IOT BASED HEART AND FACE FUNCTION MONITORING FOR HEART DISEASE PREDICTION SYSTEM WITH DOCTORS PRESCRIPTIONS

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ABSTRACT

Conventionally the term Health care is considered an important determinant to uphold the general physical and mental health and well-being of the people. Currently, this domain combined with technology is to offer better for people across time and place within most care and patient-friendly way. To be of concern with the increase of Heart diseases and Heart attack to be the primary cause of death in the world, is mainly due to the sheer negligence of health monitoring, complaining lack of time due to massive workload and pressure. Medically, accurate and exact prediction of the heart problems mainly depends on Electrocardiogram (ECG) data and patient clinical data. The work considers IOT Based Heart Disease Prediction, and Monitoring system using raspberry pi 3. It utilizes the Heart rate (Pulse) sensor module to interface to serially communicate to the raspberry pi board. Facial video recording by a camera in the ambient light. We describe a real-time algorithm to quantify the heartbeat rate from a facial video recording captured by the camera. We extract the green channel from the video using a machine learning algorithm, supported with a GPS module to location information and send it to doctors. It offers security and also facilitates retrieving all the sensor information subjected to a heart condition to monitor across time and place over the internet/Smartphone. This design is made helpful to Heart patients for determining changes in their health condition and be monitored with regard to face color and notifying with a patient location for timely help with their concerned cardiologist.

Keywords - Health Domain, IOT, pulse sensor module, Raspberry pi 3, Python. Machine Learning.

INTRODUCTION

The heart is pumping blood in the cardiovascular system consisting of veins and arteries by which blood reaches in all parts of the body. In humans, the heart is presenting just behind and slightly left the side of the breastbone. Inappropriate diet or hypertension may cause dysfunction of the heart which may lead to heart failure or commonly known as a heart attack. In the present scenario, only doctors can predict a heart attack by several tests performed manually. But in today's hustling life, due to lack of time, it becomes difficult for people to go for their regular checkups or take elders people to the hospital for their regular checkups. This may result in the sudden heart attack of a person which cannot be prevented and leads to the death of that person. Due to increasing hypertension and had dieting schedule of the people, the number of heart attacks are also increasing. This requires the automation of the health checkup of a person so that a person is well informed before any of the factors leading to heart attack rise to dangerous levels. He can visit a doctor and take proper medication that may prevent a heart attack.

Most of the time patients go for several tests, which can overburden them with extra physical activities, time, and for sure additional financial charges. As past examinations proposed the basic purposes for coronary illness can be an unfortunate food, tobacco, exorbitant sugar, and overweight or additional muscle versus fat. Whereas the common symptoms can be pained in arms and chest. Perceptibly, these reasons are autonomous of one another; legitimate investigation of this sort of dataset can improve the way toward diagnosing and can help the heart specialists also. Beforehand, various explores utilized various procedures to improve the HF determination procedure, for example, Outrageous Learning Machine, coronary illness arrangement, and AI classifiers.

PROPOSED METHOD

In this proposed system we are going to make an IoT Based Heart Disease Prediction, and Monitoring system using raspberry pi 3. We utilize a Heart rate (Pulse) sensor module to interface to the ADC(MCP), and ADC(MCP) serially communicates to the raspberry pi board. The Pulse sensor will capture the heart rate of the human body then analyses the Heart Problem. Second Camera module interfacing with Raspberry pi to take a patient picture and processing to identify the skin color and disease using a machine learning algorithm also taking a GPS location information of the Patient to send to doctors. The software sketch we used here is a python to control the entire system and to store all the sensor data in the cloud using the HTML, and Wi-Fi.

Proposed method block diagram

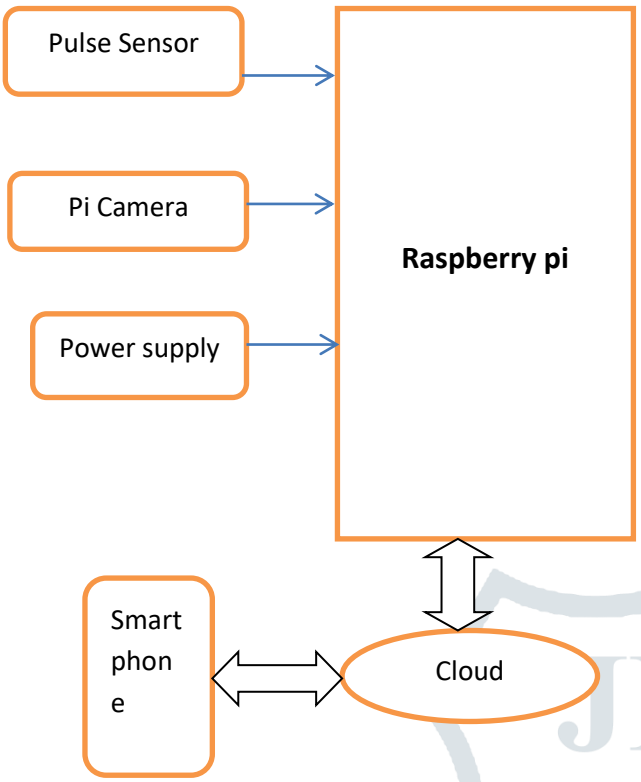


Figure 1: Proposed method Block diagram.

In the receiver side we have made the Android app for both patient and doctors login to get the information about the patient or persons. It offers security and facility for retrieving all the sensor information, and subject heart condition can Monitor from at any time, and any place in the world over the mobile phone. This design system which is very helpful to patients, and also produces if there are any changes in the condition of the health, then we have to alert immediately to the corresponding doctor. The doctor can monitor the condition based on the readings, and face color. If the condition is the minor doctor will send the prescription or the referring physician for the further treatment process and notifications about the medicines immediately based on GPS location.

Method 1

The image will be captured using Pi camera then it will be processed in Raspberry Pi then it will be fed to the trained Random Forest method for classification of heart attack or Normal.

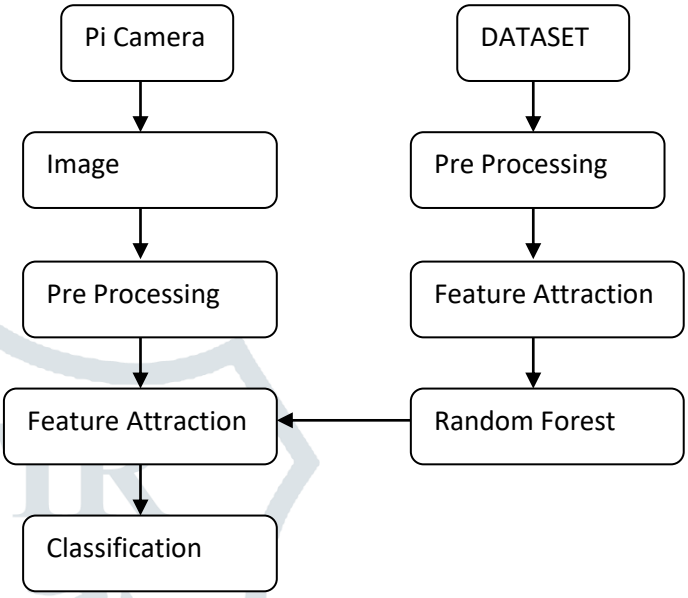
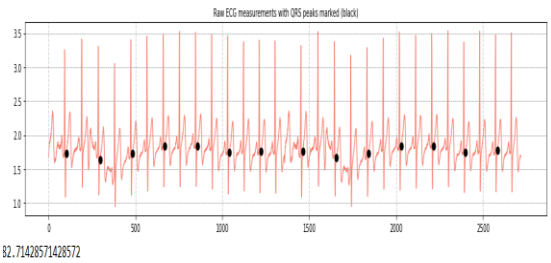


Figure 2: Heart disease detection based on face skin color.

Method 2

Using pulse Sensor ECG signal will be collected and fed to Raspberry pi, and it will be processed using the signal processing method as shown in below fig2. Such that the number of heat bits can be calculated from a sample ECG signal then based appropriate threshold method heart attack will be detected. If the number of heart bit is equal or greater than then threshold value then the person will be considered normal else abnormal.
The threshold value is selected after analyzing the number of the heartbeat of normal and abnormal ECG signals based on the Q R S value of each heartbeat.



DWT based QRS detection Electrocardiography

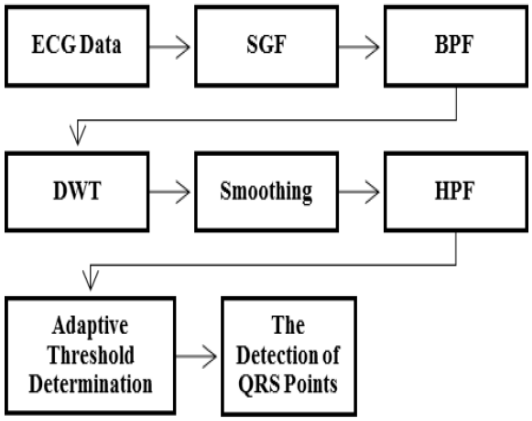


Figure 3: DWT based QRS detection Electrocardiography (ECG).

Since ordinary pulses are somewhere in the range of 35 and 195 beats for each moment, recurrence sifting can be applied to address bogus readings. The pulse means a recurrence between 0.5 Hz and 3 Hz. This frequency range is far away from the power line frequency, 50 Hz, or 60 Hz, so there are very few chances of interference from there.

Electrocardiography (ECG)

The functioning of a heart can be graphically represented as a cardiogram, commonly known as EKG or ECG waveform. It represents the activity of the heart regarding a series of electrical pulses which consists of 5 major data points- P, Q, R, S, T as shown in Fig 2. Each of these denotes a peak in the ECG waveform. Analyzing these points can give an indication in the PQRST waveform.

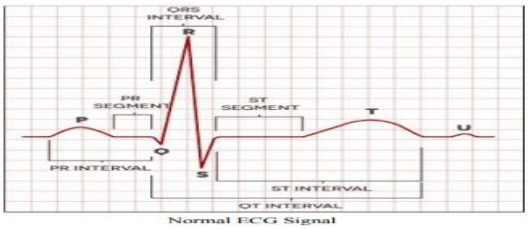


Figure 4: QRS details of normal heart beat.

Raspberry pi

Raspberry pi is the brain of this project it will receive a signal from the sensor and send it to the notch filter in this work, we utilized raspberry pi 3, is a single board, PC created in the United Kingdom by the raspberry pi establishment. Raspberry pi has many generations.

Figure 5: Image of Raspberry Pi.

The Raspberry Pi 3 Model B+ is the most recent item in the Raspberry Pi 3 territory, flaunting a 64-piece quad-center processor running at 1.4GHz, double band 2.4GHz and 5GHz remote LAN, Bluetooth 4.2/BLE, quicker Ethernet, and POE capacity by means of a different POE Cap.

HEART RATE MONITOR

The AD8232 ECG Checking sensor module is an adaptable board that worked to test the electrical movement of the heart. This electrical movement outlined an ECG or Electrocardiogram and yield as a simple reading.ECG can be very loud, and the AD8232 Single Lead Pulse Screen goes about as an operation amp to help acquire a reasonable sign from the PR and QT Spans rapidly. The AD8232 is an integrated signal conditioning block of ECG and other bioelectric potential measurement applications. It is intended to extract, amplify, and filter small bio-signals in the presence of fluctuating. Conditions, similar to those created by motion or remote electrode placement.

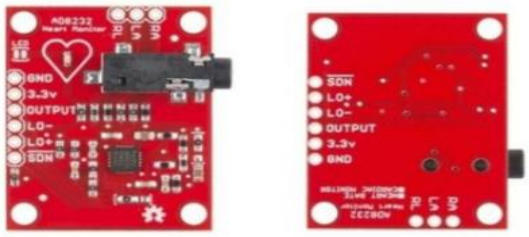


Figure 6: AD8232 ECG Monitoring sensor.

Digital camera

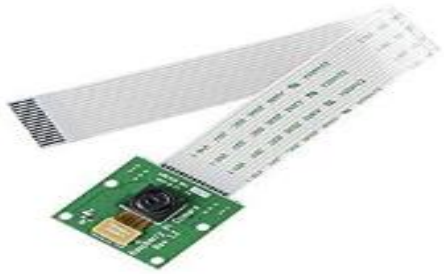


Figure 7: Pi Camera used with Raspberry Pi.

The Raspberry Pi Camera Module v2 replaced the original Camera Module in April 2016. The v2 Camera Module has a Sony IMX219 8-megapixel sensor (compared to the 5-megapixel OmniVision OV5647 sensor of the original camera).

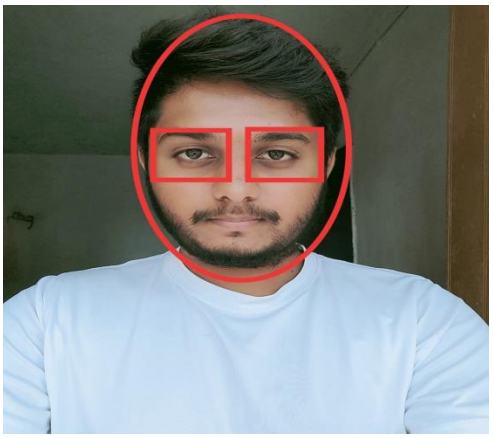


Figure 8: Detected face Image.

Camera will capture the Image then it will be feed to Raspberry Pi then based on face skin feature it will predict heart attack it there or not.

Buzzer

Figure 9: Buzzer used with Raspberry Pi

A signal is a little yet proficient part to add sound highlights at our undertaking/framework. It is little and conservative 2-pin structures henceforth can be effortlessly utilized on breadboard, Perf Board and even on PCBs which makes this a broadly utilized part in most electronic applications.

If using Face skin color, and ECG signal heart attack is detected then buzzer will produce the beep sound.

RESULTS

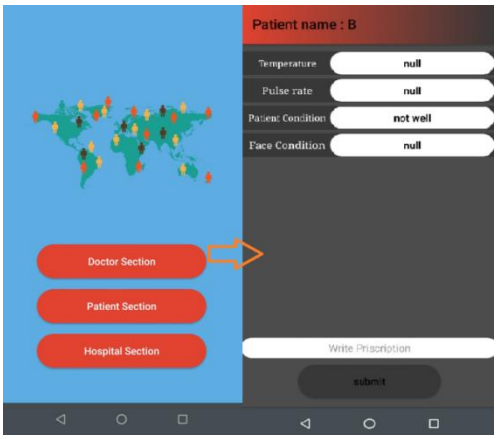


Figure 9**:** First page is home screen page of android.

Android assistance, contains 3 buttons Doctor section, Patient section and Hospital section based on selection of button respective page will open. The master needs to sign in with a significant username and mystery key, if s/he does not have a profile enrolled s/he needs to go to the register page. Coming up next is the screen catches of the login page, in case we key in invalid username and invalid mystery key. On successful login, we can see a pro menu. This page collects all the patient individual information, and the accompanying page aggregates the clinical condition for that particular day.

Figure 10: Patient name and condition update.

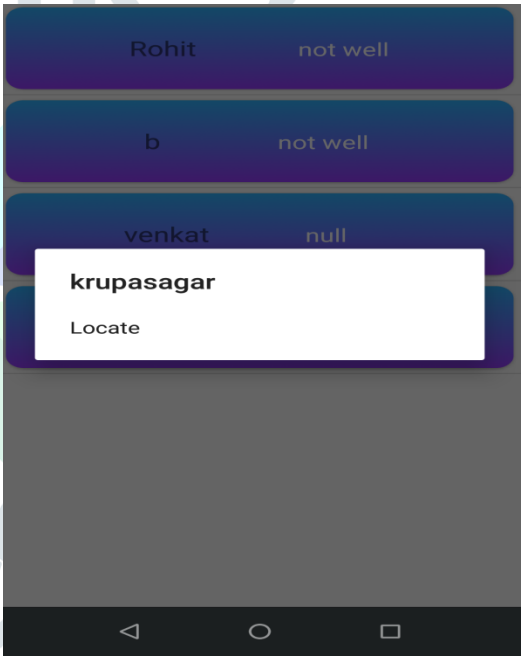


Figure 11: Patient Location.

If heart attack is predicted then Patient Location will be automatically detected such that preventive measure can be taken. The Patient Continuous Area Frameworks manages checking the patients in crisis circumstances. Along these lines, the investigation expected to propose to Tolerant Continuous Area Frameworks dependent on IoT innovations. Different innovations have been utilized in the current frameworks, which have incited the diminished mix-up rate, costs, and accelerated giving therapeutic administrations organizations. Utilizations of these frameworks incorporate following of patients, clinical staff, and important clinical resources.

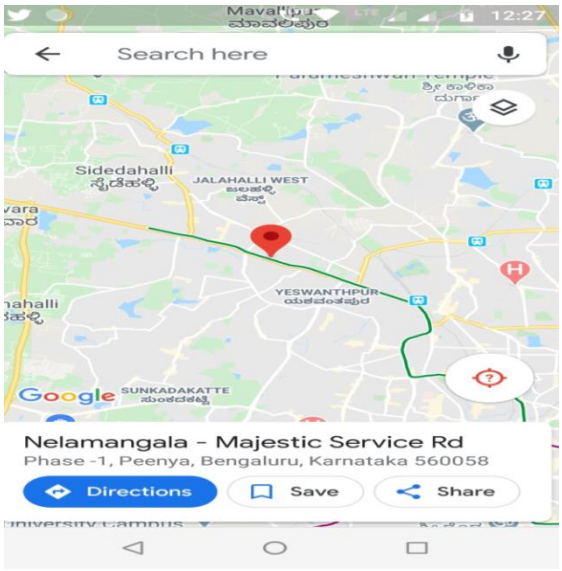


Figure 12: Patient location details.

The Patient Ongoing Area Frameworks manages observing the patients in crisis circumstances. Along these lines, the investigation expected to propose to Persistent Ongoing Area Frameworks dependent on IoT advancements. Different innovations have been utilized in the current frameworks, which have provoked the diminished error rate, costs, and accelerated giving restorative administrations organizations. Uses of these frameworks incorporate following of patients, clinical staff, and significant clinical resources. Moreover, achieving the patient and staff satisfaction is among the other crucial usage of these Structures. The exact data exchange and technique control are considered as positive pieces of this development.

CONCLUSION

This paper presents an automated mathematical model for detecting a heart attack. The main objective of this paper is to detect a heart attack accurately and wan the doctor through messaging. The proposed algorithm ECG signal and Face skin color information and this information will be feet to machine learning and it will predict heart attack in human beings.

REFFRENCE

[1] IBM Institute for Business Value, “The future of connected healthdevices”, Executive Report, 2011.

[2] A. C. Matos, A. Lourenço, and J. Nascimento, “Embedded System for Individual Recognition Based on ECG Biometrics,” Procedia Technol., vol. 17, pp. 265– 272, 2014.

[3] Shital L. Pingale, Nivedita Daimiwal, “ Detection Of Various Diseases Using EcgSignal In Matlab”, International Journal of Recent Technology and Engineering (IJRTE) ISSN: 2277-3878, Volume-3, Issue1, March 2014

[4] Sanjay Gupta, Joseph John, Virtual Instrumentation using Lab VIEW, Tata McGraw Hill Education Private Limited 2010.

[5] N. Liu, Z. Lin, Z. X. Koh, G.-B. Huang, W. Ser, and M..E. H. Ong, “Patient outcome prediction with heart rate variability and vital signs,” J. Signal Process. Syst., vol.64, pp. 265–278, 2011.

[6] Nahina Islam, Nafiz Imtiaz Bin Hamid, Adnan Mahmud, Sk. M.Rahman, Arafat H. Khan, “Detection of Some Major Heart Diseases Using Fractal Analysis”,International Journal of Biometrics and Bioinformatics (IJBB),Vol. 4, pp. 63-70, 2010.

[7] Gawali, Dhanashri H., and Vijay M. Wadhai. "Implementation of ECG sensor for real time signal processing applications." Advances in Electronics, Computers and Communications (ICAECC), 2014 International Conference on. IEEE, 2014.

[8] M. Aminian and H. Reza Naji," A Hospital Healthcare Monitoring System Using Wireless Sensor Networks", journal of Health & Medical Informatics, Vol4. Issue 2, pp. 1-6, 2013.

[9] B. Eggins, “Skin contact electrodes for medical applications,” Analyst, vol. 188, no. 4, pp. 439–442, Apr. 1993.

[10] M. Fernandez and R. Pallas-Areny, "Ag-AgCl electrode noise in high-resolution ECG measurements," Biomedical Instrumentation & Technology, vol. 34, pp. 125-130, 2000.