SMART HELMET SYSTEM USING GSM & GPS FOR ACCIDENT DETECTION

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1. Introduction

Motorcycle accidents often lead to severe injuries or fatalities due to delayed emergency response. This Smart Helmet project helps detect accidents automatically and sends location details to emergency contacts. It enhances rider safety using IoT and embedded systems technologies.
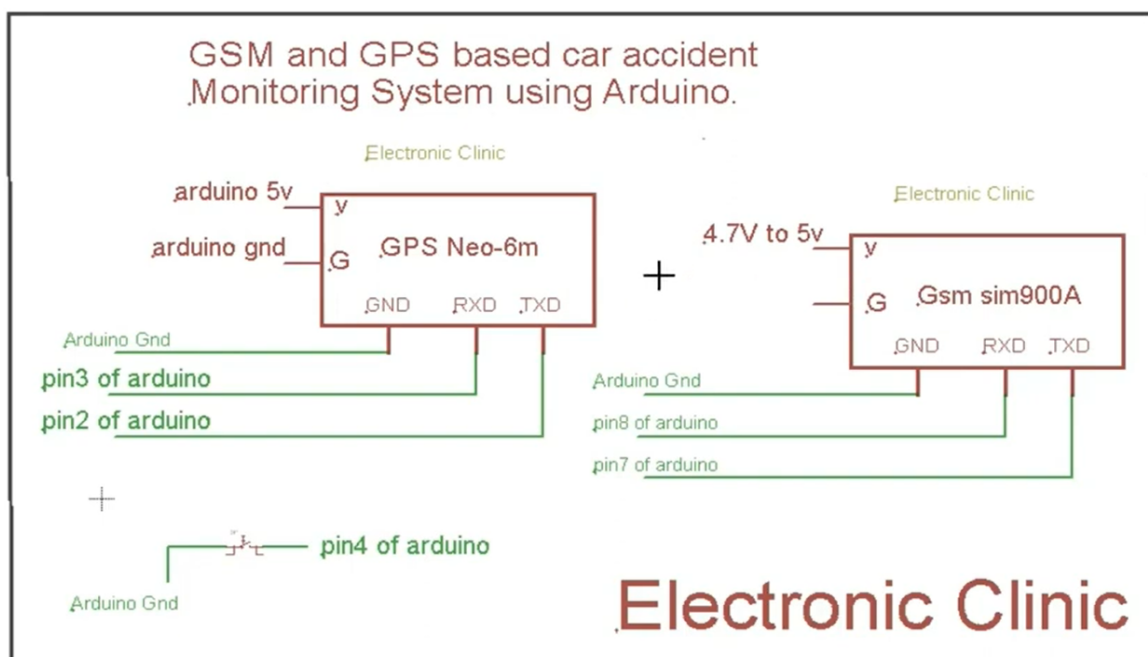
2. Literature Review

Many researchers have used GPS & GSM technologies for accident detection, but integrating the system into a helmet increases reliability since riders may not access mobile phones during an emergency.
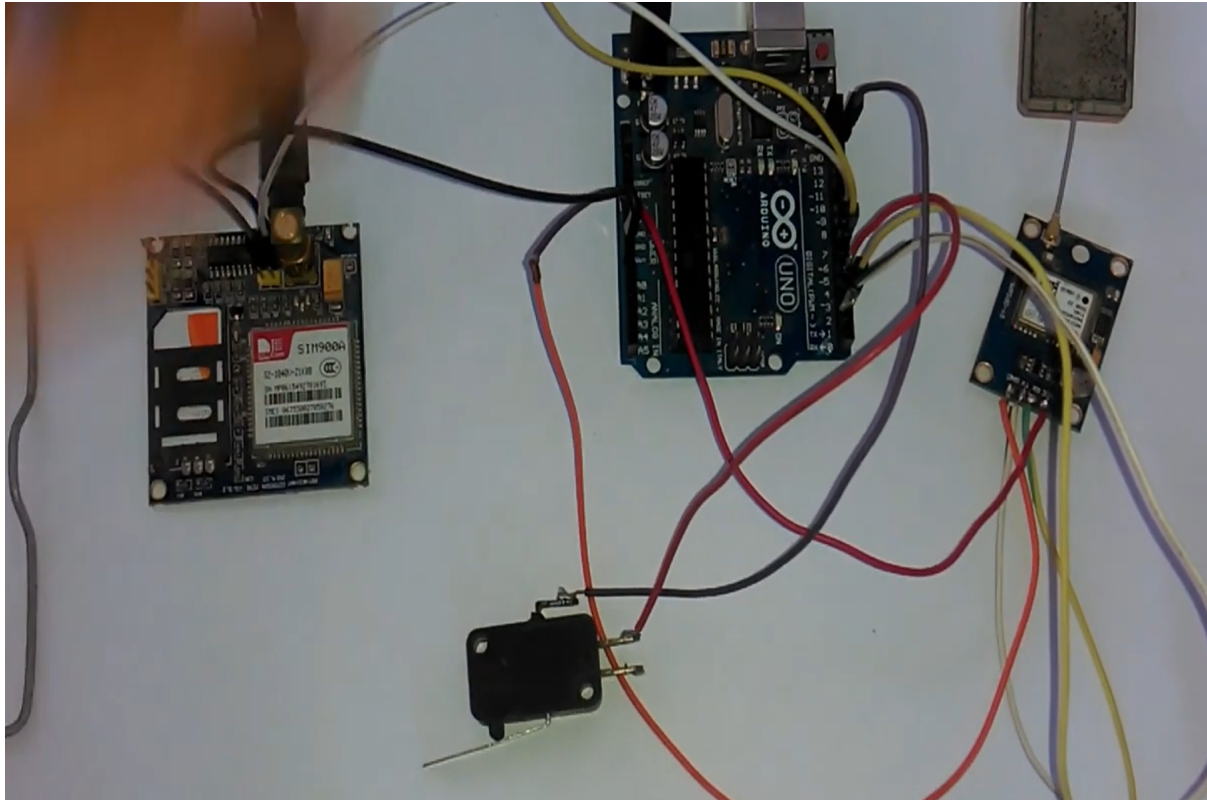
3. System Design

The design mainly consists of Arduino UNO as controller, a tilt sensor to detect accident, GPS for location detection, and GSM to send alert messages.

4. Circuit Diagram & Explanation

The tilt sensor sends a digital signal to Arduino pin 4. When triggered, Arduino requests current location from GPS module through pins 2 & 3, then sends SMS via GSM module on pins 7 & 8. Common Ground ensures stable communication.

5. Hardware Implementation

The prototype hardware is mounted inside the helmet and functions automatically without rider interaction.

6. Working Principle

1. Impact detected by tilt sensor
2. Arduino fetches GPS coordinates
3. GSM sends SMS with location
4. LED indicates alert transmission

7. Advantages & Applications

• Contactless emergency alerting
• Accurate accident location
• Portable and helmet■friendly design
Applications: Rider safety, military vehicles, smart transport

8. Results and Testing

Testing proved that SMS was successfully delivered within seconds with correct GPS coordinates when accident was simulated.

9. Conclusion

This Smart Helmet is a cost■effective solution to enhance rider safety and enable timely medical assistance. Additional features like alcohol detection can be integrated.

10. Appendix: Source Code

```
#include <SoftwareSerial.h>
#include <TinyGPS++.h>

static const int RXPin = 2, TXPin = 3;
static const uint32_t GPSBaud = 9600;
TinyGPSPlus gps;

SoftwareSerial gpsSerial(RXPin, TXPin);
SoftwareSerial gsmSerial(7, 8);

int tiltSensor = A1;
int limitSwitch = 4;
int led = 13;

String messageText;

void setup() {
  Serial.begin(9600);
  gpsSerial.begin(GPSBaud);
  gsmSerial.begin(19200);
  pinMode(tiltSensor, INPUT);
  pinMode(limitSwitch, INPUT_PULLUP);
  pinMode(led, OUTPUT);
  delay(5000);
}
```

11. Viva Questions

Q1. What is the main objective of this project?
A. To detect accidents and alert emergency contacts with GPS location.

Q2. Why use Arduino?
A. Arduino simplifies sensor integration and communication modules.

Q3. Why use GPS?
A. It provides real■time accurate location.

12. References

1. Arduino.cc Documentation
2. TinyGPS++ Library
3. WHO Road Safety Report