HEALTH MONITORING SYSTEM

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Abstract–Healthcare is one of the fastest growing industries in the world. Health Monitoring System is a promising approach to healthcare monitoring like early detection of emergency situations and diseases (for example, patients living in remote locations, it gets difficult to reach to the hospital at the time of need).Hence, this Health Monitoring System can be used to monitor patients at distant location.

This system of network has 4 networks:patient with body area, PAN area network (wi-fi module), internet and cloud, remote users(doctors).With the aid of personnel area network and body area network, can provide more powerful monitoring to meet various requirements of healthcare applications. The patient's data is transferred through the internet to the caregivers and doctors sitting at distant location. If we consider the current situation of COVID-19 pandemic, it is difficult for anyone to interact physically with the doctors, thus this system can be helpful in current situation also.

*Key Words:*blood pressure (BP), ECG sensor, temperature sensor, heart rate detector, Arduino, ESP8266 Wi-fi module.

1.   INTRODUCTION

To get the in-depth understanding of Healthcare Monitoring System, using ESP8266 Wi-fi module.This project can be explained in 5 stages:

(1) The WBSN Stage (Stage 1). In this stage, some sensors are placed on the human body. These sensors can be electrocardiograph (ECG), temperature sensor, heart rate sensor. The data recorded by the sensors are collected by Arduino.

(2) The Bridge Stage (Stage 2).During this stage, the data is transferred to the 2nd stage. ESP8266 Wi-Fi module is used to do this job. Collected data from this stage is required to be transferred to stage 4 in order to be stored and analyzed for the final destination.

(3) The Internet Stage (Stage 3). In this stage, bridge the gap between stage 2 and stage 4 via internet.

(4)   Data Storage and Analyzing Stage (Stage 4). In this stage, the data is stored and analyzed to make final decision where the data have to go or it should keep at stage 4.

(5) Healthcare Service Stage (Stage 5). In this stage, it provides healthcare services to patients. The data may be transferred to doctors or hospitals and transferred to intermediate family.

2. SCOPE OF THE PROJECT

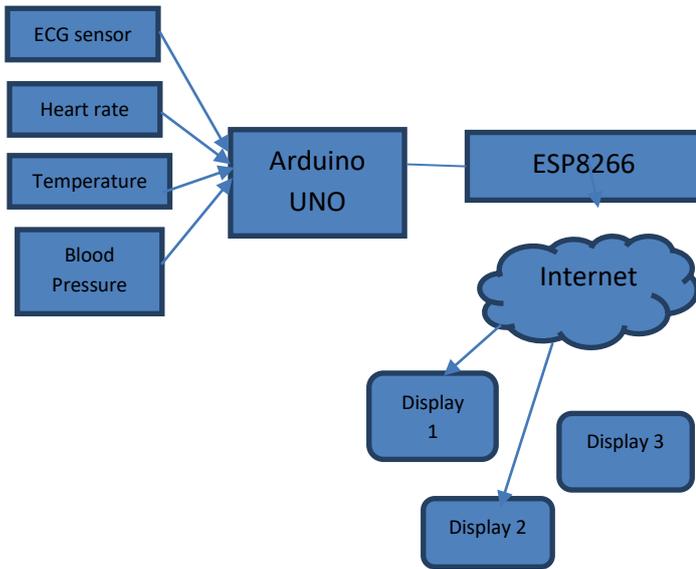The overall goal of this work is to provide the patients the medical facilities at their remote location

- **Ambient Assisted Living**

The aging population, the increasing cost of formal health care and the importance that the individuals place on living independently, are all reasons that create more opportunities for our project to gain extra importance. Applications in this field improve quality of life in order to maintain a more independent lifestyle using home automation. In fact, assisted living facilities have emerged as an alternative housing facility for people with disabilities and elderly who are not considered independent but do not need around-the-clock medical care, as in nursing or retirement homes.

- **Rehabilitation and therapy**

Once the patient is discharge from the hospital, this system gives the benefit of being anywhere he wants as well as he can be remotely analyzed from different places by the doctors. To enable a person who has experienced a stroke to regain the highest possible level of independence so that she can be as productive as possible, needs to be continuously monitored and rectified if required.
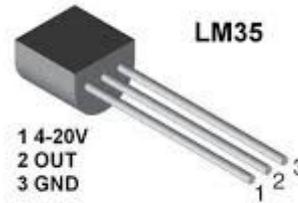
3. BLOCK DIAGRAM

ESP8266 WIFI MODULE

The ESP8266 Wi-Fi Module is a self-contained SOC (system on chip) with TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The ESP8266 is capable offloading all Wi-Fi networking functions from another application processor.

4. COMPONENTS

ECG Sensor: An ECG Sensor has disposable electrodes that are placed on the chest of the patient's body which is responsible to convert heart beat into electrical signal.

Electrodes of ECG Sensor consists of 3 pins and the connected cable of length 30 inches which makes it easier to connect with controller and placed at the waist or pocket.
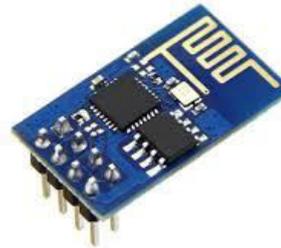

Temperature Sensor (LM35): It is a device, usually an RTD (resistance temperature detector) or a thermocouple, that collects the data about temperature from a patient's body and it converts the data into understandable form (electrical signal) for a device.

ARDUINO

Arduino is an open source electronics board which gives the user ease of using hardware and software.It is a board with sets of digital and analog input/output pins that can be used to interface with other circuitries.

HEART RATE DETECTOR

• Heart rate detector is designed for plug-and-play heart-rate sensor for Arduino.

• The sensor clips onto a fingertip or earlobe and plugs right into Arduino with some jumper cables.

5. WORKING

All the information is being carried from the patients' body with the help of sensors which convert the physical signal (like temperature, heart pulse) into the electrical signal to the Arduino. Arduino is an open-source hardware platform i.e., used to run programs and multiple peripheral elements along with it. Arduino connects to the wi-fi module via which the signal information is being carried through the internet to the receiving end where the doctors at the remote location are present for the analysis of the signals. After this, the required healthcare services are provided to the patients.

We are measuring temperature, heart rate, electrocardiogram, blood pressure. Since direct blood pressure sensors are not used, we are measuring heart rate to calculate the blood pressure using the formula by taking reference of paper published by International Journal for Research in Applied Science & Engineering Technology (IJRASET) by the name of Blood Pressure Measurement using ARDUINO. The formula is:

1) Stroke Volume = π * (LVOT dia)2 / 2 *LVOT VTI

2) Heart rate = Beat/min

3) Cardiac output = Stroke volume*Heart rate

4) Resistance = MAP * 80/Cardiac output

5) Blood pressure = Cardiac Output * Resistance
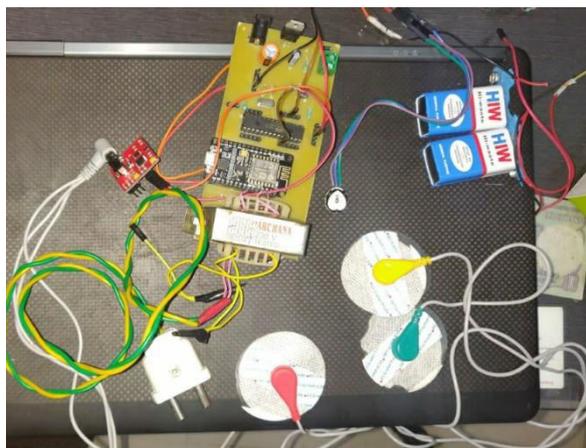
6. CONCLUSIONS

The project "Wireless Body Sensor Network" is made to monitor patients present at distant location. Our project provides promising application in medical monitoring systems so as to measure physiological data and also provide location-based information. The project is more useful in under developed areas where the hospitals are not easy to reach.

ACKNOWLEDGEMENT

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