Drone Challenge (UAV)

Dinosaur Rescue- 2025 UAV Drone Challenge TSA

Mountain House, California

2025

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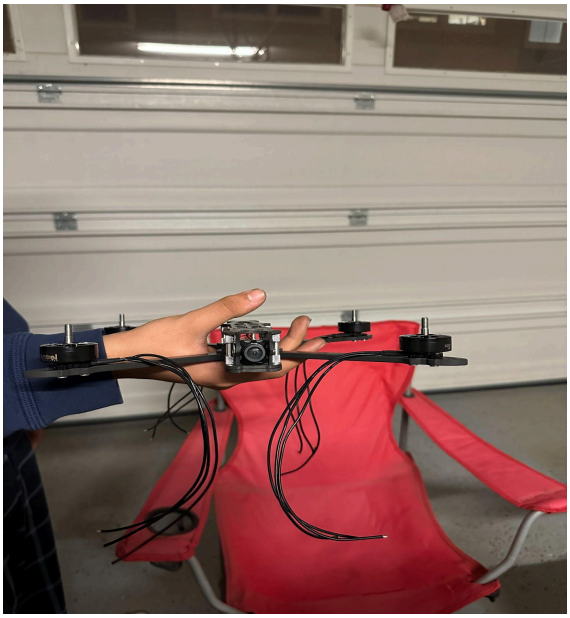
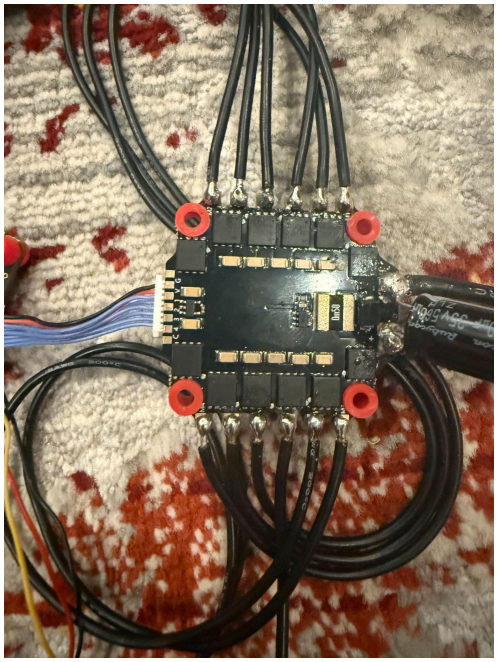
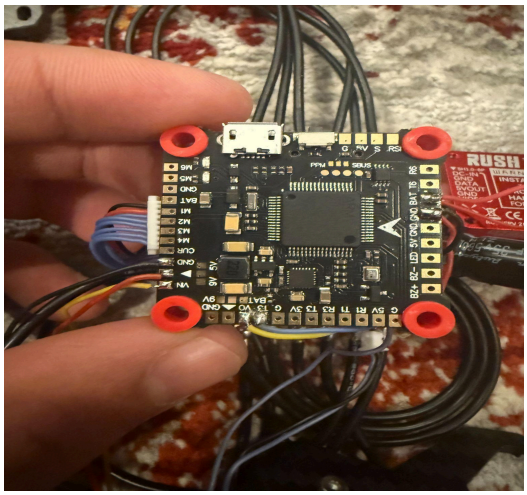
1. Photo logs:



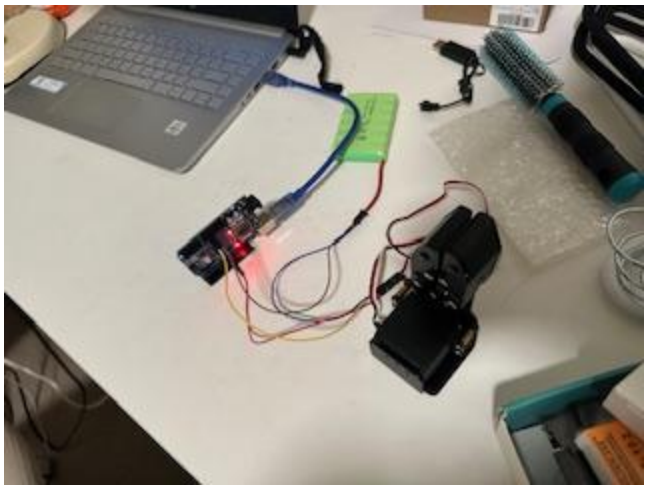
This is the dry fit of the Drone, mounting of the camera, VTX, motors, and frame completed





To the there is the completion of the soldering motors, Battery pin, and the capacitor. To the

right, connection of the Flight controller to the ESC is secured, then soldered the camera, VTX, and ELRS receiver for the controller.

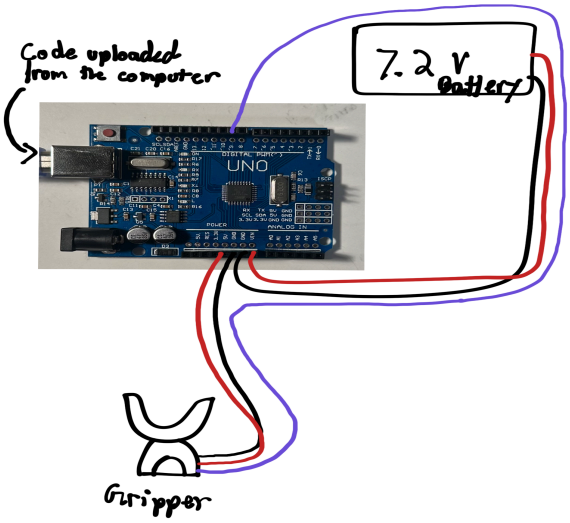


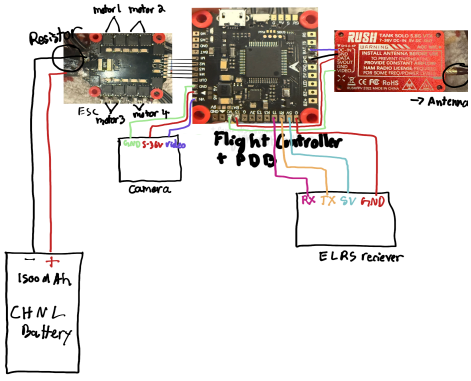
In the picture above, the connection of Arduino Uno r3 is complete through the 7.2V battery and the LDX-335MG Servo of the claw(gripper) which will be later attached to the drone.

2. Wiring Diagram

FC + ESC + other components of drone

Gripper+Arduino:





3. Engineered Drawings

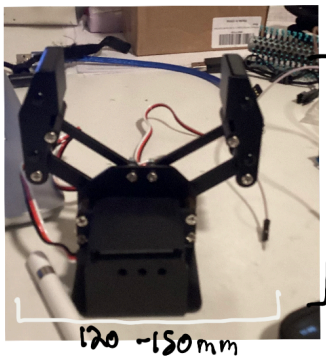
Not drawn to scale

Parts

1) Drone frame
2) Propeller + Battery
3) Claw

Frame type: Quadcopter
Frame size: 295mm (motor-motor)
Frame material: 3K Carbon Fiber

Propeller size: 7-inches
Propeller material: hard plastic



200-250 mm

Type: digital servo
Claw frame: ABS plastic + metal
Model: LDX-335 MG

4. Programming Explanation/Description

1. First, we checked that the flight controller and drone receiver were properly connected. The protocol we used to communicate between the flight controller and the receiver was SBUS.
2. We then went to the Receiver tab in Betaflight Configurator to make sure the proper protocol, SBUS, was selected.
3. Then, just to make sure that each and every control is mapped to the appropriate channel, we moved our transmitter's control sticks to test the receiver. Flight Mode Configuration: Betaflight has several flight modes, according to the pilot's competence, to help drone stabilization. We configure the following modes:
4. Angle Mode: The drone automatically stabilizes itself in this mode, making it ideal for beginners.
5. Angle Mode: This is a beginner-friendly mode where the drone automatically stabilizes itself.
6. Horizon Mode: This mode lets us do flips while still maintaining some self-leveling.
7. Acro Mode: This is for advanced control where the drone doesn’t self-stabilize, giving us full control over flips, rolls, and more.
8. We used our transmitter's switches to select between these modes.
9. Motor Configuration: We tested the motors in the Motors tab to make sure they were spinning in the correct direction clockwise and counter-clockwise. This is important for proper movement of the drone.
    - Motor 1 (front-left): Clockwise
    - Motor 2 (front-right): Counter-clockwise
    - Motor 3 (rear-left): Counter-clockwise
    - Motor 4 (rear-right): Clockwise
    - Receiver Configuration (Control Mapping):
10. The Throttle controls altitude, moving the drone up and down.
11. The Yaw controls the drone's rotation, left and right.
12. The Pitch controls the forward and backward movement of the drone.
13. The Roll controls sideways movement, left and right.

14. After having mapped the channels, we verified that moving the joysticks on the transmitter would generate the appropriate movement command of the drone.
15. Testing the Controls: Finally, we armed the drone and tested it in a safe environment. We moved the sticks on the transmitter:
16. Moving the pitch stick forward made the drone move forward, while moving it backward made the drone go backward. Moving the roll stick left and right made the drone go sideways-left or right. The yaw stick controlled the rotation of the drone.

Sources: https://oscarliang.com/flight-controller/

https://blog.unmanned.tech/how-to-setup-any-betaflight-flight-controller/

Connections between Aurdino and Servo Gripper:

Wiring:

1. Servo Motor Connections:
    - GND (Black or Brown wire): Connect to Arduino GND.
    - VCC (Red wire): Connect to Arduino 5V (or an external power supply for high-torque servos).
    - Signal (Yellow, Orange, or White wire): Connect to Arduino Digital Pin 9.

    Code:

```
#include <Servo.h>  // Include the Servo library

Servo myServo;  // Create a servo object

void setup() {
  myServo.attach(9);  // Attach the servo to pin 9
}

void loop() {
  myServo.write(0);    // Move to 0 degrees
  delay(1000);         // Wait 1 second
  myServo.write(90);   // Move to 90 degrees
  delay(1000);         // Wait 1 second
  myServo.write(180);  // Move to 180 degrees
  delay(1000);         // Wait 1 second
}
```

5. Bill of Materials

CHNL Battery	LINK(Amazon)
Battery Charger	LINK(Amazon)
Propellers	LINK(Aliexpress)
Brushless Motors	LINK(Aliexpress)
Drone Claw	LINK(Amazon)
ELRS Controller	LINK(Amazon)
Frame	LINK(Aliexpress)
Arduino Uno	LINK(Amazon)
Battery for servo	LINK(Amazon)
Video Transmitter	LINK(Aliexpress)
Camera	LINK(Aliexpress)
Antenna	LINK(Aliexpress)
Screws	LINK(Aliexpress)
Jumper wires	LINK(Amazon)

6. Drone Flight Regulations:

Drone Flight Regulations (Milpitas, CA)

Federal (FAA Rules)

- Register drones **over 250g**.
- Fly **under 400 feet** in uncontrolled airspace.
- No flying **near airports** without approval.
- Keep drones **in sight** at all times.
- No flying **over people, cars, or emergency areas**.

California & Milpitas Rules

- **No flying over private property** without permission.
- **Illegal near wildfires** (fines + jail time).
- **No drones in Milpitas parks** without approval.

7. Resources:

Flight controller to Beta Flight:

Setup Guide | Betaflight
How to Setup Betaflight Firmware on FPV Drones - Oscar Liang
How To Setup Any Betaflight 🐝 Flight Controller

Servo to Aurduino:

Servo Motor Basics with Arduino
Arduino Servo Motors : 5 Steps (with Pictures) - Instructables
Servo.h, where can I get the detail? - Programming - Arduino Forum

Connecting gripper and battery:

Omnibus F4 V3 All in One Board Hook Up Instructions

8.Work Log:

Date:	Who:	How long:	Work Done:
Dec 14th	Rushil, Shashank, Shiv	2 Hours	Selected parts for drone
Dec 21st	Rushil, Shashank, Shiv	1 Hour	Received parts for the drone and did a dry fit
Dec 28th	Rushil, Shashank, Shiv	1.5 Hours	Tested Electronics, updated flight controller
Jan 4th	Rushil, Shiv	2.5 Hours	Soldered motors and battery lead to ESC, connected ESC to flight controller
Jan 11th	Rushil, Shashank	1.5 Hours	Tested and oriented motors in Betaflight
Jan 18th	Rushil, Shashank, Shiv	1 Hour	Soldered VTX, Camera, and ELRS receiver to flight controller
Jan 25th	Rushil, Shashank, Shiv	2.5 Hours	Got VTX and Camera working, got a view of the camera on the monitor
Feb 1st	Rushil, Shashank, Shiv	2.5 Hours	Bound ELRS to the radio transmitter, and finished configuring everything in Betaflight