Institute of Electrical Engineering and Electronics

3rd Year Project Presentation

QuadCopter Design Using PID Controller

Empowering Flight with ESP32, MPU6050, and Smart App Control

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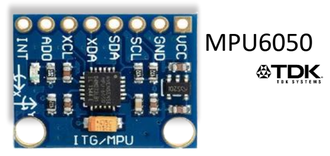
Abstract:

This Project is about an innovative quadcopter design using PID Controller, incorporating the ESP32 microcontroller and MPU6050 sensor. A Custom mobile app was built which is the central control interface, empowering users to navigate the skies easily. Witness the convergence of cutting-edge technology and creative engineering as we revolutionize drone control in this captivating project.

Hardware Material:

Esp32 by Espressif



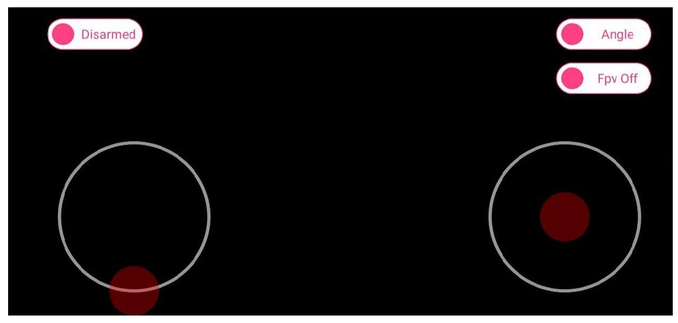
MPU6050 TDK

Brushless DC Motors

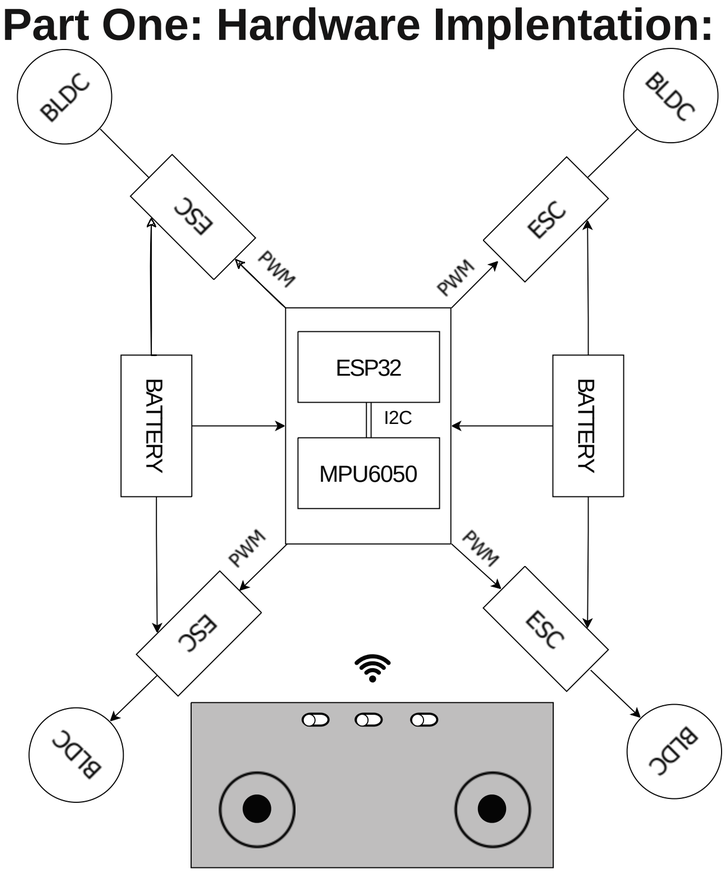
Electronic Speed Controller

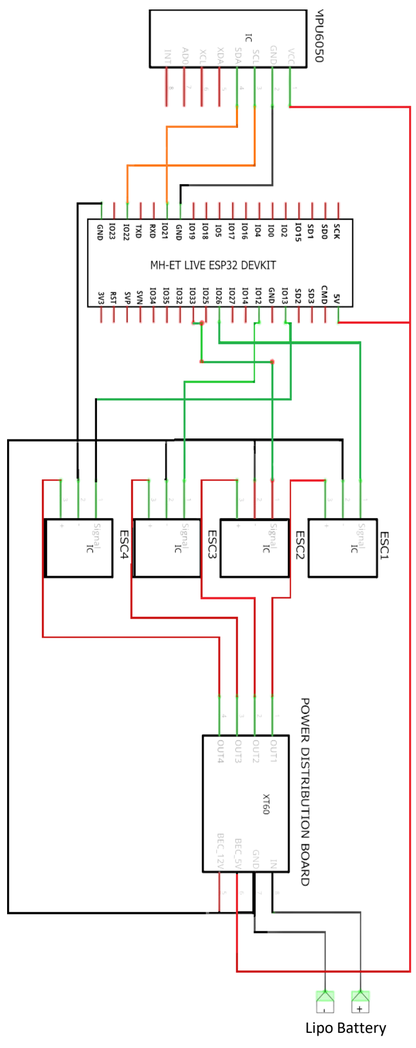
XT60 Power Distribution Board

CONTROL APP:



Part One: Hardware Implentation:

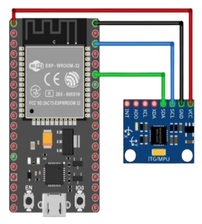




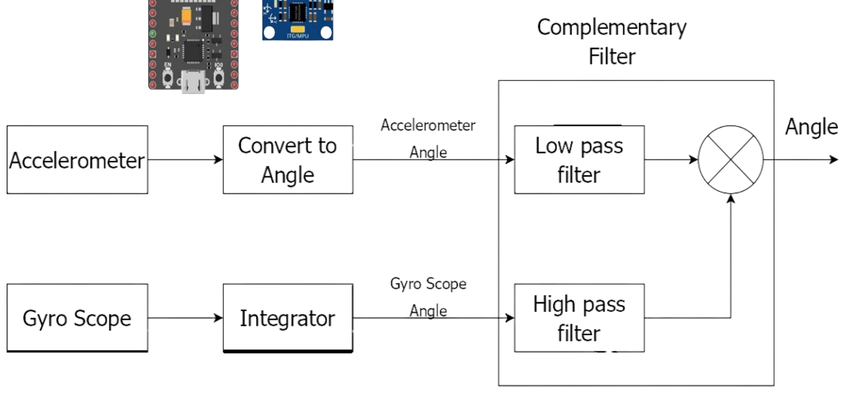
-In the figure above:

- MPU6050 is connected to ESP32 using I2C
- The Electronic Speed Controller are connected to PWM pins
- Data were send to ESP32 via WIFI

Part Two: Software Implementation



MPU6050 :



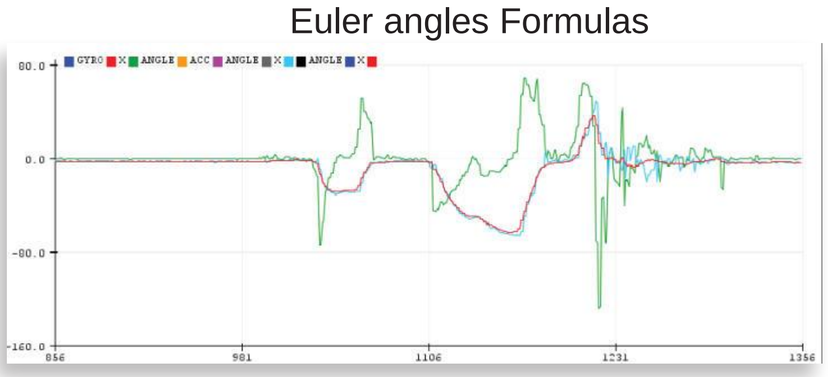
MPU6050 Block Diagram

$$angleAccX = arctan\left(\frac{accY}{\sqrt{accZ^2+accX^2}}\right)\times 57.29578$$

$$angleAccY = -arctan\left(\frac{accX}{\sqrt{accZ^2+accY^2}}\right)\times 57.29578$$

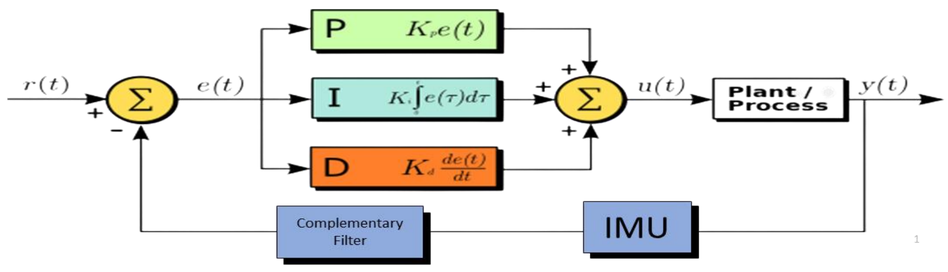
$$angleAccZ = arctan\left(\frac{\sqrt{accX^2+accY^2}}{accZ}\right)\times 57.29578$$

Euler angles Formulas

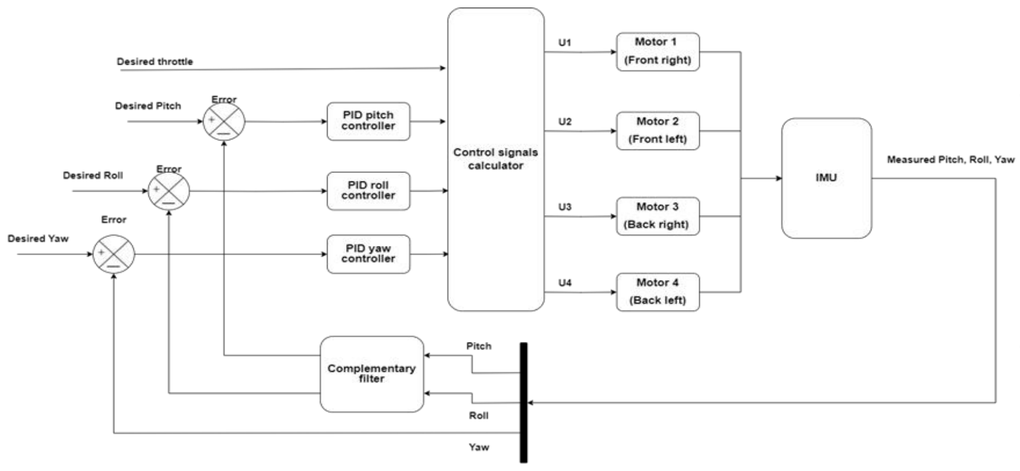


Angles Graph

PID CONTROLER:

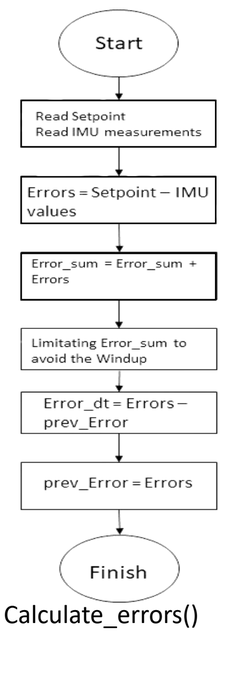


PID Block Diagram

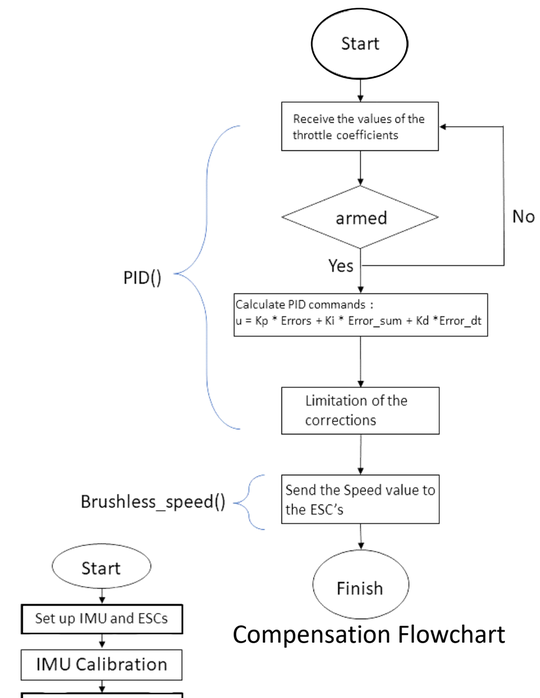


Overall Block Diagram

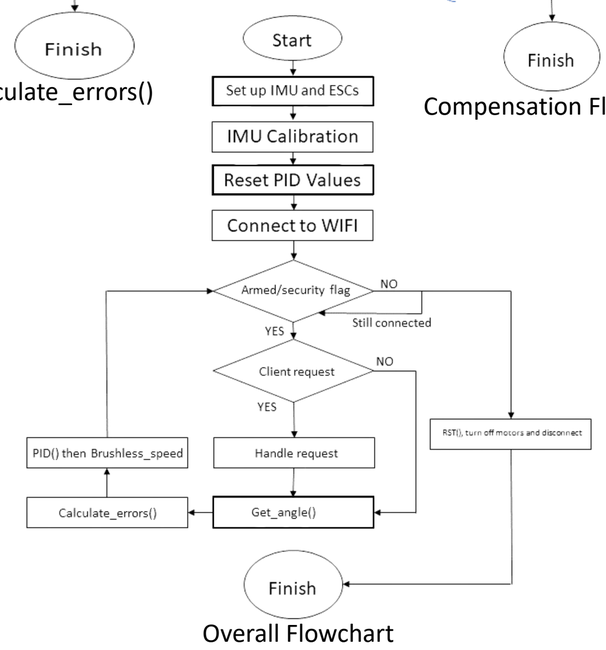
Flowcharts :



Calculate_errors()



Compensation Flowchart



Overall Flowchart

Part Three: Result

Conclusion:

Our project showcases a significant achievement in developing a stable and controllable drone. Integrating the ESP32 microcontroller and MPU6050 sensor, we achieved remarkable stability and precise control. Future improvements may involve adding an altitude sensor, GPS integration, or implementing image processing for advanced positioning.