# EVALUATION OF DIFFERENT MEDICAL IoT APPLICATIONS: SURVEY

Dr. D.S.Waghole[1], Prathmesh Bhujbal[2], Namrata Chavan[3], Komal Nanavare[4], Prajakta Patil[5]

Computer Engineering, Jayawantrao Sawant College of Engineering, Pune.

***Abstract:*** Internet of Things (IoT) is a sensor technology that connects devices to the internet for the purpose of exchanging information. IoT is a trending technology. IoT is a vital part in every sector of life. Today things and people are more connected than ever before. Today through internet-connected things such as fridge can automatically order the groceries, our home can automatically adjust to our required temperature and our car can detect the back-to-back traffic on our usual work route. IoT provides ease in life. Advancement in sensor technology has brought the automated devices in the area of health monitoring, wearables, industry and home automation.

Health care is one of the biggest fields of application of Internet of Things. IoT can be used in different situations in health care such as in case of accidents, for handicap people as well as for senior citizens. In India 30% of death occurs due to late treatments on the patients. It has been seen that patients do not get treatment until the patient reaches hospital. The basic vital parameters of the patient are checked after the patient reaches the hospital, and after that, strategy for the further treatment is planned. This delay in time can lead to loss of individual's life. In addition, patient can be diagnosed by severe health issues if not treated in time. Regular health check-up of senior citizens and handicap people is a tedious task as more than one person is required for this purpose. With the help of IoT devices, this task can be done with ease. These devices can collect information related to vital parameters of the patient such as body temperature, blood pressure, ECG, sugar level in the body etc. This data can view by the doctor with the help of mobile application provided to the doctor. With help of various data analysis algorithms, this data can be analyzed and can be used for making predictions as well as in decision-making process.

***Index Terms - Internet of Things (IoT), sensors, WSN, WLAN, ZigBee, patients, senior citizens, vital health parameter's, check-up.***

## I. INTRODUCTION

Internet of Things (IoT) is the system that has ability to transfer data over a network without requiring human-to-human or human to computer interaction. There are three A's in the IoT **Anything, Anytime, Anywhere**.[4] This means user can get any data from anywhere in the world and at any point of time. The main components of the IoT are Devices, sensors, gateways, analytics, cloud, user interface etc. IoT system is three level architecture devices, gateway and data system. [5]The data moves between these levels via four types of transmission channels such as device-to-device, device to gateway, gateway to data system and between the data system. Different Protocols are used for transmission of data. [6] WSN is vastly used. Data is transmitted between source node and destination node in WSN. Performance is analyzed using WLAN, ZigBee, etc. The Data Sensed by the sensors nodes in wireless sensor network is typically forwarded to the base station that connects the sensor network with the other networks where the data is collected, analyzed and actions are taken.

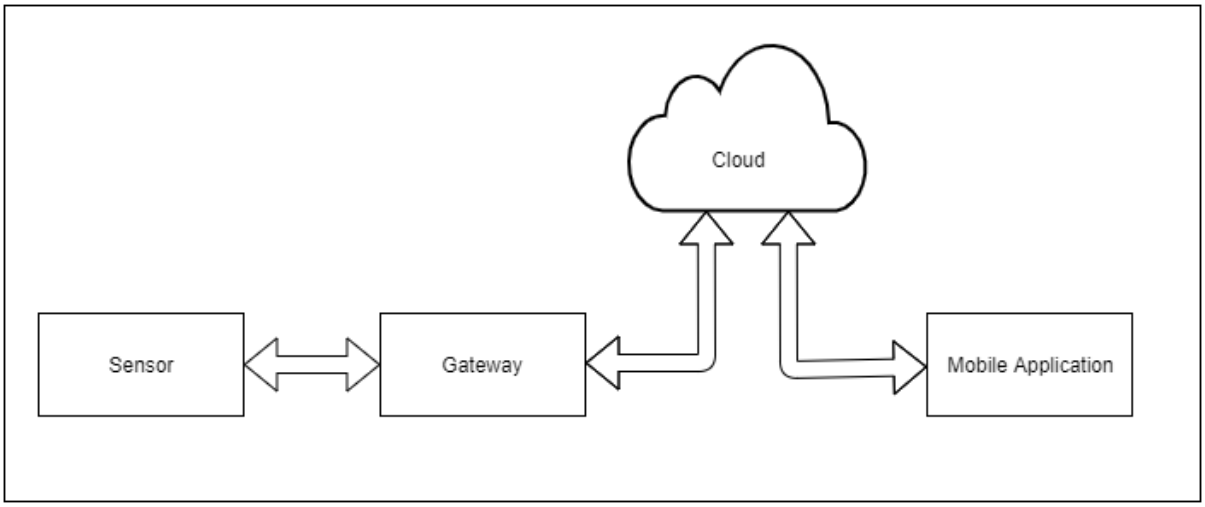


Figure 1: Basic architecture of Internet of Things

[7] Sensors are the most important part of IoT architecture as they collect all the data from the surrounding environment and provide the data to the gateway or the controller. [8] The data collected by the sensors is analog in nature, which cannot be understood directly by the user. For this purpose, these analog signals must be converted into digital form. This task is carried out by the controller. Controller acts as the brain of the system, as it converts the signals into digital form and manages different sensors connected to it. Hugh amount of data is collected by the sensors and thus requires large amount of storage. [9] This converted data is stored in a centralized storage known as cloud. Cloud is a virtual storage with huge amount of storage. Data that is stored on the cloud can be accessed any time by user with the help mobile application. With the use of cloud, there is no risk of data loss due to corruption of any hardware as in traditional method. To easily analyze the data mobile application is important aspect of IoT system. These applications can help in decision-making process.[10]

## II. LITERATURE SURVEY

In the paper the authors have represents the usage of IoT in health care system. The system in this paper is mainly designed for real time monitoring of the vital parameters of the patients. The patient's vitals parameters are transmitted to smart phones and laptops of the authorized person using a cloud server and this information can be stored and analyzed for further analysis and decision-making. By determining the pattern of the parameters, which is observed, the nature of the disease can be predicted. This paper also discusses about fetching patient's body temperature, oxygen saturation percentage, and heart rate using Arduino board, Raspberry Pi board and cloud computing.[1]

In the paper, the authors have represented a design of a smart wheelchair with multiple control interfaces. The smart wheelchair system that has been developed in the paper is based on a conventional wheelchair that is commonly available in the market, with the addition of related electrical and mechanical advancements. Additional features such as voice and gesture controlling interfaces are deployed to the system along with the conventional joystick-controlling interface to enhance the interaction with the user. [2]

In the paper,[3] the authors have developed an intelligent wheelchair to help patients by using speech recognition system to control the movement of wheelchair in different directions by using voice commands and the simple movement of the patient's fingers with keypad control. They have also provided automatic obstacle detection using an ultrasound system that helps the patient to apply a temporary brake in case any obstacle suddenly comes in the way of the wheelchair. The focus in intelligent wheelchair design was such that it must be controlled easily with minimum effort from the patient and provides protection from obstacle collision if any voice mistake happens. The low cost design was the main concern in this paper.

## III. LITERATURE SURVEY TABLE:

| Sr.no | Name | Year of Publication | Gist |
|---|---|---|---|
| 1 | Development of a Smart Wheelchair for People with Disabilities | 2016 | The system in this paper is mainly designed for real time monitoring of the vital parameters of the patients. The patient's vitals parameters are transmitted to smart phones and laptops of the authorized person using a cloud server and this information can be stored and analyzed for further analysis and decision-making. |
| 2 | Design and Development of a Smart Wheelchair with Multiple Control Interfaces | 2018 | The smart wheelchair system that has been developed in the paper is based on a conventional wheelchair that is commonly available in the market, with the addition of related electrical and mechanical advancements. Voice and gesture controlling interfaces are deployed to the system in addition to the conventional joystick-controlling interface to enhance the interaction with the user. |
| 3 | Design and Implementation of Low Cost Intelligent Wheelchair | 2012 | In this paper they have developed an intelligent wheelchair to help patients by using speech recognition system to control the movement of wheelchair in different directions by using voice commands and the simple movement of the patient's fingers with keypad control. |
| 4 | Designing A Smart Transfer Patient Bed | 2015 | The aim of the product proposed in this paper is to assist the nurse to transfer the patient from the warded bed to the medical bed so that the nurse can bring the patient to another location. The main concept of this product is to move the patient slowly and smoothly. |
| 5 | AUTOMATIC STRETCHER CUM WHEELCHAIR | 2017 | In this paper they have found that shifting a patient from wheel chair to stretcher is a difficult task and may require more hospital staff to attend a single patient or at home it will require more than one family member to do it. So, in this paper they have proposed the mechanism to convert a wheel chair into a stretcher. |
| 6 | Patient Monitoring System Based on Internet of Things | 2016 | In this paper they have developed a patient chair which can measure the vital parameter of the patient body. It can be used by senior citizens as well as physically challenged people |

## IV. CONCLUSION

The use of IoT technology in healthcare reduces the cost of medication and makes measuring the health parameters an easy task. Using IoT constant monitoring of various health parameters can be done and prediction of any kind of disease or disorder thus prevents the patient from the pain of paying frequent visits to the hospitals. The collected data of medical history of the patient can be used in future if incase there is need to change the type of treatment.

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