International Journal of Emerging Technology and Innovative Engineering
Volume 4, Issue 5, October 2018 (ISSN: 2394 – 6598)

A SURVEY ON HEALTHCARE AND AGRICULTURE IN INTERNET OF THINGS

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ABSTRACT

Internet of Things (IoT) is an environment of connected physical objects that are accessible through the internet. The 'thing' in IoT could be any object with build-in-sensors that have been assigned an IP address and have the ability to collect and transfer data over a network without manual assistance . IoT has various applications namely smart home, smart city, smart retail, smart healthcare, smart agriculture, energy engagement, poultry and farming, smart water management, industrial purpose. This paper overviews about two applications a). Healthcare becomes one of major economic and social problems around the world, especially in aging people, where it costs tremendous health expanses. In medical care the IoT is used to monitor physiological status of patients through sensors by gathering and analyzing their information and transfer that data through internet. This data is stored into database server which manages data and provides accessibility. User can view this data with the help of Android App. b) Agriculture plays important role in India which mostly depends upon natural resources and the weather conditions. Here, the user can monitor the agriculture environment from a remote location. The growth of the plant is measured by using sensor which is placed in the soil. The sensors will collect the input as measurements and transfer it to the controller through internet from where the farmers will get the intimation of plants growth. The intimation may be an application or a text message.

KEYWORDS: Internet of Things, Healthcare, Agriculture, Sensor, Controller.

I. INTRODUCTION

The ultimate aim is to create a better world for human beings, where the objects around us understand our desire and hence act accordingly without any explicit instructions. The term internet of things was first proposed by Kevin Ashton in 1982. IoT is a combination of hardware and software technologies along with embedded devices which enables to provide services and facilities to any one, anytime, anywhere required using any network. The connectivity then helps us capture more data from more places, ensuring more ways of increasing efficiency and improving safety and IoT security. IoT is transformational services that can assist companies improve performance through IoT analytics and IoT Security to convey better outcome. Businesses in the utilities, oil & gas, insurance, manufacturing, transportation, infrastructure and retail sectors can reap the benefits of IoT by making more informed decisions, aided by the torrent of interactional and transactional data at their disposal. IoT is expected to propose higher connectivity of devices, systems, and services that goes beyond machine-to-machine (M2M) interactions and covers a wide range of protocols, domains, and applications. The interconnection of these embedded devices (including smart objects), is expected to lead in automation in almost all fields, while also enabling advanced applications like a smart grid, and expanding to areas such as smart cities.

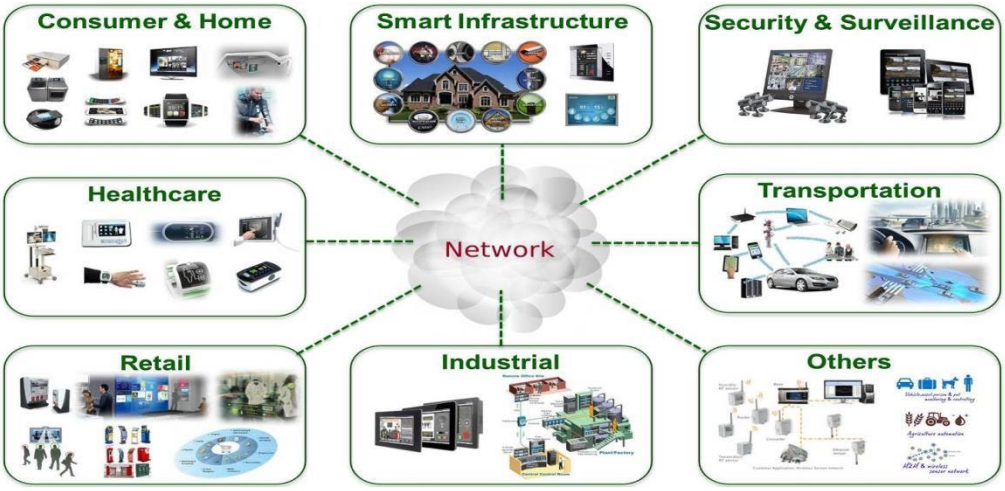

Fig 1: Applications of IOT

The health care applications are increasing day by day and more because of sensor devices. The IoT has the potential to give rise to many medical applications such as glucose level sensing, ECG monitoring, blood pressure monitoring, body temperature monitoring. The healthcare system mostly tries to work on the wireless sensor networks, embedded device technologies and ubiquitous computing. IoT systems need to provide the services to any one at anytime and anywhere. So we require architecture to implement the health care systems more efficiently and with less cost.

Modern innovative IoT applications are addressing the agriculture issues and rising the quality, quantity, sustainability and cost effectiveness of agricultural production. Many farmers still use the traditional methods of farming which outcome in low yielding of crops and fruits. But wherever automation had been implemented and human beings had been replaced by automatic machineries, the yield has been improved. Through the use of various sensors and wireless devices, farmers can obtain information about soil moisture, soil temperature, and nutrient condition in the soil or the occurrence of plant diseases and pests in plants. On the basis of the information received, farmers can react in a timely manner and apply appropriate measures. Data on the operation of agricultural machinery is obtained using sensors, which enable operators to adjust machine operation to working conditions in order to achieve higher effectiveness and quality of the production process.

II. RELATED WORK

In [3] Secured Smart Healthcare Monitoring System Based on IoT, proposes that PIC18F46K22 microcontroller is used as a gateway to communicate to the different sensors such as temperature sensor and pulse oximeter sensor. The microcontroller picks up the sensor data and sends it to the network through Wi-Fi and hence provides real time monitoring of the health care parameters for doctors. The data can be accessed by the doctor at anytime. The controller is also connected with buzzer to alert the caretaker about difference in sensor output. But the major issue in remote patient monitoring system is that the data as to be securely transmitted to the destination end and provision is made to allow only authorized user to access the data. The security issue is been addressed by transmitting the data through the password protected Wi-Fi module ESP8266 which will be encrypted by standard AES128 and the users/doctor can access the data by logging to the html webpage. At the time of extremity situation alert message is sent to the doctor through GSM module connected to

the controller. Hence quick provisional prescription can be easily done by this system. This system is efficient with low power consumption capability, easy setup, high performance and time to time response.

In [4] A Review Paper on Smart Health Care System Using Internet of Things proposes that the patients' body parameters can be measure in real time. Sensors collects patients body parameters and transfers that data to Arduino Uno which further transfer that data to cloud with the help of Wi-Fi module. This data is stored into MySQL database server which manages data and provides accessibility. User can view this data with the help of Android App which is installed in Smart phone, Tablet or PC. Cloud computing handles authentication, privacy, security, data management etc. If data is abnormal then patient gets notification and care takers will get mail about it. With the help of different decision making algorithms decisions can be made and according to its people have access to database. Patient can check their medical record Hence, this system provides Quality Health Care to everyone and error free and smooth communication to patients.

In [5] Smart Blood Pressure Monitoring System Based on Internet of Things proposes smart blood pressure monitoring system based on Internet of Things, which is characterized by three aspects. A) Monitor side: it measures the user's blood pressure along with other blood pressure monitors in operation at the server-side to ensure data accuracy. B) User side: with smart solutions, users can use the electronic blood pressure monitor to measure, record and send the data to data processing center for storage. C) Doctor side: doctor workstation may monitor users' blood pressure in real time, and give warnings or advices. It improves the accuracy and credibility significantly.

In [2] Application of IOT Based System for Advance Agriculture in India suggests internet of things based sensor network for agriculture use. The sensors consist of Soil moisture sensor, soil temperature sensor, and ph sensor for soil. This all sensor connected to each other by wireless sensor network xbee and will convey data to a station pc in the control room. From control room it will be uploaded to website where farmers can access all the data on his smart phone and tablet. This system also controls water requirement and fertilizers requirements from these sensor data for different type of crop in different time of year. The stored data of the sensors can be further analyzed and used for future uses such s in which condition we get maximum yield from crops so that farmer can plan according to it. Also this IOT based system provides atomized irrigation and fertilizer usage in real time to farmer which is very useful.

In [6] Smart System Monitoring On Soil Using Internet of Things proposes that how the sensed data will be processed and stored in cloud and from cloud the data will be relayed to the registered farm owners through their pH one or device in user understandable form. Also if pH rate of the soil is low the application suggests the pesticides to be used to improve cultivation .This will be very helpful to the farmers who are away from the land, and improves the crop cultivation.

In [7] Application of IoT in monitoring and controlling agricultural production proposes that IoT devices play a key role, with a focus on their realization by available microcontroller platforms and appropriate sensors such as Arduino products. Autonomous sensor devices gather data within monitoring systems and participate in the control process by sending signals to the actuators. Such an IoT based system provides users with the opportunity to remotely monitor conditions and production development. This system enables users to accomplish savings in inputs, achieve cost reduction and trace the production process on the farm.

III.PROPOSED SYSTEM

A. HEALTHCARE

Healthcare becomes one of major economic and social problems around the world, especially in aging people, where it costs tremendous health expanses. In medical care the IoT is used to monitor physiological status of patients through sensors by gathering and analyzing their information and transfer that data through internet. This data is stored into database server which manages data and provides accessibility. User can view this data with the help of Android App.

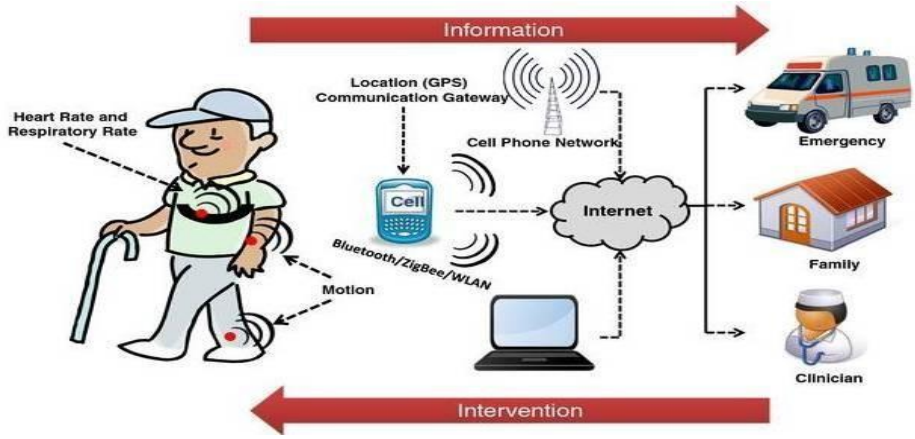

Fig 2: Healthcare monitoring

GLUCOSE LEVEL SENSING

Diabetes is a group of metabolic diseases in which there are high blood glucose (sugar) levels over a prolonged period. Blood glucose monitoring reveals individual patterns of blood glucose changes and helps in the planning of meals, activities, and medication times. In this method, sensors from patients are linked through IPv6 connectivity to relevant healthcare providers. The utility model reveals a transmission device for the transmission of collected somatic data on blood glucose based on IoT networks. This device includes a blood glucose collector, a mobile phone or a computer, and a background processor. In addition, a generic IoT-based medical acquisition detector that can be used to monitor the glucose level is found.

ELECTROCARDIOGRAM MONITORING

The monitoring of the electrocardiogram (ECG), that is, the electrical activity of the heart recorded by electrocardiography, includes the measurement of the simple heart rate and the determination of the basic rhythm as well as the diagnosis of multifaceted arrhythmias, myocardial ischemia, and prolonged QT intervals. The application of the IoT in ECG monitoring has the potential to give maximum information and can be used to its fullest extent. A number of studies have explicitly discussed IoT-based ECG monitoring. The innovation in introduces an IoT-based ECG monitoring system composed of a portable wireless acquisition transmitter and a wireless receiving processor. The

system integrates a search automation method to detect abnormal data such that cardiac function can be identified on a real-time basis.

BLOOD PRESSURE MONITORING

The combination of a KIT blood pressure (BP) meter and an NFC-enabled KIT mobile phone becomes part of BP monitoring based on the IoT is addressed. A motivating scenario in which BP must be regularly controlled remotely is presented by showing the communications structure between a health post and the health center. The BP device operates depends on the connection to a mobile computing device is addressed. A device for BP data collection and the data is transmitted over an IoT network and this device is composed of a BP apparatus body with a communication module.

BODY TEMPERATURE MONITORING

Body temperature monitoring is an essential part of healthcare services because body temperature is a important vital sign in the maintenance of homeostasis. In m-IoT concept is verified using a body temperature sensor that is embedded in the TelosB mote, and a typical sample of attained body temperature variations showing the successful operation of the developed m-IoT system is presented. A temperature measurement system based on a home gateway over the IoT has been proposed. The home gateway transmits the user's body temperature with the help of infrared detection. The main system components responsible for temperature recording and transmission are the RFID module and the module is also for monitoring body temperature.

B. AGRICULTURE

Agriculture plays important role in India which mostly depends upon natural resources and the weather conditions. Here, the user can monitor the agriculture environment from a remote location. The growth of the plant is measured by using sensor which is placed in the soil. The sensors will collect the input as measurements and transfer it to the controller through internet from where the farmers will get the intimation of plants growth. The intimation may be an application or a text message.

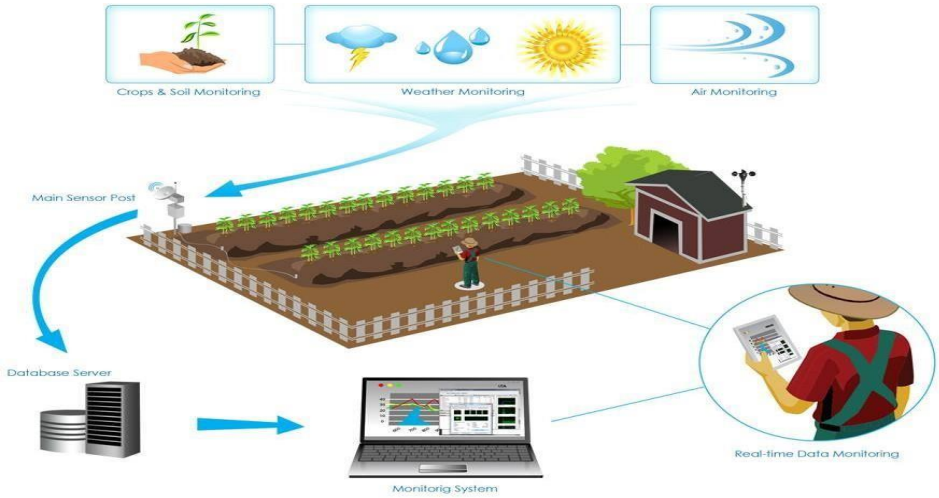

Fig 3: Agriculture monitoring

SOIL MOISTURE SENSOR

Soil moisture sensor is a sensor which senses the moisture content of the soil. The sensor has both the analog and the digital output. The digital output is fixed and the analog output threshold can be varied. It works on the principle of open and short circuit. The output is high or low indicated by the LED. When the soil is dry, the current will not pass through it and so it will act as open circuit. Hence the output is said to be maximum. When the soil is wet, the current will pass from one terminal to the other and the circuit is said to be short and the output will be zero. The sensor is platinum coated to make the efficiency high. The range of sensing is also high. It is anti-rust and so the sensor has long life which will afford the farmer at a minimum cost.

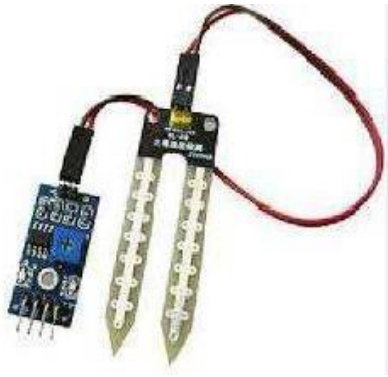

Fig 4: Soil Moisture Sensor

TEMPERATURE SENSOR

The LM 35 sensor is highly used because its output voltage is linear with the Celsius scaling of temperature. It does not provide any external trimming. It has a wide operating range. The maximum output is 5V. The output will increase 10mV for every one degree rise in temperature. The range is from -55 degrees to +150 degrees. There are three terminals as Vcc, Ground and the analog sensor. It consumes minimum amount of electricity. Thus, it is energy efficient. It is very efficient in horticulture. It is user friendly.

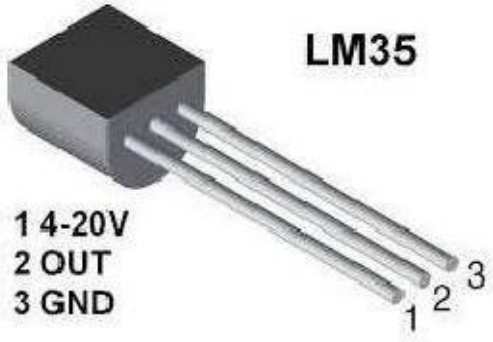

Fig 5: Temperature Sensor

PIR SENSOR

All objects with a temperature beyond absolute zero emit heat energy in the form of radiation. It is invisible to the human eye since it radiates infrared wavelengths. PIR sensors don't detect or measure heat, instead they detect the infrared radiation emitted or reflected from an object. It is used to detect the movement of people, animals or other objects. They are commonly used in burglar alarms and automatically activated lighting systems. When a human passes in the field, the temperature at that point will rise from room temperature. The sensor converts the resulting change into a change in the output voltage and this triggers the detection.

Fig 6: PIR SENSOR

SOFTWARE USED:

RADIO FREQUENCY IDENTIFICATION (RFID)

The RFID tag represents a simple chip attached to provide object's identity. The RFID reader transmits a query signal to the tag and receives reflected signal from the tag, which in turn is passed to the database. The database connects to a processing centre to spot objects based on the reflected signals within a (10 cm to 200 m) range. RFID tags can be active, passive or semi-passive/active. Active tags are powered by battery while passive ones do not need battery. Semi-passive/active tags use board power when needed. Active RFID readers have their own battery supply and can instantiate the communication. RFID is the first technology used to realize the M2M concept (RFID tag and reader). The RFID reader transmits a query signal to the tag and receives reflected signal from the tag, which in turn is passed to the database.

IV.CONCLUSION

The Internet of Things (IoT) can be incorporated clearly and seamlessly in a large number of heterogeneous end systems. In health care all devices are connected to the internet where the healthcare professionals can monitor, diagnose, and advice their patients from a remote location at any time. The proposed system is simple and patient's data can be easily accessed. In agriculture IoT based system has the ability to connect physical objects on the farm and allow their accessibility through the Internet, thus providing users with the opportunity to remotely monitor production conditions and production process. The sensors and microcontroller are successfully interfaced and wireless communication is achieved between various objects. By implementing this smart agriculture it improves the crop yielding and reduces the human workload.

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