
NRF24_MultiWii_Drone

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NRF24-MULTIWII-DRONE

- *Introduction*

1.1 Introduction

This documentation provides an overview of the NRF24 MultiWii Drone project, including its design, components, and step-by-step tutorials for building both the drone and its controller. It is structured to help users understand the project from its initial concept to the final assembly, including the challenges faced and solutions implemented in various prototypes.

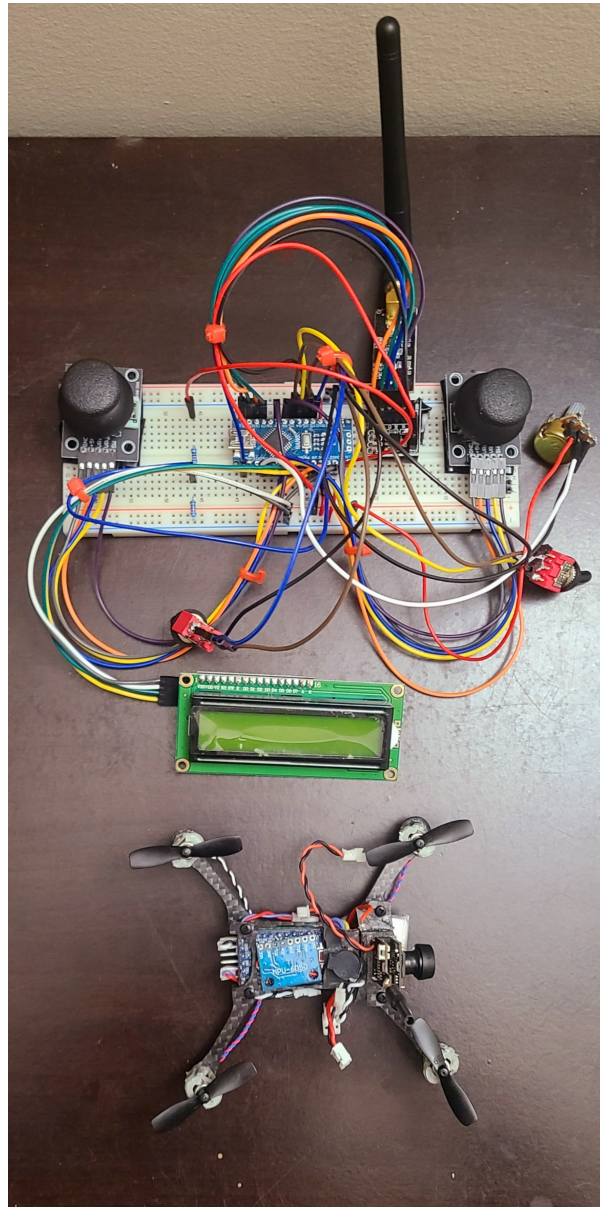
To learn more about the different parts of the project, explore the sections below:

1. **Prototypes** Learn more about the various prototypes and design changes of the drone. See the full details in the *Prototypes* section.
2. **Drone Tutorial** Learn more about the step-by-step tutorial for building the NRF24 MultiWii Drone. See the full guide in the *Drone Tutorial* section.
3. **Controller Tutorial** Learn more about the step-by-step tutorial for building the NRF24 MultiWii Drone Controller. Check out the complete guide in the *Controller Tutorial* section.
4. **Reflection** See the personal reflection on the project, including the motivation, challenges, and lessons learned. Read the full reflection in the *Reflection* section.

1.2 Prototypes

This page will provide an overview of the design of the prototypes that will start with the initial prototype and the reasons behind the design changes that lead to the next prototype.

1.2.1 Prototype One



The first prototype is the initial attempt at building the NRF24-MultiWii-Drone. However, there were weaknesses in the design that led to failure.

The main issues are listed below:

1. Too heavy

- Motor fasteners that were improvised using drywall anchors were too heavy (Motors will be glued directly in the next prototype).
- The wires were too thick using 24AWG.

- The perforated board was too large with lots of unused space.
- The soldered pin connectors (NRF24L01, perforated board, buzzer) are too heavy (These will be removed and wires will be soldered directly in the next prototype).
- 1N5819 diodes are too heavy (Using 1N4148 surface mount diodes in the next prototype).
- Using velcro is too heavy (Use super glue instead).

2. Small Propellers/Less Thrust

- Using 2 blade (faster) 37mm propellers (Use 4 blade propellers for more thrust)

3. Conductive Carbon Fiber Frame

- Possible short circuits when mounted on the carbon fiber frame (Use kapton tape for better insulation with the electrical components).

4. Poor Solder Connections

- Damaged solder tips (oxidized) resulted in poor solder connections with possible decrease in conductivity and connectivity between components and possible short circuits.
- Replace solder tips and properly resolder the connections in the next prototype.

5. Need Soldered Controller with Enclosure

- The controller uses a breadboard with weak connections and unmanaged wiring. Requires a proper enclosure with soldered connections for better reliability.

Additional materials and replacement needed for the next prototype:

1. Arduino Pro Mini Atmega 328P 5V/16MHz (un-soldered)
2. MPU6050 from DFRobot (un-soldered)
3. **Motor Encoder Circuit**
 - Surface mount 1N4148 diodes
 - Solder tips + high quality thin solder
4. Larger 4 blade propellers
5. Kapton tape for insulation
6. Copper Sheet for proper grounding

1.3 Drone Tutorial

This page will show the step-by-step tutorial for building the NRF24 MultiWii Drone.

1.3.1 Materials

1. Arduino Pro Mini Atmega328P 5V/16MHz (x1)
2. MPU6050 Gyroscope/Accelerometer (x1)
3. NRF24L01+ Transceiver Module (x1)
4. Lilypad 5V Buzzer Speaker (x1)
5. Micro 600TVL FPV Camera with 5.8GHz 25mW Transmitter (x1)
6. 6x15mm 0.8mm Shaft Coreless Motors 19000KV (x4)
7. 1N4148 Surface Mount Diodes (x4)

8. S12300DS Surface Mount N-Channel MOSFET (x4)
9. 10KOhm Surface Mount Resistor (x4)
10. 4 Blade 31mm Propellers (x4)
11. LiPO Battery 3.7 220mAH + charger + JST Battery Connector (x1)

Common

1. 30AWG Wires
2. Perforated Board (8x2cm)
3. Copper Sheet
4. Kapton Tape
5. Super Glue
6. Carbon Fiber Sheet
7. Mini USB to TTL Serial Converter Adaptor
8. M2 Nylon Hex Spacer Standoff Kit with Male and Female Screw Nut etc.
9. FPV Goggles

1.3.2 Frame

TBA

1.3.3 Electrical

1.3.4 Software

Libraries needed * RF24 * LIQUID_CRYSTAL_I2C * TimerFreeTone_v1.5

1.4 Controller Tutorial

This page will show the step-by-step tutorial for building the NRF24 MultiWii Drone Controller.

1.4.1 Materials

1. Arduino Nano Atmega328P 3V (x1)
2. NRF24L01+PA+LNA Transceiver Module with 8-pin Breakout Adapters (x1)
3. 16x2 I2C LCD (x1)
4. Joystick Module for Arduino Dual Axis Sensor (x2)
5. 3-pin Switch (x2)
6. 100KOhm Potentiometer (x1)
7. Power Switch (x1)
8. Power Connector (x1)
9. Charging Connector (x1)
10. 3.7V LiPO Battery 1000mAH (x2)

1.4.2 Frame

TBA

1.4.3 Electrical

1.4.4 Software

Libraries needed * RF24 * LIQUID_CRYSTAL_I2C * TimerFreeTone_v1.5

1.5 Reflection

TBA