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SMS based Heart Beat and Temperature Monitoring System using GSM Module

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Abstract — Humans' hearts are prized above all else, and heart rate analysis has grown in importance as a medical tool and indicator of overall health. In the medical field, tools like the electrocardiogram (ECG) and the pulse sensing system are used to analyse heart rates. The arterial blood pressure in the heart is used in this examination of the pulse. Due to the artery's proximity to the skin's surface, it's easy to feel the pulse. Since the turn of the century, healthcare monitoring systems have become increasingly technological. Unexpected deaths from a wide range of illnesses are a major problem for humans, and this is often attributable to a delay or absence of necessary medical treatment. The major objective was to design a trustworthy sensor-based patient monitoring system allowing healthcare providers to keep tabs on their patients, whether they're at a clinic, a hospital, or at home, all through an integrated healthcare system that relies on short message service (SMS). With the use of sensors, the data gathering unit (in this case, an Arduino), and some custom software, a mobile device-based wireless healthcare monitoring system was created that can report on a patient's physiological status in real time (Arduino IDE). The technology records the patient's vitals (such as their temperature and heart rate) and sends an SMS alert to the attending physician's mobile device. When compared to the current method, the proposed method has many advantages.

Keywords—Arduino, Heartbeat Sensor, Temperature Sensor, GSM modem

I. INTRODUCTION

The current standard for heart rate monitoring is the Pulse Oximetry Technique. Using a pulse oximeter, you can keep tabs on your heart rate with the use of this method. Using light absorption by blood in capillaries beneath the skin, a pulse oximeter may determine how much oxygen is present in a patient's blood. Light-emitting diodes (LEDs) and photodiodes (PDDs) make up the bulk of a pulse oximeter. The current approach has the drawback of displaying a low reading if used too often, and it is also accurate. The advantages of the new system have been crafted to counteract those of the old one. The primary goal of this technique is to track the patient's vital signs. We used sensors to record the patient's temperature and heart rate, and then transmitted that information to the Arduino's onboard microcontroller. A microcontroller sends the message to the phone's SIM card, which the user receives as an SMS. In this case, a GSM modem is employed for data transmission. A patient's vital signs are recorded by the transmitter and then texted to whoever has been designated as the caretaker, expert, or doctor. Information is transmitted via the GSM module as SMS and displayed on an LCD screen. When it detects an out-of-the-ordinary value, it will sound an alert and send an urgent SMS to notify those around. With the help of a patient monitoring system, a doctor can keep an eye on more than one patient at a time, and track more than one parameter remotely. A healthy heart is indicated by a regular heartbeat. It's useful for diagnosing heart problems in patients. The muscles in a human body receive oxygenated blood from the heart. It transports cellular waste outside the tissue. Exertion and sleep both cause changes in heart rate because of the body's need to rid itself of carbon dioxide and take in fresh oxygen.

Males in their twenties have a resting heart rate of about 70 beats per minute (bpm), while females in their thirties have a resting heart rate of about 75 bpm. With the use of this heart rate monitor, we are able to calculate the heart rate and, by comparing it to normal heart rate, we are able to easily keep tabs on the patient's present heart state. In addition to pulse and respiration rates, temperature is another prominent indicator of health. An average human body temperature reading will be around (98.6 ° F 0.7 ° F), though this can vary depending on the individual's level of activity and the environment in which the reading is taken. Blood veins in the skin expand when a person is overheated, allowing the skin to absorb some of the heat. Also, this is why the individual begins perspiring.

Then, as the sweat evaporates, the body temperature drops. Reduced blood flow to the skin occurs as a result of constricted blood vessels in response to cold, which helps the body maintain a constant core temperature. Therefore, he or she begins to shiver, which is an involuntary, fast contraction of the muscles.

II. LITERATURE SURVEY

A Mobile Health Management for Everywhere You Go: Nowadays, it's crucial to pay attention to both healthcare awareness and the development of wireless mobile technologies. Ubiquitous health care solutions are crucial because they may be accessed at any time and from any location. For the Satisfaction of All Our Requirements In order to observe and analyse ECG [Electrocardiography] waveforms from wearable ECG devices in real time under the protection of Wireless Sensor Network, an Android smart phone device has been deployed as the fourth mobile monitoring terminal. Utilizing a healthcare institution's wireless sensor network allows for greater flexibility in terms of facility location, since it eliminates the need for costly and time-consuming wired connections. As an added measure in monitoring systems, mobile phones are being used as barcode decoders for medical care. As a Means of Bringing Superior Healthcare to All who Need it. A barcode decoder will verify the patient's identity and help them take their medication correctly.

Methodology for Evaluating Medical Parameters Using a Wireless Body Area Network Based on Android: This System Depends on a Number of Critical Variables. They include electrocardiogram, heart rate, HRV, PO2, PL, and fall detection. The Tele-Medical System is a System that Measures and Evaluates These Critical Parameters. There are two separate designers of a (wireless) body network for Android smart phones; this real-time system has many functions. Information is gathered in the (W) Zone using a smartphone's sensors, transmitted to a server, and used for emergency communication with responders and a clinical server. It plays a crucial role in developing efficient and intelligent sensors. Fortunately, this is something for which compensation is possible. In the first ZigBee-based method, sensor nodes collect physiological parameters, process and analyse signal data, and relay the resulting measurement value to the coordinator node. In the second design, sensors are cable-connected to an embedded system. Data transfer to an Android-based Smartphone is accomplished using Bluetooth in both types of systems.

An Apnea Medical Aid: A Real-Time Sleep Apnea Monitor Based on a Single-Lead Electrocardiogram: The Apnea Med Assist sleep apnea monitoring system is a fully automated device that analyses the signals from a patient's electrocardiogram and uses a Support Vector Machine classifier to identify apnea events. Android App is part of this system implementation. Efficient optimization of the ECG processing, as well as the use of techniques to reduce the complexity of the Svc model and the ECG-derived respiratory signals, and the reduction in the number of support vectors all contribute to "Apnea Med assist's" simplified design.

III. BACKGROUND

EXISTING SYSTEM:

Pulse oximetry, the current method for monitoring coronary heart charge, is depicted in Fig. 1. With a pulse oximeter, this method may prove useful for monitoring heart rate. The quantity of light absorbed by blood in the capillaries beneath the skin is proportional to the amount of oxygen in the blood, and this is how a pulse oximeter works. LED and photograph diodes are the primary components of a pulse oximeter. Accuracy and overuse will show signs of inadequate study if the current method is used.

Fig. 1: Pulse Oximeter

PROPOSED SYSTEM:

Proposed Method for tracking the heart rate is based on PhotoplethysmographyTechnique as shown in below Fig.2. This method might be beneficial for tracking the coronary heart beat using photoplethysmography sensor. Photoplethysmography sensor especially includes IR LED and the IR photodiode. And for measuring of temperature, we're the use of temperature sensor DS18B20.

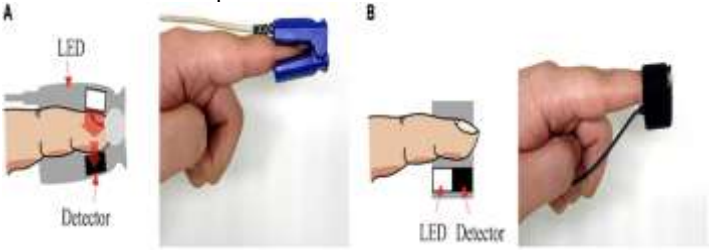

Fig. 2: Heartbeat Sensor and Temperature Sensor

IV. METHODOLOGY

In order to develop the proposed model, following components or devices are required.

HARDWARE COMPONENTS:

Hardware Components that we have used in our project are as below:

- Arduino UNO
- 16 x 2 LCD Display
- Adapter-12v
- Buzzer
- 10Kohm Potentiometer
- Heartbeat Sensor
- Temperature Sensor
- Jumper Wires
- Mobile Phone
- GSM Module

BLOCK DIAGRAM:

The detailed description about Proposed Method is explained in below Fig. 3.

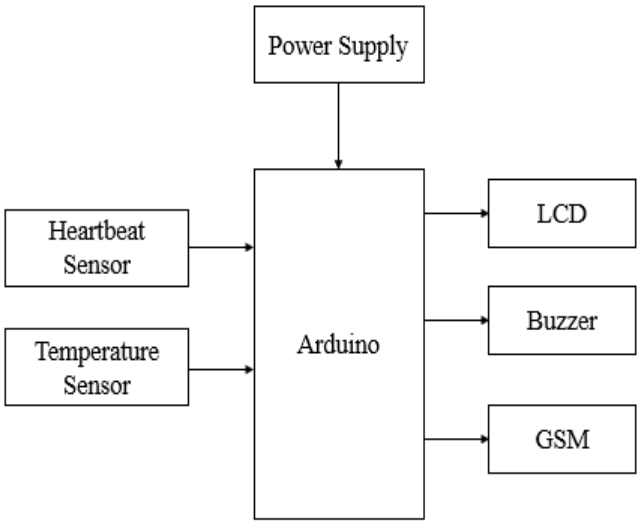

Fig. 3: Block Diagram

ALGORITHM OF PROPOSED METHOD:

In order to implement the proposed method, the following algorithm is used in this paper.

Step1: Collect all the components (Arduino Uno, Heartbeat Sensor, Temperature Sensor, LCD, Buzzer, GSM).
Step2: Arrange all the Components based on the Circuit Diagram.
Step3: Now place the Adapter in the Switch Board and turn on Switch.

Step4: Now upload the code into Arduino by placing one end of cable to USB port of Arduino and other end to Desktop/PC.
Step5: Now place the SIM card into GSM Module.
Step6: Now we have to place fingertip inside the clip.
Step7: We have to observe the Heartrate and Temperature through LCD.
Step8: Whenever our Heartrate goes abnormal, then message will gets displayed on LCD and we will get an SMS alert to our Registered mobile.
Step9: Not only Room Temperature, along with that we can get water temperature, freeze water temperature and also fire temperature through the Temperature Sensor.
Step10: We can observe the temperature of above materials through LCD.

FLOW CHART:

This step-by-step operation of the proposed model is described using flow chart.

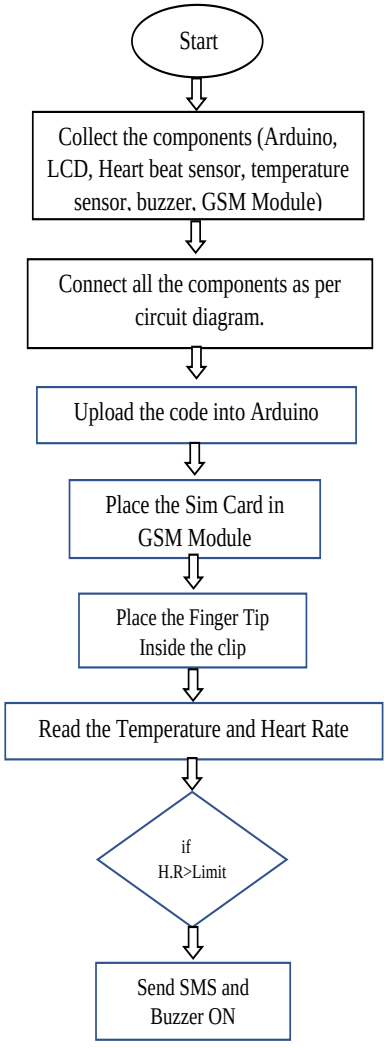

Fig. 4: Flow Chart

CIRCUIT DIAGRAM:

The following procedure is adopted in this project. The Circuit Diagram of the Proposed Method is shown below Fig. 5.

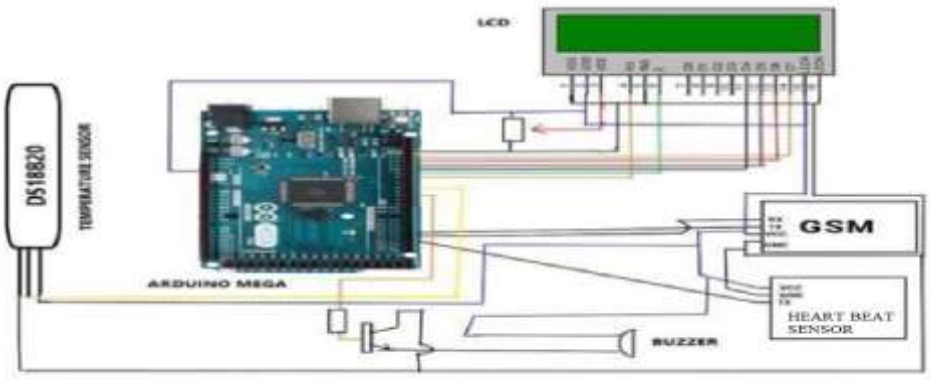

Fig. 5: Circuit Diagram

V. RESULTS & DISCUSSIONS

The average human heart charge is detected by using the IR Sensors and is given to signal conditioning circuit and the coronary heart beat fee is saved within the microcontroller by using the five-pulse components and is displayed on the LCD display screen. We will interconnect all our components as shown in below Fig. 6. Then we will place our fingertip inside clip as shown in below Fig. 7.

This mission provides healthcare authorities to maximize the high-quality and breadth of healthcare offerings through controlling costs. It is likewise lowering the needs of pricey devices to find the coronary heart beat fees. As the population will increase and demand for services increases, the capability to preserve the nice and availability of care, even as successfully managing the human resources, is performed in this undertaking. It is pretty smooth to the patient/regular humans to test their coronary heart beats without the aid of docs and others. Result of Room Temperature and Heartrate are as shown in below Fig. 8. Then we will get SMS Alert to our Registered mobile number as shown in below Fig. 9.

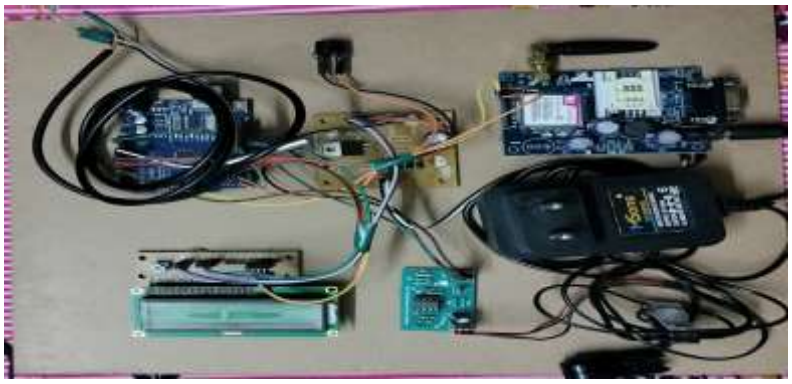

Fig. 6: Interconnection of all components

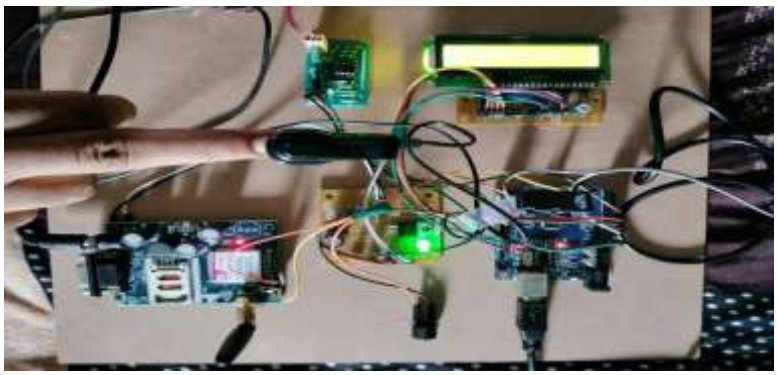

Fig. 7: Placing Fingertip inside clip

Fig. 8: Room Temperature & Heartrate Result

Fig. 9: SMS Alert

Table 1: Multiple Persons Heartrate and Room Temperature

Performance of the proposed model is analyzed based on the following parameters and their assigned values.

Person Name	Status of heartrate				Room Temperature
	Normal	Running	Skipping	Meditation	
Siva	85	150	132	57	38.44
Harshi	75	158	125	54	38.54
Mohan	**110**	172	144	69	37.25
Ramya	72	164	134	52	37.58
Jeshu	87	166	139	55	39.45
Koti	86	148	121	64	39.66
Divya	73	154	120	60	38.49

From the above Table 1, it is understood that Mohan is having high heart rate during normal condition.

Table 2: Temperature for different materials

Material	Temperature
Frozen water	8.94
Fire	51.44
Normal water	31.25

VI. CONCLUSION AND FUTURE SCOPE

Smart healthcare was incorporated in this system so that vitals including a patient's heart rate and the temperatures of their room, water, frozen water, and fire could be tracked remotely. A liquid crystal display is used to make the patient's fitness levels and other data apparent. An alarm message will be sent to the registered range through GSM, and the buzzer may activate, should an emergency occur. This will let the doctor keep tabs on the patient's health status by providing regular updates. For all cases in the advanced healthcare system, the success percentage between observed data and actual data is roughly more than 95%. When compared to the current method, the benefits of the proposed method are greater.

It calculates the Heartrate for multiple persons in various stages like when a person completed his/her running, when a person in normal condition, after completion of skipping and after completion of yoga. Along with that we have calculated the room temperature also. Detailed information is presented in Table 1. In Table 2 it had calculated temperature for different materials like frozen water, normal water and fire.

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