iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 5 **Issue:** VII **Month of publication:** July 2017

DOI:

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor:6.887
Volume 5 Issue VIII, July 2017- Available at www.ijraset.com

Internet of Things (IOT): Confronts and Applications

Jyoti Yadav[1], Anshul Bhatia[2], Sangeeta[3] , Eisha Jain[4] , Nidhi Goyal[5]
[1]*Deenbandhu Chhoturam University of Science & Technology,Murthal, Haryana, India*
[2]*Rajasthan Technical University, Kota, Rajasthan, India*
[3]*Maharshi Dayanand University, Rohtak, Haryana, India*
[4]*Gurukul Kangri Vishwavidyalaya, Haridwar, Uttrakhand, India*
[5] *Guru Jambheshwar University of Science and Technology,Hisar,Haryana India*

Abstract*: *The term "Internet of Things" (IoT) believed to have been developed by British technology pioneer Kevin Ashton in 1999. Internet of Things (IoT) is an emerging technology that can connect millions of different objects, devices like sensors, RFIDs and actuators smart devices that are embedded in the environment to observe and collect information. Next era of smart computing depends on ubiquitous sensing capability of WSN and significantly influences many applications. Two main features of IoT are as; First IoT is the expansion of the Internet to support several heterogeneous networks and interoperability among them for information exchange. Second, thing is that IoT is not limited to devices or objects but can also include information, human behaviours, etc. Thus, IoT should contain mechanisms that handle the communication of objects. IoT applications for example sensors in bridges in smart cities, smart parking, advance traffic systems, networked vehicles which help in minimizing the traffic congestion in cities and also help in reducing energy consumption. Main goal of IoT is to automate the work of real world objects with the help of sensor which sense the environment, collect the information, process the information and work is done efficiently. However, IoT have many confronts that need to be focused to gain the actual profit of IoT. This paper depicts some confronts and applications of IoT with respect to real world like smart parking smart cities and how IoT assist in making our life simple and comfortable.

Keywords:* *Internet of Things, Smart City; Sensor, Actuators, RFID

I. INTRODUCTION

The Internet of Things (IoT) is about evolution of several technologies for creating dynamic global network infrastructure with self-reconfiguration parad
igm and automation of work based on sensing of environment. It is combination of two words "internet" or "Things" internet means network of networks and thing represents any real world object. The IoT is a self-reconfiguring and intelligent wireless network which senses the environment by using devices like sensors, actuators, collect the data and function according to standard and protocols. IoT can be used for managing the things, tracking the activity, monitoring the activity, intelligent identification of things, automation of work [1]. It helps to build connections beyond traditional devices like Smartphone, laptop, desktop to different devices with embedded sensors and actuators that help in making connection among objects to object, people to people, people to physical objects, objects to environment. In future IoT will be a technology in which every physical entity will be connected to internet and can identify themselves to others. Even devices can communicates among them using IP connectivity without human interference and can analyse their surroundings. The Internet of Things (IoT) ecosystem consists of Smartphone & tablets, computers, smart objects, intelligent devices, sensing devices sensors and actuators etc. It will use Radio-frequency identification (RFID), Zigbee, Wifidirect, Quick Response (QR) codes, Near field communication (NFC), wireless sensor network, artificial intelligence, sensor or wireless technology to enable intercommunication between devices. Internet of Things includes each and everything from NFC communication in bank that is accessing account without touching the debit and credit card, sensors in a petrol pump, sensors in parking, sensors in metro doors, sensors in lift, and sensors in office building which can trace your location to display your files on the nearest screen. The aim of IoT is to make our life safer, easier and more efficient. Moreover IoT devices help in increasing efficiency, automation of work, speed of operation & more interconnected world.

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor:6.887
Volume 5 Issue VIII, July 2017- Available at www.ijraset.com

Fig 1. Internet of Things

IoT should have the following three characteristics: [2] [3]

A. Interconnected

It facilitates people to device and device to device, people to people, people to physical objects inter communication.

B. Smart Sensing

IoT environment is embedded with smart sensing devices which sense and collect data for example sensor in lift, sensor in metro doors, sensor in manufacturing process, sensors in office buildings, sensors at home to automatically control process. These sensing technologies create a virtual real environment by using artificial intelligence.

C. Comprehensive Perception

Using NFC, Wifidirect, QR Code, RFID, sensors, and two-dimensional barcode, artificial intelligence we can obtain the information about objects or physical entities from anywhere at any time such that RFID use the smart tags to track items in super store to automatically transfer the product information to the network and to automatically calculate the bill of purchased items. IoT help people to communicate with real world using wireless sensor network for identifying and recognizing the real world.

D. Intelligent Processing

The IoT connected devices can have intelligence attached with them. For example sensor-driven equipped with self-learning capabilities, self-reconfiguration capability, Nest Learning Thermostats are Wi-Fi enabled. Misfit Shine is a fitness tracker with sleep monitoring capabilities. The Misfit Shine work on the principle of divide and conquer it means distribute tasks between Smartphone and the cloud. Cloud computing is also collaborated with IoT. With the help of cloud computing we can process billions of messages instantly.

E. Save Energy

IoT devices like Motion Sensor Light have in-built motion detector which can turn the light on when it senses movement. It can save lot of power energy from wastage and boost energy harvesting & efficient utilization of power.

F. Expressing

IoT connected devices have unique capability to tell the current state to other connected devices in the surrounding. It facilitates better communication flow between human and machines.

G. Safety

IoT connected devices can help ensure safety of individual life. For example a moving car tyres can tell their current sate to car owner having smart car dashboards, it will help prevent accidents due bursting of car tyres due to overheating etc.

II. RELATED WORK

IoT is referred as connecting the smart devices, buildings, peoples, vehicles with the help of sensors, software, actuators, wireless network which activate objects, sense the environment to accumulate and communicate the data. In 2013, The Global Standard initiative on IoT describes the IoT as “Infrastructure of the information society” [4]. IoT permit the physical entities to be sensed and controlled remotely by using wireless sensor network

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor:6.887
Volume 5 Issue VIII, July 2017- Available at www.ijraset.com

In 2014, Andrea Zanella, Lorenzo Vangelista [5] focus on urban IoT and explain the usability of IoT in smart cities. How urban IoT support smart city vision, which focus on advance communication technology for administration of cities. They discussed a brief survey of technologies used in smart cities, protocols, standard and architecture implemented in urban IoT. Sachchidanand Singh and Nirmala Singh [6] explain the idea of Internet of Things, technology used characteristics of IoT, security issues and they suggested the reference architecture for Ecommerce enterprise. According to research firm International Data Corporation (IDC) the fast growth of cloud and Internet connected devices is expected to boost IoT market [7].

III.CONFRONTS OF IOT

A. Security

The most challenging issue with IoT is security. Security refers to protection of data against unauthorized or malicious users. As IoT is based on wireless sensor network which is more vulnerable than wired network because everything is in air. Moreover today we rely on cloud storage of data. Security is also a challenging issue in cloud computing also. Malicious user may attack server or cloud based server to access or destroy data. IoT is more vulnerable it is because direct control of physical entities by itself and it also refers to very critical areas for example health monitoring of patient, traffic control system, monitoring of inventory, so security check are most important here. Here intruders could access local networks or devices or nodes to grounds damage for example bringing down a factory by sending out spam, taking the control of car and crash it, changing the patients monitoring parameters that result in wrong treatment, malfunctioning of traffic monitoring system cause congestion. So security is the most critical issue otherwise it will leads to a vast destruction.

B. Privacy

Privacy and security are the different aspects security refers to integrity, confidentiality, and availability of data while privacy is about appropriate use of data. Privacy is about who can access data, what amount of data can be taken, how the data can be used. Privacy is the issue when someone personal identification information is accessed, collected, used, stored and their inappropriate or unreal disclosure. IoT devices generate enormous amount of data which help hackers to take entry and access someone personal data. Personal information can be collected from different sources like geo location based web access, getting user choice by using persistent cookie, geographic records etc. one of the critical issue to be considered is sensors and embedded devices size as their size are vanishing day by day even we cannot see these devices with naked eyes and as a result people might not aware about access of their personal information and how this information later merged and what can be derived from it.

C. Standards & Interoperability

Standards in IoT includes the application requirements standard, architecture standard, identification standard, communication standard, security standards, the application standards, information processing standard, and data standard etc. IoT is a collection of heterogeneous devices from different manufacturer. If manufacturer use different standard then interoperating will be a challenging issue. If developer design a product without following standards and rules it will leads to a critical situation. Such devices can negatively affect the resources such as storage space, network bandwidth etc. This will also affect cost constraints. So careful design and standardize configuration of devices is necessary for the interoperability of devices manufactured by different manufacturer.

D. Storage Issues

In IoT we are connecting different devices through wireless network and have embedded devices in environment which continuously sense environment and collect data then we process the collected data and take required action. But this continuous sensing of environment generates lots of data which even can't be stored in any physical medium. This enormous amount of data is referred as Big Data which is characterized by properties variability, versatility, velocity, veracity. Here requirement of physical storage is just a part of the problem. IoT devices generate continuously enormous amount of data but out of which some data is required only for sending signals to devices and there is no need to store such data. Other data like timer of devices, periodic data need to be stored for few days, while some data need to be stored for long time such as decision making data. So there is a need of some protocols and polices which specify what data are stored, where it is stored, for how long data must be stored. Consequently formation of such policy is a challenging issue

E. Limitations of Bandwidth

For wireless network we have limited bandwidth so only useful data must be transmitted over the network. As we know that wireless network provide less bandwidth as compare to wired network. Mobile devices, like smart phones or tablets, are relatively powerful in terms of computation and available main memory and can generate data at higher rate while a small personal area network called ZigBee networks that follow IEEE 802.15.4 specifications have low-power digital radios and 31.25 kB/s of data transmission rate. While some other applications for example production process monitoring, telescope, formula one racing, generate enormous amount of data which is communicated through satellite. So we have very limited bandwidth but with the introduction of IoT more and more devices are getting connected with the internet and demand for more bandwidth. With respect to IoT limited bandwidth becomes a challenging issue because sensor and actuators continuously sense data and generate flood of data.

F. Data Understanding.

IoT enabled sensor, actuators and embedded devices in environment senses and collect data, and then automatically analyze that data by comparing with other devices data. Thus the quality of analysis of data depends on features of data, processing of data, observation classification, and ground knowledge of data. Here we also need experts' suggestions to determine the validity of data. In IoT sensors automatically collect data but there validity cannot be checked automatically. It is impossible to decide automatically whether the data is valid or due to sensor failure. But this problem can be solved up to some extent by making the devices query able and by associating meta data with them. Meta data is data about data for example size of data, noise level allowed, range of data, type of data.

G. Resource-Constrained Devices

IoT devices such as sensors, cameras, actuators, data collectors have limited resources for example limited bandwidth of network, low battery devices, less storage space, low energy nodes etc. Even such devices are not able to perform their computing task independently with their own resources and they work in collaboration with other similar devices. Computing by such node in cooperation mode is unrealistic and irrelevant. Processing by such node require communication to be resource sensitive and need standard protocols.

IV. APPLICATIONS OF IOT

A. Smart Transportation

Smart transportation, also known as Intelligent Transportation Systems (ITS), is a IoT-CPS based application, in which intelligent transportation management, control system, communication networks, and computing techniques are integrated to make transportation systems reliable, efficient, and secure. In the smart transportation system, a large number of smart vehicles are included and connected with each other through wireless networks. Smart vehicles can efficiently perceive and share traffic data and schedule drivers' travels with great efficiency, reliability, and safety. Those smart vehicles can detect objects around them and safely manage speed during traveling without the operation of drivers. In the smart transportation system, each smart vehicle is deployed with a number of electronic control units (ECUs) to monitor and control subsystems in the vehicles. These ECUs are organized as an internal network to share the collected data within the vehicle. In addition, each smart vehicle is deployed with communication interfaces to connect to the outside network. In this way, all vehicles can be connected into the smart transportation system, namely the vehicular network, and exchange and share massive data of current traffic status, and ultimately offer the most efficient and secure travels to customers. The massive collected data can be further stored and processed in the fog/edge computing infrastructure, enabling efficient service to drivers and system operators. Because all the traffic status data are shared by vehicular networks, the adversary may intrude into the system and control ECUs in vehicles by launching malicious attacks against vehicle networks and fog/edge computing nodes in the fog/edge computing-based IoT infrastructure, sharing misleading traffic status data with other vehicles via communication interfaces deployed in the compromised vehicle. In this case, the confidentiality, integrity, and privacy of traffic status data can be compromised by the adversary, and serious damage to the transportation system can be caused (the increase number of congested roads, increase time spent to complete travels, etc.). Thus, in order to deploy an efficient and secure smart transportation system, techniques that can support services related security issues need be carefully investigated in future research.

B. Smart City

IoT technique which will be used in health sector, smart grid, smart transportation system etc will be combine to a bigger heterogeneous network. This network will ensure the best possible usage of public resources and ease out the job of public

administration. In addition to the above waste management, environment monitoring, effective traffic management and parking etc these sub application or services will be interconnected to the heterogeneous network results in the smart city.
Smart city use the features of smart parking, automatic waste management, automatic traffic monitoring system, automatic lighting system. In smart parking vehicles are embedded with RFID and sensor devices which monitor environment and tell the available space and gives the advice to the driver. Automatic traffic monitoring system monitors the traffic flow and control the congestion over the road. Sensors are also used to monitor speed of vehicles, air pollution level, accident location and the collected information is passed to the concerned authority. In automatic waste management system sensors are embedded in dustbin. When dustbin is full then waste collector authority get the notification about it. Sensors in smart cities can also be used to give information about resources available in the city like nearest ATM, restaurant, park, bus stand, railway station, shopping mall, hotels, banks etc.

C. Smart Grid

IoT technologies can also be utilized in the field of electricity transmission and distribution network by the similar mean of adopting the wireless sensor nodes. These sensors capture the requirement details of the usage of electricity. In Smart Grid system network energy generator will be used for better utilization of distributed energy resources whereas electric vehicles will be used for storage of energy and smart meters and communication network for interaction between customer and service provider. These smart meters monitors the usage, storage and consumption and this information will be feeded to utility provider for energy demand. Smart grid can be used to handle varying demand of electricity, fluctuation problem, to improve efficiency and reliability in power distribution. With the aid of fog/edge computing infrastructure, the large amount of data collected from smart meters can be stored and processed so that the effective operations of the smart grid can be supported. The confidentiality and privacy of energy consumption information can be available to adversaries. With the modified data, utility providers may incorrectly estimate the energy supply and demand of the grid, and can feedback erroneous energy dispatch decisions, leading to imbalance on energy supply and demand in the grid and even posing large-scale outages. In addition, key function components in the smart grid can be disrupted. Examples include state estimation, energy routing energy price, optimal power flow, etc. Thus, efficient security mechanisms that can preserve data privacy and integrity in the data collection and transmission processes need to be developed for the smart grid.

D. Smart Homes/ Smart Buildings

Now a day IoT has many applications in smart home to make our life simple and easier. IoT is used to save resources like time, money, power etc. As an application of IoT we can switch on air conditioner before entering the home or switch off it after leaving the home. We can temporarily unlock the home for relative when we are not at home, can automatically open the door when someone came at door, can automatically switch off light when we leave home and switch on light when we enter in home. With the help of IoT we can also monitor power system of smart building, lightening system, elevator system, earthquake alarm, fire alarm , ventilation in building, water tank monitoring.

E. Healthcare and Medical Applications

“Prevention is better than Cure” i.e the IoT is going to be in the field of health and medical services. In this the patient is monitored with the help of sensors to capture his record such as breathing , body temperature, blood pressure etc and feed this data to remote medical centers . The medical specialists then observe his patient and take preventive actions as and when required. Thus result in preventive care. These sensors will be using body sensor technology or body sensor network which are using tiny powered and light weight wireless sensors. This technology is going to play massive role in the field of medical and health science and made the life better by combating the illness on time.

F. Security and Surveillance

Devices embedded with sensors, actuators, RFID technology and artificial intelligence help to improve current security and surveillance system. IoT technologies can be used to monitor or track enterprise buildings, parking, bank security, shopping mall, school, college and many other public places. IoT gives a cheaper, easier way of surveillance as compare to deployment of cameras in whole work space. IoT can also be used to check suspicious activity within the work place. IoT is not limited to security of only data but it is also responsible for protecting resources from thieves, illegal use and access of resources.

G. IoT in Agriculture

Smart farming is another application of IoT. Now a day population is increasing with that demand of food is also increasing. Consequently we need smart farming technique which increase production and decrease effort requirements. In agriculture IoT can be used to monitor fertility of soil, tracking soil moisture, water needed for irrigation, nutrients monitoring, fertilizer required,

monitoring plant growth etc. a lot of research is being done by governing bodies to improve farming technique to increase food production.

H. Intelligent Coal Mine

IoT can also be used in coal mining to monitor mining process. IoT enabled devices or sensors are used to track mining position, leakage of dangerous gases, tracking person and vehicles etc. these sensors collect data about various parameters to improve safety and efficiency during mining process. IoT usage in mining process include personnel positioning, oxygen provision monitoring, wireless communication network and sensor network, drinking water monitoring, drainage system monitoring, general controlling system etc. It helps in improving coal mining process and decision making.

I. Environmental Monitoring

IoT enabled technology or devices which sense the environment and inform about natural disaster like earth quake, cyclone, tsunami, heavy rainfall well in advance and can prevent from large destruction. Here a large number of devices which work together and collect and process data in real time help in detecting anomalies which cause endangering human, animals, Birds, vegetation in environment. IoT also help in sending information to remote areas where human cannot reach. IoT can also be used to track volcano, temperature, fire detection etc. IoT is used for saving human life and reducing damage to property, vegetation.

J. Smart Business/Inventory and Product Management

IoT technologies provide flexibility in managing business and production process. It automates the work with less human intervention. A product can be monitored by using RFID based application and wireless sensor networks during its whole life cycle. Here we can also check the quality of product by monitoring different parameters by using wireless sensor networks. It also helps in preventing product theft by attaching unique identification code with the product and production description. For example in food industry RFID or sensors enabled devices are used to monitor or track product while bio sensors are used to monitor the quality parameters like bacterial composition and temperature of products, composition of mixture. Final product quality is monitored automatically with negligible human intervention.

V. CONCLUSION

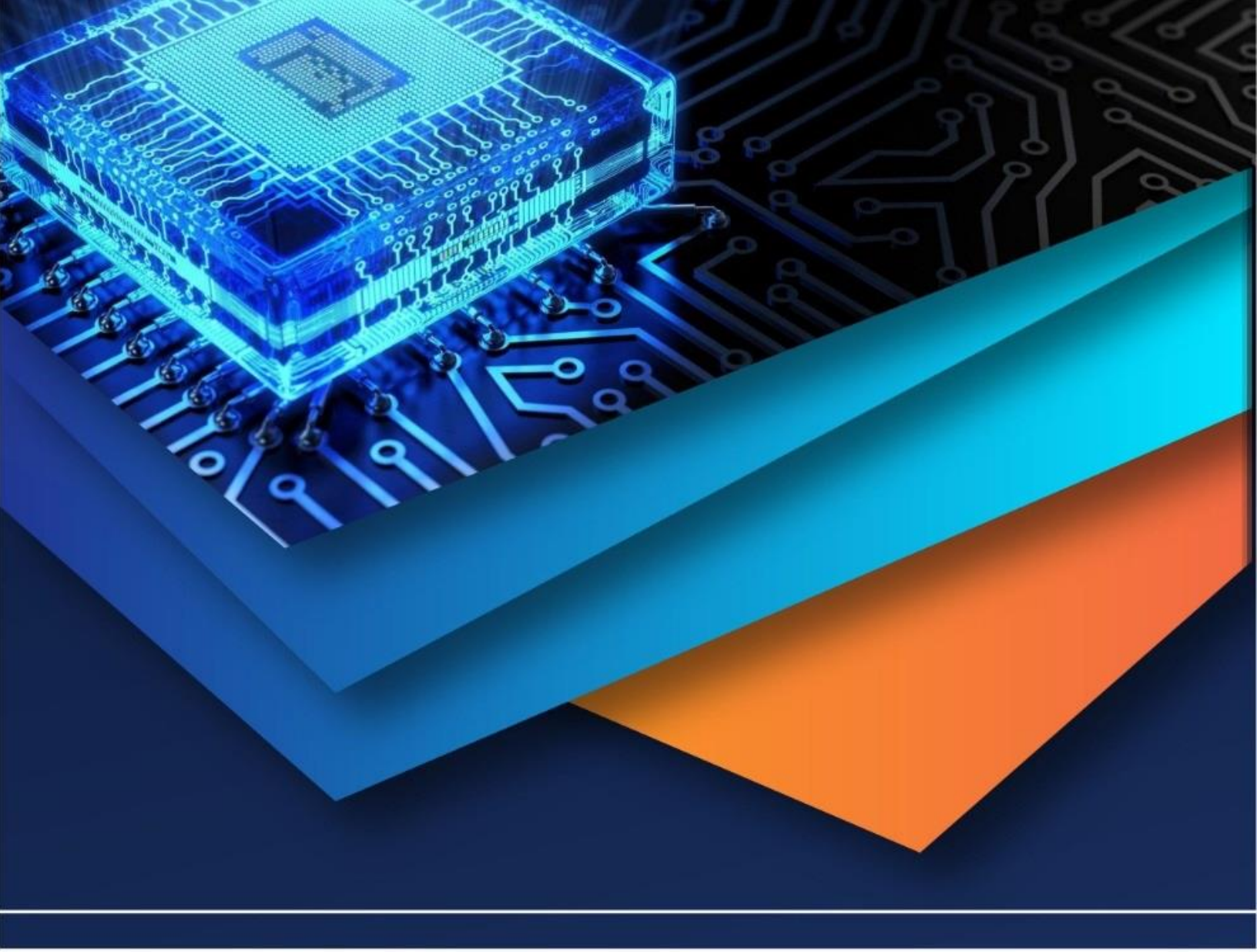
Internet of Things gradually brings a set of various technologies that brings changes in our daily lives, which help to make our life more comfortable and simpler. The main domain of Internet of Things application includes industrial, transportation, medical, education, manufacturing, mining and commerce etc. The IoT is growing very fast and it is expected that around 25 million devices will be connected by 2020. We conclude that in this research paper the key observations are meaning and definitions of Internet of Things, various confronts related to the IoT and provided real time applications of internet on things.

VI. ACKNOWLEDGMENT

First and foremost, we thank Lord Almighty for the grace, strength and hope to make our endeavor success. It gives us immense pleasure to express our sincere thanks towards our teacher Mr. Saroj Kumar Suman, Director, BrainStrom Achiever for his constant support and guidance throughout the course of this work. His sincerity, thoroughness and perseverance have been a constant source of inspiration for us. It is only his cognizant efforts that our endeavors have seen light of the day. We will be failing in our duties, if we don't express our indebtedness to blessings of our parents.

REFERENCES

[1] J. A. Stankovic, "Research directions for the Internet of Things," IEEE Internet Things J., vol. 1, no. 1, pp. 3–9, Feb. 2014.
[2] T.Liu and D.Lu,"The application and development of IoT,"in Proc. Int. Symp. Inf. Technol. Med. Educ. (ITME), 2012, vol. 2, pp. 991–994
[3] Internet of Things : Six Key Characteristics, http://designmind.frogdesign.com/2014/08/internet-things-six-keycharacteristics/
[4] "Internet of Things Global Standard Initiative" 26 June 2015.
[5] Andrea Zanella, Lorenzo Vangelista, "Internet of Things for Smart Cities", IEEE Internet Of Things Journal, Vol. 1, No. 1, February 2014
[6] Sachchidan and Singh and Nirmala Singh," Internet of Things (IoT): Security Challenges, Business Opportunities & Reference Architecture for E- commerce.
[7] Internet of Things market to hit $7.1 trillion by 2020: IDC, http://www.zdnet.com/article/internet-of-things-market-to-hit-7-1-trillion-by-2020-idc/



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY