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Patient Health Monitoring Using IoT

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Abstract

The health monitoring system has become popular these days due to uniqueness and diversified usage in the medical field. Everyday many lives are affected because the diseases are no timely and properlyno sideshow didn't get a chance to provide Medical help. To deal withthe set type of situation, this system helps to monitor a patient' the patient's condition from time to time. This system is user friendly and reduces the human effect.

Keywords—IOT, Health, Sensor.

1. Introduction

Internet of Things (IOT) based smart health monitoring system will help to measure various health related parameters like bodytemperature, Pulse, ECG, Blood pressure etc. Which will help to predict diseases. System will consist of a website which willhelp to monitor patient's health and also data can be shared witha particular doctor if required by URL. This system can be implemented at our home or old age homes to keep the track of an individual's health also for the daily health check up of people working at electricity boards sport at the time of reporting or exit. This system canal so be helpful to monitor the health of mine workers and people working at the merchant navy and to monitor the patients in the hospital who are kept under observation. In the hardware part PCB package is used to develop a compact system, sensors for measuring health-related parameters like temperature, Heart rate, Blood Pressure, ECG. This system is especially designed for heart patients and senior citizens who cannot go for regular health checkups. Data from sensors will be further sent to the Cloud server using the machine learning algorithm that will predict different diseases considering those measured parameters.

2. Literature Review

A number of reviews were done in the past as part of researchpapers/ technical reports on IoT based Health Monitoring System.

2.1 Study about Smart Doorbell

(a) First System Here, researcher designed health monitoring system using AT mega 8microcontroller with **Wireless Body Area Sensor Network(WBASN)**. In this work, the sensors which are used here are Temperature sensor, Blood pressure sensor, Heart beat sensor. These sensors are placed on the human body which helps to monitor the health condition without disturbing the daily schedule of the Patient and these health related parameters are then forwarded to physician's server using long range wireless technology GSM. Health monitoring system consists of sensors, microcontroller, LCD display and GSMmodem to transmit or receive health related data to or from the doctor. Similarly, at the hospital the same GSM modemissued. Hence, GSM modem helps in the establishment of a network between patient's server and doctor's server. LCD (Liquid Crystal Display) display is provided to show the instant result to the patient. Here researcher used LM34 as temperature sensor, IRLE Dandre LED is Used for heart rate monitoring and Pressure transducer or the sensor based on piezo electrical material issued to measure the systolic BP and diastolic BP. Microcontroller reads data as given by the temperature sensor, blood pressure sensor and heart rate sensor and processing it gives the output in the form of digital and it gets directly displayed on LCD or it gets transmitted to the doctor's server through GSM modem.

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This system gives exact and instant results with high accuracy which gets directly displayed on LCD. It takes max 4-5sec to monitor the doctor's server using GSM wireless technology. This system takes a small amount of time to know the health condition of the patient and then delivers their port to the doctor.

2.2 Study about Object Detection

(b) Second System using the same system, health parameters are sensed by using RFID reader, Blue tooth, GSM and UMTS.This system gives facility to monitor the blood pressure of patients. The health parameter directly sends to the doctor using GSM and UTMS. Here, a video guide is used. This video guide feature serves the patients age and his blood pressure correctly. This system consists of three parts: Touchpad, remote server and reading of the Tag ID and BPM. For reading the Tag ID and BPM, use a microcontroller unit(MCU)as kernel. The client touch pad receives the blood pressure measurement(BPM) data of a RFID through Bluetooth. Client touch pad sends the data to the health parameter. Also, these Health parameters are directly sent to remote data centers and remote data centers to the doctor using GSM and UMTS wireless technology. Data Gets transmitted in the form of the packets. This system helps to store previous data. Similarly, it takes less time to monitor the blood pressure of the patient.

(c) Third System shows the blood pressure monitoring system using microcontroller. This system includes a
Motor control unit, Microcontroller ATmega328, LCD display. The pressure sensor is directly connected to, which is in flatted or deflated via a motor and Valve. ON and OFF switches of the motor are controlled by the microcontroller at the correct time. Due to changes in the ON and OFF switches of the motor, the wrist cuff gets Inflated and deflated, this pressure Is measured by The pressure sensor. Pressure sensor generates the health parameter in the analog sensor. The processing of analog sensors is done with the help of the microcontroller and gives digital output which is displayed on the LCD or on the PersonalcomputerusingRS232.MagnetoresisteRAM(MRAM) stores the value of systolic and diastolic blood pressure and is directly connected to the microcontroller. Similarly, there is no need
to pump the cuff by hand, all the system is controlled by the microcontroller. It is not required to calculate or observe blood pressure manually. Time consumption is very less compared to the old system

3. METHODOLOGY

The objective of this project is the Design and implementation of an IOT based health monitoring system. The sensors are used to sense the oxygen saturation(SPO2) and heartbeat(BPM) of the patient. These sensors are connected to a control unit, which calculates the values of all the sensors. These calculated values are visible on the LED display of the device and can be seen on the phone sing blynkApp. These calculated values will be displayed on a website which can be accessed by using IP address. For world wide sharing of the data thing speak can bused. The system consists of one more website which predicts the disease after entering the sensor's readings.

Microcontroller and Sensor:

ESP32-The ESP32 is allow-cost system-on chip(SoC) series created by Express if Systems. It is an improvement on the popular ESP8266 that is widely Used in IoT projects. The ESP32 has both Wi-Fi and Bluetooth capabilities, which make it an all rounded chip for the development of IoT projects and Embedded systems in general.
MAX30100-It is used for detection of oxygen saturation(SPO2) and heartbeat(BPM)of the patient. Small beams of light pass through the blood in the finger, measuring the amount of oxygen. It does this by measuring changes of light absorption in oxygenated OR deoxygenated blood. Heart beat rate, given by the formula: BPM (Beats per minute) =60*where f is the pulse frequency.

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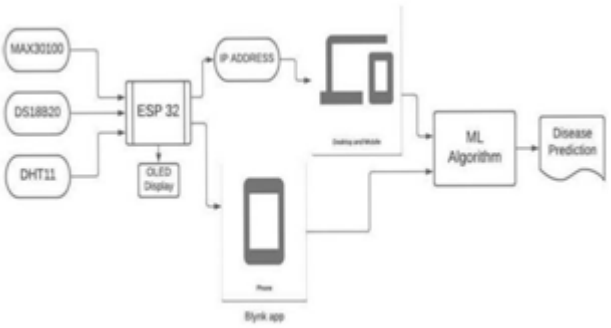

Fig 1. Block Diagram of Project

IV. PCB DESIGN

First the Hardware is made on Bread board, shown in fig5. Then, The PCB Designing of the circuit is done. Easy EDA software issued to make the PCB design. First, the schematic diagram is made.

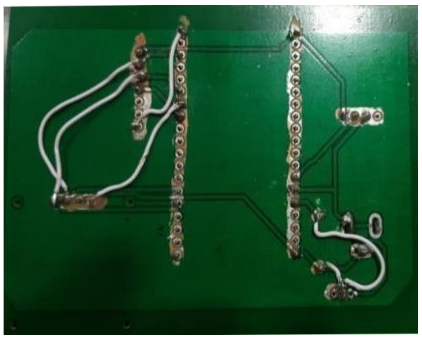

Fig 2. Back view of PCB

Connections:

1. MAX30100 to ESP32 -Vinto3.3V SCLtoGPIO22
SDA toGPIO21INT toGPIO19GND
toGND
2. DS18b20toESP32-VCCto5V
SIG
to GPIO13GND
toGND
3. DHT11 to ESP32-VCC to3.3V
SIG
to GPIO12GND
toGND
4. OLED to ESP32 and MAX30100 -VCCto5V SCAtoSCAofMAX30100S
DA to SDA ofMAX30100GNDtoGND

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Fig 3:3D modelling of PCB

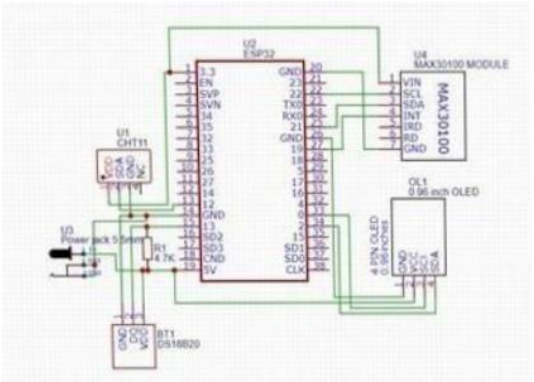

Fig 4: PCB Schematic

V. Experimental Results

The body temperature sensor, pulse rate sensor, room Temperature and humidity sensor values are calibrated us in themicrocontroller. The complete prototype of the health monitoring system with the sensors are shown in Fig.5, where it shows the output value soft the sensors calculated and displayed in a LCD display of that these values. These sensor values are then sent to the data base server. These data can be accessed from the cloud by The authorized users using the IoT application platform. The sensor values of the patient are displayed on the own in

The system uses c level and heart Disease dataset 2016 from kaggle website. This Dataset contains 14 features containing different Parameters and their readings for e.g. Heart rate, blood pressure, etc. The basic idea is to Using machine learning algorithms to predict the final result on the basis of ourdataset, i.e. to predict heart Disease in a patient. First, system check if We have any null values in the data set, the and preprocessing on the data that Includes concepts like feature scaling and visualizations. Then the data is split into training and testing dataset. We fit the train and test data in too

Ur classifiers which will gives us the precision and accuracy about how accurately our classifier predict the target (heart disease). Here, KNN Classifier gives the best result and finally predict the results After selection the model is saved in a the used to determine the performance of the KNN classifier. The case study is done by taking the readings from IOT system andthen taking the readings of same person by using other Deviceswhich are used by the doctors.

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Fig5.File using pickle. As the final step usedconfessional

Fig 6. Reading son LED

The system uses c level and heart disease dataset 2016 fromkaggle website. This dataset contains 14featurescontainingdifferent

Conclusion

The system monitored body pulse rate and Oxygen saturation using sensors, Which are also displayed on an LCD. These sensor values are then sent to the App and also creates an IPad Dress if required by entering these calculated values In the website we can predict heart disease.

REFERENCES

[1] The Internet of Things is considered no was one of the Feasible solutions for any remote value tracking especially in the field of health monitoring. In this paper, an IoT based health monitoring system was developed. Gul raiz J. Joyia, Rao M. Liaqat,

[2] Afta b Farooq, and Saad Rehman, Internet of Medical Things(IOMT): Applications, Benefits and Future Challenges in Healthcare Domain, Journal of CommunicationsVol.12,No.4,April 2017.

[3] Shubham Banka, Ishan MadanandS.S.Saranya, Smart Healthcare Monitoring Using IoT. International Journal of Applied Engineering Research ISSN0973-4562Volume13,Number15,pp.11984-11989,2018.

[4] Shukla, A., Juneja, V., Singh, S., Prajapati, U., Gupta, A., & Dhabliya, D. (2022). Role of hybrid optimization in improving performance of sentiment classification system. Paper presented at the PDGC 2022 - 2022 7th International Conference on Parallel, Distributed and Grid Computing, 541-546. doi:10.1109/PDGC56933.2022.10053333 Retrieved from www.scopus.com

[5] K.Perumal, M.Manohar, A Survey on Internet of Things: Case Studies, Applications, and Future Directions, In Internet of Things: Novel Advances and Envisioned Applications, Springer International Publishing,(2017)281-297.

[6] S.M.Riazulislam,Daehankwak,M.H.K.M.H.,Kwak,K.S.:TheInternetofThings forHealthCare: A Comprehensive Survey. In: IEEE Access(2015).
[7] P.Rizwan, K.Suresh. Design and development of low investment smart hospital using Internet of things through innovative approaches, BiomedicalResearch.28(11)(2017).
[8] Shukla, A., Almal, S., Gupta, A., Jain, R., Mishra, R., & Dhabliya, D. (2022). DL based system for on-board image classification in real time, applied to disaster mitigation. Paper presented at the PDGC 2022 - 2022 7th International Conference on Parallel, Distributed and Grid Computing, 663-668. doi:10.1109/PDGC56933.2022.10053139 Retrieved from www.scopus.com
[9] K.R.Darshanand K.R. Ananda Kumar, "A comprehensive review on usage of internet of things(IoT) in health care system, "in Proc. International Conference on Emerging Research in Electronics, Computer Science and Technology,2015.
[10] Internet of Things(IoT):Number of Connected Devices World wide From 2012 to 2020(in billions).[Online]. Available:https://www.statista.com/statistics/47 1264/IoT number of-connected-devices-worldwide/