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HCMS: Health Care Monitoring System

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Abstract: Cloud services such as Amazon web service provide high scalable and highly available architecture to build application. In this project we are using ESP8266 Wi-Fi module to collect data from different sensors and publish the same data to the cloud. The ESP8266 module will use Wi-Fi channel to connect to internet and in turn to the server to publish the data collected and retrieve the same. We will be creating a smart Health Care Monitoring system which will be using AI to predict the patients vitals and help in creating a better monitoring system and can improve speed of diagnosis. Also the details of the patients' vitals will be available on an Android application.

Index Terms— Cloud Services. ESP8266. AI. Android Application.

I. INTRODUCTION

A severe illness is usually followed by prolonged rehabilitation it depends upon how well a rehabilitation program is carried out and how well the patient adheres it. But it becomes very difficult for the patient to have constant access to his/her vitals. Also there is inaccessibility of such equipment due to their high cost and unavailability in rural areas so the main purpose of this paper is to help the patients, by providing a cost effective solution that will provide them with the better reliability. This paper also describes precise diagnosis of the patient's activities during the vitals. This project consists of different types of sensors along with a well- known concept of IoT (Internet Of Thing). The sensors will be attached to arduino board through which data will be collected. This project also makes use of ESP8266 which is a Wi-Fi module to send or receive data.

This paper reviews, analyses and represents the comparison between the existing methods of diagnosis with the proposed method. After apprising about the existing methods, pros and cons are set out. Further brief information about the proposed method along with the individual modules is given. Detailed information about the design and implementation of the proposed method is also mentioned. This paper sheds light on the ways in which proposed method is more helpful than the existing one.

II. EXISTING METHOD

Traditionally in case of any emergency the patient has to physically visit the in the hospital or can get the treatment at home. A treatment of an hour costs upto INR 500; and and if the patient is admitted to an emergency room; that sums up to at least INR 8000 a day. Moreover this treatment can extend up to several months, making it unaffordable for common people.

A doctor examines the patient on the basis of recovery of the fitness of the patient, age of the patient, capability of the patient to recover. Depending on the above criteria the doctor prescribes to the patient.

The merits of this method of treatment are that the patient receives personal attention. Doctor being the professional has an expertise to monitor the accuracy of the illness. The demerits of this method; Unavailability of the doctors, equipment and the high cost of the ICU machines make this approach inefficient and complex.

III. PROPOSED METHOD

The proposed method will include three modules: System Box, Server, Android Application. The person who is suffering for a particular illness and is admitted to an ICU, this project uses different types of sensors like the Temperature sensor, heart rate sensor, water level sensor. All this sensors are attached to the human body as done in ICU rooms(as demonstrated in Fig 1). A periodic watch is taken using these sensors and the data which is collected form this sensors is sent to the ESP8266 Wi-Fi module, which then sends the data to the web server. The same data can be accessed through an android application which is provided with the login of the doctor as well as the login of the patient. Each particular patient is provided with a different login details which helps the doctor to easily differentiate between the patients.

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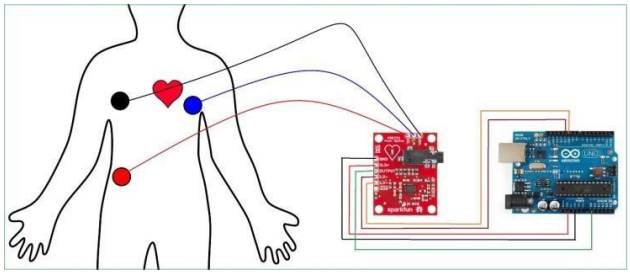

Fig 1: Attachment of sensors

Feedback is provided to the patient in the form of an Android app. Depending on this feedback it deciphers if the patients' vitals are good or not (as demonstrated in Fig 2).

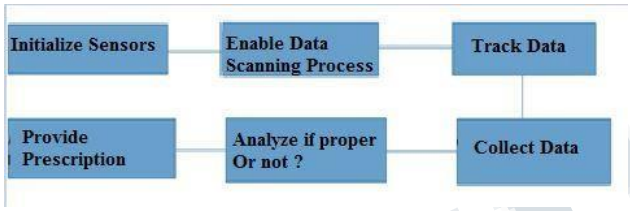

Fig 2: Flowgraph of Diagnosis Assessment

A. Module 1:Sensor Module

There are various sensors used in this system as listed below:

1. Temperature Sensor (DS18B20)

This sensor provides a 9-bits to 12 bits celsius temperature measurement. It communicates over one wire bus that by definition requires only one data line and ground for communication with the microprocessor. It has a unique 64- bit serial code which allows multiple DS18B20s to function on the same 1-wire bus.

Fig 3: Temperature Sensor

Temperature sensor specifications:

DS18B20 sensor is basically used to track the human Temperature. This is done byplacing the sensor below the arm pit of the user.

2. Heart rate sensor (MAX30100)

MAX30100 is an integrated pulse oximetry and heart rate monitor sensor solution. It combines two LEDs, a photo detector and optimized optics and low noise analog signal processing to detect pulse oximetry and heart rate signals. It operates in 3.3V power supply and can be powered down through software.

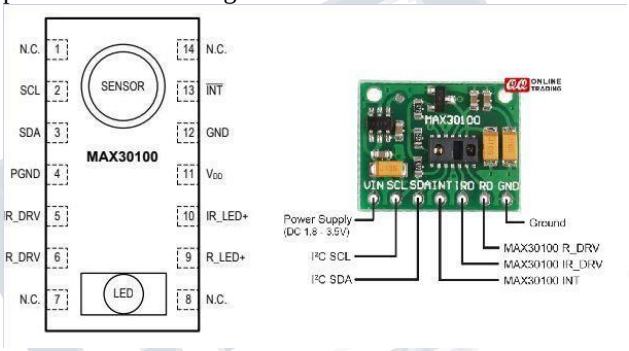

Fig 4. MAX30100 Heart Rate Sensor

Heart Rate Sensor Specification:

The patient only needs to place his/her finger at the tip of the sensor and the pulse rate will be calculated and through Wi-Fi module this data will be sent to the cloud.

3. Water Level Sensor:

This sensor is used to detect the level of water or other liquid fluids. The level measurements caneither be continuous or point values.

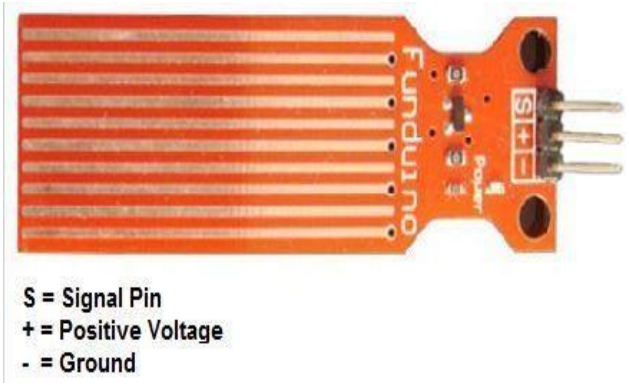

Fig 4 : Water Level Sensor

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Water Level Sensor Specification:
This sensor will be kept in the urine bag attached to the patients' body in order to keep a track of the amount of urine formed every hour.

4. ESP8266 :
ESP8266 is a low cost Wi-Fi microchip which is developed by Chinese manufacturers. It is with 1 MB of built-in flash, allowing for single chip device capable of connecting to Wi-Fi network. It consists of 16 GPIO pins. NodeMCU is a firmware which runs on ESP8266 and is an open source IoT platform.

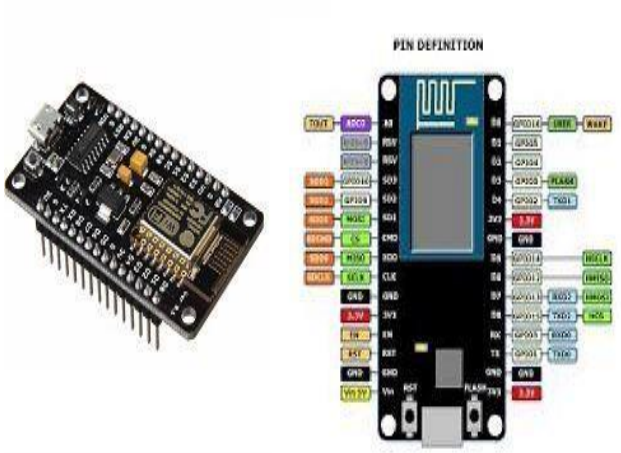

Fig 5: ESP8266 (NodeMCU)

ESP8266 Specification :
This is connected to the arduino board and which helps to send and retrieve data over cloud through Wi-Fi channel

5. Arduino UNO:
Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards or Breadboards (shields) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++. In addition to using traditional compiler toolchains, the Arduino project provides an integrated development environment (IDE) based on the Processing language project.

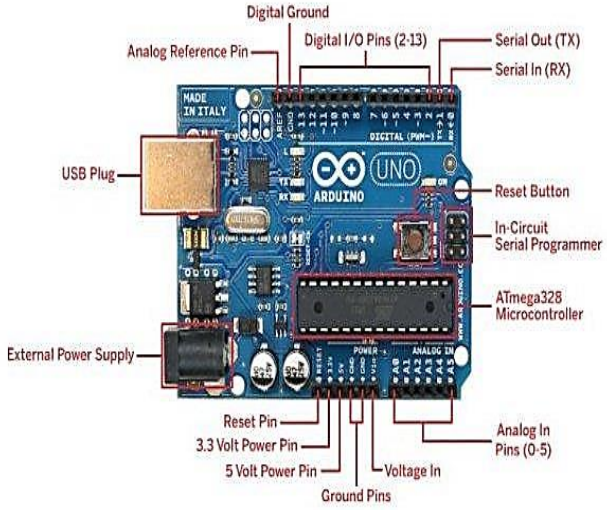

Fig 6. Arduino UNO

Arduino UNO Specification :
This board is used to connect various sensors and other hardware in order to make the system working and provide data to the ESP8266 Wi-Fi module.

B. Module 2:Cloud
We are using the available cloud storage from a very well- known server in order to send and retrieve data which is sent through ESP module. The cloud storage also provides with a good GUI (Graphical User Interface) which makes the associated doctor and also the patients' family to check the results of the patient being diagnosed on a regular basis.

C. Module 3: Android Application
An application will be provided to support the user with a list of data being diagnosed with. After entering the valid login details of the patient each and every member who logged in can view the data. This application will display the current values of data.

IV. DESIGN

The hardware of the project contains three sensors namely DS18B20, MAX30100, Water level sensor, Arduino UNO, ESP82666, mounted on each other. The sensors provide with the results of the patients' diagnosis, Arduino UNO is used to interface sensors and also as a controller, ESP8266 is used for transferring the data and a android application for providing better GUI and feedback.

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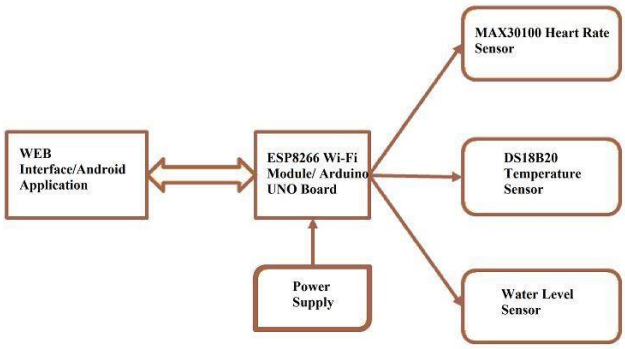
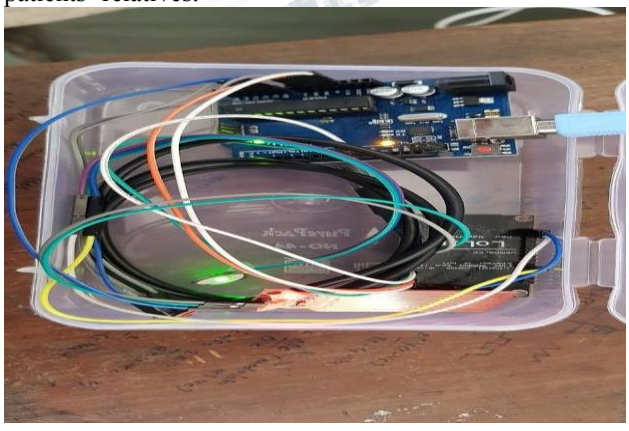


V. IMPLEMENTATION

This project consist of various types of sensors like heart rate sensor (MAX30100), Temperature Sensor (DS18B20), Water level sensor and along with that the well-known concept known as IoT (Internet of Thing).The sensors will be attached to the Arduino board through which the data will be collected. The data such as pulse rate, temperature and urine level of the patient. A Wi-Fi module known as the ESP8266 module which acts as a client as well as the server is connected to the system..

The Wi-Fi module will be connected through the Arduino board and the data collected through sensors will be sent to a web server which will work on some basic protocol. The project also contains an Android Application; this application will be connected through the server through the Wi-Fi module and can receive all the data which is stored on to the server. The data stored will be received by the particular login details as once the patient will be admitted to the hospital his/her login details will be added with the particular Id and password.. The password and login details will be provided to the doctor as well as the patients' relatives.



VI. COMPARATIVE STUDY

The previous method of treatment is more reliable because the patient receives personal attention from the doctors and particular surgeons throughout the consultation phase. Doctors being the professional has an expertise to monitor the accuracy of the exercise. The proposed method has brought together the advantages of both the previous method and the cost effective treatment with independency.

The demerits of the previous method which includes unavailability of the doctors and the high cost of the sessions are effectively overcome by the proposed system. This system will require intervention of the doctors only for prescriptions, which reduces the need for costly doctor's sessions.

The previous method needs investment of a huge sum of money which is reduced in the proposed system by a one-time investment for all type of sensors. The time and efforts that were required for visiting the doctors on regular basis will also be reduced. More over the proposed system also provides support for the differently abled people.

VII. RESULT

Starting with the initial step, the patient who is supposed to calculate or check all the reports need to wear all the sensors, switch on the KIT which consist of Arduino UNO and all the sensors .The sensors will calculate the heartbeat , temperature , urine level ,pulse rate of particular body. This data from the sensors and the ESP8266 will be compared with the valid data set of values. The ESP8266 and Arduino UNO will transmit the data to the server. In order to help the patients, a user friendly graphical user interface is created. This application will be provided to support the user with the results gathered from the sensors. This application will display the current values that's the result for a particular body.

VIII. CONCLUSION

Our work intends to provide cost efficient and faster diagnosis to the patients since high cost equipment are not affordable to rural areas.

This system is useful for people in rural areas that lack availability of hospitals and equipment.The development of this project is an effective tool for

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patients to understand the use of IoT in their daily life. In future it may reduce the dependency of going to the doctor again and again and also the cost of every session.

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