

Analysis On Present Status Of Internet Of Things

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Abstract: Internet is backbone of communication system. It expands its horizon with a quick pace. Internet is justifiably outlined as “network of networks”. It is, in most Internet nowadays is that the backbone of virtual communication worldwide. It's increasing its straightforward terms, a method of creating an association between your pc and the other pc globally through servers and a few dedicated routers. The most important style of communication of current internet is among humans (i.e. human-to-human). Following future style of communication that uses internet because the underlying technology is that the internet of Things (IoT). IoT extends the capabilities of internet to change human-to-machine communication (M2M). Therefore; IoT may be same to supply communication among everybody and everything. IoT permits U.S.A. to implant some kind of intelligence within the objects that area unit or may be connected to the web so as to exchange data, thence communicate, invoke bound actions supported inputs, take selections and supply helpful services. During this paper, the fundamental underlying progress of IoT is mentioned and also the design of IoT is explained. The paper additionally highlights the foremost helpful technologies of those days that use IoT for his or her functioning. Further, the applications and options of IoT area unit mentioned within the paper. Lastly, the problems and challenges in implementing the IoT area unit in short mentioned. The IoT nowadays is gaining plenty of recognition thanks to its potential that's however to be extracted by the trade, world and government moreover. These sectors will bring immense economic and skilled advantages by using IoT within the right manner. With the rapid advancement in technology, we are heading to a world in which everyone and everything will be able to communicate and be connected. Such technology that provides communication among anyone and at any place or any time is the Internet of Things (IoT). The IoT may be termed as the Internet of future that will enable machine to machine (M2M) learning.

Index Terms: Internet of things (IoT), human to machine communication, sensors, virtual communication, cloud server, gateway, IoT technologies

1. INTRODUCTION

THE main concept behind IoT is to have non-dependent, self-determining connection which is secure and allows data exchange between real world physical devices and real applications. Such devices can be PDAs, laptops, smart phones, personal computers (PCs), tablets and many other handheld embedded devices. Many of such smart phones these days have various sensors embedded in them which can sense, make informed decisions, compute, and transmit the accumulated information on the Internet. By employing a network consisting of the devices having various types of sensors can further give rise to many services and applications which can be highly beneficial; personally, professionally. The IoT is an intelligent combination of sensor devices, processing unit which can also put on cloud, objects, communication infrastructure, action invoking system and a decision-making system. Objects used in IoT systems have some features that uniquely identify them on the Internet. Smart sensor devices can sense these physical objects as the latter contain Radio Frequency Identification (RFIDs) Tags or other barcodes for identification purposes. After identification, these sensors pass on the object- specific information to the processing unit on the Internet. Various sensors may be used in combination for the purpose of designing smart applications. After the processing is done by the processing unit, the results are further forwarded to a system for making decisions and invoking suitable actions corresponding to the decisions. In this review, the basic workflow of IoT, its architecture, features and possible applications are addressed. The Internet of Things (IoT) is a popular research area for industry, academia and government as well. Many international organizations in Europe and America are actively participating and contributing to the design and development of IoT in order to gain various beneficial and robust automated services. The services built using IoT also have to undergo and surpass many security-related challenges. The flow of this review paper is as follows. First part explains the basic workflow of IoT. Second part addresses the architecture employed in IoT. Third part explains the technologies used in IoT.

2 BASIC WORKFLOW OF INTERNET OF

THINGS (IOT)

Internet is evolving at a fast pace connecting zillions of things worldwide in the last decades and such things are of varying processing capabilities, sizes, computational power with support to various kinds of applications. Therefore, there is a need to merge the conventional Internet with a smarter Internet of future, the Internet of Things (IoT) lets the physical real objects to connect and also equips them with intelligence in order to process the information specific to the object. This information is further used to make useful independent decisions. Hence, IoT is capable of giving rise to numerous beneficial applications and also services which were unimaginable earlier. The general IoT scenario is depicted in fig. As the technology advanced, the storage capacities and processing power of the devices increased exponentially, in turn their sizes reduced. Such smart devices employ various types of actuator and sensor. These devices can also get connected to the Internet and hence, can communicate. This in turn gives rise to a new set of opportunities. Also, the real world objects are these days fitted with RFID tags or some other type of barcodes which can easily be scanned via smart devices like barcode readers, embedded RFID scanners and smart phones.

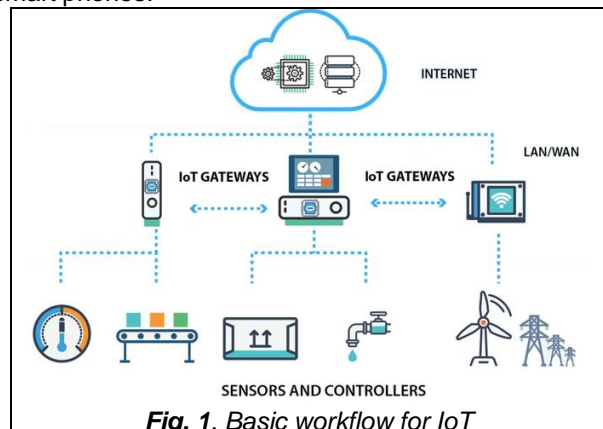


Fig. 1. Basic workflow for IoT

The basic workflow for IoT is explained below:

1) Sensing of object, identifying and communicating object-

specific information: This information may include sensed data including the motion, humidity, temperature, vibration, chemical composition of the air depending upon the different types of sensors. Varying types of sensors can be employed for designing and implementing smart applications.

2) Triggering of an action: Object-specific information that is received is then processed by a processing unit of the smart device. According to the processed information, an action that is to be invoked is determined.

3) The system or the smart device provides rich set of services and also provides with the mechanism of providing the feedback of the status of current system to the administrator. The results of the actions that were invoked are also sent to the administrator

3 ARCHITECTURE OF IOT

Basic architecture of IoT mainly includes sensors, gateway and cloud server.

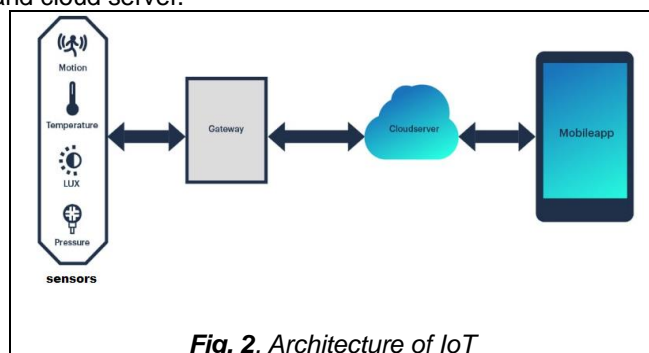


Fig. 2. Architecture of IoT

Best feature of sensor is its ability to convert data or information in suitable form for better analysis. In other words various operations in IoT are start with sensors and actuators carried out an action initiated by control system. Gateway is a network node and it will connect two different communication network which uses different protocol or set of rules. Cloud server is a logical or virtual server connected via internet and it can be access remotely. Data from each device is sent to cloud platform and cloud allows the user to access data from any location

4 TECHNOLOGIES USED IN IOT

The Internet of Things employs some key technologies like RFID, 2D barcodes, NFC etc. These technologies enabled physical real world objects to be referred and to be uniquely identified over the Internet.

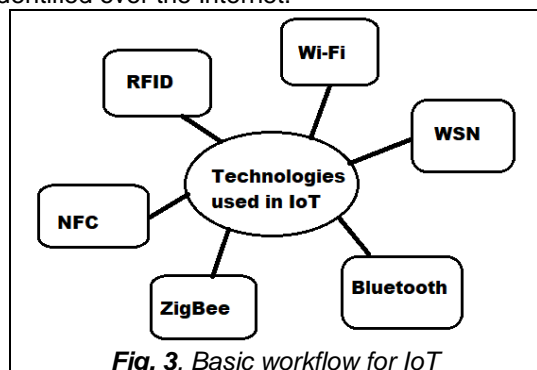


Fig. 3. Basic workflow for IoT

Some of the majorly used technologies in IoT are explained

below:

1) Radio Frequency Identification (RFID) is a technology that transfers the objects or a person's identity by a serial number using some radio waves. RFID technology is highly important in IoT in order to resolve issues related to object identification in an economic manner. RFID tags can be categorized in three different categories on the basis of power supply method used in tags. These categories can be referred to as Active RFID, Passive RFID and Partially Passive RFID. RFID Tags mainly constitute of a reader, an access controller, software, an antenna, a tag and a server. RFID Tags can be used in applications such as patient monitoring, distribution, military applications and so on.

2) Internet Protocol (IP) is a major primary network protocol which is employed on Internet. IP is fully responsible for the transmission of datagram over the network boundaries. IP has two versions in operation currently: IPv4 and IPv6. Although, IPv4 is still being majorly used over the Internet. IPv4 can be classified over a range of 5 classes- A, B, C, D and E. A, B and C are used for normal use of the Internet users. IPv6 has the capability to cater to a large number of IP addresses.

3) Barcode can be described as a method of encoding characters and digits by the use of the combination of white spaces and vertical bars of different widths. They are the optical codes which are readable by machines. Each item having a barcode label attached to it, and its information is stored in the barcode. QR Code systems are gaining huge popularity in automotive industry because of their ability to read fast and store a large amount of data in comparison to the old standard systems. Usually, barcodes are interpreted using laser scanners and cameras.

4) Wireless Fidelity i.e. Wi-Fi is a wireless technology used for networking allowing the computers or other devices to establish communication over a signal. Vic Hayes has developed Wireless Fidelity. These days, Wi-Fi is used to deliver very high speed WLANs (Wireless Local Area Network) in order to connect millions of public locations like hospitals, cafes, airports etc., organizations and houses. Today, Wi-Fi is also being integrated in handheld devices, tablets, notebooks and Consumer Electronics devices.

5) Bluetooth is a technology that operates wirelessly for small distances. It is an economical alternative to other wireless technologies. Bluetooth eradicates the need for physical cabling among the connected devices like PDAs, notebooks, printers, tablets etc. It works in the range of 10 to 100 meters and communicates at a speed which is less than 1 Mbps. Bluetooth technology can be used to create Personal Area Networks (PANs). It generally can be connected using two topologies; Pico net and Scatter net. Pico net connects up to 8 devices at a same time for the purpose of sharing data.

6) ZigBee This technology was created to enhance the functioning of wireless sensor networks (WSN). That was created by Zig Bee Alliance which came into existence in 2001. ZigBee is a technology that operates for short transmission ranges, has low cost, and is reliable and scalable. Its data transmission rates are lesser and its protocol design is highly flexible. ZigBee is developed on IEEE 802.15.4 standard and it consumes less power. It works on the topologies such as mesh, clustered tree and star. ZigBee is majorly used in automation of homes, medical monitoring,

digital agriculture etc.

7) Near Field Communication (NFC) NFC is a wireless technology that operates in short ranges. It works on the frequency of 13.56 MHz, needing a distance of up to 4 cm. This technology is convenient and allows consumers worldwide to interchange digital information, make simple transactions, and connect to the electronic devices by the use of a touch. NFC can also operate smoothly in dusty environment, it will not need line of sight communication and hence it is an easy and convenient connection method.

8) Actuators convert the energy into motion. They take up some source of power in the form of hydraulic liquid or electric current. They can create a rotary motion, linear motion or swing motion as well. Actuators operate at limited ranges, generally till 30 feet and exchange data at less than 1 Mbps. Actuators generally are employed in the field of manufacturing and in industrial applications. The actuators can be categorized into three categories: Electrical: solenoids, ac and dc motors and stepper motors Hydraulic: which employ hydraulic liquid for the purpose of actuating motion Pneumatic: which employ compressed air for the purpose of actuating motion. These three categories are widely used these days although electric actuators are the most popular.

9) Wireless Sensor Network (WSN) Wireless Sensor Network consists of autonomous and independent devices which are spatially distributed. WSN uses certain sensors in order to monitor and analyze environmental and physical conditions like sound, vibration, pressure, temperature, motion and different pollutants, present at varying locations. WSN is formed by thousands of nodes which can communicate with each other and can transmit data to each other. WSN in IoT has gained huge popularity in many fields like security, manufacturing, flood detection, military, healthcare forest fire etc.

10) Artificial Intelligence (AI) Artificial Intelligence can be termed as a technology that consists of electronic and virtual environments which are in turn responsive to the surroundings and people. In an intelligent world, the devices work in direction to help people in order to carry out their routine life activities in an easy and natural manner with the use of Information or Intelligence which is fed in the connected devices in the network. Artificial Intelligence is characterized by: (i) Embedded: Multiple devices are networked in the environment (ii) Context Aware: Such devices are able to recognize you and the context of your situation (iii) Personalized: Such networks are customized according to your needs (IV) Adaptive: These can easily change or adapt in response (v) Anticipatory: These can perceive your desires without mediation.

5 APPLICATION OF IOT

1) Design of smart cities: Internet of Things (IoT) can assist in the designing of smart cities. It can be helpful in monitoring the air quality, economical lighting up of city, finding emergency routes, watering gardens etc.

2) Predicting natural disasters: Natural disasters can be predicted with the help of a combination of some sensors with their independent simulation and coordination. It is helpful to take suitable actions prior to the occurrence of disaster.

3) Design of smart house: Internet of Things can help in designing smart homes. This will enable the user to monitor the consumption of energy, detect emergencies, searching things in the home with ease, security etc.

4) Design of efficient transport system: The intelligent system of transportation shall provide the users with an efficient and manageable transportation control by the use of sensors, and information [9]. This automated and intelligent system will have exciting features like transport law enforcement, mitigating pollution, reducing jams in traffic, reducing arrival delays etc.

5) Industrial applications: The Internet of Things (IoT) is beneficial in industries as well. It can help in managing numerous automobiles for an organization. IoT can also help to analyze the environmental performance of these automobiles and select the ones that require maintenance.

6) Medical applications: The Internet of Things (IoT) is highly employed in medical sector also [8]. It can help in the proper monitoring of patients' health, their activities, their medicine intake etc. These are some important applications of IoT which are yet to be fully explored in future.

5 CONCLUSION

The paper analyzed the forthcoming of IoT and it will connect each and every one to the devices. IoT is working with the smart sensors and devices for communication. In simple words human to human communication is replaced with human to machine communication. The paper systematically explains the basic workflow of IoT, architecture of IoT and technologies used in IoT with applications. As IoT is developing day by day it will be beneficial personally and economically.

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