Mini Low powered Drone

Kian McIntosh

2/21/24

Overview

Paper airplanes are embedded deep into the childhood of many of us. Folding these complex origami devices and then throwing them hoping they fly, I want to use paper airplanes as a base for a miniature drone device. It would attach itself to the paper airplane and then would provide a motor and control surfaces for it to fly. There would be the ability to mount a camera to record or stream footage of the drone. This would utilize toroidal propellers to reduce noise and make it usable indoors. It would be very agile and could be used as a cool indoor or outdoor rc plane. I plan to use a small inexpensive lithium ion battery that's connected to an ESP32(figure 1) that is connected to mini digital linear actuators(figure 2) that control the plane's control surfaces. The ESP32 will have an option to add a camera but it will severely impact the fight time. The whole thing will be controlled by an app on your phone either using Blynk or another such app. If Blynk becomes too unreliable and there is room in the budget then a custom rc receiver and controller will be added and a pico will be used instead. The manual input will be the use of the controller. The automatic part will be the built in gyroscope that stabilizes flight. The actuation will be the mini digital linear actuators. The whole device will provide a tail to whatever plane is used. The modularity with lanes is so that you can optimize it for speed, stall speed, or efficiency(figure 3).

List of Components by Functional Category

Output Display

- LED indicator for power level on the plane, when its blinking your battery is low

Manual User Input (for interaction with the user)

- Controller to fly the plane around

Automatic Sensor (for response without user input)

- Gyroscope stabilization to control the plane.

Actuators, Mechanisms & Hardware

- Mini Digital Linear Actuators

Logic, Processing, and Control

- ESP32 wifi board using Blynk

Appendix

Figure 1: ESP32 Wifi board

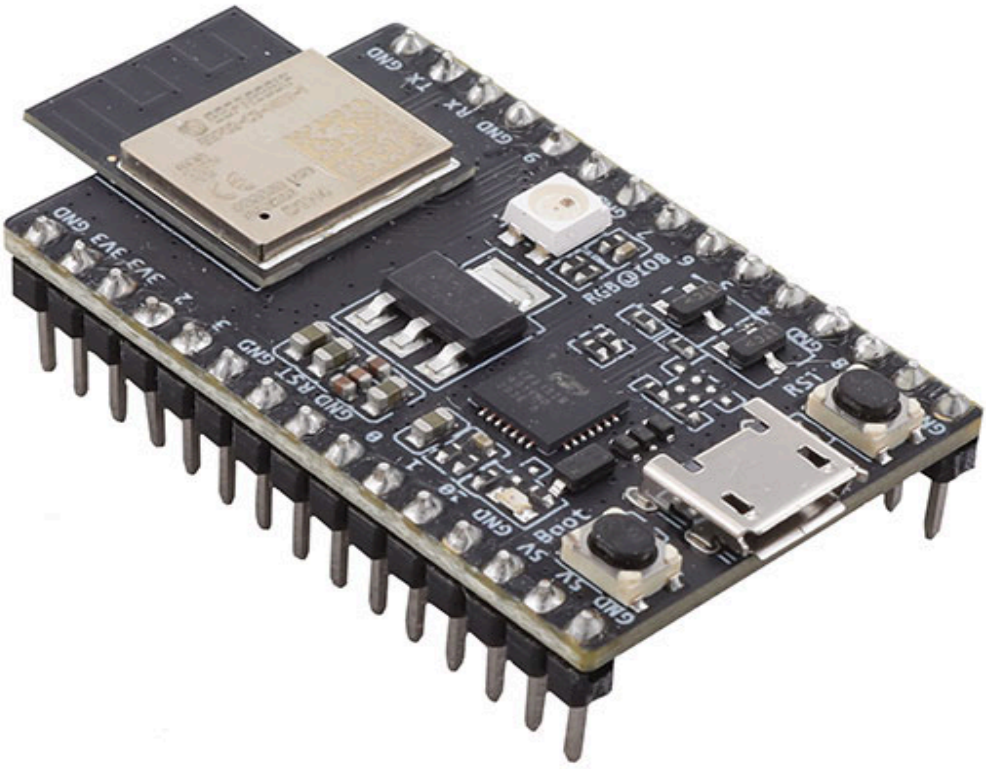


Figure 2: mini digital linear actuator, will be used with the ESP32 to control the tailerons.

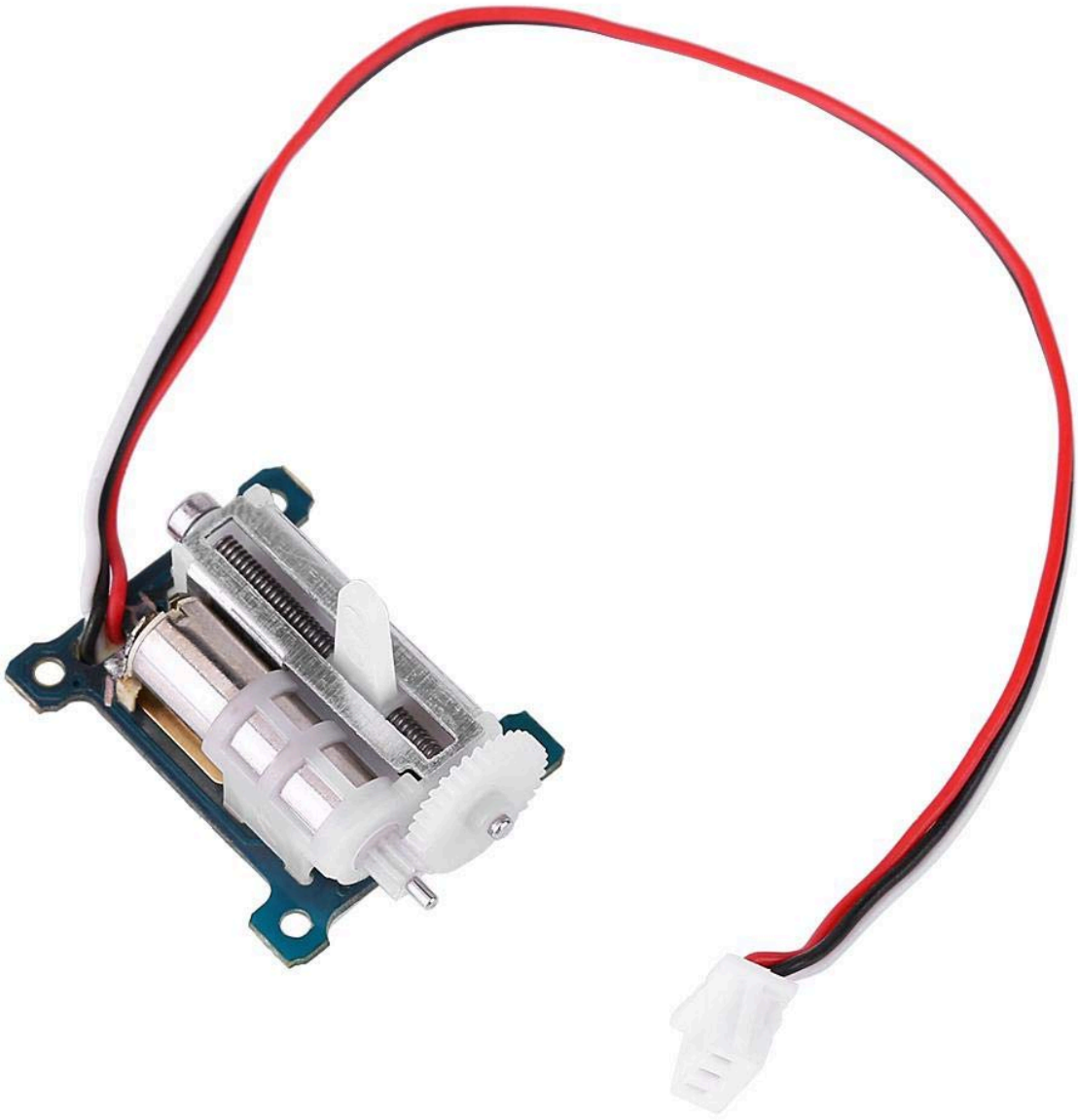


Figure 3: Rough sketch of the design.

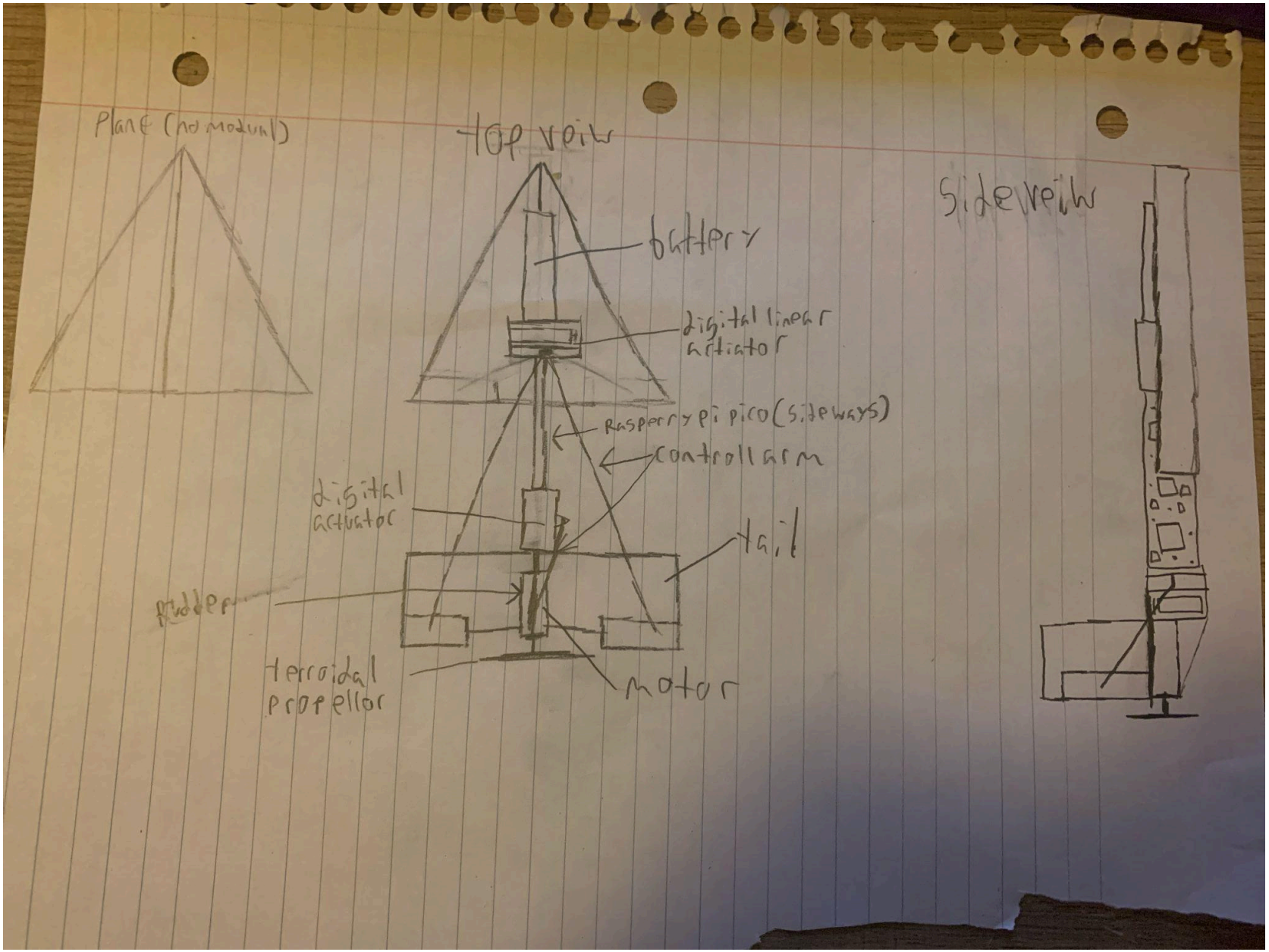
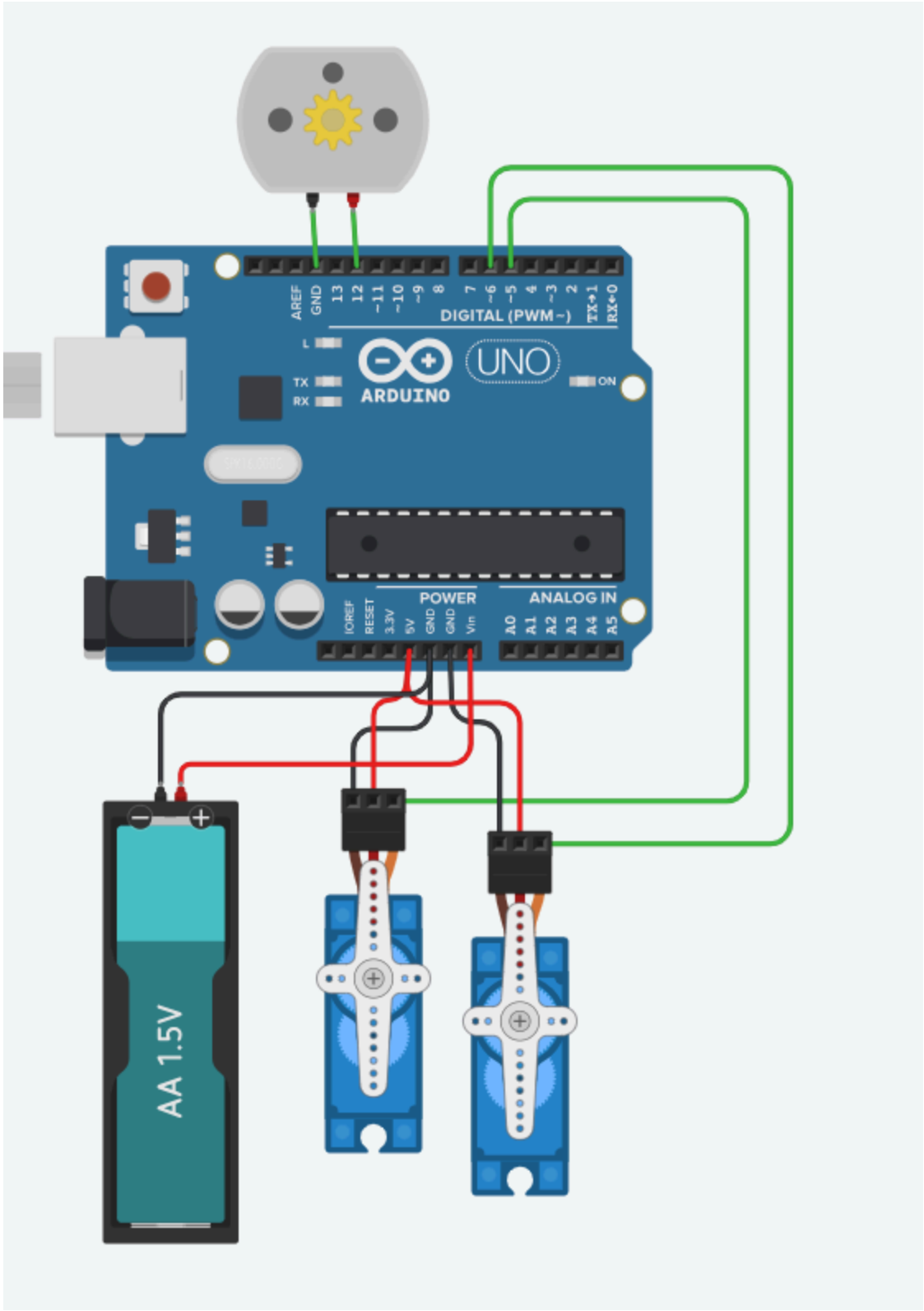

Plane (no modual)
top veiw
battery
digital linear actiator
Rasperry pi pico (sideways)
controll arm
digital actuator
tail
rudder
terroidal propellor
motor
side veiw

Figure 4: Rough circuit diagram(arduino used in place of esp)(servos used in place of linear actuators)(AA battery used in place of Lithium battery)


AREF
GND
13
12
~11
~10
~9
8
7
~6
~5
4
~3
2
TX→1
RX←0
DIGITAL (PWM~)
L
TX
RX
ARDUINO
UNO
ON
POWER
ANALOG IN
IOREF
RESET
3.3V
5V
GND
GND
Vin
A0
A1
A2
A3
A4
A5
AA 1.5V