User Manual

skyTech Dynamics

Falcon Nano Drone

1. Introduction

The Falcon Nano is a lightweight, Wi-Fi enabled drone designed for indoor and outdoor exploration. Ideal for hobbyists, students, and researchers, it offers precise control through a mobile application. The system supports remote flight management, sensor based stabilization and basic automation features accessible via an easy to use app.

2. Drone Components

| Part	Description
Propellers (x4)	Generate lift and propulsion to maneuver the drone in various directions.
Brushless Motors (x4)	Power the propellers for smooth and efficient flight.
Main Frame	Durable structure that holds all components securely.
ESP32-DevKit-V1 Controller Board	Central unit for processing commands, Wi-Fi communication, and sensor data integration.
Electronic Speed Controllers (ESC x4)	Regulate motor speeds for stable control and power distribution.
MPU6050 Gyro Sensor	Provides acceleration and gyroscope data for flight stabilization.
Battery	Rechargeable power source for the drone and electronics.
LEDs (x2)	Status indicators for power, connection, and alerts.
300 Ohm Resistors (x4)	Protect circuits and manage current flow to LEDs and sensors.
Male Connectors	Facilitate secure wiring between components.

ESP32-DevKit-V1
Controller Board

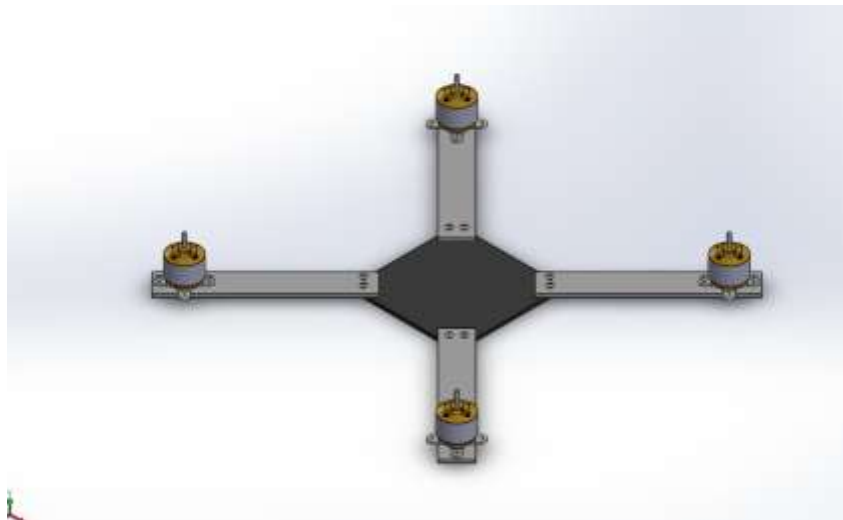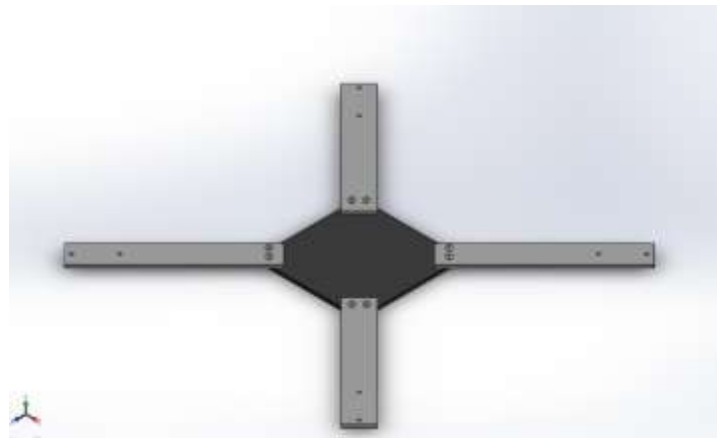Propellers

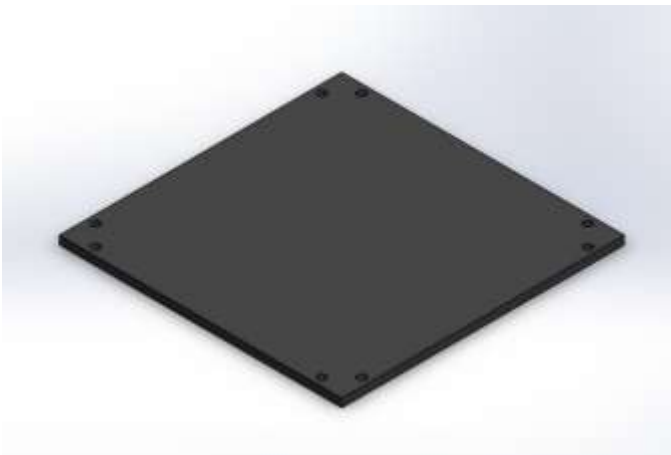Electronic Speed
Controllers

MPU6050 Gyro
Sensor

Brushless Motors
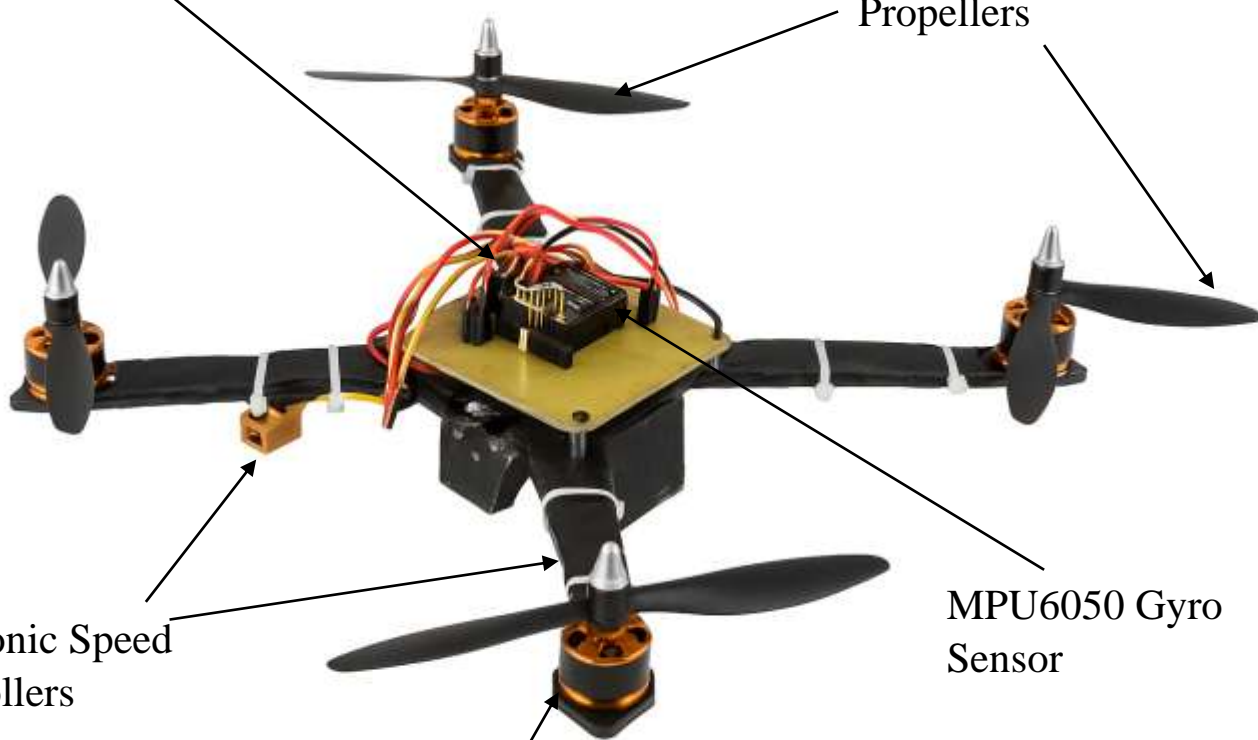
3. Assembly Instructions

❖ Build the Frame

- Secure the four arms to the central plate using provided screws and connectors.
- Mount the motors on the ends of each arm with mounting brackets.

❖ Install Propellers

- Fasten each propeller to the motor shafts, ensuring two rotate clockwise and two counterclockwise for balanced thrust.

❖ Mount the Electronics

- Place the ESP32-DevKit-V1 board on the central frame using spacers and screws.
- Connect signal wires from the ESCs to the designated GPIO pins on the ESP32.
- Wire the MPU6050 gyro sensor to the I2C pins for stabilization data.
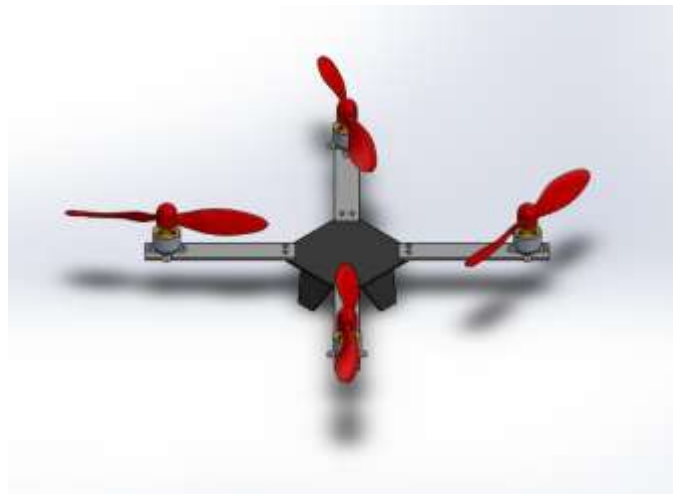
❖ Connect Power Supply
- Attach the battery to the power input on the ESP32 board.
- Verify polarity (positive to VCC, negative to GND) before activation.

❖ Wire Peripherals
- Solder the 300 Ohm resistors in series with the LEDs and connect to ESP32 pins for status indication.
- Use connectors for all wiring to ensure modularity.

❖ Setup Wi-Fi Interface

- Program the ESP32 to create an access point (AP mode) using code examples from the Arduino library.

4. Safety Guidelines

- Fly in wide open spaces clear of people, animals, vehicles, and structures.
- Never operate in inclement weather, high winds, or near power infrastructure.
- Verify battery charge and all connections before powering up.
- Maintain distance from rotating propellers to avoid injury.
- Power down and disconnect the battery post-use.
- Steer clear of prohibited zones like airfields or public gatherings.

5. Use Precautions

- void adding weight that could strain motors or reduce flight time.
- Limit session durations to prevent overheating of components.
- Protect the ESP32 from electrostatic discharge during handling.
- Shield the device from liquids, dust, and extreme heat/cold.
- Only modify code if familiar with programming to avoid instability.

6. Operating Guide

❖ Power On
- Insert the battery; the ESP32 will boot, and LEDs will illuminate to show readiness.

❖ Establish Connection
- Join the Sparrow Micro Wi-Fi network on your device

❖ Calibrate Sensors
- Use the app's calibration tool to balance the MPU6050 gyro for optimal stability.

❖ Flight Operations
- Throttle – Adjusts the drone's height.
- Yaw – Rotates the drone clockwise or counterclockwise to change direction.
- Pitch – Moves the drone forward or backward.
- Roll – Slides the drone left or right for lateral movement.

❖ **Shutdown**
- Reduce throttle to land safely.
- Use the interface to stop motors, then disconnect the battery

7. Cleaning and Upkeep

- Clean the frame with a soft, dry cloth to remove dust.
- Examine propellers for damage or wear before flights.
- Tighten all screws and check connectors regularly.
- Store in a cool, dry environment.
- Recharge the battery with the specified charger only.
- Update ESP32 firmware through the app for enhancements.

8. Technical Specifications

Parameter	Specification
Controller	ESP32-DevKit-V1-30pin Wi-Fi Microcontroller
Power	Rechargeable Li-Ion Battery
Propeller Size	3 inches
Connectivity	Wi-Fi 2.4 GHz
Motor Type	Brushless DC Motors, controlled via ESCs
Control Range	Up to 20-30 meters (Wi-Fi dependent)
Duration	8-12 minutes per charge
Sensors	MPU6050 Accelerometer/Gyroscope

9. Problem Resolution

No Wi-Fi network visible

ESP32 not powered or code issue

Fix: Check battery, reprogram firmware

Motors fail to spin

ESC wiring error or low power

 Fix: Inspect connections, recharge battery

Erratic flight

Sensor misalignment

Fix: Recalibrate MPU6050 via code or dashboard

Brief runtime

Battery degradation

Fix: Replace battery or optimize code efficiency

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Thank You

Thank you for choosing **SkyTech Dynamics**.
Fly safely and enjoy your **Falcon Nano Drone** experience!