INTERNET OF THINGS (IOT): ARCHITECTURE, APPLICATIONS AND SENSORS

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***Abstract*:** Internet of things is one of the fast growing topics in the world. Data transfer is one of the important one in the field of communication. Internet Of things refers to send data's between devices, vehicles, building etc in more secure way. In this paper, we discussed about the IOT four layer architecture, study of different sensors , the areas where IOT is applied, how objects can be sensed using sensors throughout the network etc. In IOT there is a less chance of human to human interaction and human to computer interaction.

Index terms: **IOT,Sensors, RFID, EQ Radio,Proximity Sensor, Pressure sensors.**

1. INTRODUCTION

In IOT[12][13] ,the things can be a person with heart monitor implant, a farm animal with biochip transponder, an automobile with sensor which sense the driver about the low air pressure in tyres or any other manmade object with an IP address to send data to a network. In this fast moving life, people don't have time to spend so much time for data collection, analysis of some areas .In this cases IOT can be useful by spending more time or sending some detailed result or picture to the correct person in the correct time so as to save time for this type of things. People can get easily about the replacement some devices or regenerate some documents and so on. IOT is increased in huge margin because of IPV6's. Usually a person can easily assign an IP address for almost all things.IOT is practically now applied in fields like Medical, Agriculture, Building management, Health, Transportation etc.

II. IOT ARCHITECTURE

With less human intervention the devices are connected to the internet and send and receive data using IOT. IOT architecture[9] consists of four important layers.

2.1.Sensor layer

Sensor layer is the bottom layer of IOT architecture. This layer contains sensor networks, RFID tags, Embedded systems and details about different sensors.It uses sensors to catch information from different devices.

2.2.Gateway layer

The data transmitted to the next layer is done with the help of gateway layer. It is an important layer. The main features of this layer are scalability, flexibility and help the different organization to communicate easy and independently.

2.3. Management layer

IT acts as an intermediate between Gateway layer, Network layer and Application layer. Device management and Information management were handled here. Useful data can be extracted from the raw datas with the help of management layer.

2.4. Application layer

This is the top most layer of the IOT architecture. It helps the user to access different applications. It gives precise idea about different applications where IOT can be deployed The applications may be used in numerous sectors like transportation, health care, agriculture, education, various government organizations etc.

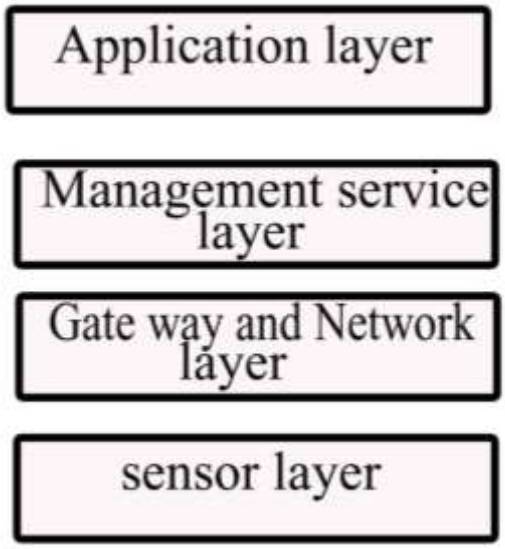

Fig1.IOT four layer architecture

III. APPLICATIONS OF IOT

IOT can be used in various areas for secure purpose.

3.1 Heart Monitor Implant

IOT has made a big impact in Heart Monitor implantation .A heart patient can be implemented with a small chewing gum like device inside the skin of the patient called insertable cardiac monitor ,which is used to record the heart pulse rate and various heart related things. It's a good security for a heart patient who is staying alone in home. If any fluctuation in heart pulse or some unwanted notice about the functioning of heart, a message alert or call will go automatically for the patient relative or nearby hospital. It can be also be implemented by sending the patients house address to the nearby hospital so that they can easily send the ambulance or doctor to the patient home. This can be done with the help of GPRS system. This can easily reduce the death rate due to heart attack.

Step1: If there is any fluctuation or change in heart beat, the information is send to patients relative and to nearby hospital.

Step2: Patient details with correct address is send to hospital with the help of GPRS.At the same time patient relative also rush to home.

Fig 1.

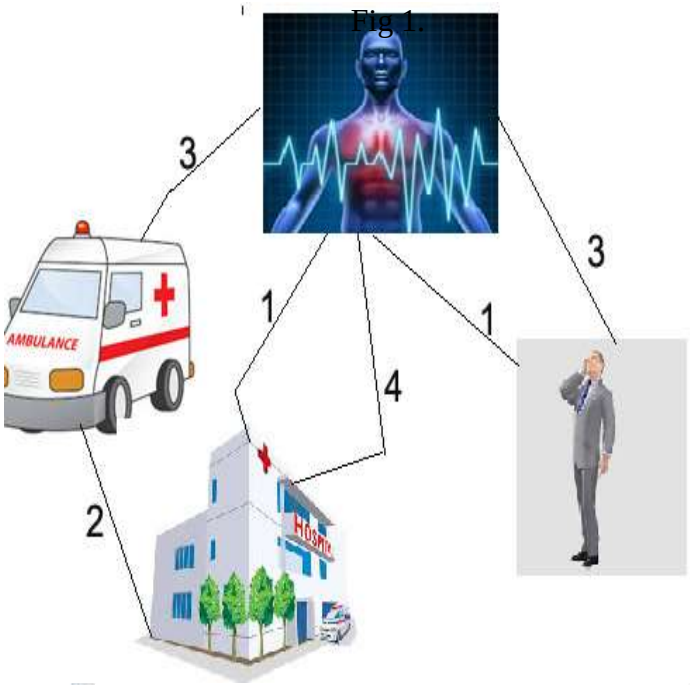

Fig 2. IOT application for heart monitor implant

Step 3: Hospital send an ambulance to the patient home with a doctor before the patient falls to emergency situation

Step4: Patient is taken to hospital with utmost care and treatment is provided.

These things can be possible only through IOT. This can be used more efficiently by reducing the human to human interaction and human to machine interaction.

3.2. In Accident reduction

IOT can be used in transportation systems to avoid accidents. For example, a car can be fixed with some high quality sensors to capture the speed of the car which is going in front. If it crosses some speed limits the car which is following will get an indication and correspondly the car will slow down. This makes the driver alert.

It can be used in other way. Vehicle steering can be fixed with some alcohol sensors. This sensor catches the driver's breath and check the alcohol level. If it crosses the limit the car will sends a message to nearby police station with car number. The Police will track the car by GPRS and catch the driver. This type of things can be introduced in our vehicles to avoid accidents.

3.3. IOT for Woman Safety

Safety for woman in society is becoming a serious issue throughout the country. A wireless sensor network should be placed in public places like Malls, Bus stations, Railway station for the protection of woman and children.

For example, An EQ Radio, Which is an emotion recognizing device can be fixed in public places. If a person feels someone follow them, then their emotions and feel will be different. They try to run fast or try to take new route to home and so on. These type of emotions can be easily captured and send to nearby helping agency with the location. In some places working woman face lot of problems while they returning

from office. Some woman uses two wheeler or three wheeler for travel. If they feel some one following them then they try to run fast. If they run fast the car then it may be noted by some wireless sensors and messages can be send to corresponding agency to send the rescue team.

3.4 IOT for smart home

The home based lighting, air conditioning; security etc can be easily controlled using an IOT based system. We can easily place sensors and connect it to our mobile or laptop. If TV, Fan, Washing machine is ON means we get alert via sms.We can easily controlled it by our mobile phone. Programs can be written in Raspberry –pi to Switch OFF the TV, Fan etc. We can also pevent some unknown person entering our home.

IV. IOT SENSORS

Some technologies like machine learning, commodity sensors, embedded systems helps a rapid growth in IOT. Sensors are used in early days in lot of areas. But the boom of IOT makes the sensors more popular. In IOT the various functions and data capturing, sending and receiving are done using various sensors. The sensors captures data and transmit and share with all connected device

Some of the important sensors used in IOT world are listed below.

4.1. Proximity Sensor

This sensor detect the presence or absence of a nearby object.Most commonly used in cars, retail industry,malls, stadium, airport etc.

4.2. Pressure sensor

It detect the pressure and convert to electric signals.Most commonly used in heating systems,Water systems and manufacturing systems.

4.3 Chemical Sensor

Most commonly Used in industrial environments. It is used to indicate liquid changes. Some examples of chemical sensors are PH glass electrode sensor, Hydrogen sulfide sensors, and chemiresistor sensors.

4.4 Smoke sensor

It senses smoke and its level.. It is mainly used in manufacturing industry, home, factories etc.Examples are Optical smoke sensors, Ionization smoke sensors.

Table 1. Below shows a survey on different sensors used in different applications.

Sl.No	Paper	Sensor used	Applications

1	IoT based smart home automation system using sensor node.[4]	LM35, IR sensors, LDR module, Node MCU ESP8266, and Arduino UNO	Controls some home appliances like light, fan, door cartons, energy consumption, and level of the Gas cylinder
2	Environmental Monitoring Using Wireless Sensor Networks(WSN) based on IOT .[1]	Wireless Sensor	Monitor the parameters in environment.
3	FarmBeats: An IoT Platform for Data-Driven Agriculture.[3]	Sensor types like i.e., cameras, drones and soil sensors,	Boost agricultural productivity by increasing yields, reducing losses and cutting down input cost
4.	IOT Based Water Quality Monitoring System[8]	pH Sensor, Conductivity Sensor, Temperature Sensor, Turbidity Sensor	Water quality measuring system
5	Automatic Smart Parking System using Internet of Things.[11]	IR sensor	Smart Parking System (SPS) which enables the user to find the nearest parking area.
6	IoT Driven Healthcare System for Remote Monitoring of Patients.[10]	Biomedical sensors measure the human body's heartbeat, blood pressure, pulse and ECG.	Track human health
7	IoT Based Vehicle Emissions Monitoring and Inspection System.[2]	Gas sensor	Tracking down vehicle causing taint on the city roads and measures multifarious genres of toxic wastes, and its level in air.
8	Automatic Home Appliances and Security of Smart Home with RFID, SMS, Email and Real Time Algorithm Based on IOT.[6]	Gas Sensor, Monitor Sensor, RFID	Providing Home security
9	Women's safety using IOT.[5]	Temperature Sensor, hearbeat Sensor, Monitor Sensor.	Providing Safety for woman
10	Architecture and Plan of Smart hospital based on Internet of Things(IOT).[7]	RFID,Infrared Sensor	Making smart hospital using IOT

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