SUDDEN CARDIAC ARREST PREDEICTION AND DIAGNOSIS USING ECG SIGNALS

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Received: February 07, 2019 Accepted: March 24, 2019

ABSTRACT: *Cardiacarrest occurs suddenly and often without warning. It occurs when our heart suddenly stops pumping blood round your body, commonly because of a problem with electrical signals in your heart. A person dies within minutes if he is not treated immediately.The existing system detects the cardiac arrest and only sends information to the doctors and family members but they cannot give immediate help to the patient if they are far away. It detects cardiac arrest only when it occurs but the patients die within few minutes from the time of their cardiac arrest. This is a major drawback in this system. To overcome this drawback we have used Successive approximation algorithm where the patient's heart rate is automaticallyupdated in IOT cloud, which can be viewed and accessed by doctor from any location, if the patient's heart rate exceeds the threshold value the defibrillator automatically gets ON and electric shock is given to the patient as an immediate remedy.*

Key Words: *Sudden Cardiac Arrest, IOT Cloud, defibrillator.*

1. INTRODUCTION

Cardiacarrest occurs suddenly and often without warning. It is caused due to electrical failure in the heart which results in that causes an uneven heartbeat. Sudden cardiac arrest happens without caution and requires immediate emergency treatment. A person candie from sudden Cardiac Arrest in minutes if it is not treated right away. Doctors rarely analyze cardiac arrest with medical tests as its happening. Instead, cardiac arrest frequently is diagnosed after it occurs. ECG (Electrocardiogram) records the electrical activities generated by the heart muscles. Doctors usually use an ECG to help diagnose heart block. It shows how rapid the heart is beating and its regularity. ECG electrodes are used to acquire the heart rate of the patients and displayed in a waveform.

2. LITERATURE SURVEY

EmranulHaque [1] discussed in his paper about an automatic ECG signal processing system for detecting cardiac disorders as part of telemedicine application. This system is used toacquire ECG signal, process it and extracts important parameters like PQRST to detect heart abnormalities.HimanshuGothwal [2] discussed in his paper about the method to analyze electrocardiogram (ECG) signal, extract the features, for the classification of heart beats according to different arrhythmias. Fast Fourier transforms are used to classify the peaks in the ECG signal and then Neural Networks are applied to identify the diseases.

Levenberg Marquardt Back-Propagation algorithm is used to train the network. NikhilGawande [3] presents a method to classify various heart diseases using convolution neural network algorithm which gives variation in P wave, QRS complex and T wave parameter in ECG are used to identify the type of illness of human heart.Sugondo Ha diyoso [4] has used PAN Tompkins algorithm for detection of Arrhythmia disease using ECG signals to know the heart condition of athletes and patients using mobile android mobile.AnupmaMarwaha [5] presents a method for analysis of ECG signals and arrhythmia detection using Digital filter algorithm and Neural network approach.It uses smooth filter with an odd span to remove all the base line drifts.

3. METHODOLOGY

Our paper includes ECG sensor that measures the heart pulse and transfers the signal to (PIC16LF1526) microcontroller which has a in built Analog to digital convertor that converts the signals into digital signal and sends to 16X2 LCD module which displays the ECG values and also sends to GSM module (SIM 800C) which transfers the data to the IOT cloudwhich stores each second data of the patient which can be viewed by the doctor from anywhere. A defibrillator is connected through a serial port to the PIC microcontroller

which gets automatically ON when the patient's heart rate exceeds the threshold value. This defibrillator can also be accessed by the doctor using a IOT cloud switch from any location.

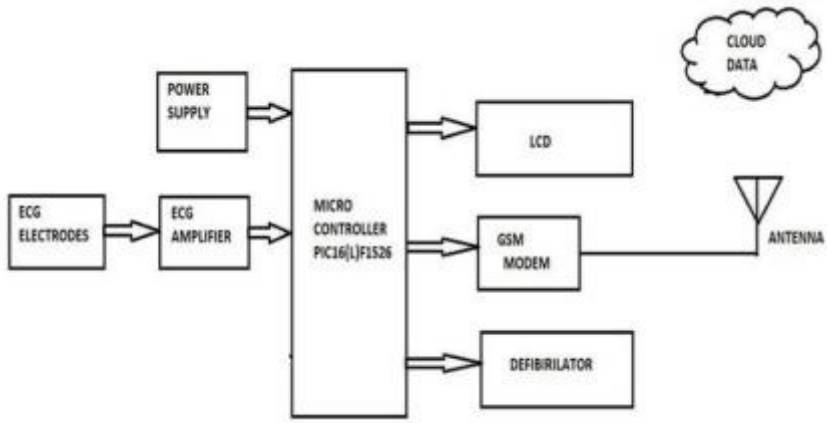

Fig 3.1: Block diagram of proposed system

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A. PIC16LF1526

The microcontroller used is PIC16LF1526 which has inbuilt Analog to Digital converter, Two Enhanced Universal Synchronous Asynchronous Receiver Transmitter(EUSART),a C compiler Optimized Architecture and has only 49 Instructions.

B. ECG electrodes

The ECG electrodes are used to record and monitor the patient's heart ratewith better accuracy.The ECG electrodes are used to record electrical signals of the heart. An ECG is a noninvasive, effortless test with rapid results. During an ECG, electrodes that can sense the electrical activity of our heart are attached to our chest and sometimes our limbs.

C. GSM SIM800C

The GSM SIM800C module used comes with RS232 interface, which allows you to connect PC as well as a microcontroller with RS232 Chip (MAX232). The have some features like configurable baud rate, ESD compliance, audio jack and stub antenna.

D. 16X2 LCD

The 16X2 LCD module used has an Operating voltage of 4.7V to 5.3V, Current consumed is 1mA and it is anAlphanumeric LCD display module, meaning can display alphabets and numbers. The LM358N used is an Operational amplifier

E. Defibrillator

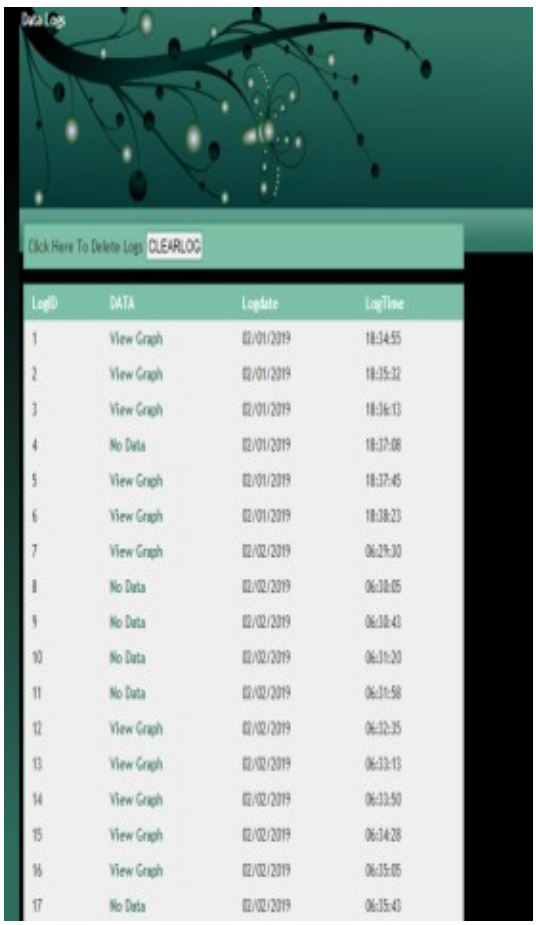
A defibrillator delivers a dose of electric current also called a counter shock to the heart.Defibrillators can be peripheral, transvenous, or implanted , depending on the type of device used or needed.

4. RESULT

The heart pulses are extracted by the ECG sensor and these signals are sent to the PIC microcontroller which has a inbuilt analog to digital convertor that converts the analog signals into digital and these signals are transmitted to GSM module from which the cloud is accessed and the patient's data's are updated in the IOT Cloud. Doctor's can access the cloud from anywhere. If the heart rate of the patients exceeds the threshold value the automatically defibrillator is turned ON.

Fig 4.1: working model

CLOUD DATA SHEET



Data Logs

Click Here To Delete Logs CLEARLOG

LogID	DATA	Logdate	LogTime
1	View Graph	02/01/2019	18:34:55
2	View Graph	02/01/2019	18:35:32
3	View Graph	02/01/2019	18:36:13
4	No Data	02/01/2019	18:37:08
5	View Graph	02/01/2019	18:37:45
6	View Graph	02/01/2019	18:38:23
7	View Graph	02/02/2019	06:29:30
8	No Data	02/02/2019	06:30:05
9	No Data	02/02/2019	06:30:43
10	No Data	02/02/2019	06:31:20
11	No Data	02/02/2019	06:31:58
12	View Graph	02/02/2019	06:32:35
13	View Graph	02/02/2019	06:33:13
14	View Graph	02/02/2019	06:33:50
15	View Graph	02/02/2019	06:34:28
16	View Graph	02/02/2019	06:35:05
17	No Data	02/02/2019	06:35:43

Fig 4.2: Cloud data sheet

ECG WAVEFORM

Fig 4.3: ECG waveform

SWITCH

Fig 4.4: IOT control switch

This control switch can be accessed by the doctor to switch ON the defibrillator.

5. CONCLUSION

In this work, we have described a prototype system to detect the cardiac arrest using ECG signals and this ECG signals are sent to a Microcontroller (PIC16LF1526) which has a inbuilt analog to digital convertor. So

the signals are then sent to the GSM module and the collected data's are stored in aiot cloud which stores each second data of the patient which can be viewed by the doctor anywhere. When the patient's heart rate exceeds the threshold value the defibrillator is automatically turned on which gives a electric shock to the patient to normalize their heart beat this information is also forwarded to the doctor so that he can provide immediate help. In future these electrodes can be made into micro chips by using nanotechnology instead of using wired system. This system helps us to diagnose the cardiac arrest one hour before and immediate help is provided to save the patient.

6. REFERENCES

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