Smart surveillance, automated transportation, smarter energy management systems, water distribution, urban security and environmental monitoring all are examples of internet of things applications for smart cities.

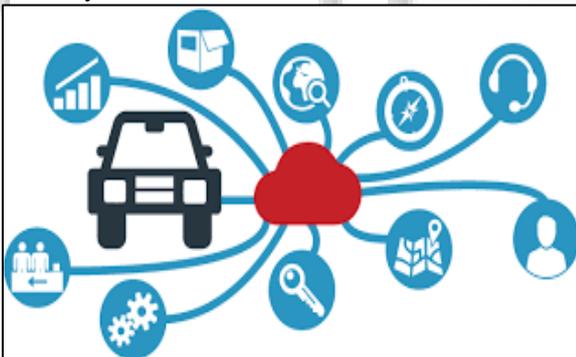


IoT will solve major problems faced by the people living in cities like pollution, traffic congestion and shortage of energy supplies etc. Products like cellular communication enabled Smart Belly trash will send alerts to municipal services when a bin needs to be emptied.

C. Connected Cars:

The automotive digital technology has focused on optimizing vehicles internal functions. Now, this attention is growing towards enhancing the in-car experience

A connected car is a vehicle, which is able to optimize its own operation, maintenance as well as comfort of passengers using onboard sensors and internet connectivity.



Most large auto makers as well as some brave start-ups are working on connected car solutions. Major brands like Tesla, BMW, Apple, Google are working on bringing the next revolution in automobiles.

D. IoT in agriculture:

With the continuous increase in world's population, demand for food supply is extremely raised. Governments are helping farmers to use advanced techniques and research to increase food production. Smart farming is one of the fastest growing field in IoT.



Farmers are using meaningful insights from the data to yield better return on investment. Sensing for soil moisture and nutrients, controlling water usage for plant growth and determining custom fertilizer are some simple uses of IoT.

VI. CONCLUSION

In our paper Internet of things (IOT), the future of IOT is virtually unlimited due to advances in technology and consumers desire to integrate devices such as smart phones with household machines. Wi-fi has made it possible to connect people and machines on land, in the air and its sea.

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