DRONE-PCB

Project Overview

This project involves designing and developing a drone PCB containing various components essential for its operation and control. The primary components include WS2812B LEDs for visual indicators, GY-521 accelerometer and gyroscope module for stability control, Raspberry Pi Zero GPIO for processing power, and an Arduino Pro Micro for additional control logic. The PCB also includes an HC-12 wireless module for communication, a Logic Level Bidirectional converter for interfacing different voltage levels, and essential passive components like resistors.

Objectives

- To design a PCB capable of controlling a drone using multiple sensors and control modules.
- To integrate communication capabilities for remote control and data transmission.
- To ensure proper power regulation and interfacing between different components.

Components

1. **WS2812B LEDs**:
    - Individually addressable LEDs used for visual feedback and indicators.
2. **GY-521**:
    - A module containing the MPU-6050 accelerometer and gyroscope for flight stability and orientation detection.
3. **RPi Zero GPIO**:
    - General-purpose input/output pins of the Raspberry Pi Zero used for various control signals and interfaces.
4. **Header-Male-2.54_1x3**:
    - Connectors used for interfacing different modules and sensors with the PCB.
5. **Logic Level Bidirectional Converter**:
    - Used for safe interfacing between components operating at different voltage levels.
6. **4.7K Resistor**:
    - Pull-up resistor used in I2C communication lines for proper signal integrity.
7. **Arduino Pro Micro**:
    - Microcontroller used for additional processing and control logic.
8. **HC-12**:
    - A wireless communication module used for remote control and data transmission.

Schematic Design

The schematic design involves creating circuits for the following sections:

1. **Power Distribution**:

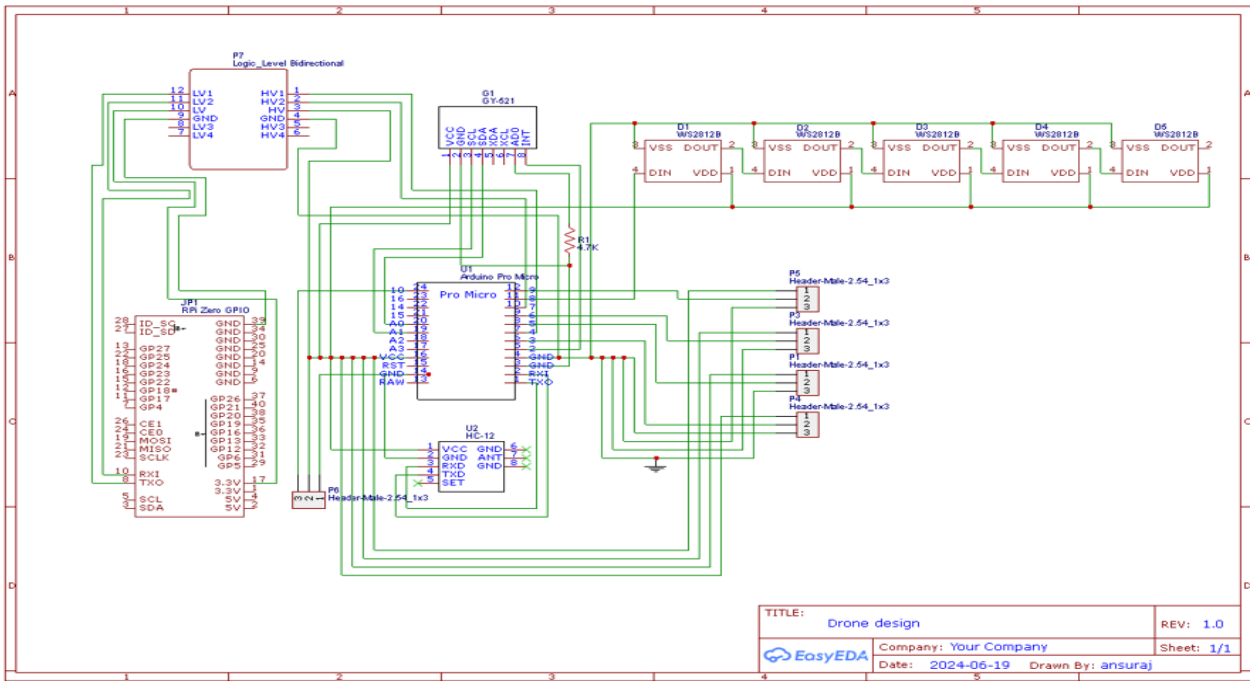
    - Ensuring proper power supply to all components including the RPi Zero, Arduino Pro Micro, WS2812B LEDs, and GY-521 module.
2. **Control Logic**:
    - Using the Arduino Pro Micro for handling control signals and interfacing with the RPi Zero GPIO.
3. **Sensor Integration**:
    - Connecting the GY-521 module for real-time orientation and acceleration data to maintain drone stability.
4. **Communication**:
    - Integrating the HC-12 module for wireless communication.
5. **Visual Indicators**:
    - Utilizing WS2812B LEDs for visual feedback and status indicators.

PCB Layout

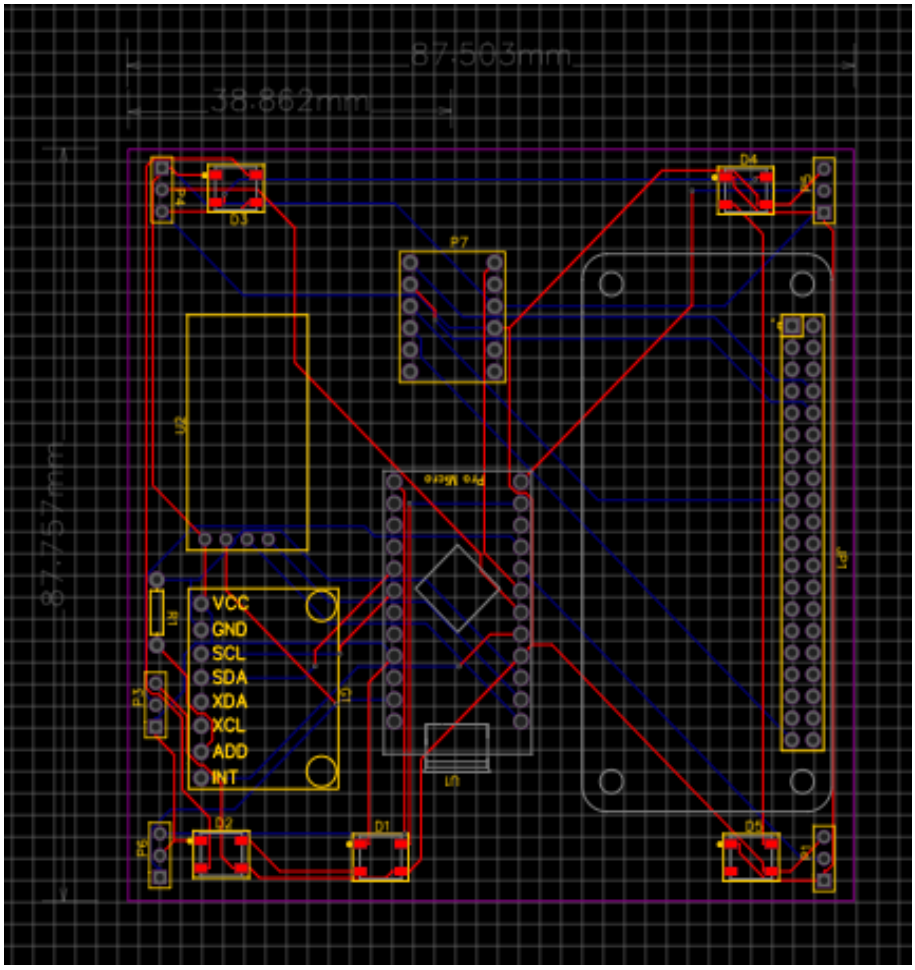
The PCB layout was designed using EasyEDA, ensuring proper spacing and routing for each component to prevent interference and ensure reliable connections. The layout includes:

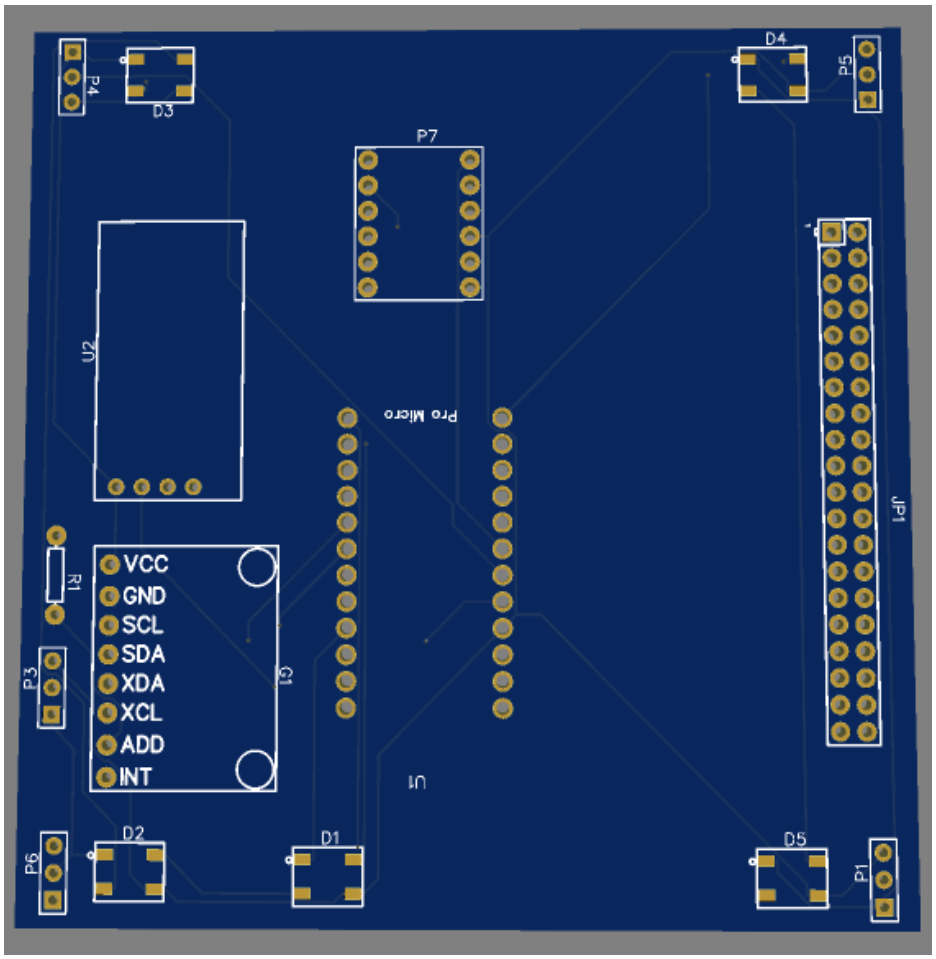
- **Power Distribution Network**: Efficient routing of power lines to ensure stable voltage supply to all components.
- **Signal Routing**: Careful routing of control and communication lines to minimize interference.
- **Component Placement**: Strategic placement of components to facilitate easy connections and maintain signal integrity.

-SCHEMATIC



-PCB LAYOUT:-





Software Implementation

The software involves programming the Raspberry Pi Zero and Arduino Pro Micro to control the drone's operation. The main functionalities include:

- **Flight Control**:
  - Using data from the GY-521 module to maintain stability and control the drone's movements.
- **Communication**:
  - Establishing a communication link with the HC-12 module for remote control.
- **LED Control**:
  - Programming the WS2812B LEDs for status indicators and visual feedback.
- **Data Processing**:
  - Processing sensor data and control signals on the Raspberry Pi Zero and Arduino Pro Micro.

Conclusion

This project successfully demonstrates the design and implementation of a drone PCB integrating various essential components for control, stability, and communication. The thoughtful selection of components and careful PCB design ensures reliable performance and ease of use. The integration of visual indicators and remote communication capabilities enhances the functionality and usability of the drone.