

TRISELECT

(**TRI**pedal **I**ntegrated **S**ystem for
Experimental **C**ontrol and **T**esting)

Emmett
Osborne

01

Background

Background

- **Overview:** 3 legged remote control robot! 3 years in the making...
- **Primary Goal:** Implement an ESP8266 as a master controller, receiving data from 7 external IMU sensors via I2C, as well as commands from a wireless transceiver to control actuation of 18 servos driven by three separate servo drivers in order to smoothly control a tripodal robot called TRISECT.
- **System Functionality:** Remote control input directly controls 18 servos to get a 3 legged robot to stand whilst relying on IMU data from 7 sensors.
- **Purpose:** Learn ESP8266 RTOS SDK, practice Master/Slave Topology, demonstrate proficiency in Microcontrollers & Imbedded systems.

02

Development Process

Development Process

01 FLOWCHARTS

Designed software architecture based on desired hardware design.
Designed circuit diagrams and custom PCBs in Altium.
Designed high level flowcharts.
Designed detailed flowcharts.
Finalized circuit diagram and flowcharts.

02 HARDWARE

3 years and 7 major revisions...
3D printed joints & body designed in Solidworks.
Carbon Fiber Rods & M Hex Screws.
4 Custom PCBs.
1 microcontroller, 7 IMUs, 3 servo drivers, 1 radio transceiver, 4 voltage regs, 1 I2C multiplexer.
18 servos driving 9 joints on 3 legs.
8 18650 LiPo batteries (+2 in remote)

In total: 4 PCBs, 8 batteries, 9 carbon fiber rods, 18 servos, 69 printed parts, 106 wires, 274 screws.

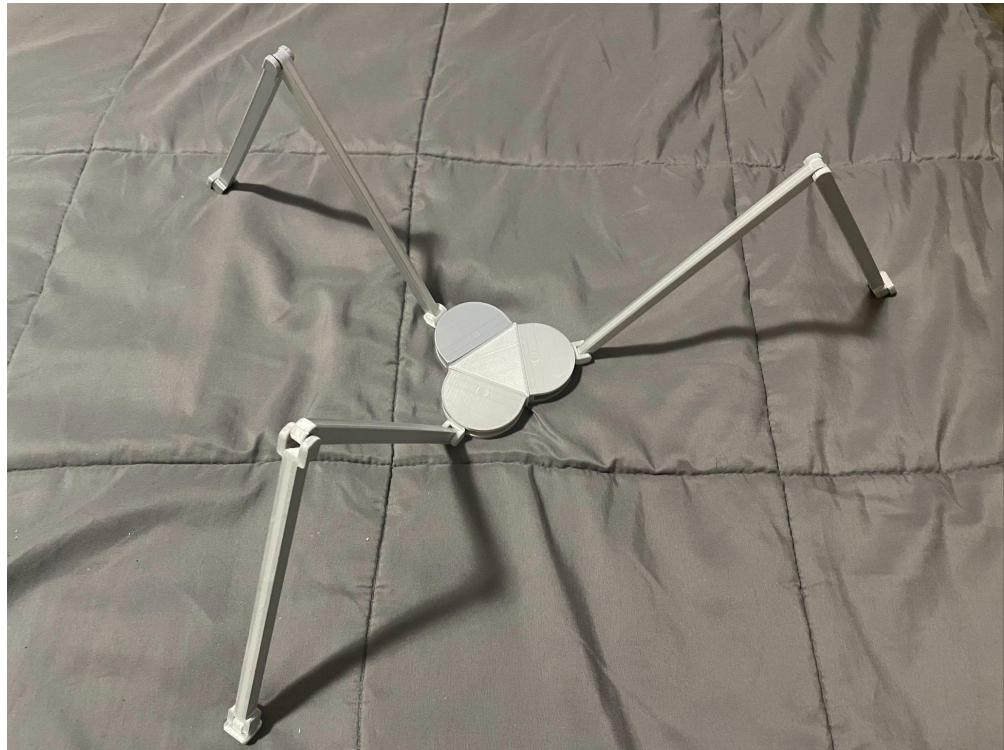
03 SOFTWARE

ESP8266 RTOS SDK
Developed with Platformio
All custom software in C, plus two C libraries (NRF24L01 & PCA9685).

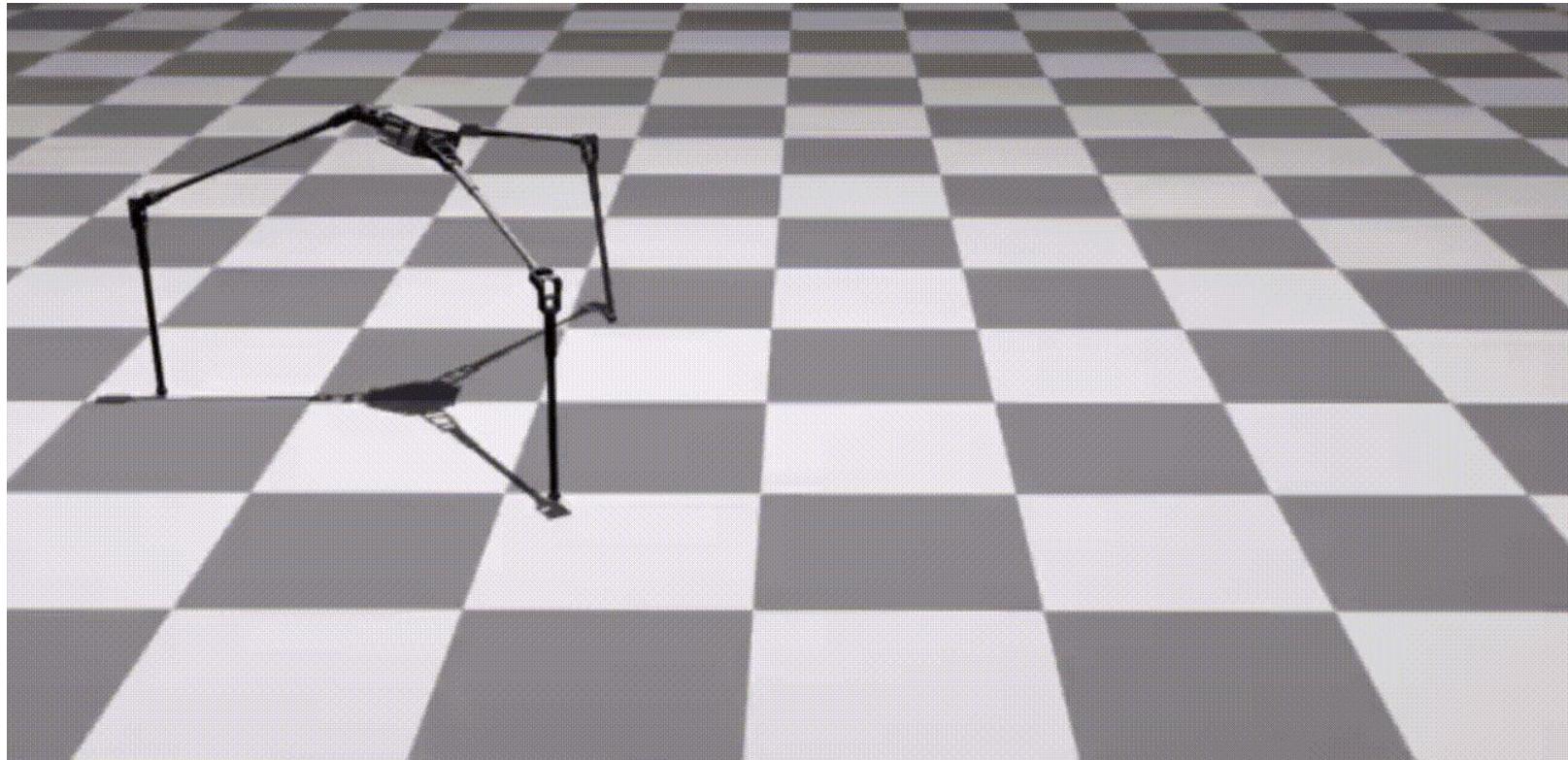
03

Development Documentation

Initial Concept (2022)

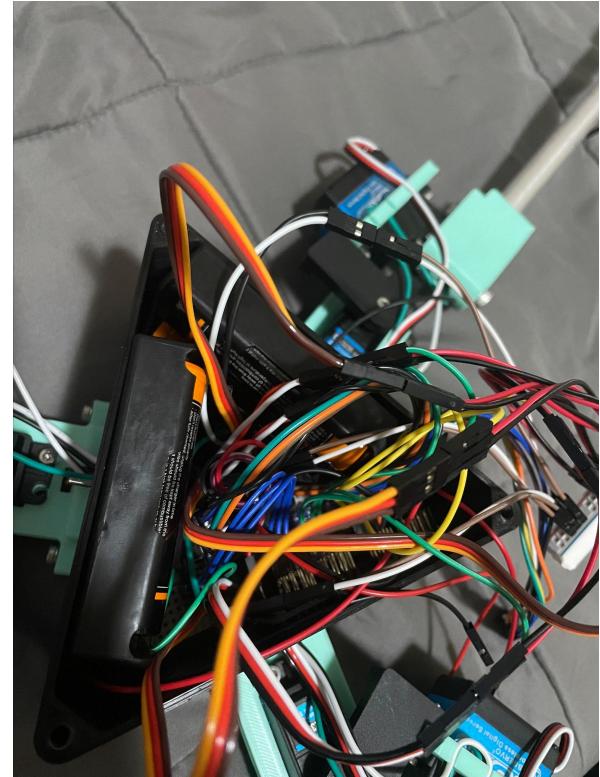


Initial Concept (STriDER - RoMeLa)

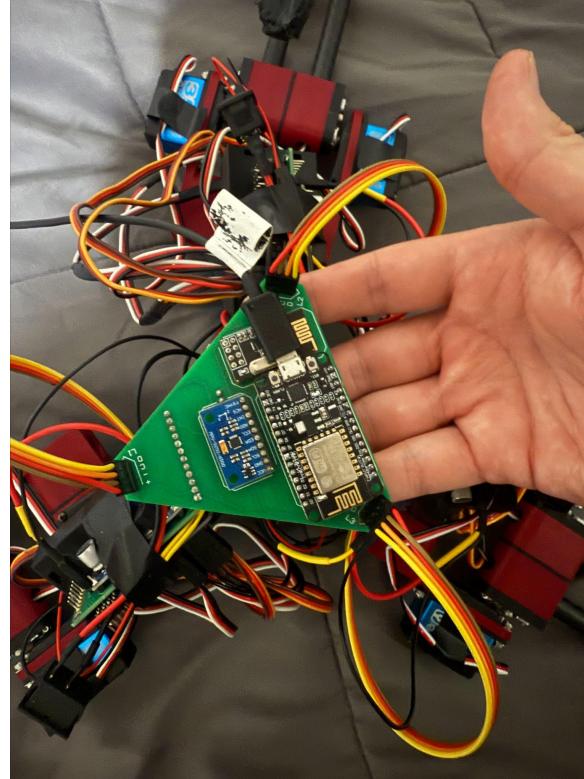
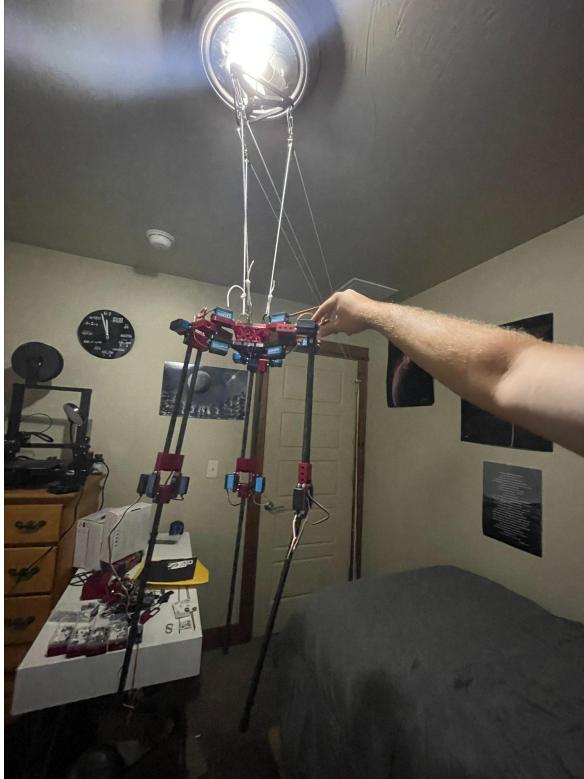


First Full Scale Prototype (2023)

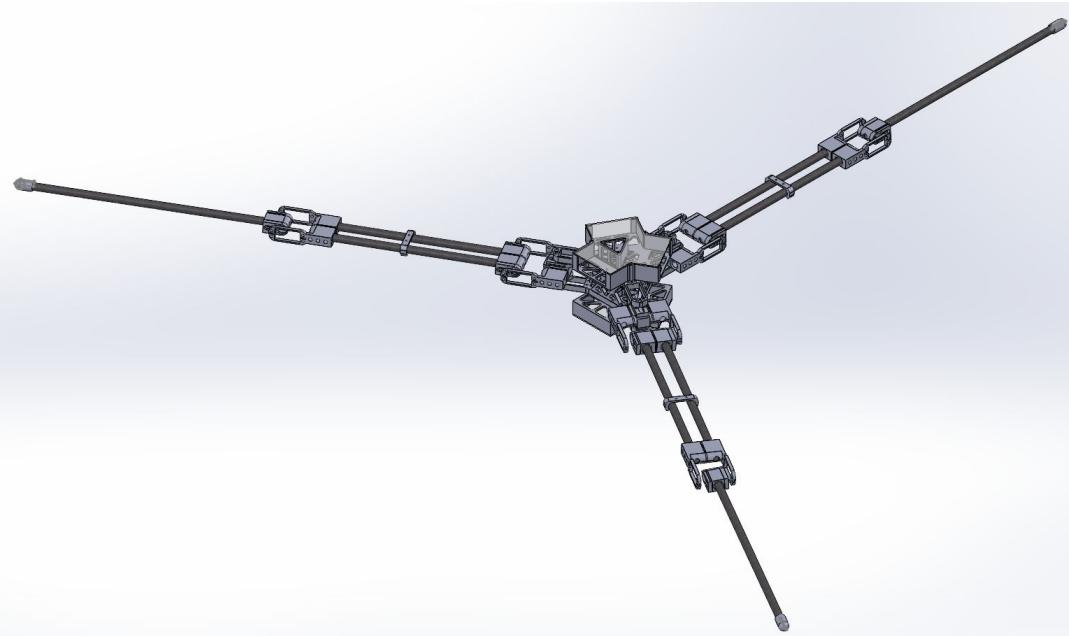
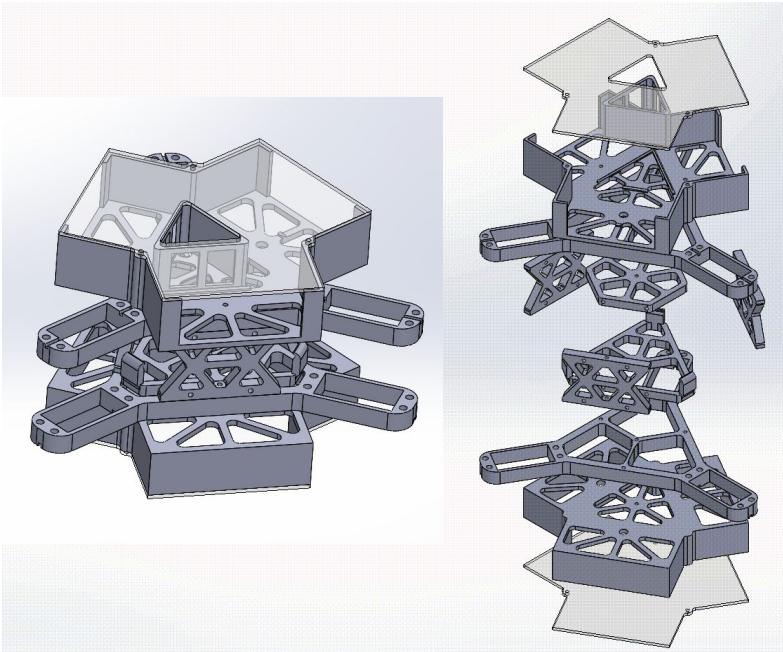
total failure lol



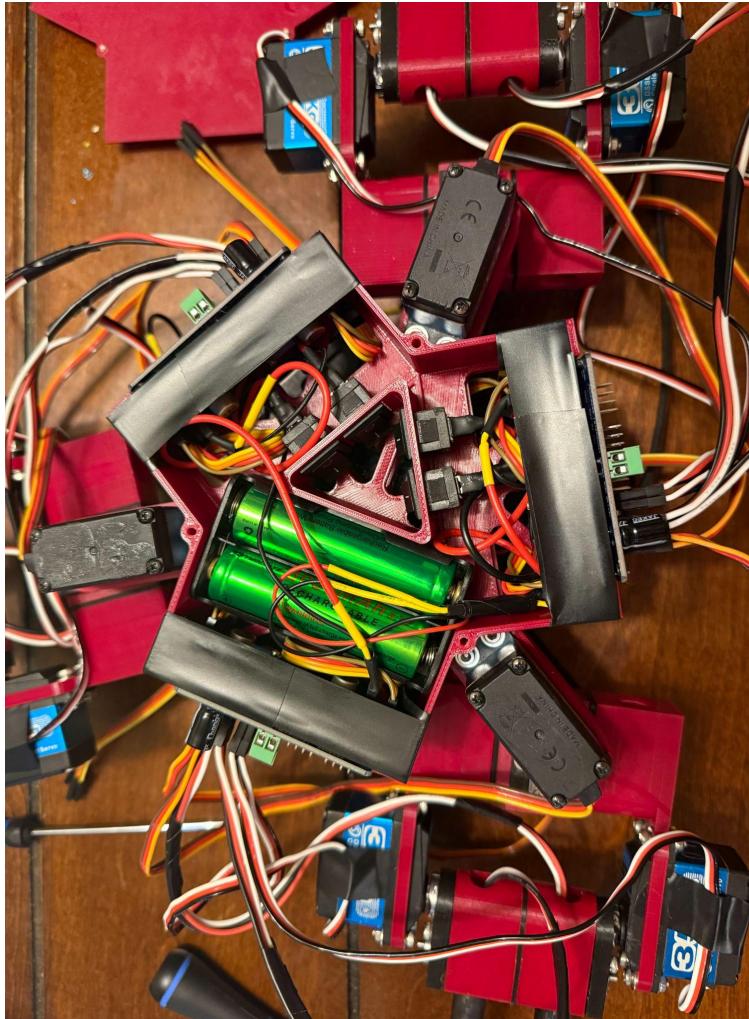
Current Model - V7 (2024/2025)



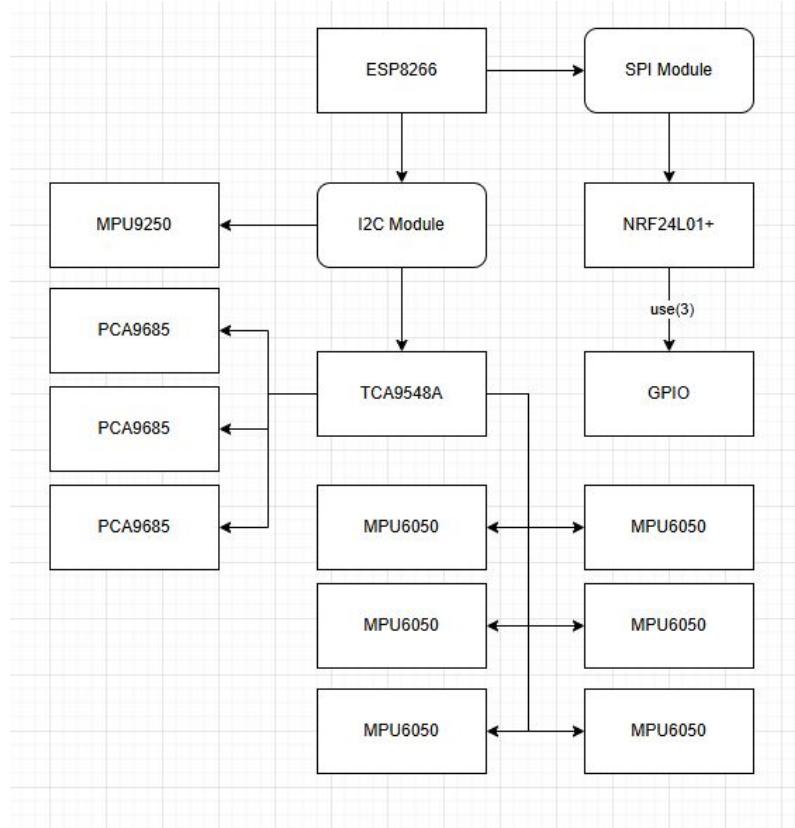
Precise Assembly of Intricate Nonsense **(PAIN)**



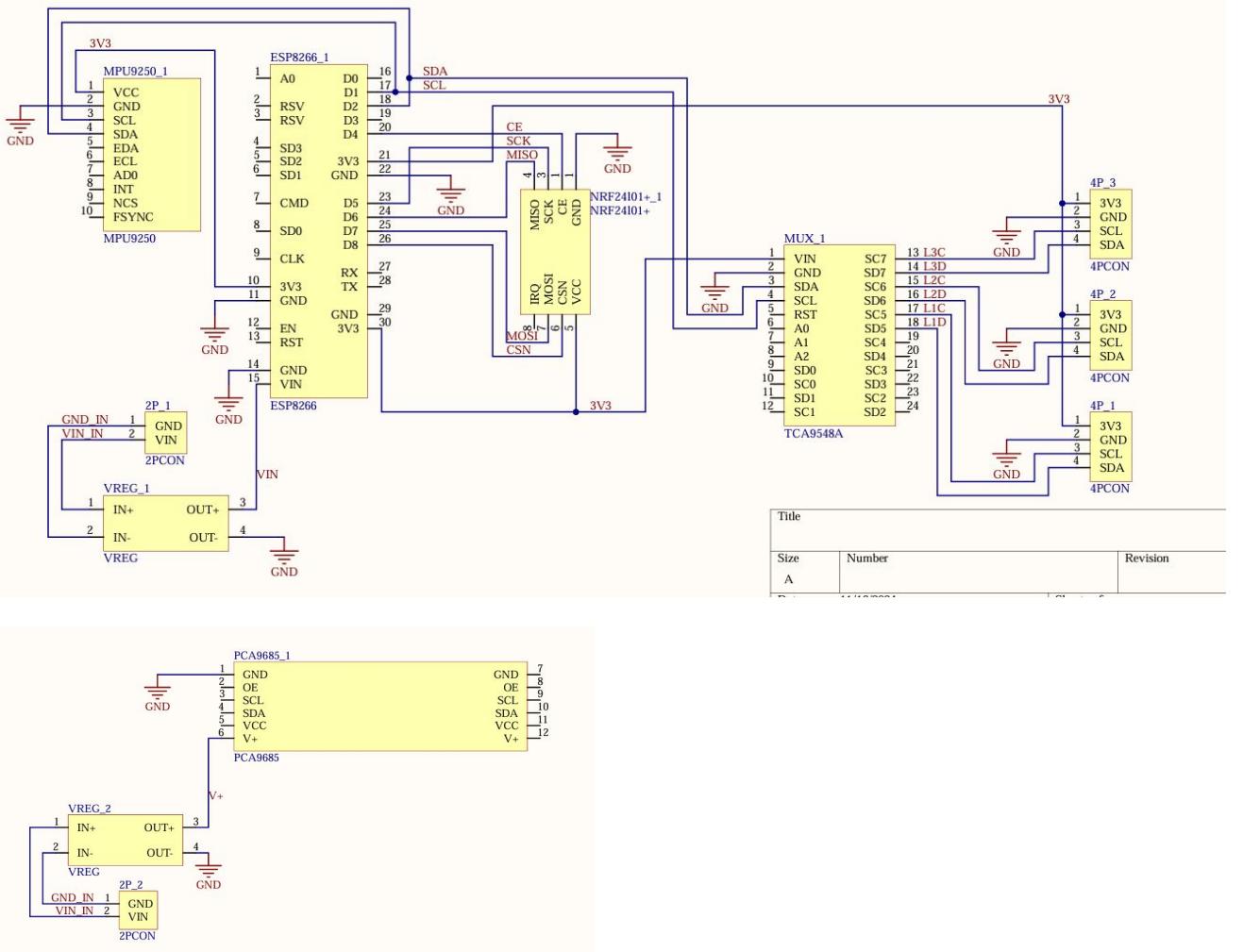
Less Ugly Wiring



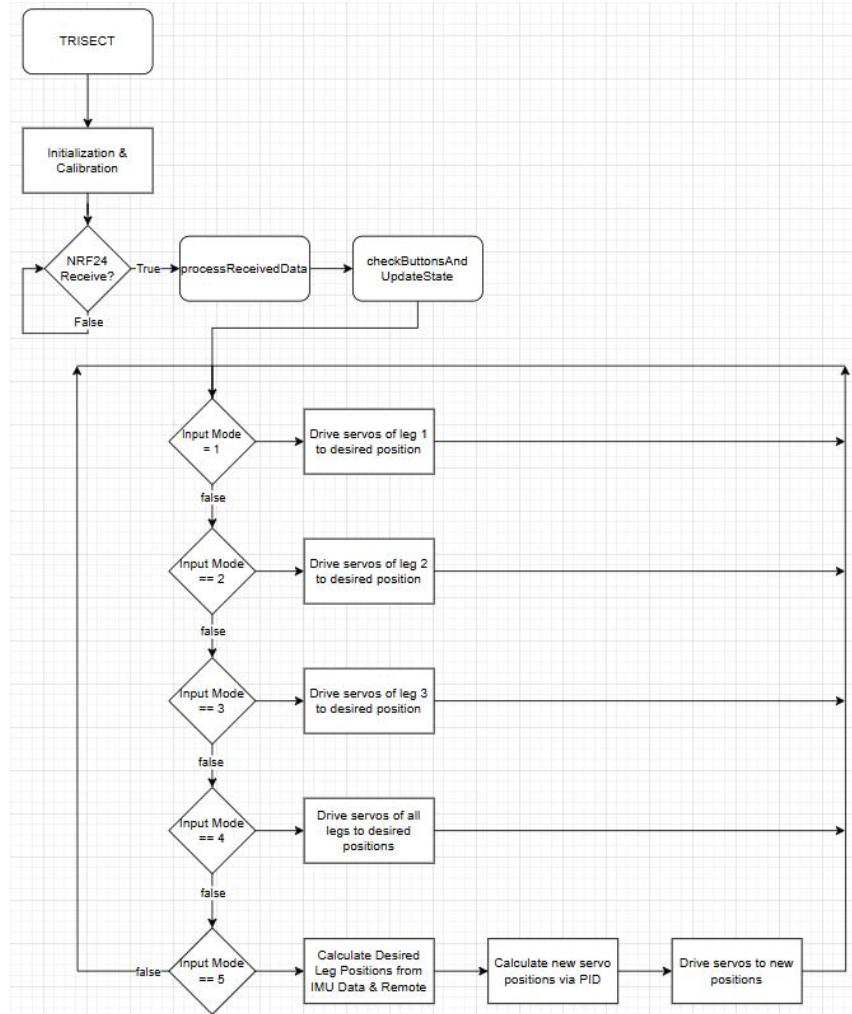
Software Architecture



Circuit Diagrams (Altium)



Main High Level Flowchart



s t a n d .



04

Demo (I hope)

QUESTIONS?