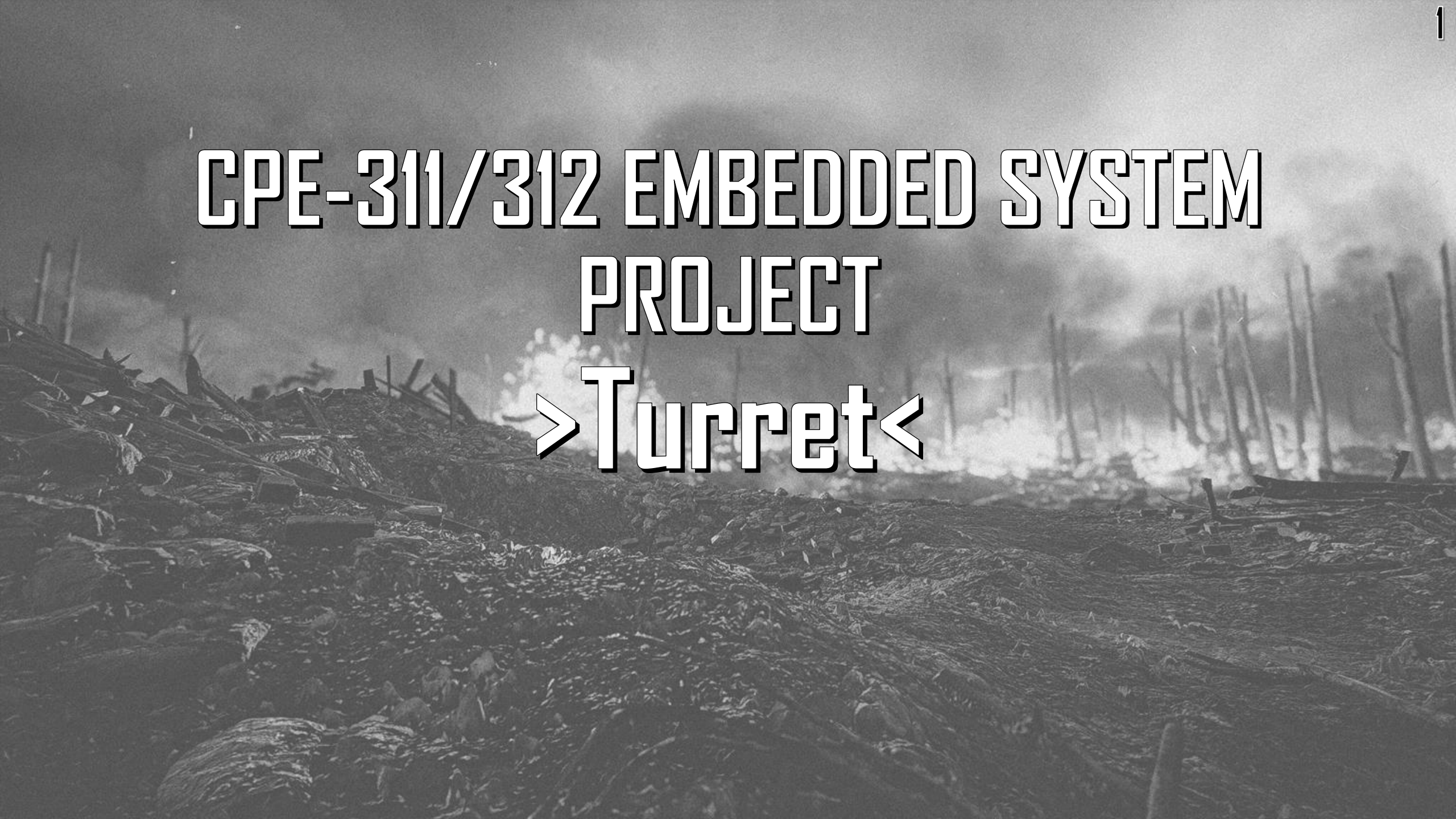


CPE-311/312 EMBEDDED SYSTEM PROJECT

>Turret<

MEMBERS

ทินภัทร สุมานิตย์
2111311409

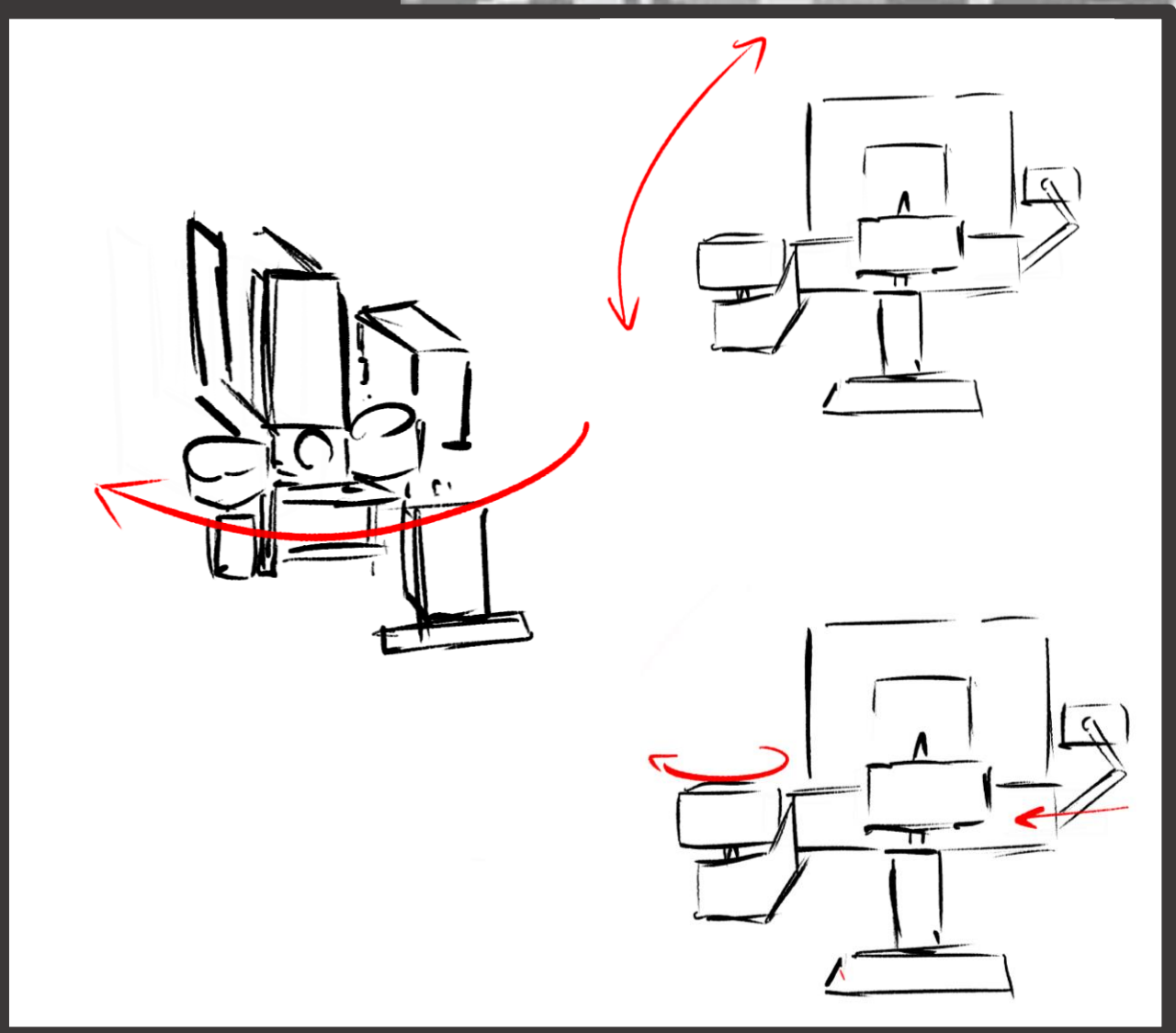
พันกวี จุลกระเศียร
2111310609

พัชผล ผดุงพจน์
2111311060

ณยศกร เพิ่มผล
2011310303

WHAT IS TURRET?

PROJECT OVERALL DIAGRAM



Requirement

Moving

- Horizontal 180 Degrees
- Vertical 45 Degrees
- 1 Degree : 20 ms

Shoot

- 5 loads
- Rate > 1 : 1 s

Communication

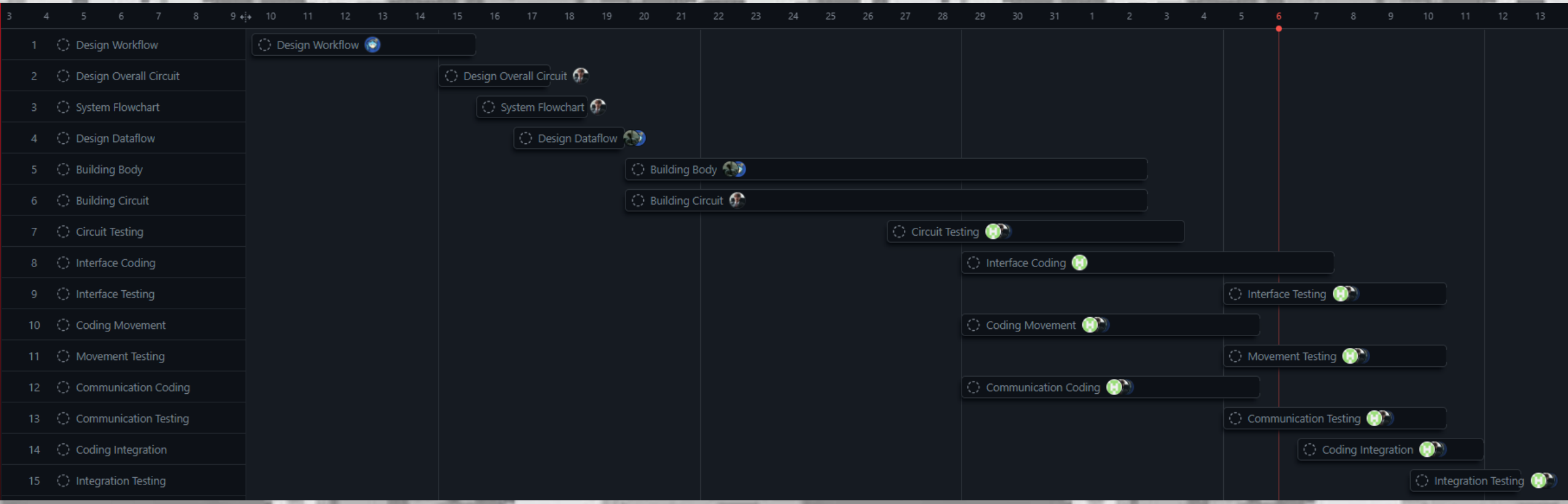
- App Control
- MQTT Protocol

PROJECT PLAN

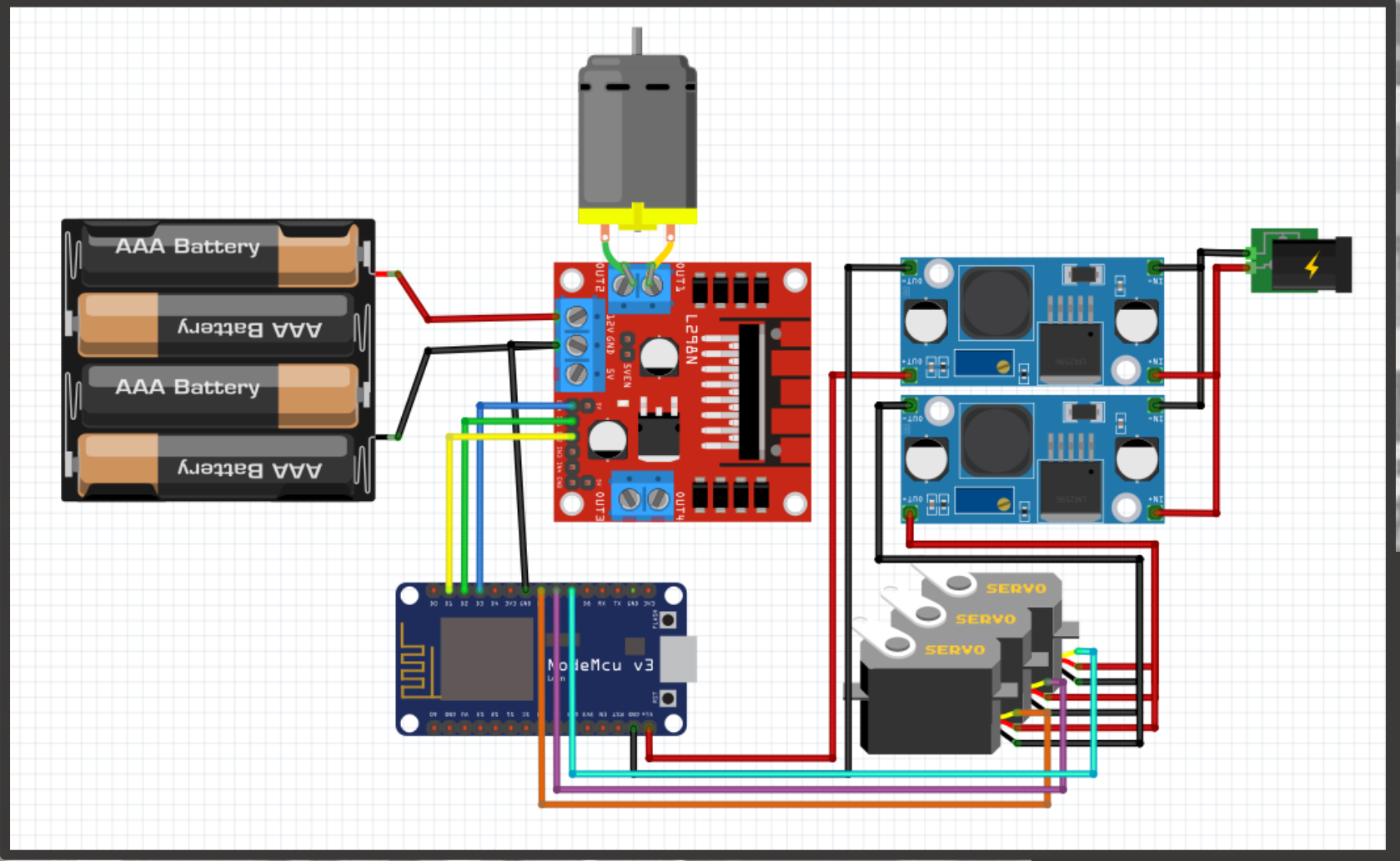
Adapted Waterfall model

- Software Requirements
  System Requirements
- Overall Design
- Building Body & Circuit
- Coding
- Testing
- Operation

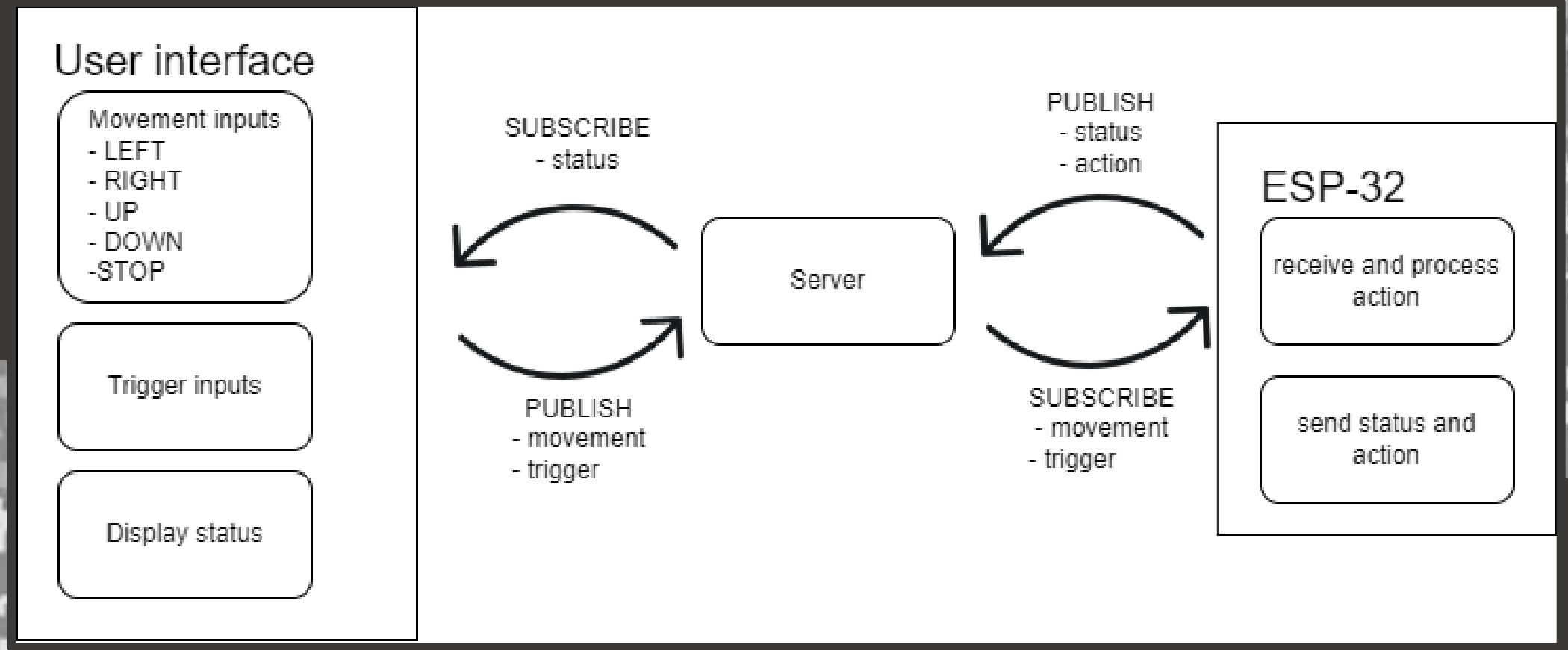
PROJECT PLAN



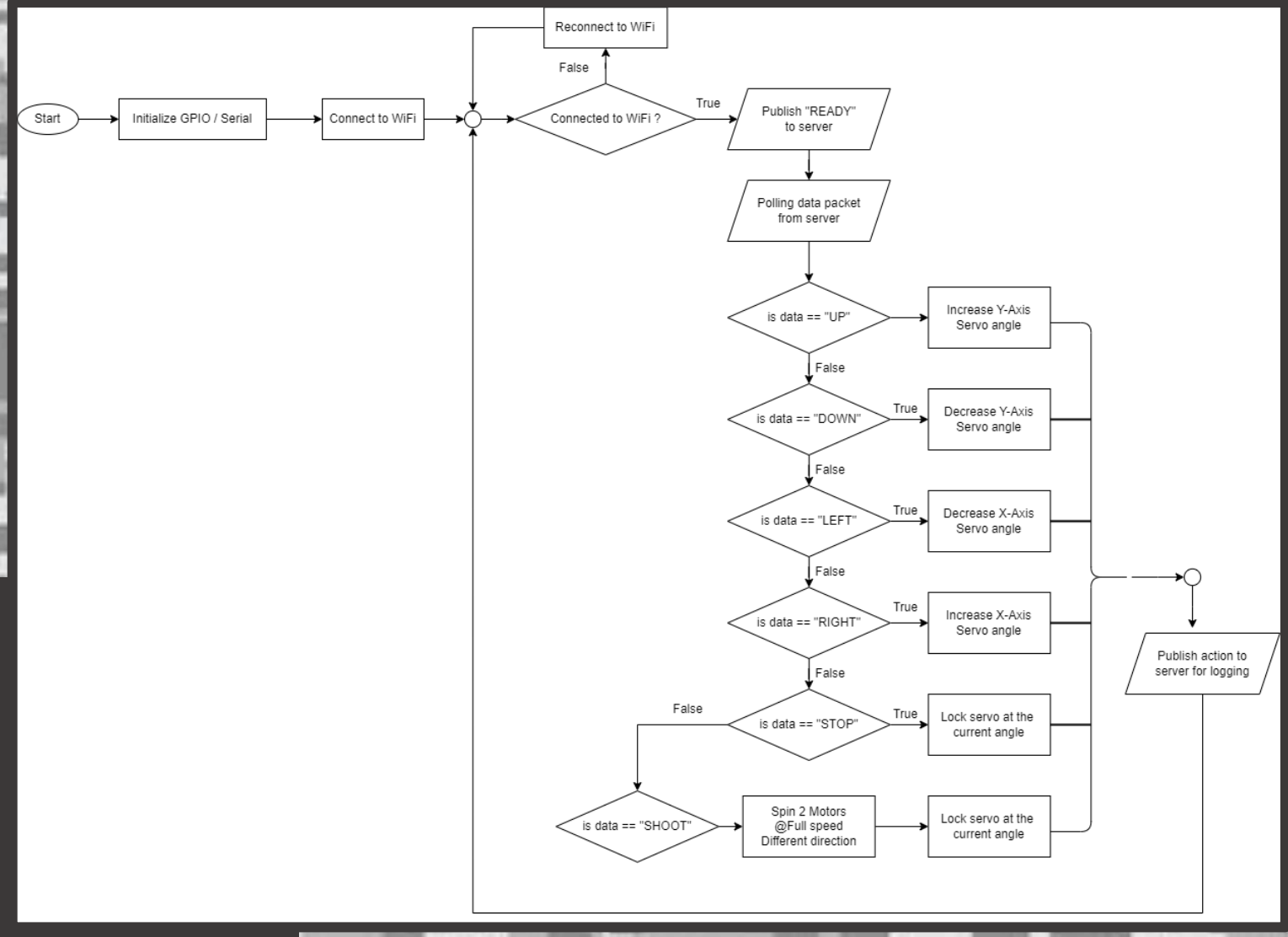
CIRCUIT DESIGN



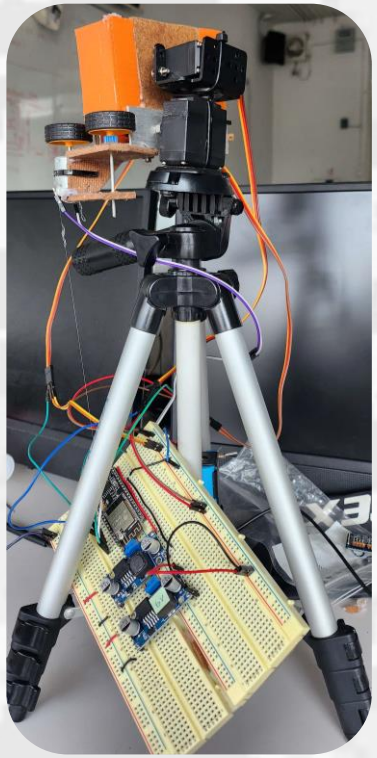
DATAFLOW

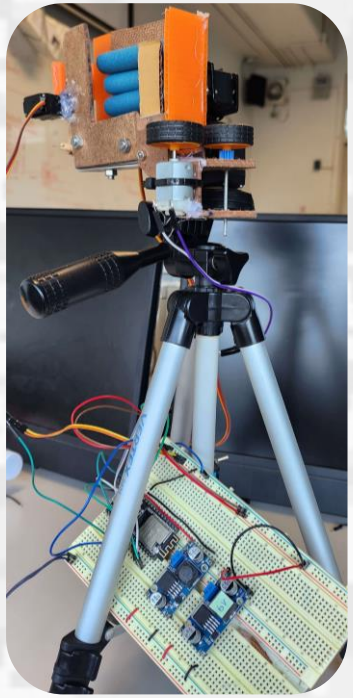

User interface
Movement inputs
- LEFT
- RIGHT
- UP
- DOWN
-STOP
Trigger inputs
Display status
SUBSCRIBE
- status
PUBLISH
- movement
- trigger
Server
PUBLISH
- status
- action
SUBSCRIBE
- movement
- trigger
ESP-32
receive and process action
send status and action

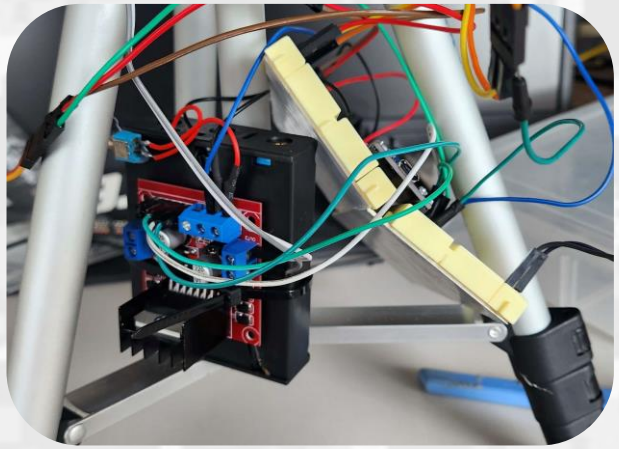
FLOWCHART

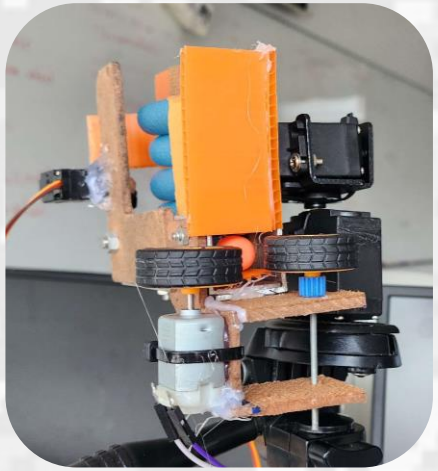

Start
Initialize GPIO / Serial
Connect to WiFi
Connected to WiFi ?
False
Reconnect to WiFi
True
Publish "READY" to server
Polling data packet from server
is data == "UP"
Increase Y-Axis Servo angle
False
is data == "DOWN"
True
Decrease Y-Axis Servo angle
False
is data == "LEFT"
True
Decrease X-Axis Servo angle
False
is data == "RIGHT"
True
Increase X-Axis Servo angle
False
is data == "STOP"
True
Lock servo at the current angle
False
is data == "SHOOT"
Spin 2 Motors @Full speed Different direction
Lock servo at the current angle
Publish action to server for logging

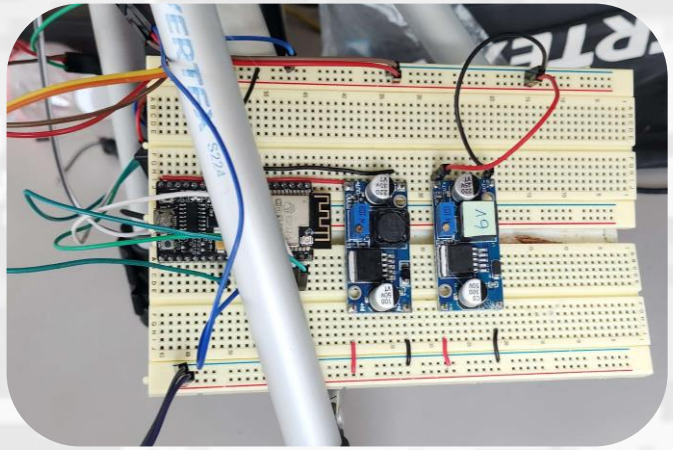
TURRET

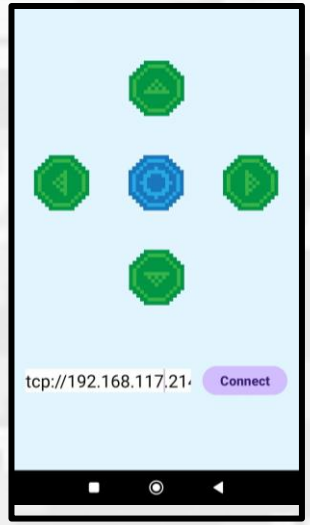




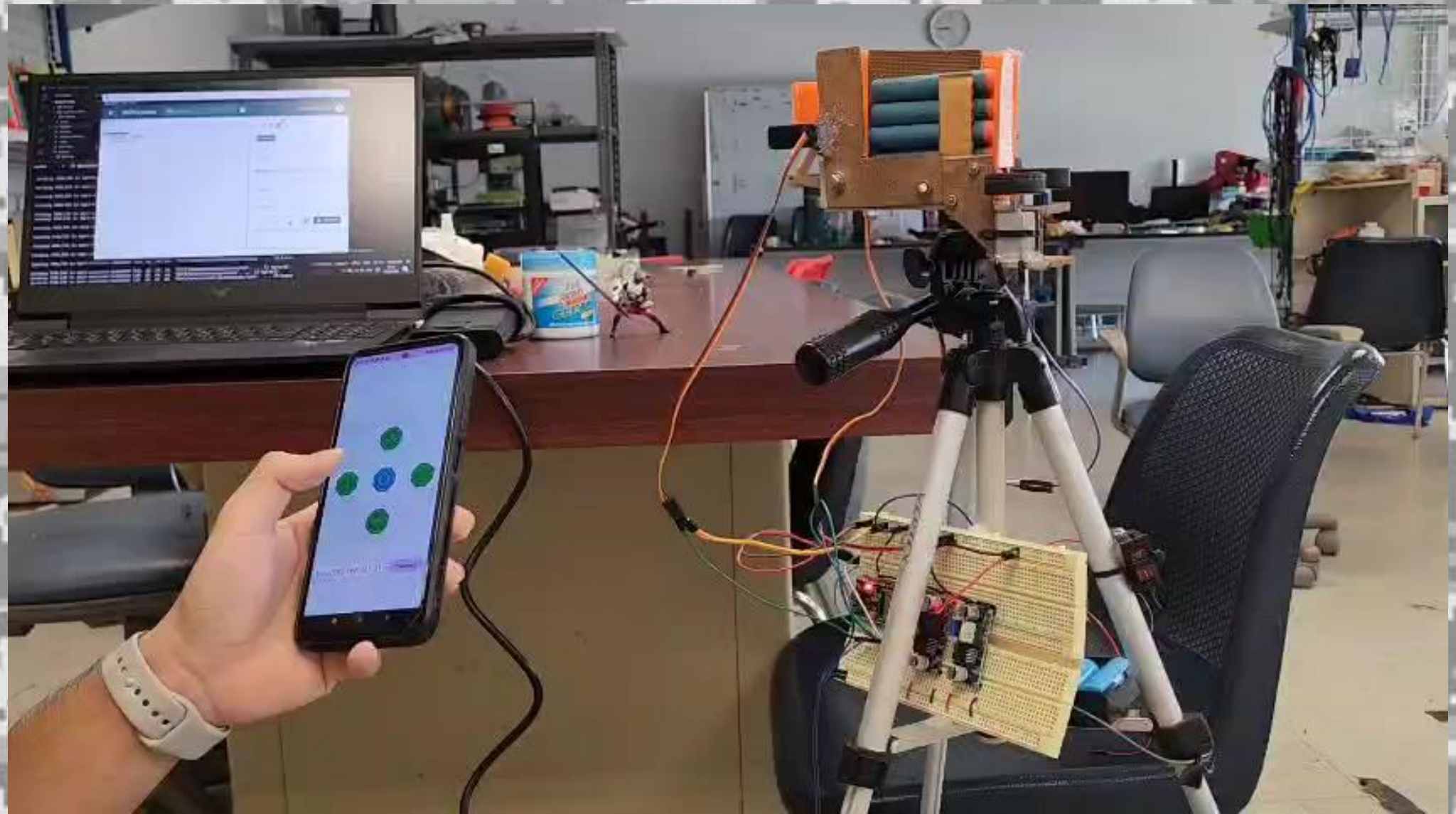








Turret Demo



PROBLEM & SOLUTION

1. Problem Power consumption problem

    Problem : Motor driver circuit draw too much current

    Solution : Use 2 separate source

        1.) 12V1.5A for ESP32 & Servo

        2.) 9V3.3A Battery for Motor & Motor Driver

PROBLEM & SOLUTION

2. I2C Addressing problem

Problem : Could not find I2C address for PCA9685 servo driver

Solution : Control servo without PCA9685

3. The wire

Problem : Not enough and broken jumper wire

Solution : Stealing

Conclusion

From the process of building the turret with ESP32 MCU we have learned how to control servo motor using PWM signal, control motor with H-bridge motor driver, writing real-time controlling program with freeRTOS, receiving and sending data via WIFI with MQTT protocol and finally Robotic body design and movement planning.