International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 07 Issue: 03 | March - 2023 Impact Factor: 7.185 ISSN: 2582-3930

HEART ATTACK PREDICTION USING MACHINE LEARNING

Dr.M. Manoj Prabu[1], S. Ramprakash[2], G. Ajith[3], S. Sethuragavan[4], R. Sathyan[5]

[1A]Asociate Professor,[2,3,4,&5] UG Students, BE, Final Year,
Department of Biomedical Engineering
Sri Shakthi Institute of Engineering and Technology, Coimbatore, India

Abstract: Early detection is essential for both the treatment and prevention of heart attacks, which account for the majority of deaths worldwide. A machine learning model for predicting a person's risk of having a heart attack based on various medical factors is the goal of this project. Patients' medical histories, lifestyle, and physical characteristics, such as temperature, humidity, heart rate (in beats per minute), and spo2 (blood oxygen levels) by corresponding sensors. Using machine learning algorithms like the naive Bayes classifier, SVM classifier, and KNN classifier, the data will be cleaned, pre-processed, and analyzed. Using metrics like precision, recall, and the F1-score, the model will be trained and tested on a dataset of patients who are known to be at risk for heart attacks. The final model will be put into use as a web application that lets users enter their medical information to get a customized heart attack risk score. This project aims to provide individuals and healthcare professionals with an easy-to-use, wearable device and accurate tool for identifying heart attack risk factors and taking preventative measures.

Key words – Body Temperature, Heart rate, breathing rates, blood oxygen level, smart wearable system

1.INTRODUCTION

In today's modern world not like our ancestor's, even small aged youngsters are in danger of heart attack. This is due to a lack of physical activities, not eating good foods, not following good lifestyle habits, etc. And in most cases heart attack was unpredictable and mostly it causes death. So it is most important to be aware of a heart attacks in the earliest stage. In today's life as the technology gets improved most of the things and information are available in internet and it is easy to access with our mobile phones and computers etc. So in today's life not only information is available but also food, entertainment stuffs, goods, products, accessories, equipment's everything are available in internet. Likewise if regular parameters(values) of human body is available it is easy to predict any diseases in the earliest stage and easy to treat. With the use of machine learning it is much more accurate to predict the heart attack with the data sheet given to the machine learning. So our paper proposes for the heart-diseased persons who are in the danger of attack again at any time . We introduce a wearable device which continuously measures 4 major parameters of the human body from which the changes in the body happen which results in attack. The parameters are temperature, humidity, spo2 level, heart beat. The previously proposed system measures four parameters but it is more complicated to use it with the machine learning and basically it is larger in size . So we developed a system smaller in size and wearable which Is more convenient for the heart to take along with at all time. The system consists of four sensors which will continuously measures parameters and those parameters are stored in the IOT platform named thing speak. For the transfer of values node mcu is used as software module. From that platform the data's are transferred to machine learning. As per the data sheet and coding on the machine learning the system will provide the necessary information to doctors and attenders of the heart diseased person on mobile phone.

2.Statiscs:

Further than 755 of CVD- related deaths do in low and middle income countries. The world health confederation predicts further than 23 million CVD-related deaths are due to cardio vascular complaint. roughly20.1 millionU.S grown-ups have coronary roadway complaint, and 805000 Americans have a heart attack each time.

3.Materials and Methods

3.1 System overview:

The system consists of 4 sensors temperature sensor DHT11, heart rate sensor KY039, and spo2 sensor-MAX30100. These sensors measure the parameters and then these sensors are connected with the node MCU which is act as a software module to interconnect sensors with the IOT platform (Thing speak) and machine learning. In machine learning as per the coding and the datasheet, the system will provide the necessary information. If the person is in danger of a heart attack then the system will alert the doctors and the attendees of the patients, if not the system will continue to measure the parameters.

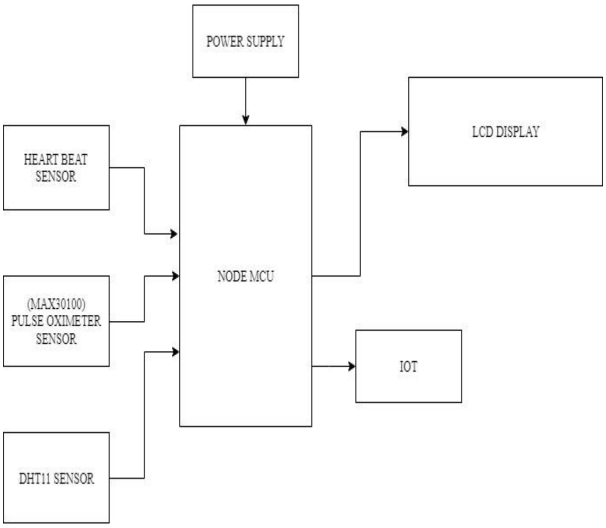

Fig 3.1

3.1.1 DTH11 Temperature sensor:

The DTH11 is an introductory,ultra-low-cost digital temperature and moisture detector. It uses a capacitive moisture detector and a thermistor to measure the girding air and spits out a digital signal on the data leg(no analog input legs demanded). It's fairly simple to use but requires careful timing to snare data. It works on 3 to 5v power and IO. it works up to2.5 mama uttermost current during conversion(while requesting data). It's good for 20- 80 moisture readings with 5 delicacy. It's also good for 0 – 50- degree Celsius temperature readings with-2 degree Celsius delicacy. It measures not further than 1 HZ slice rate. Body size15.5 mm * 12 mm *5.5 mm 4 legs with0.1 distance. While reaching the cutlet in the detector the detector detects the temperature and moisture and gives the values as digital values on the digital affair leg. The affair values are also transferred to the knot mcu and to the IOT platform(thing speak) and to the machine literacy.

Fig 3.2

3.1.2 MAX30100 Sensor:

The module features the MAX30100 – a ultramodern, intertwined palpitation oximeter from Analog bias. It combines two LEDs, a photodetector, optimized optics, and low- noise analog signal processing to descry blood oxygen signals. On the right, the MAX30100 has two LEDs – a RED and an IR LED. And on the left wing is a veritably sensitive photodetector. The idea is that you shine a single LED at a time, detecting the quantum of light shining back at the sensor, and, grounded on the hand, you can measure blood oxygen position. The MAX30100 chip requires two different force voltages1.8 V for the IC and3.3 V for the RED and IR LEDs. So, the module comes with3.3 V and1.8 V controllers. This allows you to connect the module to any microcontroller with 5V,3.3 V, or indeed1.8 V position I/ O. One of the most important features of the MAX30100 is its low power consumption the MAX30100 consumes lower than 600μA during dimension. Also, it's possible to put the MAX30100 in standby mode, where it consumes only0.7 μA. This low power consumption allows perpetration in battery- powered bias similar as handsets, wearables, or smartwatches. palpitation oximetry is grounded on the principle that the quantum of RED and IR light absorbed varies depending on the quantum of oxygen in your blood. The following graph is the immersion diapason of oxygenated hemoglobin(HbO2) and deoxygenated hemoglobin(Hb).

Fig 3.3

International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 07 Issue: 03 | March - 2023 Impact Factor: 7.185 ISSN: 2582-3930

3.1.3 KY039 Heart Rate sensor

This KY- 039 Cutlet Discovery twinkle Measuring Sensor Module uses bright infrared(IR) LED and a phototransistor to descry the palpitation of the cutlet, a red LED flashes with each palpitation. The LED is the light side of the cutlet, and the phototransistor is on the other side of the cutlet, the phototransistor is used to gain the flux emitted when the blood pressure palpitation by the cutlet when the resistance of the phototransistor will be slightly changed. We chose a veritably high resistance resistor R1 because utmost of the light through the cutlet is absorbed, it's desirable that the phototransistor is sensitive enough. Resistance can be named by trial to get the stylish results. The most important is to keep the guard of slapdash light in the phototransistor. For home lighting that's particularly important because the lights at home are substantially grounded on 50HZ or 60HZ change, so a faint twinkle will add considerable noise. As per the before detectors, it also consists of a digital affair leg from where values come out to the knot mcu.

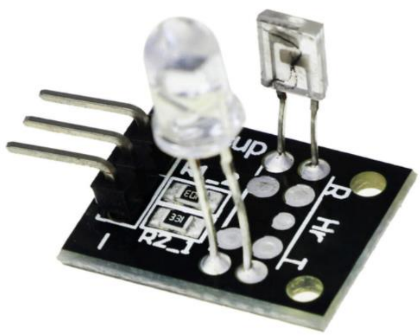

Fig 3.4

3.1.4 NODE MCU

NodeMCU is an open- source Lua- grounded firmware and development board especially targeted for IoT- grounded operations. It includes firmware that runs on the ESP8266 Wi- Fi SoC from Espressif Systems, and tackle that's grounded on the ESP- 12 module. Operating Voltage3.3 V, Input Voltage 7- 12V, Digital I/ O Legs(DIO) 16, Analog Input Legs(ADC) 1, UARTs 1, SPIs 1, I2Cs 1, Flash Memory 4 MB, SRAM 64 KB, timepiece Speed 80 MHz, USB- TTL grounded on CP2102 is included onboard, Enabling Plug n Play, PCB Antenna, Small Sized module to fit dashingly inside your IoT systems. It's responsible for the transfer of data from tackle to the pall and machine literacy.

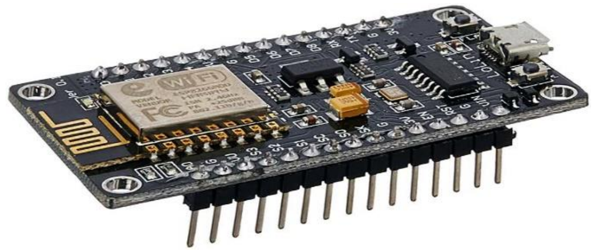

Fig 3.5

After the collection of data from the three sensors, the data are transmitted to the IOT platform and machine learning classifier through wifi. We can access the readings with a username and password. From that, machine learning will compare the data we acquire and the data set we upload on the machine learning. After comparing the machine learning classifier will provide the accurate output .

2.1.4 SOFTWARE USED:

- Language : Java
- IDE :Arduino IDE

4.RESULTS

As per the results shown in the hardware and in software table, the data we acquire is normal for the individual and the patient is not in danger of heart attack and the system will continue to take readings on a daily basis. If the data we acquired is below the normal value then the machine learning classifier will alert the doctor and attendees of the patient. Overall, machine learning models can be effective in predicting the risk of heart attack, but it is important to carefully evaluate their performance and consider factors such as interpretability and fairness. As the readings are noted once then the next readings will automatically be noted in the things speak cloud and machine learning. Thus if the person reaches the danger level the machine learning once found the same readings in the dataset of the heart attack person and it will give the results to the patients attendees and to the doctors. Anyone can access the readings while the username and password can be available to anyone.

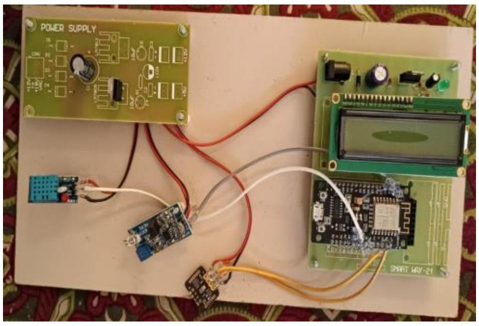

Fig 4.1

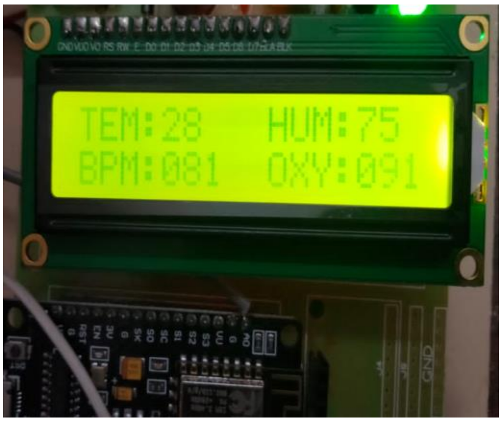

Fig 4.2

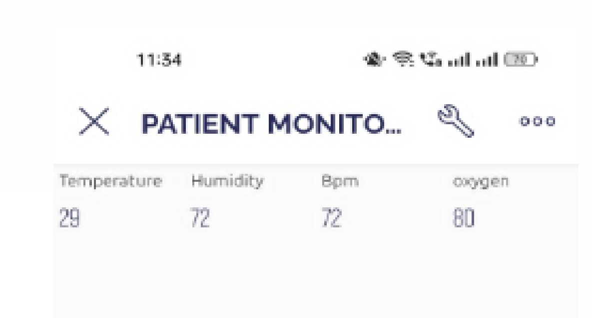

Fig 4.3

5. Conclusion:

As we get the results with good accuracy our prototype will work in good condition on regular basis. Technology has developed in a great manner that we get everything in our homes by ordering online. Likewise, if our health condition is online and easy to see then the availability of pre-treatment for heart attack will happen. Most probably we can ensure saving a life. As it is a machine learning . When this prototype is made into a functioning gadget, these kinds of problems can almost be resolved. All types of people can use a mobile phone after the ideal values are discovered and entered into it. This will be simple since mobile phones have considerably higher levels of availability and credibility in our society than any other electronic gadget. The daily monitoring will be accompanied by data analytics based on a person's data base. The software will produce a weekly report detailing the patient's status in precise detail. These results will reflect the individual's potential for having a heart attack.

6. Future work

The future work of this project is to make the prototype a product which small in size and wearable by the patients on the daily basis regularly. We plan to develop the prototype of a glove that is worn by the patients on the hand-covering fingers. If it is successful then we develop our product like smart watches which consist of waterproof covering for patients will wear even while bathing. Once the prototype is found to function correctly on healthy persons, evaluation and monitoring of patient data will be conducted. To make online communication simpler, an app can be developed.

7.References

1). Meharwar Fatima, Maruf pasha," Survey of Machine Learning Algorithms for Disease Diagnostic", journal of intelligent literacy system and operation, 2017

2). Harshit Jindal, Sarthak Agrawal, Rishabh Khera1, Rachna Jain and PreetiNagrath," Heart complaint vaticination using machine literacy algorithms", transnational journal of material wisdom and engineering, 2021

3). Jaymin Patel, Prof.TejalUpadhyay,Dr. Samir Patel," Heart Disease vaticination using Machine literacy and Data Mining fashion", conference paper 2016

4). Dangare C S & Apte S(2012). Advanced study of heart complaint vaticination system using data mining bracket ways.

5). Soni J, Ansari U, Sharma D & Soni S(2011). Prophetic data mining for medical opinion an overview of heart complaint vaticination.

6). Khourdifi,Y., & Bahaj,M.(2019). Heart Disease Prediction and Bracket Using Machine Learning Algorithms Optimized by flyspeck mass Optimization and Ant Colony Optimization.

7). Deekshatulu,B.L., & Chandra,P.(2013). Bracket of heart complaint using k- nearest neighbour and inheritable algorithm.

8). Ramalingam VV, Dandapath A, RajaMK. Heart complaint vaticination using machine literacy ways a check. Int J Eng Technol. 2018.

9). Bouali H, AkaichiJ. relative study different bracket ways heart complaint use case. In 2014 13th transnational conference on machine literacy and operation.

10). Daniel Teichmann, Dennis De Matteis, Marian Walter and Steffen Leonhardt, " Cardiorespiratory Monitoring Device Fusing Two Noncontact Sensor Principles ", 11th International Conference on Wearable and Implantable Body Sensor Networks, 2018

11)J.Ojarand,S.Pille,M.Min,R. Land,J.Oleitšuk, " glamorous Induction Detector for the Respiration Monitoring ", Biomedical circuits and system conference, 2017

12) Toshiyo Tamura, Yuka Maeda, Masaki Sekine and Masaki oshida, " Wearable Photoplethysmographic Sensors Past and Present ", Electronics 2014, 3, 282- 302; doi10.3390/ electronics3020282, 2016

13) Madhan Mohan P and Nagarajan V " Spot and nonstop Monitoring of Heart Rate by Combining Time and frequence sphere Analysis of Photoplethysmographic(PPG) Signals at Rest Conditions ", IET Signal Processing, Vol. 9,pp.

14) Daniel Teichmann, Jerome Foussier, Jing Jia, Steffen Leonhardt, Marian Walter, " Noncontact Monitoring of Cardiorespiratory exertion by Electromagnetic Coupling ", IEEE Deals On Biomedical Engineering, VOL. 60,NO. 8, AUGUST, 2016

15). Bouali H, AkaichiJ. relative study different bracket ways heart complaint use case. In 2014 13th transnational conference on machine literacy and operation.