

Weston Dilling, Mohammad Chikhani, Riley Duncan

## Overview

Autonomous robot capable of identifying objects by color and retrieving to a predetermined location.

## Group Members

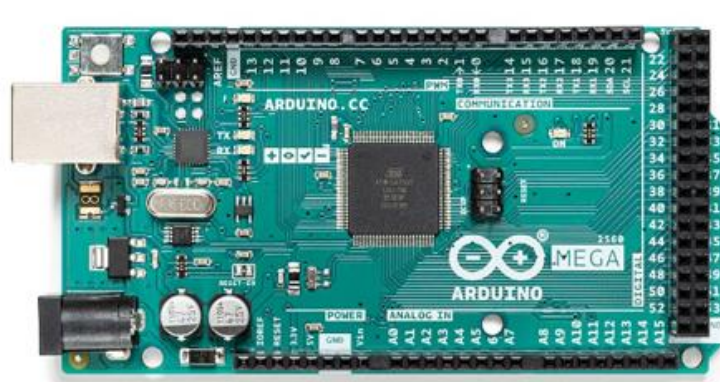


Weston Dilling (PM): Navigation, Power  
Mohammed Chikhani: Gripper  
Riley Duncan: Object Detection

## Gripper

### ROBO-FETCH GRIPPER

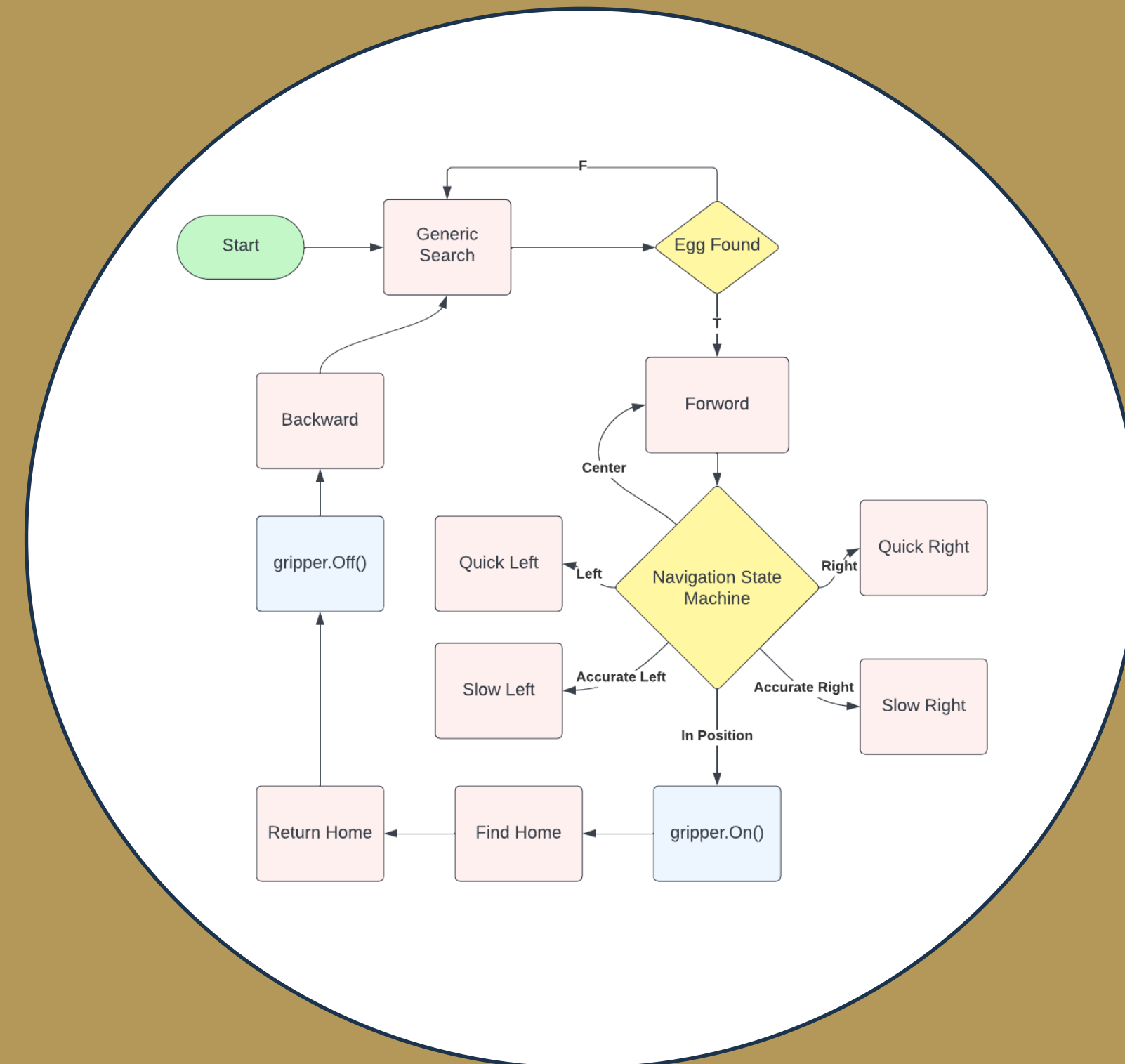
- IR Break beam sensors integrated with the mechanical gripper to detect when an Easter egg has been captured and then relay such information to the Raspberry Pi Pico.
- Gripper powered by the MG-996R Servo Motor. Operating voltage between the range of 4.8 – 6V DC.
- Arduino MEGA 2560 board used to give input commands to the gripper such that the gripper is able open, hold and release various colored Easter eggs within a specific time frame.
- The Pi Pico inputs commands to the MEGA 2560 and in return, the MEGA 2560 communicates with the Pi Pico that the egg has been captured so that the robot may begin navigating to the designated drop-off location.



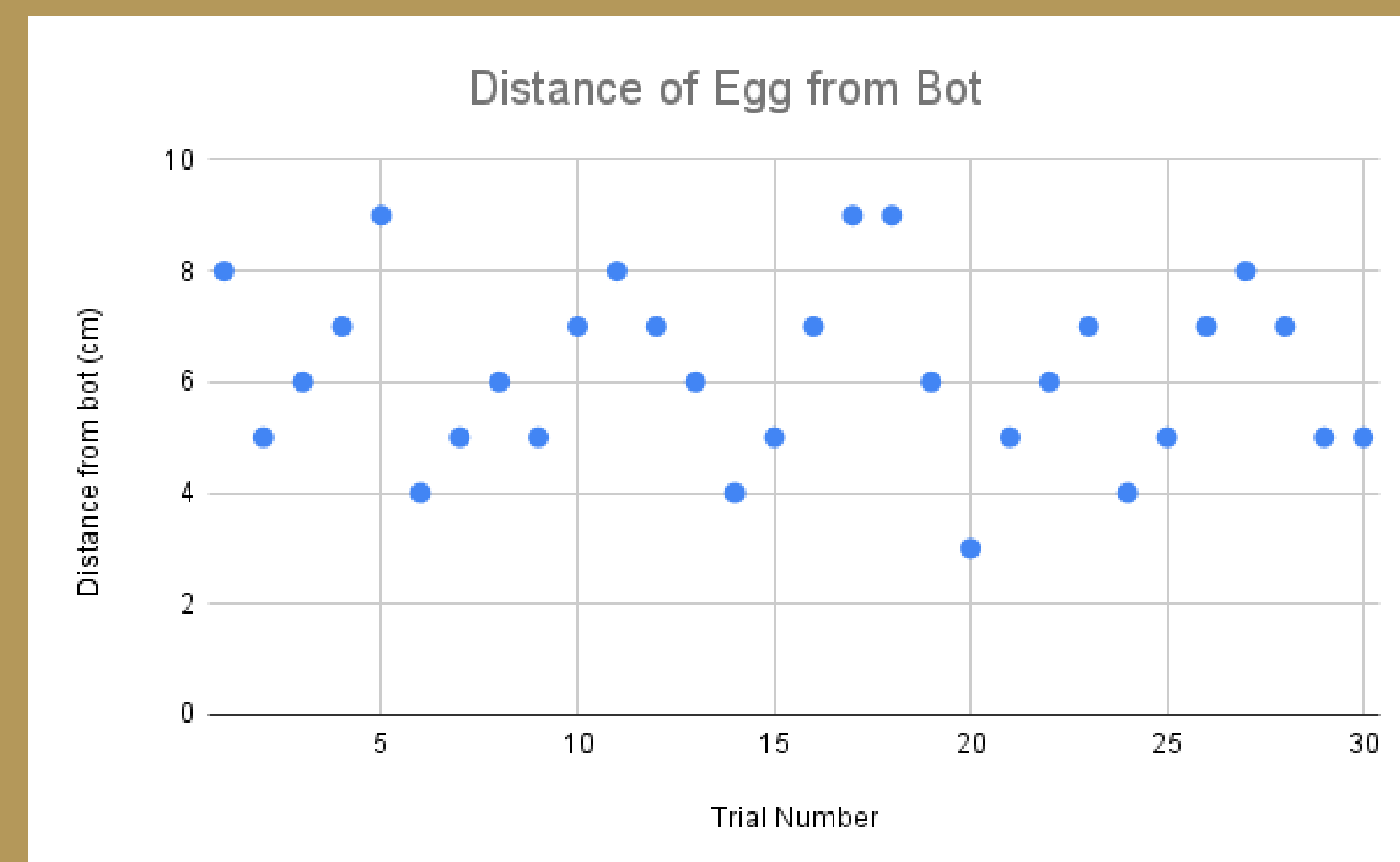
## Testing Requirements

Requirement	Measured Results
Object Detection in different lighting conditions (Object Detection)	Can detect eggs reliably <u>290 cm</u> away above <u>100 Lumens</u>
Precise Motor Control (Navigation)	Bot initiates a grab within <u>6.17 cm</u> of the egg on average
Maintaining bot inside the arena (Navigation)	Bot remained in the arena <u>96.7%</u> of the time during testing
Open/Close the Gripper every time it's told to do so (Gripper)	Gripper opened/closed as it was supposed to <u>100%</u> of the time during testing
Don't die on senior design day (Power)	Batteries were measured to last ~8 hrs in theory and was observed to fetch eggs for <u>1 hour</u> without dying

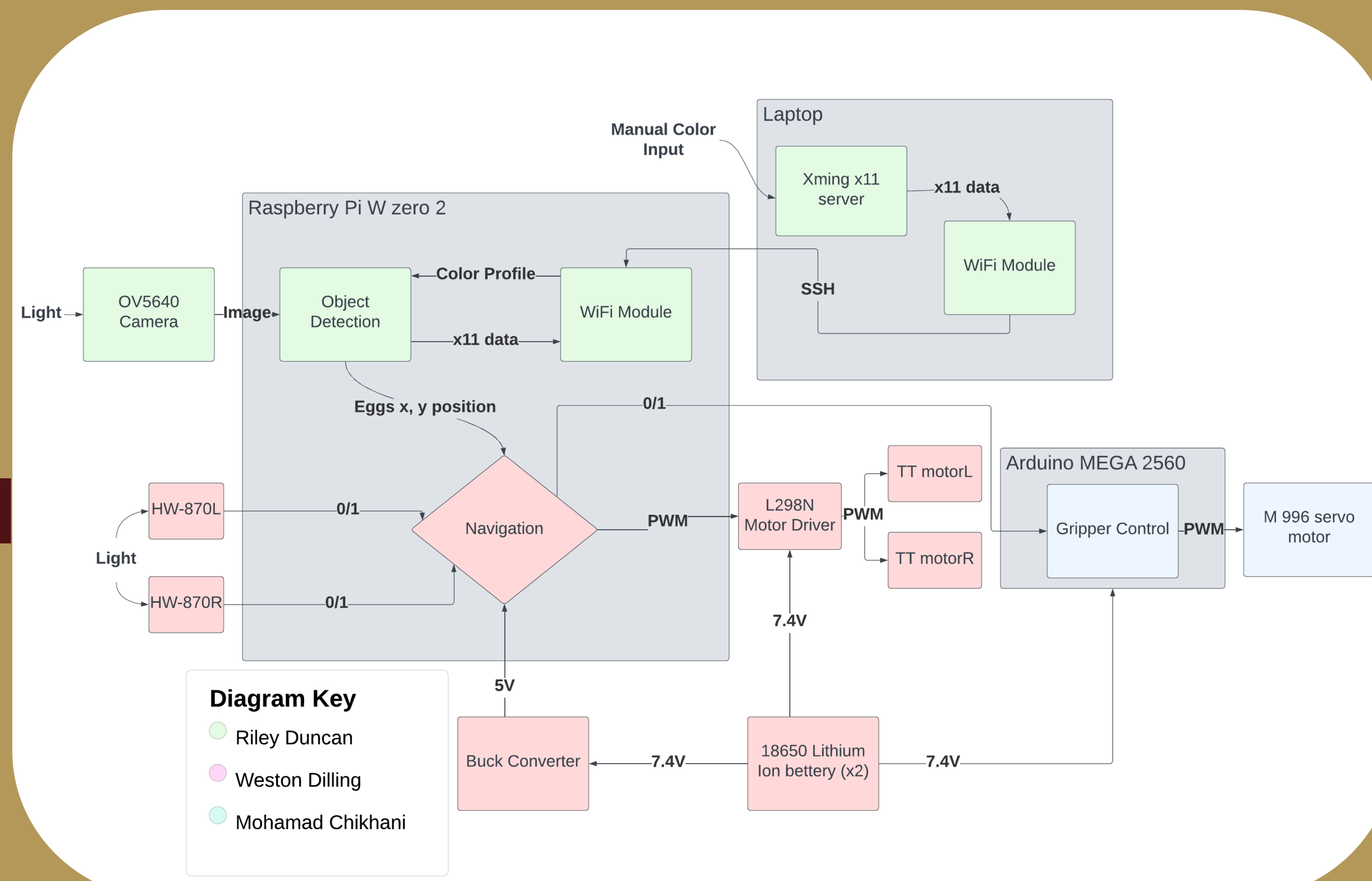
## Navigation State Machine



## Navigation Test Results



## Hardware Block Diagram



## Object Detection Test Results

