

HEART SENSORIZER- HEART BEAT CHECKING AND HEART ATTACK DISCOVERY SYSTEM

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ABSTRACT-In these modern era there is a drastic increased in the amount of heart maladies including increased hazard of heart attacks. There is no proper communicating device to inform pre chosen people for a patient stricken with a heart stroke or to alarm Heart strokes in sleep. In this project we are implementing a heartbeat checking and heart attack discovery system by means of the Internet of things. We are implementing a system which is an aid to reduce the death rate owed to the heart attack by timely heart attack detection. In this system, we are particularly using smart Heart Beat sensor. The system begins checking immediately when patient heart beat goes beyond a certain boundary, the system directs an alert to the controller which then transmits through the GSM module alerts the nearby hospital, Doctor along with concerned users. Similarly the system signals for lower heartbeats. Each time the user logs on for monitoring, the system also displays the live heart rate of the patient. Thus concerned people may also monitor heart rate as well get an notification of heart attack to the patient straightaway from everywhere and the individual can be saved.

This product is a well-organized alarming device for heart abnormalities that notifies the specified entities for help in the span of a SMS signal time. This device can be used by any individuals but is vastly suggested for public with heart ailments and hereditary heart problems perfectly serving the purpose of remotely and automatically notifying for the help upon heart ailment.

KEYWORDS-Heart Sensorizer, Bradycardia, Tachycardia, Apnea ArduinoUno, Microcontroller

INTRODUCTION

Human heart is a crucial organ that works continuously and thus, is always prone to ailments, however, most of the ailments when treated within a certain period can replenish this vital. In order to do so there is be a continual tracking device. Heart Connoisseur is a well-organized alarming device with a user interface, location tracking module and physical state analysing module which detects heart abnormalities and notifies the specified entities for help in the span of a SMS signal time. With an application designed to evaluate the complete activity of the device forms a compatible communicating routine both for the doctor and for the patient. Application can be installed on any android device, thus, providing a scope for all the aids to provide help when required. Moreover, from a doctor's perspective this form summarised collection of patient data, as, state of all the patients can be investigated through the aid of a solitary interface. The device also being intelligent enough to communicate on its own aid the help as well. With the regular analysis of the weekly data and with notifications for every expected abnormality not just the task of treating but also the task of predicting the task eases out for a medical practitioner. Thus, providing all that ever needed right from tracking to predicting and then to informing the aid the device is both quick to perform and easy to use.

With Arduino mini as the root component it is equipped with a Heart rate sensor, Accelerometer, ESP8266, GSM/GPRS/GPS module's and the compatibility of the device over any person and tracking media for any person, this device detects various heart ailments like

1. **Heart attack:** a swift existence of coronary thrombosis, naturally resultant in the decease of fragment of a heart muscle and sometimes fatal.
2. **Heart blockages:** Heart block is a malady or genetic condition that bases a liability within the heart's natural pacemaker owed to roughly kind of obstacle (or "block") in the electrical transmission system of the heart.
3. **Bradycardia:** bradycardia is a symbol of a problematic through the heart's electrical process. It means that the heart's regular pacemaker isn't working accurate or that the electrical paths of the heart are interrupted. In severe methods of bradycardia, the heart strokes so gradually that it doesn't drive adequate blood to encounter the body's desires. This can be a basis indicator and can be life-threatening.
4. **Tachycardia:** Tachycardia is a disorder that makes your heart beat more than 100 times Per minute. There are three categories of it:
 - **Supraventricular:** This ensues once the electrical signs in the organ's higher chambers backfire and source for the heart rate to swiftness up. It beats so fast that it can't fill with blood earlier it contracts. That decreases blood movement to the rest of the body.
 - **Ventricular:** This is a swift heart rate that jumps in the ticker's lower chambers. It ensues when the electrical signs in these chambers fire the incorrect way. Yet again, the heart strokes so quick that it can't fill with blood or drive it over the rest of the body.
 - **Sinus tachycardia:** This happens when your heart's ordinary pacemaker directs out electrical signs quicker than usual. Ticker strokes fast, but it strokes the way it should.

5. **Apnea:** Temporary cessation of breathing, especially during sleep.

GSM module enables it to notify remotely the set of people enlisted in the sd-card attached to it for that particular heart ailment.

User Survey:

A recent survey conducted in South Central Railways Hospital justifies the theoretical claims made.

Table 1. Feedback provided by different people as per survey

Name	Age	Sex	Feedback
<u>K.N.Raja Reddy</u>	56	M	Definitely helps at the time of stroke
<u>N.Yadagiri</u>	61	M	Automation is really an advantage
<u>Saralamma</u>	68	F	Price should be below 3500
<u>Vankataramana</u>	55	M	Better if it also notifies for heart burn
<u>Bushan Kumar</u>	48	M	Remoteness is very helpful

All these independent feedbacks are in favor of the device’s functionalities.

PRODUCT REQUIREMENT ANALYSIS

Existing System:

Devices like LifeFone, Bay Alarm Medical, Medical Guardian use wifi module to notify about the abnormality, they are large in size, costlier and common man can’t afford these costlier devices. Fitbit also serves the purpose of heart rate tracking, however, it is not intelligent enough to communicate on its own.

LifeFone– needs a manual push and is WiFi powered thus imposing locational constraints.

Medical Guardian – not independent of location

Bay Alarm Medical – not independent of location

Proposed System

- The proposed product overcomes the limitations of existing system.
- It doesn’t have signal range restrictions as GSM module is used in place of Wi-Fi module.
- It is cheaper when compared to LifeFone, Bay Alarm Medical and Oximeters.
- It’s smaller in size and easy to use, it even detects person’s motion and detects abnormal fall of a person using 3 axis-accelerometer and notifies to prechosen contacts with location and heart rate as SMS.
- As the data is maintained in thing speak server time by time and is accessible for aid as well as doctor from an application with location, it eases out the task of providing medical aid to the patient.

ARCHITECTURE

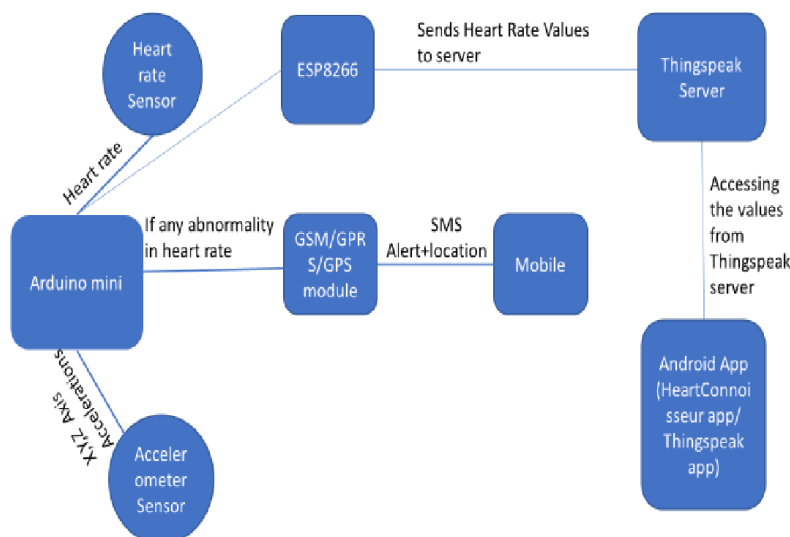
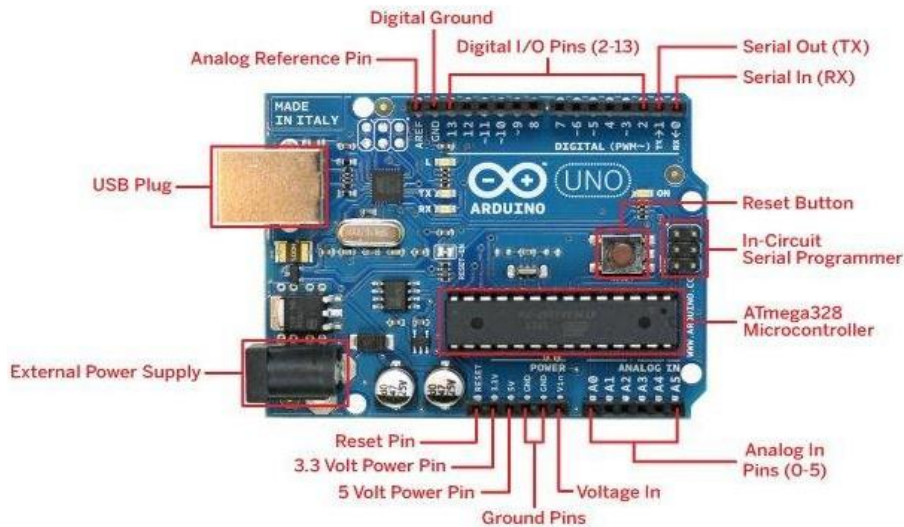


Fig 1. System Architecture

TECHNICALSPECIFICATIONS

Arduino Uno:The Arduino Uno stands as a microcontroller panel created on the ATmega328. This Microcontroller has14 digital input/output pins, 6 analog inputs, a 16 MegaHertz crystal oscillator, a USB assembly, a control card, an ICSP header along with a reset knob. It comprises all desirable to support the microcontroller; merely unite computer by a USB cable or power this one with an AC-to-DC convertor or battery start. The Uno varies from complete proceeding boards.

Uno means one and only in Italian then is entitled to characterize the upcoming release of Arduino 1.0.



Basic Components required in Heart Sensorizer:

1. HEART RATEMONITOR



Fig3. Heart Rate Sensor

2. GPS



Fig4. GPS

3. GSM/GPRS



Fig 5.GSM/GPRS Module

4. ACCELEROMETER



Fig6.Accelerometer

5. SEGMENT DISPLAY

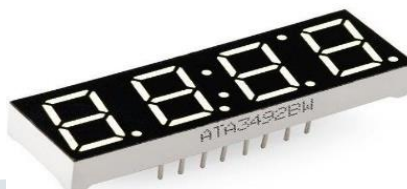


Fig7. Segment Display

6. ESP8266

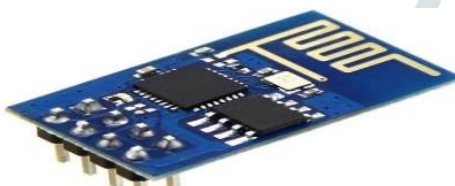


Fig8. ESP8266

Design Diagram of Heart Sensorizer

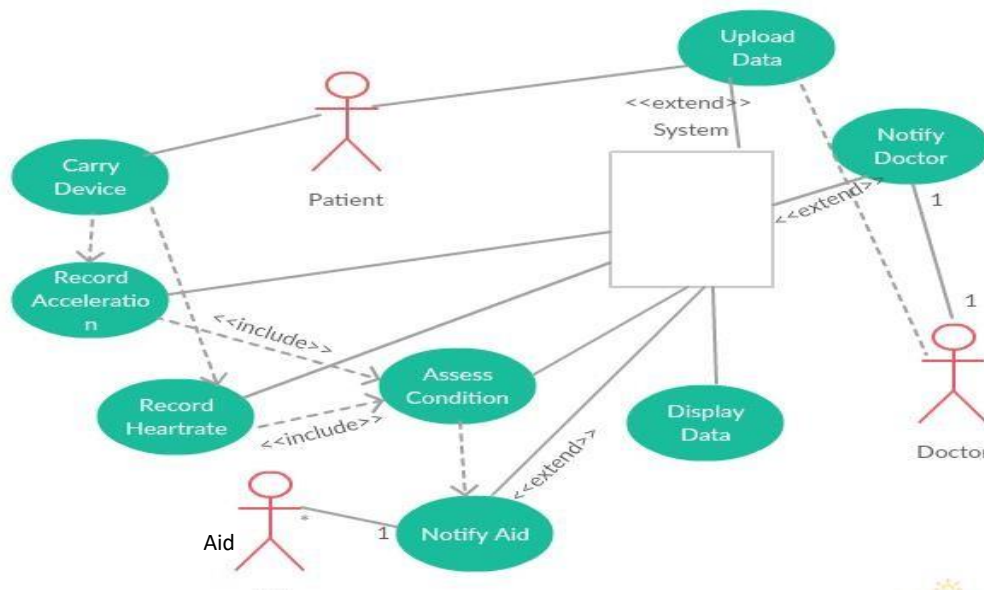


Fig9. Use Case Diagram

The actors patient, aid and doctor and their corresponding use cases have been shown. The use cases signify the diverse ways in which the actor can interact with the application.

VALID TESTS

Device was tested on few individuals as follows

Table2. statistical analysis of ten patients in age range 21-60(Non Athletes)

	Person at Rest	Expected Result	Difference	Exercise	Result
1	72	76	4	87	P
2	116	120	4	175	P
3	79	84	5	96	P
4	97	99	2	100	P
5	90	93	3	176	P
6	67	70	3	121	P
7	115	116	1	176	P
8	79	87	8	141	F
9	95	98	3	113	P
10	80	87	7	136	F

CONCLUSION

The risk of an attack can be nullified to a great extent when the aid reaches the patient within a required period of time with proper prior knowledge about the attack even in a scenario where the patient is absolutely in no position to communicate for help. To achieve this notification should be precise and tracking should be uninterrupted. Hence, we have designed the device in such a degree that it requires minimal level of user interaction and can carry it continuously with ease. Locational, Time and other dependencies have been nullified to a great extent. It receives and updates current rate to the Aid automatically along location in a span of an SMS delivery time thereby providing a very good scope for treatment. Respecting the importance of every second in the course of help, this device also maintains a notifying routine for expected abnormalities that are pre-computed thus alerting the doctor prior briefly about the ailment. The weekly summary of the patient's heart rate makes the task of predicting the ailment and also the task of assessing the ailment easier for a medical practitioner. The task of the medical aid is also made simpler with presence of the application as it would notify prior to the attack for an expected attack making the aid alert.

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