Cloud Based Secured Health Care Monitoring With Prompt Notification Using Connected Devices

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Abstract

This project describes about the wireless health monitoring of the patient using the smart sensors and spending low power in transmitting the data which will improve the quality of the treatment by giving the prompt response, the cloud access helps to monitor the patient status from any part of the world. Internet Of Things(IOT) becoming one of the most adaptable feature for accessing the data from any parts of the world, here we are getting the patient data's using the various sensor and these values are updated and stored in the cloud using the IOT module, the IOT module which we are using here has an built in cloud server link whenever a data is sent from the controller using serial communication is directly updated and stored in the unique cloud, using SDN (Software Defined Network) architecture the system becomes flexible and readily accessible to the end user irrespective to the network traffic, the SDN architecture and flow is defined in the Losant cloud platform, the numerous data which are generated from the bio-sensors is managed using the fog-computing on cloud computing, since the fog-computing consists of two plane, the control plane is used to give alert to the care taker/doctor during abnormal condition based on the collected values, the collected sensor values are stored and maintained in the data plane. so that the care taker or the doctor can access that data from any part of the world using that fog computing concept through android application which enriches the quality of service, by viewing the data ,one can easily follow the accurate status of the patient and the treatment can be done promptly.

Keywords: - Health monitoring, smart sensors, Cloud Computing, Internet of Things (IOT), SDN (Software Defined Network), Fog-computing, Android application

I. INTRODUCTION

The Health is one among the worldwide challenges for humanity. According to the constitutions of World Health Organization (WHO) [1] the highest attainable standard of health is a fundamental right for an individual. Healthy individuals can also reduce day to day pressure which they are facing on the already overwhelmed hospitals, clinics, and medical professionals also reduce workload on the public safety networks, charities, and governmental (or non-governmental) organizations [2]. To keep

individuals healthy an effective and readily accessible modern healthcare system is a prerequisite [3]. A modernized healthcare system should provide better healthcare services to people from anywhere at any time in an economic and patient friendly manner. Currently, the present healthcare system is undergoing a cultural shift from a traditional approach to a [4] modernized patient centered approach based on various new technologies. The healthcare professionals play the major role in the traditional approach. They need to visit the patients directly for necessary diagnosis Centre for treatment and advising. There square measure 2 basic issues related to this approach. Firstly, the tending professionals should air website of the patient all the time and second, the patient remains admitted in a hospital, wired to bedside biomedical instruments, for a period of time. [2] The patient oriented approach has been conceived in order to slove these two problem. In this approach the patients who undergoing treatment are equipped with certain knowledge and detailed information to play a more active role in disease diagnosis, and prevention. The key element of this second approach is a reliable and readily available Cloud Health Monitoring System (CHMS). The need for a real time recording and notification of vital signs of a patient is of prime importance for an effective CHMS. By encapsulating the advantages of modern bio instrumentation, computers, and telecommunication technologies a modern CHMS should acquire, record, display, and transmit the physiological data from the patient body to a remote location at any time. For more efficient, timely, and emergency medical care the CHMS must also be incorporated with an alarm system. In order to alert the patient as well as the health care service providers the CHMS should not only monitor and analyze the critical patient's data but it should also send alarming messages in case the monitored data go outside their normal ranges through IOT communication and secured using MQTT protocol with edge computing. Hence, a vigorous info system should be related to the CHMS.

Most of the proposed CHMS are centralized in a sense that all patient's data are stored in a single server, by using necessary firmware and software the server can be connected to AN open communication network via MQTT protocol. Thus a patient's data will be monitored from a far off location. Existing and widespread portable networks will assist during this regard. Recently, [7] mobile networks are considered critical for solving future global health care issuses. The mobile healthcare system is considered as a matured idea now due to the global marker penetration of the mobile phones.. By using the handheld phone phone healthcare system can be accessible for all people, who are living in remote areas without much access to other types of communications. Even an easy portable will become a robust tending tool currently. Text messages and phone calls will quickly deliver real- time and significant data of a patient to a far off location also app notification ensures the attention of the caretaker towards patient. Thus the patients, living in remote areas, will cut back inessential back-and-forth visit the way placed hospital and healthcare centers.

II. **Literature Review**

The study of a Wireless Health Sensing element Network (WHSN) and Radio Frequency Identification (RFID) based u-Healthcare system. The system [11] is capable of observance the patient's medical standing by mistreatment RFID body sensing element and wirelessly transmits the medical information to a neighborhood digital computer (WHSN gateway) before transmittal it to the central info server. Acknowledge to the patient's movements, WHSN node's movements are laced with the practicality of the Mobile IPv6. Patients are alerted just in case of emergency through their wearable device and may conjointly receive messages with their Smartphone's. The projected system is intended [3] live to live and monitor necessary physiological information of a patient so as to accurately describe the standing of her or his health and fitness projected a system is designed to measure and monitor necessary physiological information of a patient so as to accurately describe the standing of her or his health and fitness. The patient's temperature, heart beat rate, muscles, blood pressure, blood glucose/sugar level, and electrocardiogram pulse waves are monitored, displayed, and keep by their system. To make sure responsibility and accuracy the projected system has been field tested. The check results show that their system is in a position to live the patient's physiological information with a really high accuracy. Proposed system includes [12] the planning and implementation with subsystems. Data is distributed via information science to an cloud server containing clinical information, which may be accessed on the smart phone and can conjointly be shared with the hospital/caretaker/doctor anytime to provide prompt medical recommendation once

required. 2 wireless protocols were investigated: a Bluetooth (IEEE 802.15.1) ad-hoc network and a Wi- Fi (IEEE 802.11) ad-hoc network. To do so, 2 subsystems were designed: a sensing element system and a show system. The sensing element system consists of 2 thermometers and a wireless transmitter/receiver. The information's are communicated to the cloud system wirelessly. The cloud device consists of a wireless transmitter/receiver Associate in android an iOS mobile device. The results regarding the affectivity and medication/treatment of the designed system also the integration with a dashboard for better readability and visualization are provided. The cloud health care system has the capability to monitor physiological parameters from multiple patient bodies. In their proposed system [9], a organizer node has connected on patient body to gather all the signals from the wireless sensors and sends them to the bottom station. The connected sensing elements on patient's body, a wireless body sensor network (WBSN) and they able to sense the pulse rate, pressure and then on. This technique will find the abnormal conditions, issue Associate in microcontroller to the patient and send a SMS/E-mail to the care taker. Android developed application helps in data notification [13] which will be observe by the doctor in real time additionally as history information via net with an alarm/indication in case of abnormalities. The temperature sensors can send the readings to a microcontroller through Zigbee wireless communication. To send the time period information to health observance info, wireless local area Network (WLAN) has been used. Arduino with LAN defend supported IEEE 802.11 commonplace has been used for this purpose. Observed results from a cluster of data shows the time period temperature reading successfully monitored regionally (at home) and remotely (at doctor's computer).

III. **Proposed Method**

In this module, we are going to monitor health condition of patients with less power. The pressure sensor (breathe), Heartbeat sensor, temperature sensor, MEMS sensor are used monitor the health status of a patient. Whenever any parameter is going to be in abnormal manner then controller automatically sends the information to cloud via IOT module. In the cloud server the transmitted data is stored which can be accessed by the unique address. The data is monitored by the doctor/care taker through the app/dashboard. Based upon the input value of the sensors the doctor (care taker) can analyze the patient status.

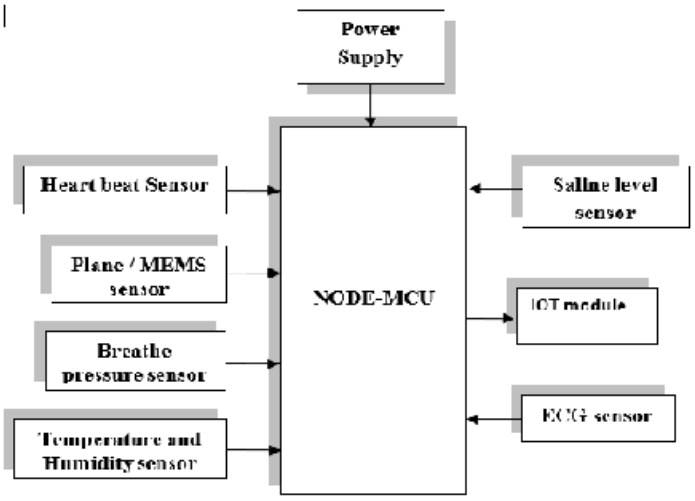
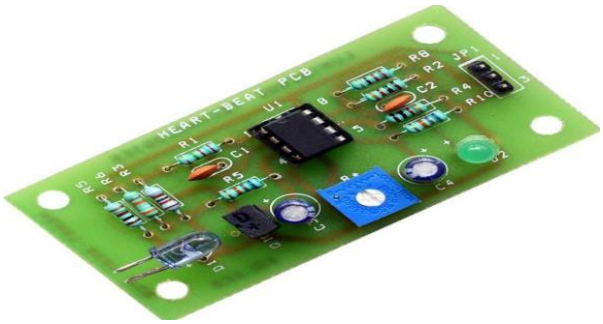


Fig 3.1Block Diagram of Proposed Method

A. Heartbeat sensor

The principle of Heartbeat measuring system is predicated on the red and infrared radiation, absorption characteristics of aerated and deoxygenated pulse. Aerated pulse absorbs additional infrared radiation and permits additional red lights to meet up with the pulse. Deoxygenated (or reduced) pulse absorbs additional red lightweight and permits additional infrared radiation to meet

up with. Red lightweight is within the 600-750 nm wavelength infrared radiation is within the 850-1000 nm wavelength light band.



Pulse measuring system uses a lightweight electrode with red and infrared LEDs that shines through a fairly semitransparent signal with sensible blood flow. Typical adult/pediatric sites in the finger, toe, pinna (top) or lobe of the ear. Kid sites area unit the foot or palm of the hand and the hallux or thumb. Opposite the electrode could be an photo detector that receives the light that passes through the measuring parameter in the sensor.

B. Temperature Sensor

The DS18B20 series sensors provide accuracy in integrated- circuit temperature sensors, whose output voltage is linearly proportional to the stargazer (Centigrade) temperature. The DS18B20 so has a plus over linear temperature sensors tag in ° Kelvin, because the user isn't needed to figure an outsized constant voltage from its output to get convenient Centigrade scaling. The DS18B20 doesn't need any external standardization or trimming to supply typical accuracies of ±1⁄4°C at temperature and ±3⁄4°C over a full −55 to +150°C temperature

C. **Breathe pressure sensor**

The Breathe pressure sensor provides an easy way to detect the breathe and abnormal sound based on sound and breathe density, it consists of microphone which captures the peak sound and amplified using amplifier, the amplified signal is processed and sent as an input to the controller, the output of the sensor can be adjusted using potentiometer based on the threshold value.

D. **Tilt sensor**

The Tilt sensor consists of small iron ball which is present inside a sealed metal shield, based on the ball movement the degree of tilt will be found using MMA7361L IC, this value will be given to the GPIO pin of the Node MCU.

E. **Node MCU**

ESP8266 could be a hardware module that connects the overall hardware for the interpretation of the hardware's output on NodeMCU, which is integrated with GPIO; PWM; IIc, one wire and ADC beat one board. The facility supply to ESP8266 – NodeMCU is given through USB cable, which works in 5V 1A.

F. **Internet Of Things**

Internet Of Things (IOT) refers to technologies that enable each wireless and wired systems to speak with different devices of a similar sort. (Mobile To Mobile) M2M could be a broad term because it

doesn't pinpoint specific wireless or wired networking, info and engineering. This broad term is notably used by business executives. M2M is taken into account an integral a part of the Internet of Things (IoT) and brings many edges to trade and business in general as it contains a wide vary of applications like industrial automation, logistics, Smart Grid, good Cities, health, defense etc. largely for observance however conjointly for management functions.

G. SDN and Fog-computing using Losant

Losant is an ready-to-use and highly powerful cloud enterprise platform designed for IOT to assist you quickly and firmly build advanced connected solutions. Losant uses open communication standards like REST and MQTT to supply property from one to several devices. Losant provides powerful knowledge assortment, aggregation, and mental image options to assist perceive and quantify huge amounts of sensing element knowledge. Losant's drag-and-drop work flow editor permits you to trigger actions, notifications, and machine-to-machine communication while not programming.

If you do not have a tool, however still need to expertise several of the options Losant provides, please inspect the Losant Walkthrough, which can guide you thru building an area weather dashboard. Losant's Fog Computing is an inbuilt smart functionality within the Losant platform that allows for deploying workflows to your connected devices and executing those workflows on the device itself. This is in contrast to various inbuilt application, dedicated workflows, which are executed in the Losant's platform.

IV. Results And Discussion

The results of human health condition are based on different inputs from the different sensors. Based on the different threshold values the different dataset will be generated, the temperature sensor should be in range of 33-37 Celsius, if it exceeds 40 the alert will be sent to the care taker, the pulse sensor should be in range of 72-80 beats per minute, if it is less than 50 beats per minute it sends an alert, The breathe pressure value should be 90 to 120.If it goes beyond or less than the limit, an alert will be sent to the caretaker. The MEMS value is 300. If it exists above 300, it alerts the care taker, from the generated data we can obtain the live status of the patient in dashboard and abnormal status will be sent as a notification to the doctor/caretaker through Android app.

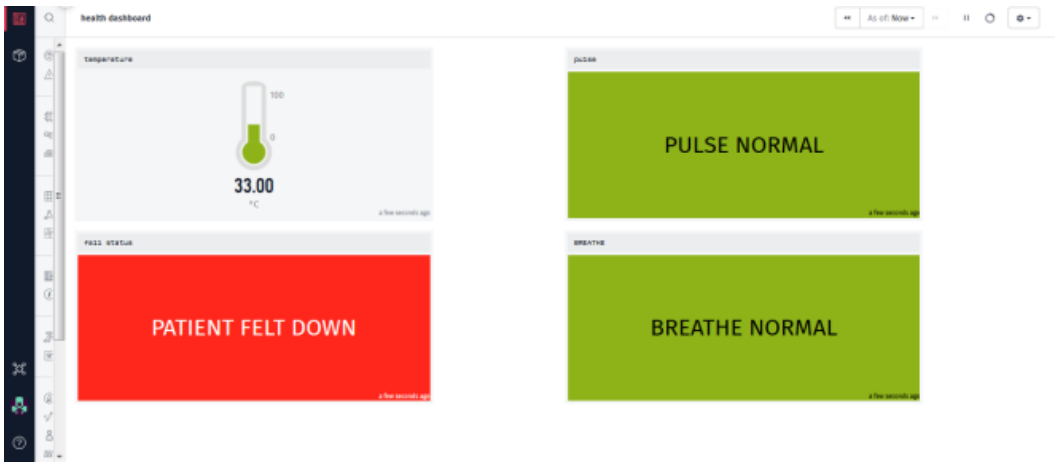


Fig 4.1 Dashboard of Patient health status

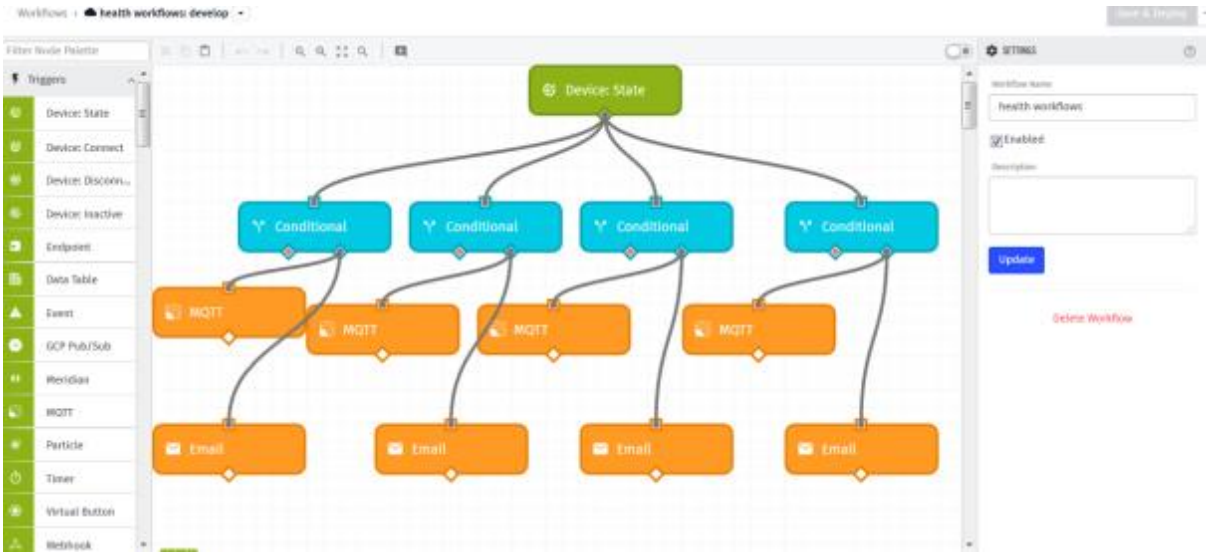


Fig 4.2 workflow snapshot

Fig 4.3 MQTT integration snapshot

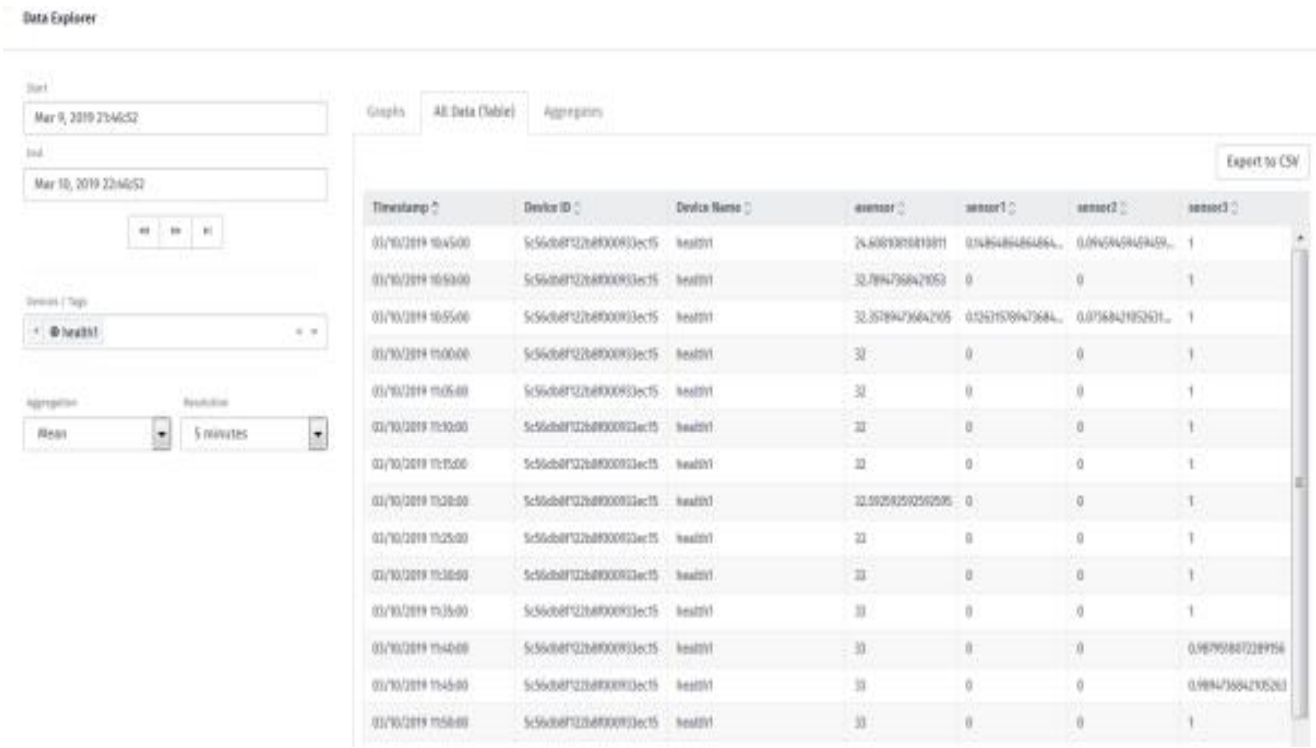


Fig 4.4 Data explorer snapshot

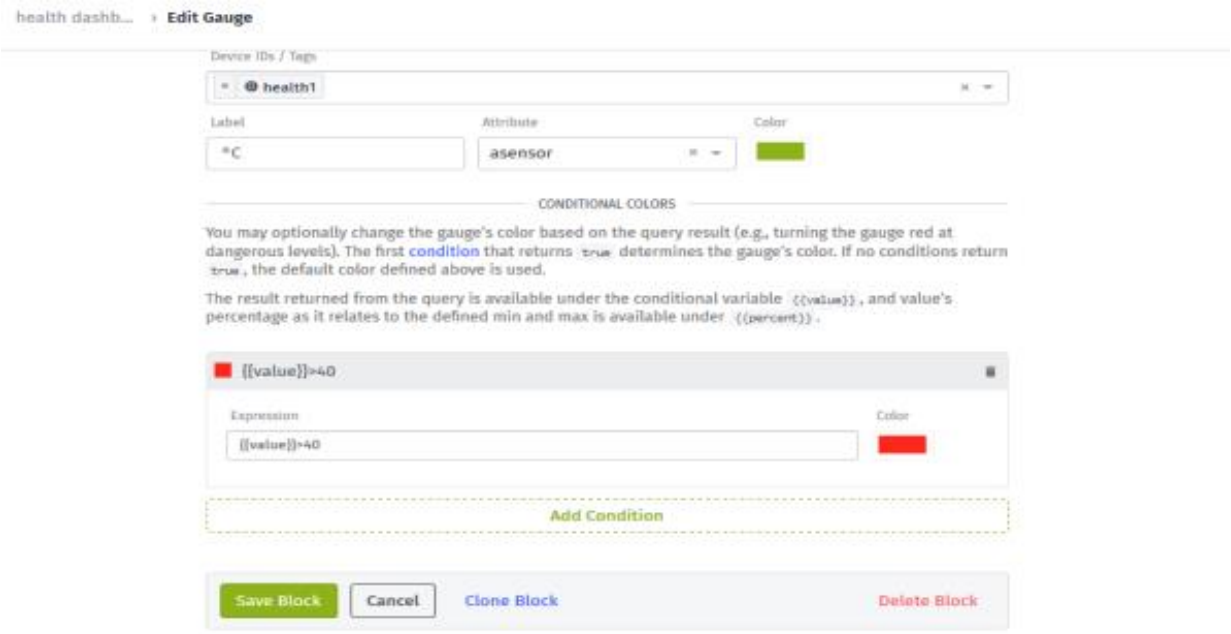


Fig 4.5 Defining condition

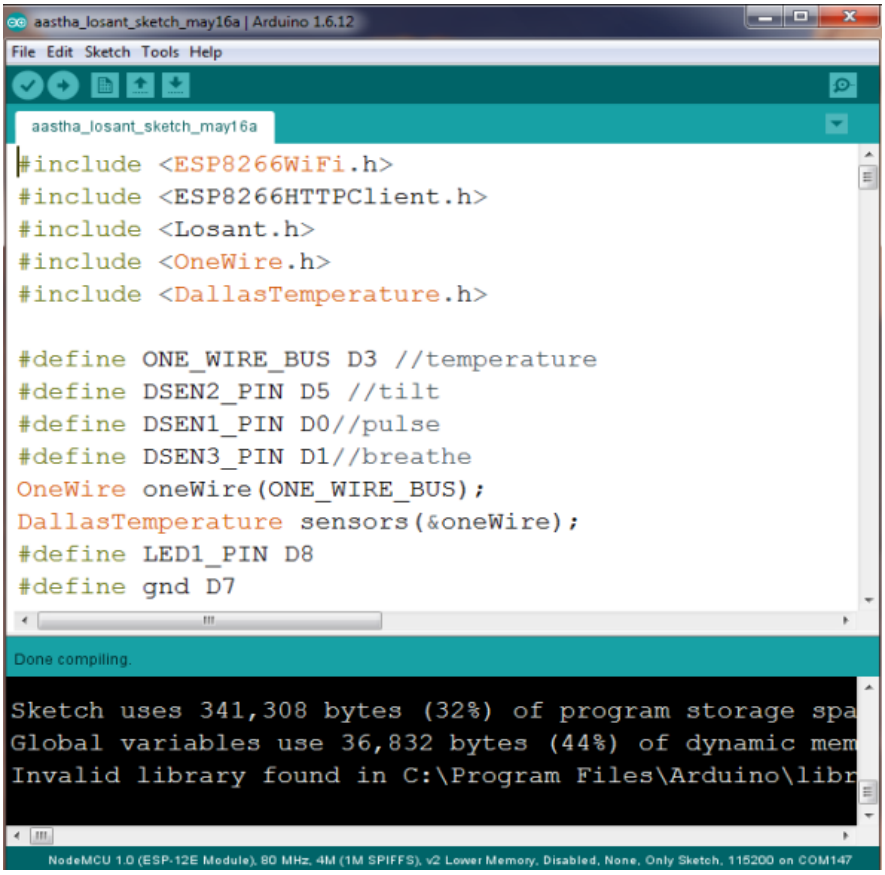


Fig 4.6 compiled code snapshot

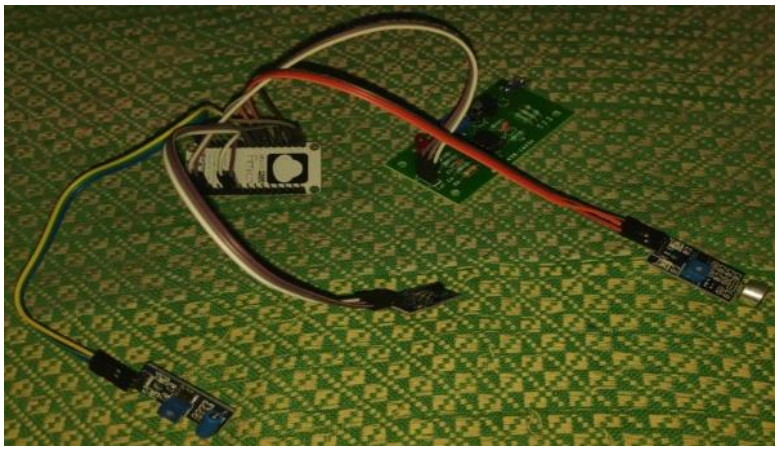


Fig 4.7 Hardware Snapshot

V. CONCLUSION & FUTURE SCOPE

Monitoring human health condition based on IOT helps the doctor to save many lives of human. By using this module, we can detect the patient's health condition. The sensors such as temperature, pressure, heart beat and plane should be fixed in the patient's body. It checks the body continuously. The patients are no need to stay in hospital for too many days and also the doctor has to check and observe the condition of the patients repeatedly. The main drawback in traditional method is time consuming and difficult for the doctor to monitor the condition of the patient continuously. This application helps the patient to go out without the help of caretakers. It is very useful for the patients like pregnant ladies and old age people if they faint. The condition of the patient will be updated via IOT module. The doctor can view the exact condition of the patient by identifying unique address in the IOT module. The condition of the patient can be viewed in any part of the world. This system can be enhanced by applying the future disease prediction using various AI based and human learning algorithms.

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