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A Paper on Internet of Things

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Abstract: One of the most frequent word used in the Information Technology nowadays Is Internet of Things .It is now often said that the future is internet of things will change the real entities to smart objects .

It is going to form a wholesale link system to develop a common platform to provide control of objects around us. In view of this we present paper emphasis on IOT concepts through review of research papers, discuss and online databases .It focuses on delimitation, requirements, characteristics of IOT. The paper aims to provide an overview of IOT usages in our daily life. This also provides a passage for further researches.

Keywords: Internet of Things, IOT architecture, IoT Technologies, IoT Applications, Smart Environment, Smart Energy and Grid, Smart Manufacturing, RFID.

I. INTRODUCTION

Today everything is directly or indirectly influenced by internet which including education, communication, government and humanity.

Thus one more step is added in the chapter is the internet of things through which objects and machines can majorly recognize their property and functions to enhance there capability and may lead to human comfort.

This concept is providing a great ease to human life by creating smart applications such as smart environment ,security, energy saving, communication etc leading to change in the role of internet which is now a cutting edge technology.

IoT should have the following three characteristics

- 1) *Comprehensive:* It should inculcate all the characteristics of devices including data handling of which data that is being produced.
- 2) *Reliable:* Machine to machine (M2M) and devices communication, is the key implementation technology of the Network of Things, which should be reliable in operation as other operation are based on the information produced.
- 3) *Intelligent Processing:* By collecting IoT data into databases, various intelligent computing technologies including cloud computing will be able to support IoT data applications. The terms like Big Data and Cloud should be intelligently and effectively be used.

A. Internet of Things

The term of internet of things is composed of two words Internet and Things. Internet –A global system of interconnected system providing information and allowing communication using standard protocols .It is a connected network that consist of millions of private ,public and government of local to global scope that are linked into exchanges of broad array of electronic wireless and network technology. According to Internet World Statistics estimated users as of June 2018, 55.1% of world population has internet access.

Things-Everyday objects include not only electronic devices equipment and gadgets by things .Combination of both living and non-living objects.

B. Definition

The internet of things cannot be accepted as single definition across worldwide. Every class of society has reframed its business according to their point of reference. According to Kevin Ashton an expert on digital innovations,

“An open and comprehensive network of intelligent objects that have capacity to auto-organize share information data and resources reacting and acting in face of situations and changes in environment.”

For course of past decades IOT has greatly attracted the attention of global infrastructure of networks by forming a connection of physical objects .

It is capable in forming connection of human to human, human to machine and machine to machine.IOT describes a world where anything is capable to communicate with anything in an intelligently manner.

People have misconception that being connected is to get connected with only electronic devices but in real time one may connect to even non electronic devices in a way.

The IOT sensors and actuators that are embedded in a device and are capable to sense both environment and communicate they become tools for complexity and respond swiftly.

C. Emergence

The IOT is a revolutionary concept that represents the future of computing and communication. The first machine or internet appliance was a coke machine at Carnegie Mellon University in early 1980's. The programmers working on it could not determine whether or not cold drink is awaiting but were successful in connecting the machine to internet. The IOT became popular in 2003 by performing related market analysis through Auto ID center.

D. Pseudonym

Just like a human can be named in a number of ways IOT is called by different people by different names such as Internet of Objects, Embedded Intelligence, connected Devices and technology of Omnipotent, Omniscient and omnipresent, Integration of computing, Pervasive Computing and Computer Environment.

E. Architecture

A large number of objects are expected to connect with IOT making it impossible for old architecture to carry. Hence there is strong demand to imbibe certain changes in the architecture. Although there are many IOT architectures proposed. The most popular one is the five layered structure.

- 1) *Coding Layer*: It forms the uppermost layer of architecture and forms identification of things. A unique identity is assigned to every object making the system safe and easy to handle.
- 2) *Perception Layer*: It provides a physical link to each object. It consists of data actuators and sensors like RFID and IR sensors. It collects information and data about real objects and processes it to form digital signals and transmits to Network Layer.
- 3) *Network Layer*: This layer receives digital signals and transmits them further through transmission medium like Wi-Fi, Zigbee etc.
- 4) *Middleware Layer*: It is the processing layer of system and uses smart processing equipments where information is completely processed and action is taken into account based on the information. This layer ensures that the processed information is stored in databases for further reference and this layer uses technologies like Obiquious Computing System, Cloud Computing.
- 5) *Application Layer*: This forms appropriate match for application of IOT in various sectors. The application of IoT itself promotes products and development of IoT. The layer forms an integral system and is important in large scale development of IOT.

F. Technologies

There are many technologies associated with IOT such as Internet Protocol, Electronic Product Code, Barcode, Wireless Fidelity, Bluetooth, Zigbee, Near Field Communication Actuators, and Wireless Sensors Networks (WSN), Artificial Intelligence. Some of them are discussed below.

- 1) *Radio Frequency Identification (RFID)*: It provides low energy, simple and versatile options for identification and access tokens, connections, bootstrapping and payments. It employs bidirectional radio transmitter receivers to identify and track tags associated with objects.
- 2) *Wi-Fi Direct*: It removes the use of various access points. It allows Object to Object connection with as good as speed if Wi-Fi. It does not compromise with high speed with lower latency operations.
- 3) *Cloud Computing*: With large amount of data being generated as millions of devices are expected to connect with IOT in near future the only technology seems to be working is cloud with providing access to anywhere from everywhere and from anything. With smart objects and concepts of cloud grouped together may cause enormous benefits for large scale development.

II. APPLICATIONS

Internet of things promises better and more secure human life, making it easier, safe and smart. There are many applications such as smart cities, homes, transportation, energy and smart environment:

A. *Smart Cities*

Proper planning of township and the extensive use of technology. At every stage proper planning is required with cooperation of local people and government to successfully implement IOT. On application of IOT various aspects of human life can be joined such as improved infrastructure public transportation, reducing traffic, safe travelling of pedestrians. Weather Monitoring System etc can be extensively implemented also providing connections of railway stations, bus stations etc becomes highly innovative and smart. Some of the cities which are under smart cities projects are New York, Shanghai, Singapore. Even now in India certain cities are passed as smart cities like Kanpur etc. Smart cities may still be viewed as cities of the future and smart life, and by the innovation rate of creating smart cities today's, it will become very feasible to enter the IoT technology.

B. *Smart Home and Buildings*

One of the most important technologies of IOT which is Wi-Fi's technology plays an important role in home automation which includes automation in field of electronic devices, security, consumer products etc. A lot work is involved to integrate and hold together technologies such as healthcare energy and home environment. Homes and Buildings can be managed by smart lighting, air controller central heating and cooling. IOT is providing intelligent management system over building system to ease human life.

C. *Smart Energy and the Smart Grid*

IOT can be implemented for large scale energy management using smart grid which is related to control of information and transfer of energy. A smart grid intelligently works by integrating the communication technologies and information to the network enabling real time and two way communication between end user and consumers for transferring energy efficiently. The important factors in information and communication technologies that include sensing and regulating the power flows. Digital communication interfaces can be utilised to transmit the data across the grid.

A highly responsive and co-operating system can be established using smart energy meters to report energy usage and automation system to process data. Many applications can be handled with the help of IOT for smart grids for example- industrial, nuclear power, solar power, vehicles, hospitals etc. Developing such grids is reliable and efficient and takes a step further for clean energy supplies. Load flow equations and developing algorithms lead to more advanced implementation of IOT.

D. *Smart Health*

A very important factor involved in modernization is human health which can be more efficiently and greatly achieved by implementation of IOT. With the help of IOT, patients' status can be monitored and regulated constantly from anywhere around the globe.

For this, sensors that are responsible for sensing health and comparing the characteristics of human health with their past records. Also, comparative study of health can be analyzed and performed. In such a way better health quality can be achieved lowering the costs and eliminating the old and traditional ways. Many people are affected by critical health situations but a very effective solution can be provided to such people and moving a step further to achieve better health.

III. CONCLUSION

IOT is bringing an ocean of technological changes in our daily lives. It is also helpful in achieving simpler and comfortable human life. The application in which IOT is involved has greatly influenced human life and helps in achieving a better and peaceful life. There are yet many flaws in IOT governance and its implementation.

Key Observations

- A. There is no standard definition of IOT
- B. Universal standards are required to define IOT
- C. Technologies are varying from user to user and hence are inter operable
- D. Making better global governance and making human life easy, simpler and comfortable.



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