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INTERNET OF THINGS: A STUDY ONHH ITS WORKING PRINCIPLE AND MODE OF SENSING, ITS APPLICATION AND SECURITY FEATURE.

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Abstract: Today's world mainly operates on a massive and a giant technology termed as internet. The internet provides the basic working structure for all the types of work that is structured and also connects the two poles of the world. INTERNET OF THINGS (IOT) is a stage where all the components from all the types of industry can interact together through a common communication medium and through common protocol. The Internet of Things (IoT) is a narrative concept that is rapidly gaining ground in the scenario of modern wireless telecommunications. IoT makes a world of pro-active objects which will respond to the scenario that the environment is creating. It comprises of items which will accept and generate information and act accordingly. The major application of this is implemented in smart cities. The smart cities are connected through wireless medium where the citizens can accomplish their tasks wisely and effectively. This involves a minimal utilization of natural resources but it can be achieved with the entire involvement of the government along with the innovation made for the development of smart city through this medium. This paper mainly focuses on enhancing the security features of the existing system in wireless sensing medium employed in IoT by responding to the circumstances in prior and performing alertness to the citizens and the people in the city. It is estimated that by the year 2020, there will be 50 billion objects connected to the Internet over the world.

Keywords: Smart city, IoT, RFID

1. INTRODUCTION

The basic idea of this concept is the pervasive presence around us of a variety of things or objects – such as Radio-Frequency Identification (RFID) tags, sensors, actuators, mobile phones, etc. – which, through unique addressing schemes, are able to interact with each other and cooperate with their neighbours to reach common goals [1].

The connection of physical things with the internet happens with the innovation made in embedded systems which is termed as smart objects. The Smart objects mainly act as the building block of IOT [2]. In this context, key components of the IoT will be RFID systems [1], which are composed of one or more reader(s) and several RFID tags. Tags are characterized by a unique identifier and are applied to objects (even persons or animals). RFID creates a distributed environment where the product carries a tag. The tag is sensed by an antenna and the information is passed on through the wireless medium. RFID does not require line of contact .It works on a longer distance range. It routes the data to a wide variety of backend through any wireless medium like wifi, web, remote, data services etc . The diagrammatic illustration is given below

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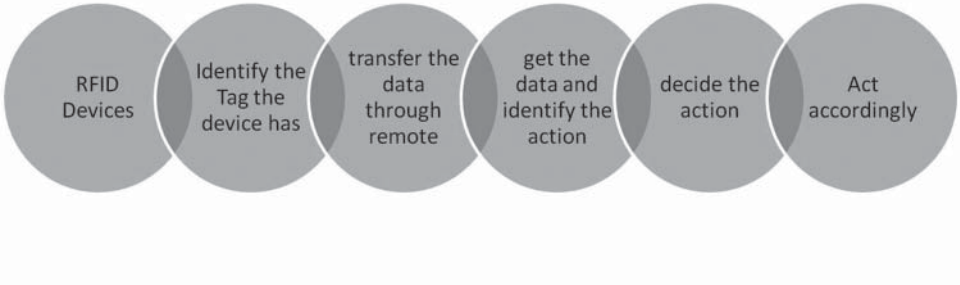

Figure 1.1 Mode of sensing in IoT

2. RELATED WORK:

This section describes about an important concept namely M2M paradigm which forms the basic working principle of IOT. [3]The M2M paradigm is the concept in which both wired and wireless medium of machines can interact with each other and do their work. The major advantage of this paradigm is there is no human intervention. Many applications of the machine to machine paradigm play a very important role and an innovative role in many pioneering concepts like smart city and augmented reality.

The IOT environment judges the surrounding area through many sensors. Actually it works in a sensor oriented environment where many objects are connected to each other and pass their information among themselves to initiate an action [4]. This also includes the concept of intelligent agent where the agents sense the outside world by sensor and acts accordingly based on which they are classified as proactive and reactive agents.

The layers of IOT can be best illustrated by means of a diagrammatic representation which is given in Figure1.2

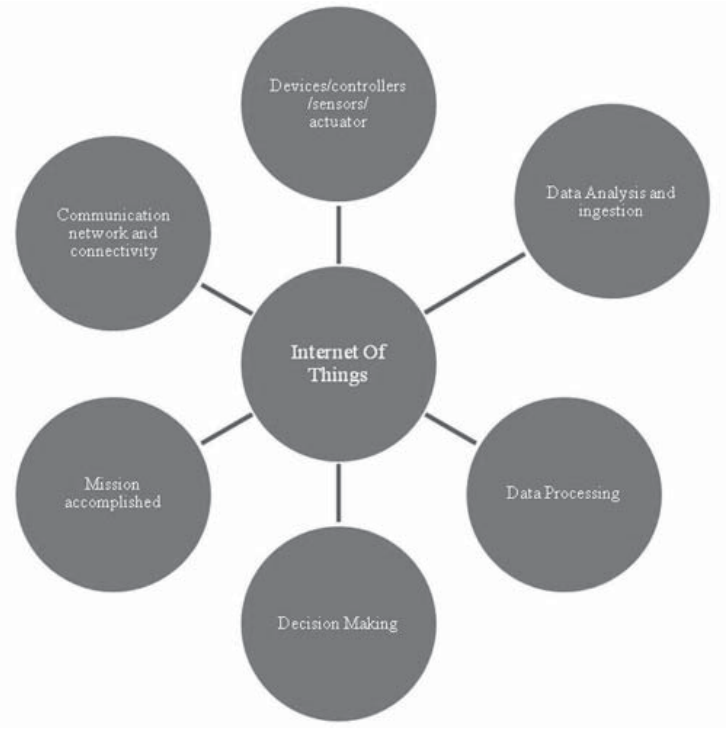

Fig 1.2 Steps involved in data sensing and data processing

The basic idea is the system identifies the external environment through sensor devices, controllers, initiator, and actuators. The processed information will be passed as signals either in wired or wireless medium based on their mode of communication used. The obtained information will be processed, analysed and generally computing of the information takes place.

Basically the system here computes the information and data that is obtained and makes a decision. This is the working principle of IOT. [5]The concept of Augmented Reality also plays a vital role where the devices will be supplemented by a computer to enhance one's view of perception also it changes the real world happening into a simulated one. Thus increasing the scope of invention and innovation.

3. FACTS ABOUT INTERNET OF THINGS:

Internet of things is already in effect: Internet of things or IOT is an emerging concept, but if we closely observe, we find out that we use up to 5-6 devices which connect to the internet, making the IOT concept true for our day to day life. This concept actually started in the early 1970's, when the first ATMs went online.

Big businesses are already investing billions into this concept: According to a survey, in the year 2008, there were more devices connected to the internet than there were human beings, and according to Cisco, that number is expected to go up to 50 billion by the year 2020. Tech companies see a promising future in this concept, claiming it will make their businesses more efficient. According to a study by GE, the IOT will add about 15 trillion dollars to the global GDP in the next 20 years.

The IOT could save lives: The IOT could well revolutionize patient care, as well as improve communication between doctors and patients. For example, researchers in Tokyo university have invented an electrical ink, which when put on clothing can monitor heart rates, which people can use to monitor their heart rates and check for other vital signs by themselves.

Wi-Fi developments will make the IOT work better: Researchers at the University of Washington have invented a Wi-Fi router that transmits signals using 10000 times less power than normal routers. This helps in installing sensors with extremely low power in normal objects such as coffee makers, etc., i.e., such Wi-Fi developments can make the IOT work better.

IOT can have some drawbacks: The IOT has some problems, especially security concerns. For example the Indian software SilverPush can track you anywhere around the globe using small sound devices attached in TVs and mobile phones. This type of software come with a major security risk and can steal a person of his right to privacy.

4. RESEARCH FOCUS

4.1 IoT and WSN- A Survey

Internet of things plays an important role in the development of smart cities and smart environment. However the security features also play a significant role without which the actions taken are ineffective. There are many systems in the smart environment that connect all the buildings, apartments and houses in the smart city and inform residents, citizens about any problem that has occurred in and around the city. But still research is going on in the area of sending alert messages and warning messages to the citizens in the city in prior to any accidents or robbery that is going to happen in the vicinity or in the city.

4.2. Body of Work

Modern technological world achieved the improvement in many areas of engineering and in day to day activities. Also one of the emerging and recent innovations that are rapidly gaining attention is that of

SMARTCITY. Smart city is one of the revolutionary technology where all the objects surrounding the area will be connected through sensor and the information will be passed to the citizen regarding any normal or abnormal situation that is about to occur or occurred. This is one of the breaks through idea that is implemented in many metropolitan cities across the globe.

The system will identify the unusual behaviour of any vehicle by sensing the speed of the vehicle. This can be done by automatically calculating the speed of the vehicle and if it goes beyond the approved speed in the city an alert message will be sent to the citizens in the city along with the vehicle number. Thus it plays an important role in security of the residents in the city. This can also be implemented by taking one step forward by identifying whether any accidents or any fire accidents that had taken place in the smart city.

It can be established by incorporating the sensors in the cars that are allowed to access the smart city. If any such cars are involved in racing going beyond the speed limit allowed in the city an alert message will be sent to the car owner stating the speed limit of the car, current location of the car, area where the car over speeded and in case if an accident occurs then a corresponding alert message will be sent to the car owners also.

5. APPLICATION AREAS OF IOT

Internet of things has a wide variety of application in almost all the areas of engineering and technology. Here we discuss some of its outstanding and breakthrough application.

5.1 Smart Environment

While smart city works on connecting all the devices through the sensor and passing information to the citizens and alerting the people and higher officials, SMART ENVIRONMENT can also be made. With the advent of the smart environment a wide variety of uses can be achieved namely doing smart agriculture, smart machinery assembling industry.

5.2 Application in Health Care

IoT devices can be used in the healthcare system to identify the diseases and unusual behaviour of human organs. This can be mainly used to monitor the raise in blood pressure, sugar level in the patient’s blood and monitor them.

Also it plays an important role in continuously monitoring the patient with respiratory problem, by analysing the value of oxygen used during the inhale process. Thus Internet of things has its own establishment in the field of medicine as well.

5.3 Application in Environmental Monitoring

Monitoring of environmental activity can also be done using Internet of Things. This can be implemented to identify any natural calamities like flood, unusual and heavy rainfall, earthquakes and forest fire. This can be notified and information along with the severance values can be sent to the respective geological station informing about the strange routine observed in the particular place at particular time

5.4 Application in Security

Internet of things has a vital role in the security of the house hold items. This can be implemented by providing lock and unlock features to the appliances which can be activated by wireless medium like blue tooth and infrared rays.

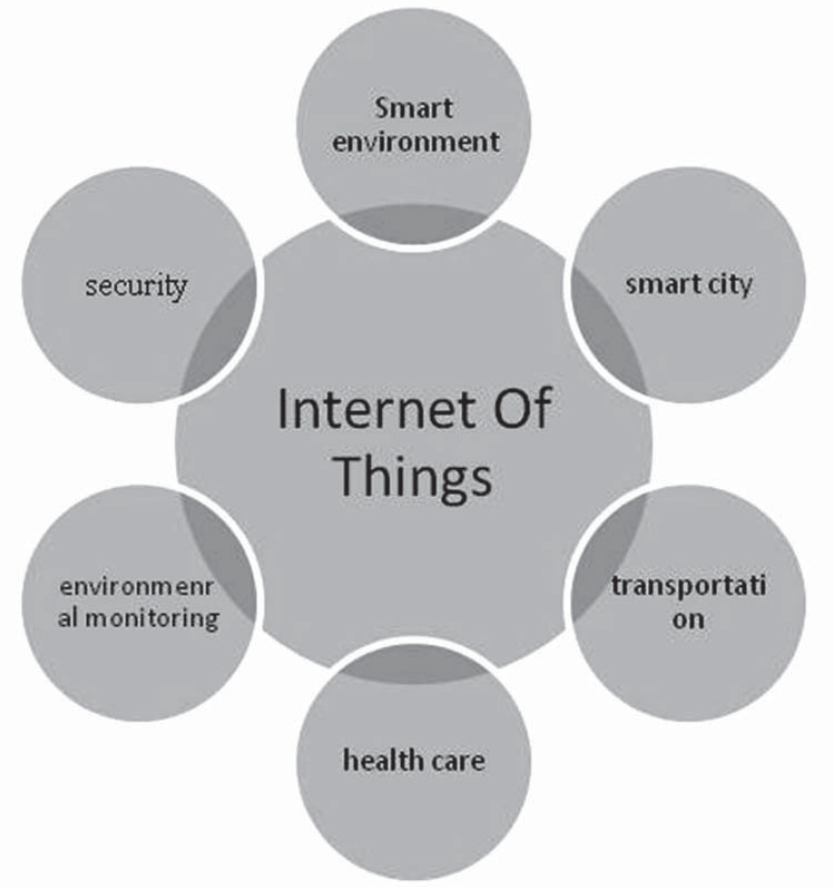

Figure 1.3. Applications of IoT

5.5 Smart Living Room

Take an example of a smart living room, in which as soon as the person enters the room, the smart room taps into a cloud based profile of preferences like climate control, music, lighting and décor. It can also detect the amount of stress a particular user has been through that particular day, using the calendar app and biosensors that detect the stress via the blood pressure and heart rate, and accordingly can change the music and other preferences to a more soothing nature. It can also detect the temperature outside and set the temperatures in the room. On the software side, there are algorithms which are so sophisticated that the system can know what the user wants based on his preferences.

6. CONCLUSIONS

Internet of things is a break through innovation that is made in the world of science and technology. This technology can be employed in all the areas which needs to be automated and takes decisions based on the scenario that the outside world is creating. This can be done by very powerful sensors that are used to sense the objects and act accordingly. It creates awareness and sends an alert message in prior to any unfavourable deed to the concerned owner and gives an status quo of the object along with all the information captured at that point of time. While our paper explains about how to alert the people in prior to over speeding and sending the message to the car owners stating the over speeding of their car, it can be taken step ahead by alerting the people by sending messages to the owners if they have any abnormal activity like water overflow, short circuit in home, switched on electrical equipments, sudden raise in the temperature and unusual door tamper activity. This idea can be implemented in the concept of smart city thus building a smart environment.

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