ECS1001: ARDUINO AND EMBEDDED C

(PJT)

HEALTHCARE BOT: HEART ATTACK RECOGNITION SYSTEM

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PROBLEM STATEMENT

Nowadays numerous persons are mislaying their life owing to heart attack and shortage of medical attention to patient at correct stage. This attack cannot be predicted, but it can be known from the human heartbeat which is a very vital health parameter of the human cardiovascular system. Heart rate reflects the health conditions of the human cardiovascular system that determined by such as stress at work, before or after sports and the psychology factor. Unfortunately, some people do not know their heart rate before or after doing an activity.

SURVEY:

India has one of the highest burdens of cardiovascular disease (CVD) worldwide. The annual number of deaths from CVD in India is projected to rise from 2.26 million (2003) to 4.77 million (2011). Coronary heart disease prevalence rates in India have been estimated over the past several decades and have ranged from 1.6% to 7.4% in rural populations and from 1% to 13.2% in urban populations.
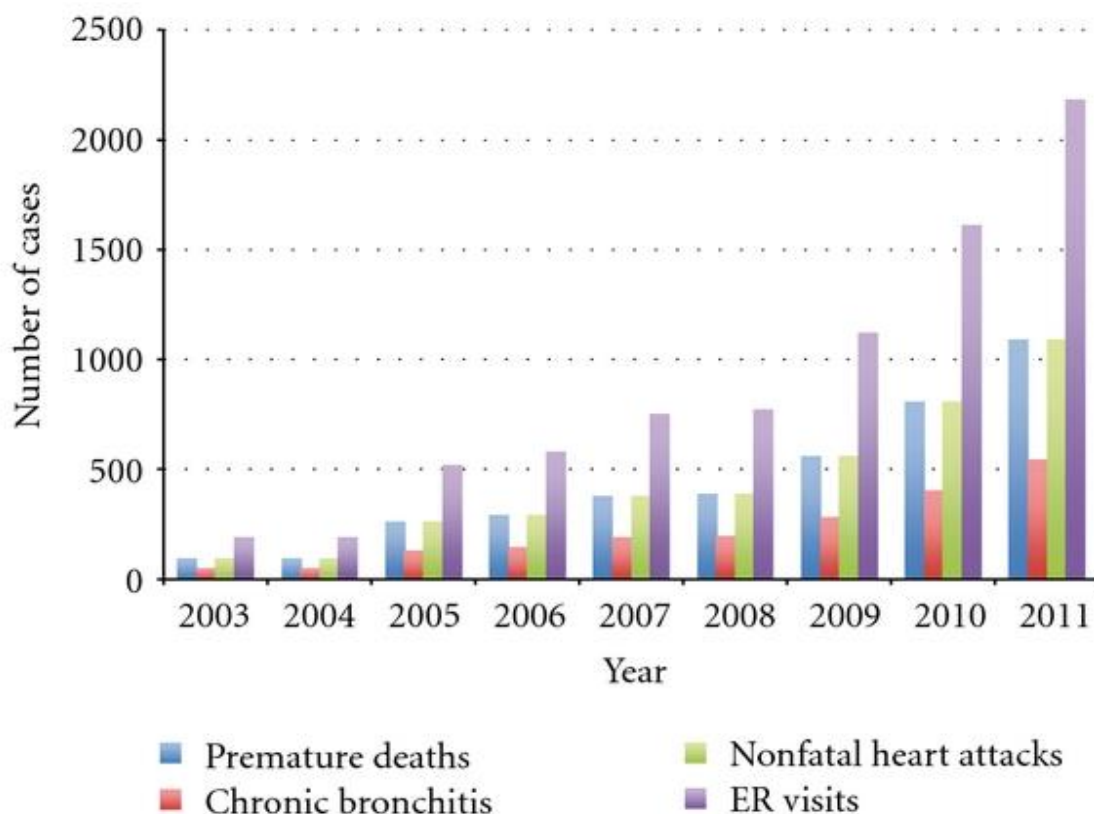
ABSTRACT

In this project we are implementing heart rate monitoring and heart attack recognition system using IoT. The system will carry hardware having sensors with android application. The heartbeat sensor will allow checking heart beat readings and store the data in the database which can be accessed by the health workers and the users using cloud technology. The developer may set the high and low level of heartbeat limits. Once these limits are set the system can start monitoring the patient's heartbeat and as soon as the heart beat readings goes above or below the limit set by the user the system will send an alert about high or low heartbeat as well about chances of heart attack.
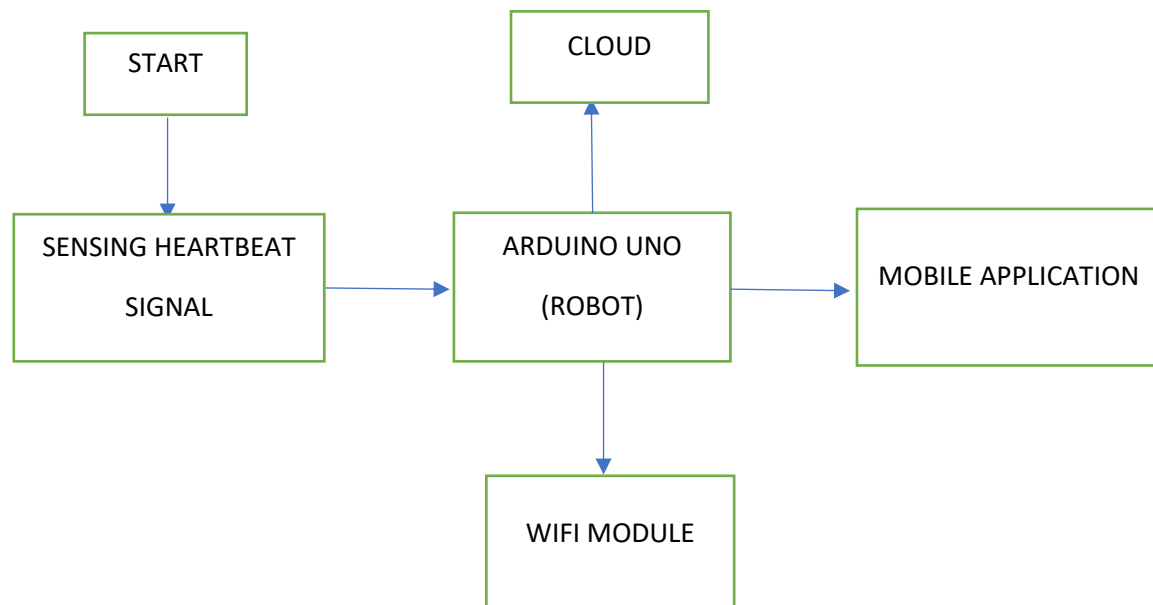
This project proposes to measure heart rate by using pulse sensor, Arduino microcontroller, and Android Smartphone. It is based on the principle of measuring the variation of blood volume in our body using a light source and detector. We also measure the heart rate by using the ECG or EKG (electrocardiogram) waveform as the comparison result of the pulse sensor (pulse oximeter) with ECG waveform. The sensor consists of an infrared light-emitting-diode (LED) and a photodiode. The LED transmits an infrared light into the fingertip which is reflected back from the blood inside of finger arteries. The results show that this tool can detect the value of the heart rate and is displayed on the screen of an Android. The sensor takes under 10 seconds to detect the value of the heart rate. Notification via SMS will be sent of the heart rate such as under normal conditions (BPM, Beat Per Minute <50, normal (BPM = 60 to 100) or above normal (BPM> 100).

Pill Dispenser: The system also provides a pill dispenser machine which dispenses medicines according to our needs using push buttons which are intact to the robot. It can also be controlled using a android application as well
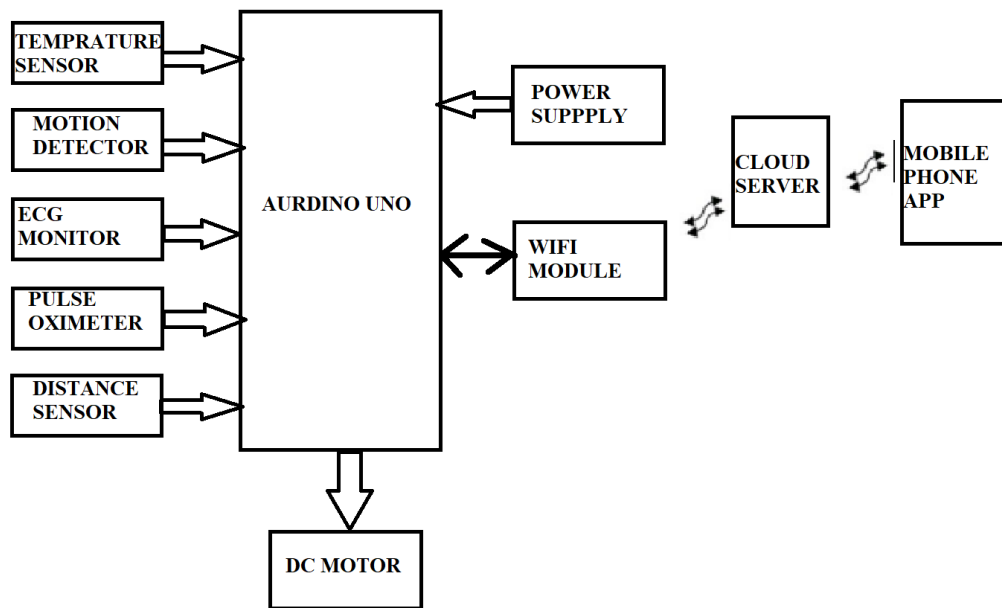
METHODOLOGY

The proposed system has eminence of detecting heart attack with help of observing heart rate based on internet of thing. Our method uses a pulse sensor, Arduino board and a Wi-Fi module. After setting up the system, the pulse sensor will start sensing heart rate readings and will display the heartbeat of person on android application . Also, with the use of Wi-Fi module it will transmit the data over internet. System allows a set point which can help in determining whether a person is healthy or not by checking his/her heartbeat and comparing it with set point. After setting these limits, the system will start monitoring the heart rate of patient and immediately the heart rate goes above or below the certain limit the system will send an alert message. As a part of this project, we are implementing an android application model that will track the heartbeat of particular patient and monitor it correctly and give the emergency message on chances of heart attack.

SYSTEM ARCHITECTURE:

```
   ┌──────────┐                          ┌──────────┐
   │  START   │                          │  CLOUD   │
   └────┬─────┘                          └────▲─────┘
        │                                     │
        ▼                                     │
┌────────────────┐     ┌──────────────┐     ┌──────────────────┐
│ SENSING        │     │ ARDUINO UNO  │     │ MOBILE           │
│ HEARTBEAT      │────▶│ (ROBOT)      │────▶│ APPLICATION      │
│ SIGNAL         │     │              │     │                  │
└────────────────┘     └──────┬───────┘     └──────────────────┘
                              │
                              ▼
                       ┌──────────────┐
                       │ WIFI MODULE  │
                       └──────────────┘
```
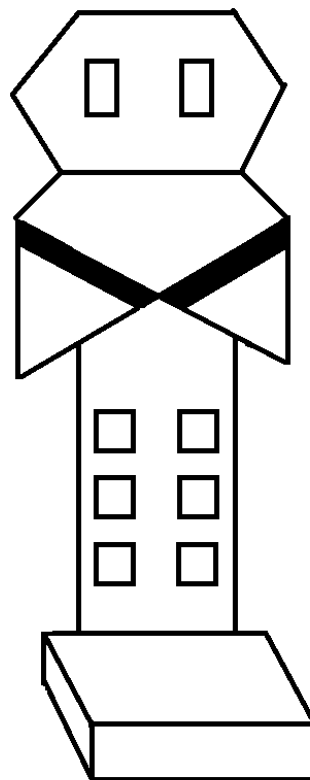
The system methodology by which the robot moves is described by the following block diagram:

BLOCK DIAGRAM:

```
  TEMPRATURE
  SENSOR
                    ┌──────────────┐              ┌──────────────┐
  MOTION            │              │◄─────────────│  POWER       │
  DETECTOR          │              │              │  SUPPPLY     │
                    │  AURDINO UNO │              └──────────────┘
  ECG               │              │              ┌──────────────┐
  MONITOR           │              │◄────────────►│  WIFI        │
                    │              │              │  MODULE      │
  PULSE             │              │              └──────────────┘
  OXIMETER          │              │
                    │              │
  DISTANCE          │              │
  SENSOR            └──────────────┘
```

CLOUD SERVER   MOBILE PHONE APP

DC MOTOR

STRUCTURE OF THE ROBOT:

PLAN OF ACTION

The entire project is divided into 3 phases and 4 modules:

Phase1:

In this phase, we will develop an android application that displays the final reading from the sensors that are interfaced with the Arduino board which is placed inside the core of the robot. The user will set a particular threshold value for the heart beats per minute in the app itself.

Simultaneously, we will connect the electronic components to the Arduino board and write the code in embedded C language.

Phase 2:

This phase primarily focusses on the motion of the robot i.e., the mechanical kinematics of the robot. We will attach various motors and actuators for the movement of the robot.

For the software part in this phase, we will integrate the aforementioned app with the cloud or the database using cloud computing.

Phase 3:

The final phase consists of the assembling all the systems made in previous phases and thereby creating the entire robot (We will estimate the dimensions of the robotic structure for embedding the circuits. The pill dispenser and its related components will be made using additive manufacturing technology).

Timeline of progress

Serial No:	Phases	Date
1	**1**	**24-09-22 to 30-09-22**
2	**2**	**01-10-22 to 20-10-22**
3	**3**	**21-10-22 to 30-10-22**

COST OF COMPONENTS

Serial No:	Name of the item	Count	Cost
1	Arduino Uno Board	1	900/-
2	Temperature sensor	1	200/-
3	Motion detecting sensor	1	58/-
4	Wheels	4	220/-
5	ECG monitor	1	549/-
6	Nuts & Bolts	1 box each	100/-
7	Battery	1	750/-
8	Pulse Oximeter (MAX30100)	1	125/-
9	DC Motor	2	400/-
10	Wi-Fi module	1	375/-
11	Bluetooth module-STM 32	1	159/-
12	Push buttons	6	300/-
13	3 D printer filament	3kg(approx..)	3000/-
14	Distance sensor	1	70/-
15	Insulation tape	1	20/-
Total Cost:			7226/-

REFERENCES

Google scholar Articles

- *Remote Sensing IoT based Android Controlled Robot || Tajim Md. Niamat Ullah Akhund*

- *Patient Health Monitoring IoT System || Mr.Akash M. Rathod, Dr. G.U Kharat, R.S Bansode*

- *Heart Attack Detection and Heart Rate Monitoring Using IoT || Nehal Patel*

- *An Interactive Robot in a Nursing Home: Preliminary Remarks || Will Taggart, Sherry Turkle, Cory D. Kidd*

- *The Development of Heart Rate Detection Using Arduino Microcontroller and Android || Poltak Sihombing, Yose E Barus, Sajadin Sembiring, and Elviwati M Zamzami*