

ET3491- ES and IoT DESIGN PROJECT

FALL DETECTION IN ELDERLY PEOPLE

III YEAR ECE B

TEAM MATES:

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DESCRIPTION OF THE PROJECT:

This system aims to identify sudden falls in elderly people and trigger an alert mechanism to notify caregivers, improving response time and enhancing safety. The MPU6050 sensor collects acceleration and gyroscope data, which is processed using an Arduino Uno to determine whether a fall has occurred.

KEY COMPONENTS USED IN THE PROJECT:

HARDWARES USED:

ARDUINO UNO

MPU6050

SOFTWARE USED: ARDUINO IDE

Detection Method

- The system continuously monitors acceleration and orientation data.
- Threshold-based logic is applied: a sudden drop in acceleration coupled with an abrupt change in orientation indicates a fall.
- Gyroscope data helps **minimize false alarms** by distinguishing normal movement from actual falls.

Potential Enhancements

- Wireless Communication
- Machine Learning Integration
- Wearable Design

ADVANTAGES:

1. Enhanced Safety
2. Real-Time Monitoring

3. Cost-Effective
4. Customizable Sensitivity
5. Portable & Wearable
6. Potential for AI Integration

PROGRAM:

```
#include <Wire.h>

#include <MPU6050_light.h>

MPU6050 mpu(Wire);

int buzzer = 9; // Buzzer connected to pin 9

bool fallDetected = false;

void setup() {

    Serial.begin(9600);

    Wire.begin();

    mpu.begin();

    mpu.calcOffsets(); // Calibrate sensor

    pinMode(buzzer, OUTPUT);

    Serial.println("MPU6050 Initialized");

    delay(1000);

}

void loop() {

    mpu.update();


    // Read acceleration and gyroscope values

    float acceleration = sqrt(pow(mpu.getAccX(), 2) + pow(mpu.getAccY(), 2) +
pow(mpu.getAccZ(), 2));

    float gyroChange = sqrt(pow(mpu.getGyroX(), 2) + pow(mpu.getGyroY(), 2) +
pow(mpu.getGyroZ(), 2));


    Serial.print("Acceleration: ");

    Serial.print(acceleration);
```

```

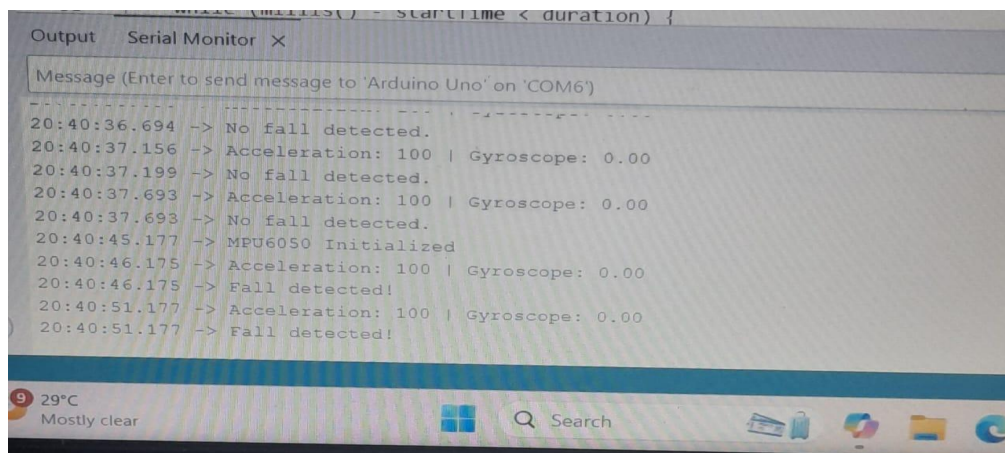
Serial.print(" | Gyroscope: ");
Serial.println(gyroChange);

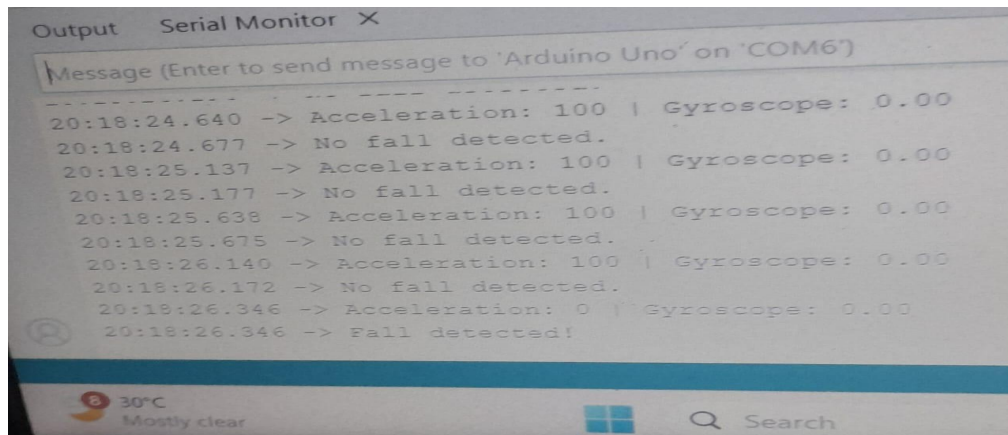
// Multi-stage fall detection
if (acceleration < 0.5 || gyroChange > 40) { // Adjusted thresholds
    Serial.println("Fall detected!");
    digitalWrite(buzzer, HIGH);
    fallDetected = true;
    delay(5000);
    digitalWrite(buzzer, LOW);
} else {
    if (fallDetected) {
        Serial.println("User has recovered, no fall detected.");
        fallDetected = false;
    } else {
        Serial.println("No fall detected.");
    }
}

delay (500);
}

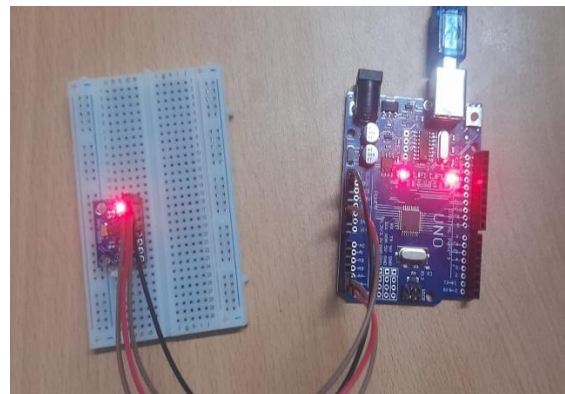
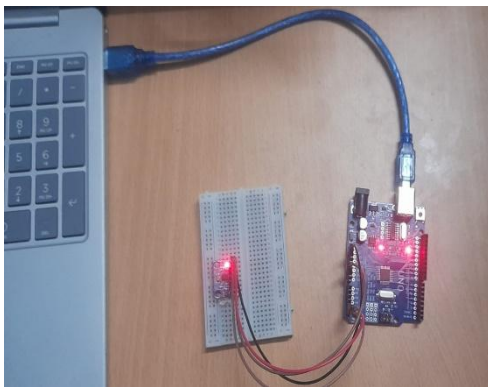
```

OUTPUT:





CIRCUIT CONNECTION:



RESULT:

- Accurate Fall Detection
- Immediate Alerts
- False Alarm Reduction

