CADID: Automated Cardiac Disease Detection System

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ABSTRACT

Now a day's Cardiac arrest is a global health concern. It is estimated that nearly half of all cardiovascular deaths worldwide are due to Cardiac arrest resulting in an estimated 4 to 6 million cases each year. Roughly half of cardiac arrest patients experience some warning signs in the week before. But it is misjudged like gastric problems or something like that. So our proposal CaDiD helps to monitor cardiac activity and detects cardiac diseases. The system displays the cardiac signal with details. So many people of India didn't get the treatment of doctors. As half of the Indians are poor, they can't afford money for treatments. Here is the importance of CaDiD, a system to display cardiac signal along with the details about the diseases. This system doesn't require the presence of doctor, as it is self-usable. CaDiD is the system to identify cardiac disease and will show in display. It needs only one pulse signal from our one finger. Comparing ECG, CaDiD is simple, less cost, self-usable, requires only one pin instead of having more pins

Keywords: ECG sensor, Raspberry Pi display.

I. INTRODUCTION

With the cost of social insurance ascending, there is a need for powerful strategies for diminishing the doctor's facility costs. Locally situated observing advances take into account constant well being checking. The observing of heart rate and ECG can furnish vital data about patients with any heart infections, for example, arrhythmia. Recognition of such occasions at a beginning period can save the life of the individual. Heart illnesses are the fundamental purpose behind the expansion in death rate worldwide. The constant ECG signal gives us the general data about cardiac signal by utilizing non-invasive ECG sensor.24 h or 48 h ECG observing is winding up more imperative in both homecare and clinical settings. Characteristics of ECG signal depend upon physical status of patient.

Joining with setting data from movement status is valuable to enhance analysis precision on the ECG signals, recognize the most widely recognized anomalous ECG designs in various exercises, and assess the cardiovascular capacities for the clinicians. Generally, patients need to convey a massive instrument for continuous ECG checking, which confines their versatility and makes them awkward with such huge numbers of terminals and links around their bodies. There is a developing interest for little size ECG securing framework. With the improvement of gadgets in the course of recent years, more practical methodologies have been proposed to substitute customary strategies for mobile ECG observing.

II. METHOD & MATERIAL

A. Construction

The following figure shows the structure of the CaDiD (Fig. 3). The CaDiDmainly consists of three units: Pulse sensing, softwareand display.In this proposed system programming is the most important part is implemented byRaspberryPi and arduino.Arduinois used to convert analog signal to digital signal. After getting pulse signal from Sensor attached to finger and it compares with the symptoms of disease. Result will be displayed on the screen that is mounded on theRaspberry Pi

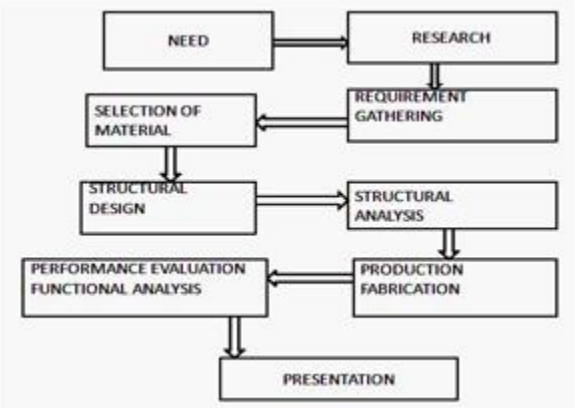


Fig. 1: Flow chart of design and fabrication methodology

- Existing work analysis to identify problems and requirements.
- Selection of fabrication materials.
- Designing the structure of CaDiD.
- Analysis of design and optimization.
- Start of fabrication.
- Testing and evaluation of overall performance of CaDiD.
- Adding necessary modifications.
- Presentation and report formation.

B. Working

CaDiD , a system to display cardiac signal along with the diagnosis. This can be easily used in our homes. This include finger band that sense the cardiac activity from the blood flow and pass it to the CaDiD circuit then compares the signals with stored data about various disease condition. After comparing it will identify the disease of patient. Then display the disease on the screen. So cardiac disease is easily detected then we can take necessary steps. Recordingelectric pulse of heart over a period of time using a pulse sensor, detect the cardiac diseases from ECG signal analysis. And Count number of beats per minute (BPM).

C. Block Diagram Description

The input to the circuit is applied from the regulated power supply. The a.c. input i.e., 230V from the mains supply is step down by the transformer to 12V and is fed to a rectifier. The output obtained from the rectifier is a pulsating d.c voltage. So in order to get a pure d.c voltage, the output voltage from the rectifier is fed to a filter to remove any a.c components present even after rectification. Now, this voltage is given to a voltage regulator to obtain a pure constant dc voltage

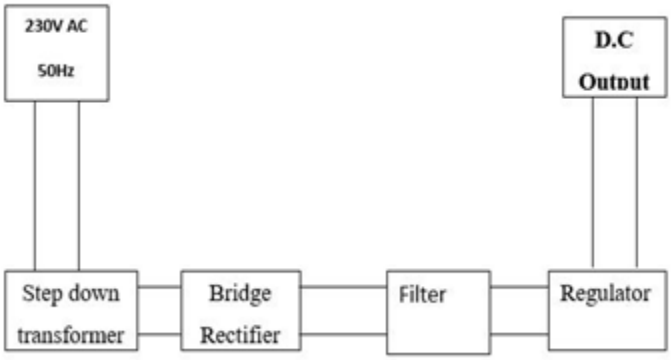


Fig. 2: Power Supply

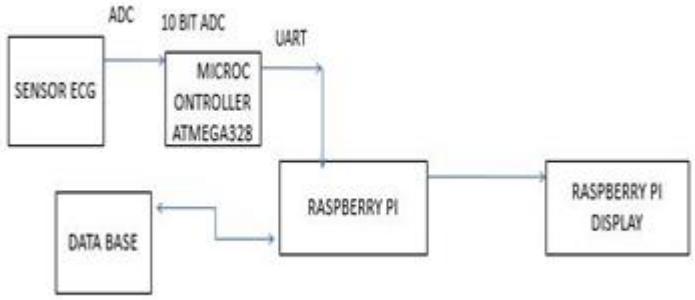


Fig. 3: Block Diagram Of CaDiD

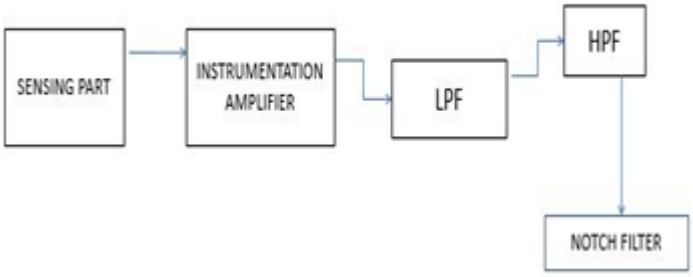
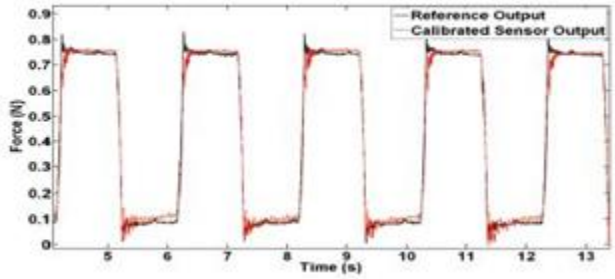


Fig. 4:Block Diagram Of Sensor

The Pulse Sensor is a plug-and-play heart-rate sensor for Arduino. Essence it is an integrated optical amplifying circuit and noise eliminating circuit sensor. Clip the Pulse Sensor to your earlobe or fingertip and plug it into your Arduino, you can ready to read heart rate. Also it have an Arduino demo code that make it easy to use. CaDiD , a system to display cardiac signal along with the diagnosis. This can be easily used in our homes as thermometers glucometers etc.This include finger band that sense the cardiac activity from the blood flow and pass it to the CaDiD circuit then compares the signals with stored data about various disease condition. After comparing it provide the printed format of the cardiac activity along with diagnosis.

D. Calibration and verification of ecg sensor



The calibration and verification procedures were automatically performed by the computer program in order to minimize the environmental noises and human effects.

III. LITERATURE REVIEW

R. Gupta and J. N. Bera.[1] The proposed system is modular and makes use of transportable equipments that are easy to operate. The machine connects a remote rural patient to a town based heart specialist by a rural healthcare centre as intermediate node. The goal of this system is to transmit a ECG data from the patient residence t to the rural healthcare centre for wireless reception and computerized processing for initial level diagnosis. Moreover, a GSM based link can be used to seek expert opinion from a heart specialist.

HyukjeKweon,ByungchaeLee,Myoungho Lee [2]This paper portrays the hardware/software design of an robotized ECG analyzer. It is a 12 leads ECG. ECG waveform is printed on the thermal printer. By using pattern recognition and Minnesota diagnosis criteria, peak detection and diagnosis programs are implemented. Mainly this paper focuses on diagnose the heart diseases without doctors or ECG analyst help and can involve various diagnosis algorithms.

A. Lymberis.[3] Smart wearable can possibly offer an insignificantly prominent telemedicine stage for individualized wellbeing administrations that are easily available, of better quality for the patient and national than the today solutions, and cost-effective .

The model designed by YudongLuo,IEEE,SankuNiu, Jose Cordero , and YantaoShen[4], The research work aims at developing a real time non-invasive metabolism and blood circulation surveillance system for monitoring human's health condition by sensing the various bio-signals on human body. Goal of this paper to study the functions and characters of organs and tissues that highly relate with the metabolism and blood circulation system, also it is expected to help modeling the entire circulation system. This paper focus on developing a new low-cost, portable, high accuracy, non-invasive radial pulse sensor.

Nagaravali Turlapati,Chandana Srinivas [5]Continuous monitoring of the heart for various metrics is very important, this has led to at home and remote monitoring of events such as heart attacks or any other issues concerning the heart and reporting to the doctor and family members in case of emergency. This paper contains an intelligent pulse sensor and temperature sensor integratedwith the arduino chip and GSM (Global System for Mobile communication) modem. The sensor measures the heart rate and room temperature and based on the readings, plots the ECG (Electrocardiogram) and displays the heart rate and room temperature. A special feature of detecting the mood of the person by using the heart rate is also deployed here. This is done by calculating the CPR (Cardiopulmonary Resuscitation) value using the heart rate. In case of any sudden variations in the heart rate, a message is sent to the doctor and family members using GSM modem for the immediate rescue of the person concerned. This study has demonstrated the use of arduino and sensors to help patients monitor themselves without going to the hospital and remote monitoring of the patient by the doctor. This reduces the cost of readmission to hospital. The measurements are of comparable accuracy to those made by larger medical devices. The use of this technology helps to take immediate actions in case of emergency and enhances the response rate of the medical support to the patient.

IV. RESULT &DISCUSSION

Through this project we were able to construct a new instrument. CaDiD'.This provides cardiac signal easily and diagnosis of disease condition. In fact, it helps both doctor and patients. In case of emergency situation, the accurate diagnosis is ready helpful.

In the proposed system CaDiD can be made more popular by applying IOT software. This will enable the user to access cardiac signal directly on his/her phone. One of the main benefit is when a cardiac patient uses this device, he will under the observation of a doctor. If an emergency condition arises the device will send the cardiac signal to the doctor and he can provide necessary treatment immediately to save life of patients.

Table 1.Observation of CaDiD

Characteristic	Sub.1	Sub.2
Age	45	56
Sex	Female	male
Weight	73Kg	75kg
Height	1.71m	1.71m
BPM	136bpm	72
Disease	Hyper tensed	Regular

V. CONCLUSION

The main objective of this project was to display cardiac signal along with the diagnosis of the disease. The intended objectives where successfully accomplished by CaDiD. Our low budget product can easily diagnose various heart disease from the signal taken using a single sensor. CaDiD provides a cost effective and energy efficient alternative of commonly used ECG

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