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KUMASI, GHANA

HEART RATE AND TEMPERATURE MONITORING SYSTEM

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PROBLEM STATEMENT

Advancements in Vital Monitoring: Traditional vital checks require hospital visits, specialized equipment, and professional interpretation, but technology is revolutionizing this process.

Traditional Vital Monitoring Methods: Early methods like touch-based fever checks, mercury thermometers, and manual pulse monitoring were useful but time-consuming, less accurate, and lacked continuous tracking.

Technological Evolution: The healthcare field is undergoing remarkable technological evolutions in monitoring vitals. Traditionally, checking vitals such as heart rate, temperature, and blood pressure required hospital visits and specialized equipment. Early methods included touch-based fever checks, mercury thermometers, and manual pulse monitoring, which were time-consuming and less accurate.

Impact of Technological Advancements: Technology has empowered patients to gain basic insights into their health, encouraging awareness of potential health issues and promoting healthier lifestyles.

METHODOLOGY

System Requirements

To solve the problem of monitoring and displaying heart rate and body temperature, the system must:

- Measure Heart Rate – Using a heart rate sensor
- Measure Body Temperature – Using a temperature sensor
- Process Sensor Data – Using a microcontroller
- Display the Data – On an appropriate screen

Components

- Heart rate sensor
- LM35 temperature sensor
- Microcontroller (Arduino Uno)
- 500ohms Potentiometer
- LM044 20x4 Alpha Numeric LCD

Arduino Hardware Connections

Using Proteus software, attach the pulse sensor and temperature sensor to the Arduino, connect the 20X4 LCD, and power supply through the 5V and GND pins.

Code

The code initializes the LCD, defines pin assignments, and sets up global variables for measurements. It includes functions for setup, loop, and displaying welcome messages. The code measures heart rate and temperature, detects heartbeats, and displays animated dots while measuring.

Below is the code with which the Arduino was programmed:

```
#include <Wire.h>

#include <LiquidCrystal.h>


LiquidCrystal lcd(8,7,6,5,4,3);
```

```
const int pulsePin = A0;
const int tempPin = A1;

void setup() {
  lcd.begin(20, 4);

  lcd.setCursor(0, 0);
  lcd.print("Hello!");
  lcd.setCursor(0,1);
  lcd.print("Checking your vitals");
  delay(1000);
  lcd.setCursor(0,2);
  unsigned long startTime = millis();
  while (millis() - startTime <1000) {
   lcd.print(".");
   delay(100);
  }
  lcd.clear();
}

void loop() {

  float pulseValue = analogRead(pulsePin);
  int bpm = map(pulseValue, 0, 1023, 40, 180);

  float tempValue = analogRead(tempPin);
  float temperature = (tempValue * 5.0 * 100.0) / 1024.0;
```

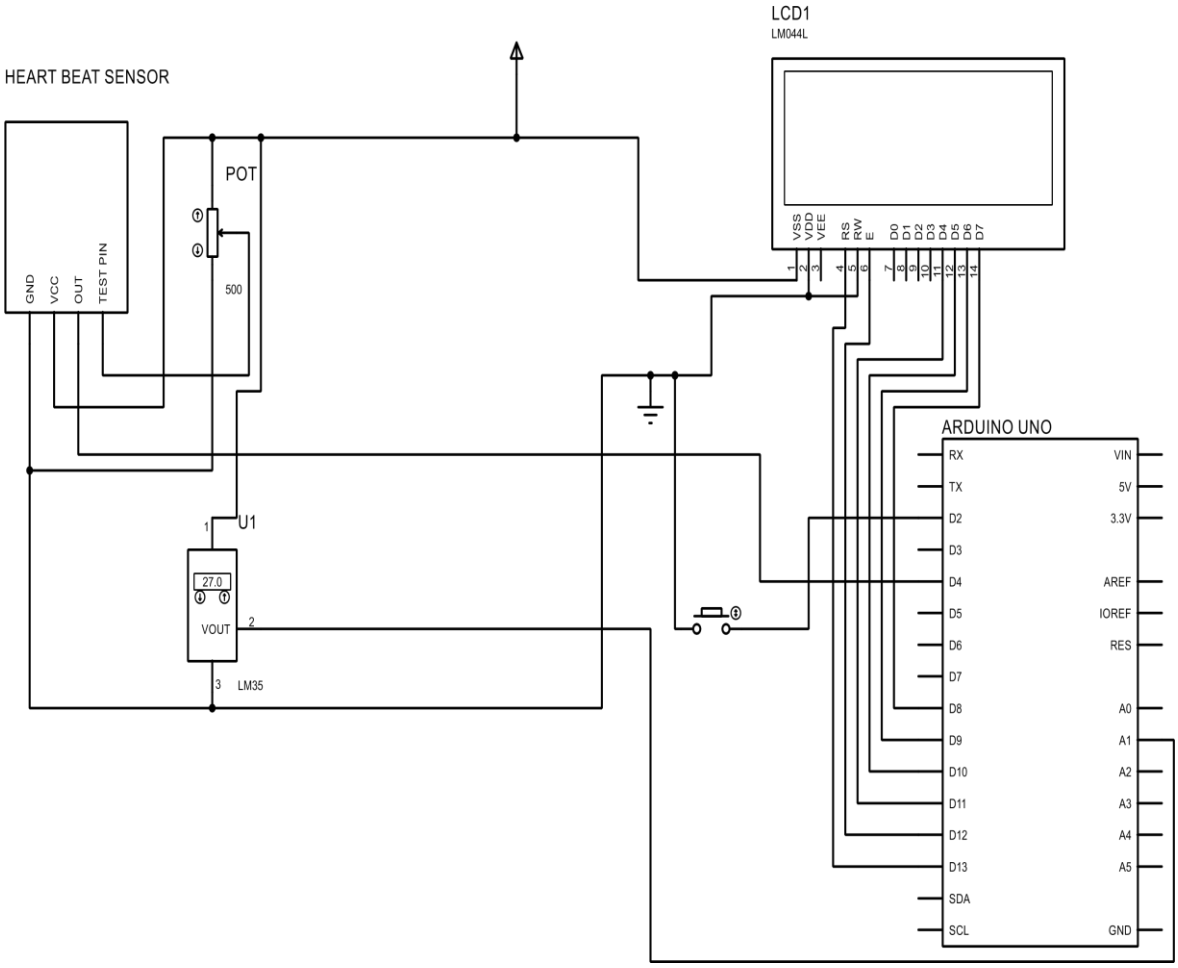
```
  lcd.setCursor(0, 1);
  lcd.print("Heart Rate: ");
  lcd.print(bpm);
  lcd.print(" BPM");

  lcd.setCursor(0, 2);
  lcd.print("Body Temp: ");
  lcd.print(temperature);
  lcd.print(" C");

  delay(2000);
}
```

SCHEMATIC DIAGRAM

The schematic diagram below illustrates the connections bet



ween the components.

DISCUSSION AND CONCLUSIONS

Challenges

- The simulation cannot accurately replicate the human heart waveform.
- The software lacks a built-in heart sensor, requiring external sources with limitations.

Improvements

Integrate a more advanced heart model or connect the simulation to real-time biometric data for better accuracy.

Conclusion

Sensor-based temperature and heart rate monitoring devices provide a quick, precise, and practical means of monitoring vital signs. These sensors, integrated with microcontrollers, gather and analyse health data in real time, enhancing remote patient monitoring and personal healthcare. This technology marks a significant step toward more efficient and accessible medical solutions.

REFERENCES

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