

An IoT Based Healthcare Monitoring System using Wemos-D1

Siddhant Jain¹, Vishal Maurya², Mayank Bisht³

¹⁻³Systems Engineer, Tata Consultancy Services Ltd, Bengaluru, Karnataka, India

Abstract - The Internet of Things is a domain in which smart objects actively communicate among each other which are available in the Internet in order to achieve high-level tasks for the benefit of users. With the continuous development of the IoT, more and more things will be able to access to the internet. In the medical and e-health field various body sensors are smart objects that are communicating with each other to allow a real time monitoring of vital signs of patients. These types of body sensors generate important data related to health such as temperature, heart rate etc. which will be helpful for doctors and patient relatives in order to provide assistance to that user. In this paper, we proposed an Intelligent patients monitoring system to monitor the patient a with the help of IoT (more specially connected sensors network and Wemos-D1 micro controller kit) that collects the status information which include patient's heartbeat rate, body temperature, humidity, unexpected body movement by using sensors like temperature sensor, heart beat sensor etc. and send these data to the cloud. As a result, patient's doctor and nurses can see his current health condition. In case of emergency if the patient's health condition is not stable (critical), the system automatically sends a SMS and E-mail to doctor and relatives of the patient. This would help the doctor to monitor his/her patient from anywhere as well as helps the patient's relatives to view patient's health condition remotely and act according to that.

Key Words: IoT, Wemos-D1, Thingspeak cloud, Temperature sensor, Heart rate sensor, Moisture sensor

1. INTRODUCTION

In this era of busy lifestyle, everyone is being focused on their work for better life. But this life is better only if we pay attention towards our health. Health is a factor to which no one can compromise. We often heard that "Health is Wealth" means there is no other thing greater than our health.

In this Covid-19 pandemic we realized that how much health is important and in such situations even doctors are not able to assist each and every one personally and in our busy life style we just forget about this important factor. According to World Health organization, the most causes of deaths are Ischaemic heart disease and stroke and this is increasing day by day, specifically in the Covid-19 situation. It is necessary to perform regular health check-up and is needed to be done monthly or quarterly. But we often forgot it due to work load or

some other reasons. So there is need to find one system by which we are able to monitor our health remotely or at our home.

In this paper we implement portable IoT based Healthcare Monitoring System so that any person is able to perform his regular health check-up at home. IoT is a blooming technology which is very popular now days for bringing automation in various fields such as home automation, Medical automations, agriculture etc. IoT covers different techniques and approaches in health and research. The advancement in IoT is changing the society and also there is a rapid drop in cost of IoT based components which make it possible for normal people to innovate new models and products at home. This system consist of various sensors such as temperature sensor, Heart beat sensor, Moisture Sensor which are used to monitor various body parameter of patent. This all is possible due to microcontroller kit which is implemented with a Wi-Fi module and think speak cloud service to which all the sensed body data is uploaded. There are many platforms are available such as Raspberry pi, Arduino and its variants, Wemos-D1, Intel Galileo etc. The raspberry pi is most famous and popular platform because it offer complete Linux sever but by using raspberry pi the Overall cost of the system increases that is why same model is achieved by microcontroller and they are cheap as compared to raspberry pi. In this we are using wemos-D1 which allows interfacing service an actuators through general purpose input output pins. This combination of wemos-D1 and IoT becomes a new innovation technology in health care system.

2. LITERATURE SURVEY

P. Dineshkumar et al [1] proposed a system which monitors heart beat rate, figure humidity and blood pressure and sends data to Intel Galileo Gen2 and then Intel Galileo Gen2 sends data to the "Thingspeak" cloud with the help of Wi-Fi connections or with the Internet provided by the sim card internet provider that is inserted in the Intel Galileo Gen2. The health sensor data ore mapped in Thingspeak cloud onto the Hadoop Distributed File System to store sensor data and then these data is viewed by doctor through mobile device or through PC through web browser. It uses Intel Galileo Gen2 Kit is an interference between the sensors and Thingspeak cloud. Intel Galileo Gen2 Kit transfers data

from sensors to Thingspeak cloud which is further stored in Hadoop Distributed file system and that can be access by doctor from anywhere. Using the Thingspeak website anybody can monitor patient data.

R. Kumar et al [2] uses Raspberry pi for monitoring patient data. In this model Raspberry Pi monitor patient parameter such as temperature, respiration rate, body movement, heart rate. Then these data is monitored from anywhere in the world using internet connection on monitor of screen. The patient data is send to patient web database through USB dongle or Ethernet cable. He has used IR transmitter and receiver in order to measure heartbeat of patient. In order to calculate pulse of patient pulse rate sensor is used which is connected to the finger of patient. In order to measure temperature of patient thermistor is used. In order to measure body movement of patient accelerometer sensor is used. In respiration sensor the breath rate is measured that is it calculates number of breath per minute. For respiration sensor he had used two thermistors are connected in bridge with the help of resistor. With all these sensors the data is analyzed of patient and send to the web database server and that data can be access by doctor from anywhere through internet connection using web browser.

Pedro Maia et al [3] focuses on web based platform for interconnecting body sensor. It uses Web interface in order to gain information of patient from various sensor attached to body. It uses Devices Connection Module, Visualization and Management Module, Storage Module, Common Service Module. Device Connection Module is for integrating body sensor to the web platform. The Visualization and Management Module provides a web interface between doctors, patient and system administrator and manage all information about patient, body sensor, medical record. Storage module is used to stored data of patient. Common services module provide infrastructure for communication and security of patient data. In these he had proposed module to create an effective web based platform between body sensor and doctors.

3. METHODOLOGY

In this paper, we have different sensors such as heartbeat sensor, temperature sensor, moisture sensor etc. and Wemos-D1 micro-controller kit for processing the data collected by sensor. This all sensors are connected to Wemos-D1 kit as source of input from patient.

As shown in fig.1, when patient applies above sensors to their body, sensors sense various parameters of patient's body such as body temperature, heartbeats, humidity etc. Signal generated by sensors are send to Wemos-D1 via interfacing input output pins. Here patient body temperature, Heart rate is measured using this sensors and can be monitored in the screen of any display device which have internet connectivity.

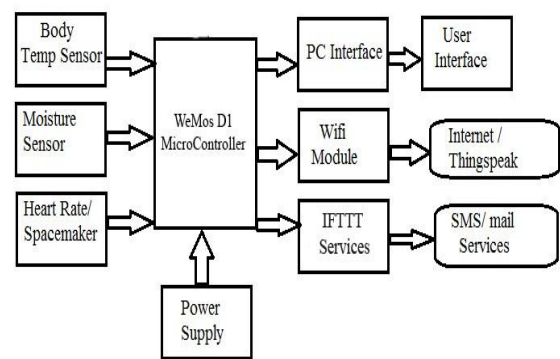


Fig.1: Block Diagram of IoT based Healthcare Monitoring System

The Wemos-D1 kit is implemented with Wi-Fi module ESP8266EX so that it can be connected to internet. Once data from sensors is arrived to Wemos-D1, it sends it to the cloud through internet. In this we are using Thingspeak cloud service. Thingspeak cloud is used for storing sensor data. Once data available to Wemos-D1 then this sensor data are sent to thing speak channel by using think speak API and channel ID with help for integrated Wi-Fi module ESP8266EX.

By using a computer or mobile doctor is able to access all the patient parameters regarding his health remotely due to cloud since data is access through web url from the cloud. We set some upper and lower boundaries for the health parameters of patient. If values senses by sensors are above the boundaries or lower than the boundaries then patient is in critical situation. An alert is send via SMS and E-mail to doctor and patient's relative so that emergency help is provided to that patient to save his/her life.

Here we used IFTTT web service for sending messages and emails to doctors and patient's relatives. It is freely available service stands for If This Then That means if something happens then it perform the given task. When patient's body readings are critical then it automatically sends messages and emails to contacts given by patient.

In this paper we have temperature sensor- LM35 for reading the patient body temperature. LM35 is most popular temperature sensor. One of the important features of LM35 is that its output voltage is directly proportional to degree centigrade i.e. Per 10mV rise in output voltage is equal to per degree rise in centigrade.

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