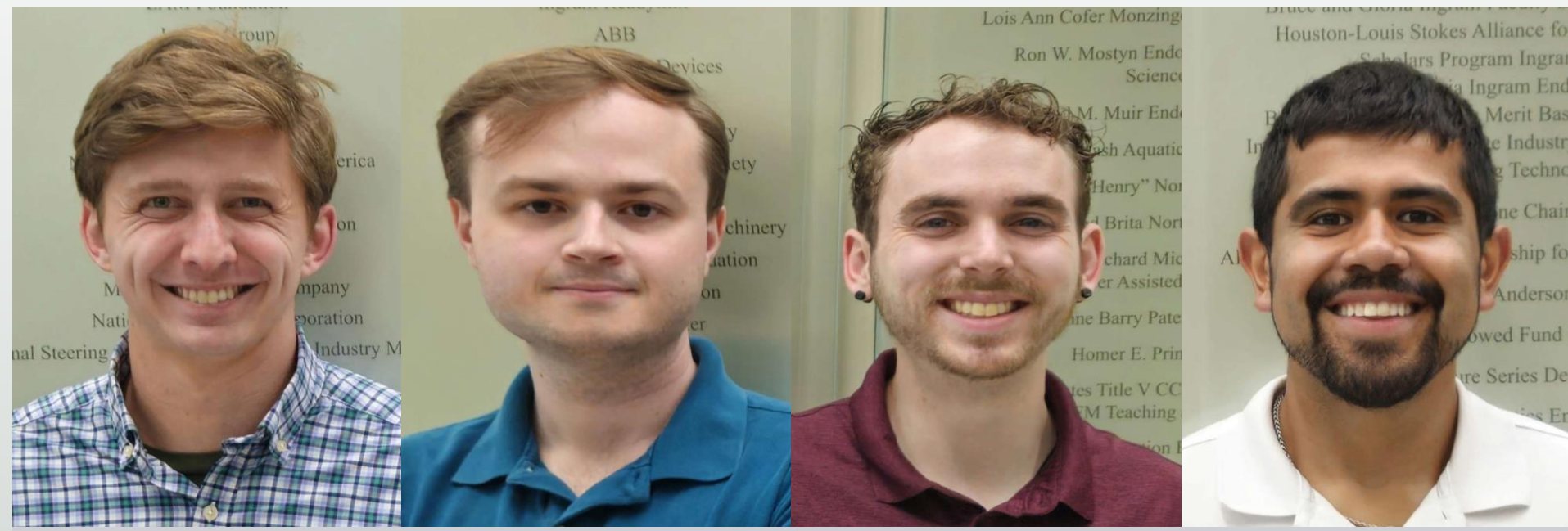


E2.10 – Eggstraction Bot



Hunter Chopskie, Jake Helpinstill, Carson Holland, Aaron Luna

Overview



Hunter Chopskie **Jake Helpinstill** **Carson Holland** **Aaron Luna**

Our product is an autonomous robot car that locates and transports plastic eggs using sensors, a camera, a gripper, and a navigation algorithm.

Power Budget

Part	Passive Current Draw	Active Current Draw
ESP32-CAM	255mA	436mA
MPU-6050 Gyroscope	4.3mA	6.5mA
TCRT5000 Analog IR Sensor (x2)	28mA	60mA
TCS34725 RGB Sensor	3.5mA	12mA
Bi-Metal Gearbox	284mA	326mA
Motor (x2)		
BSS138 Level Shifter	1.9mA	5mA
Arduino Uno Rev3	45mA	65mA
MG995 Servo Motor	42mA	445mA
TOTAL	663.7mA	1355.5mA

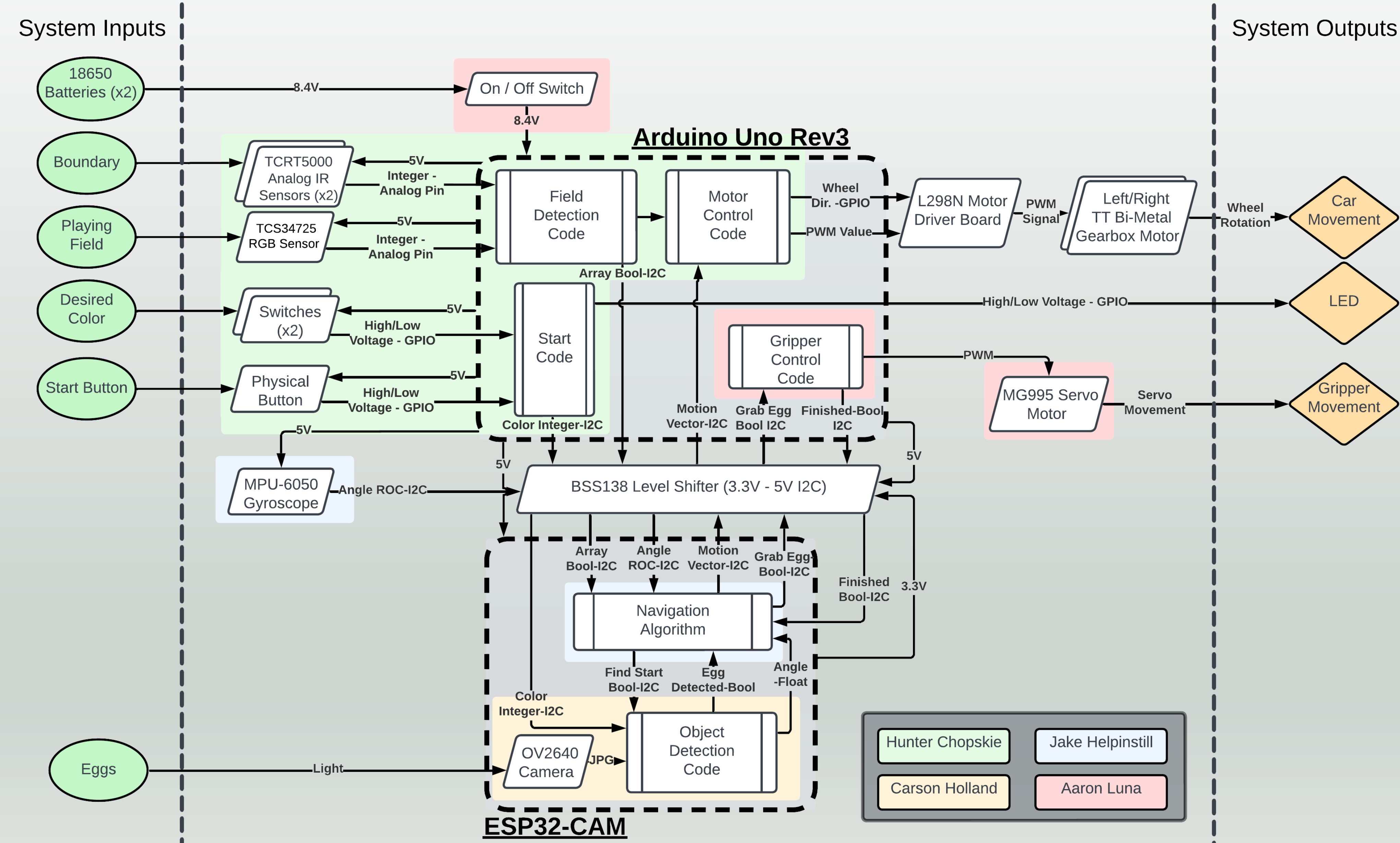
D2 Changes

- Object Detection and Navigation working in parallel on the same processor
- Mounted Gripper onto robot
- Common protoboard for hardware
- Upgraded to TT Bi-Metal Gearbox Motors
- Implemented RGB Sensor for reliable destination detection
- 3D printed Gripper extensions
- Implemented start user interface

Acknowledgements

Faculty Advisor – Mr. Jeffrey Stevens
Sponsor – Mr. Fawzi Behmann
Texas State University

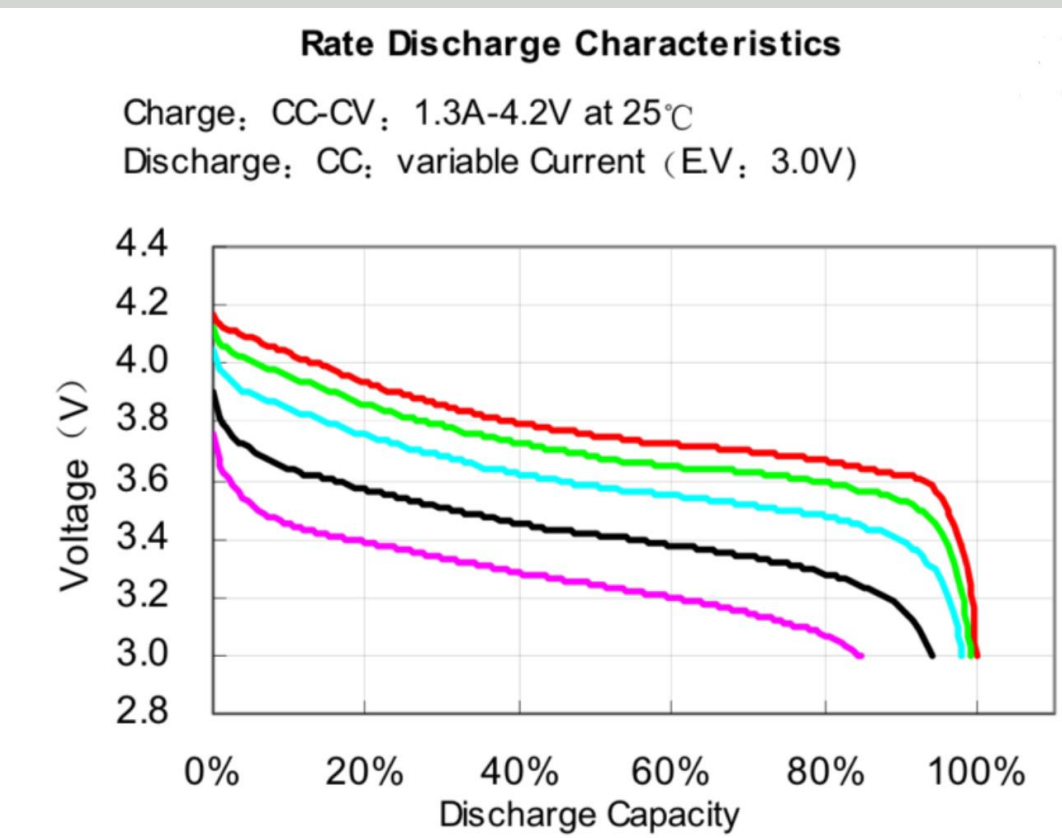
Top Level Block Diagram



Power Test Results

Power (Aaron Luna)

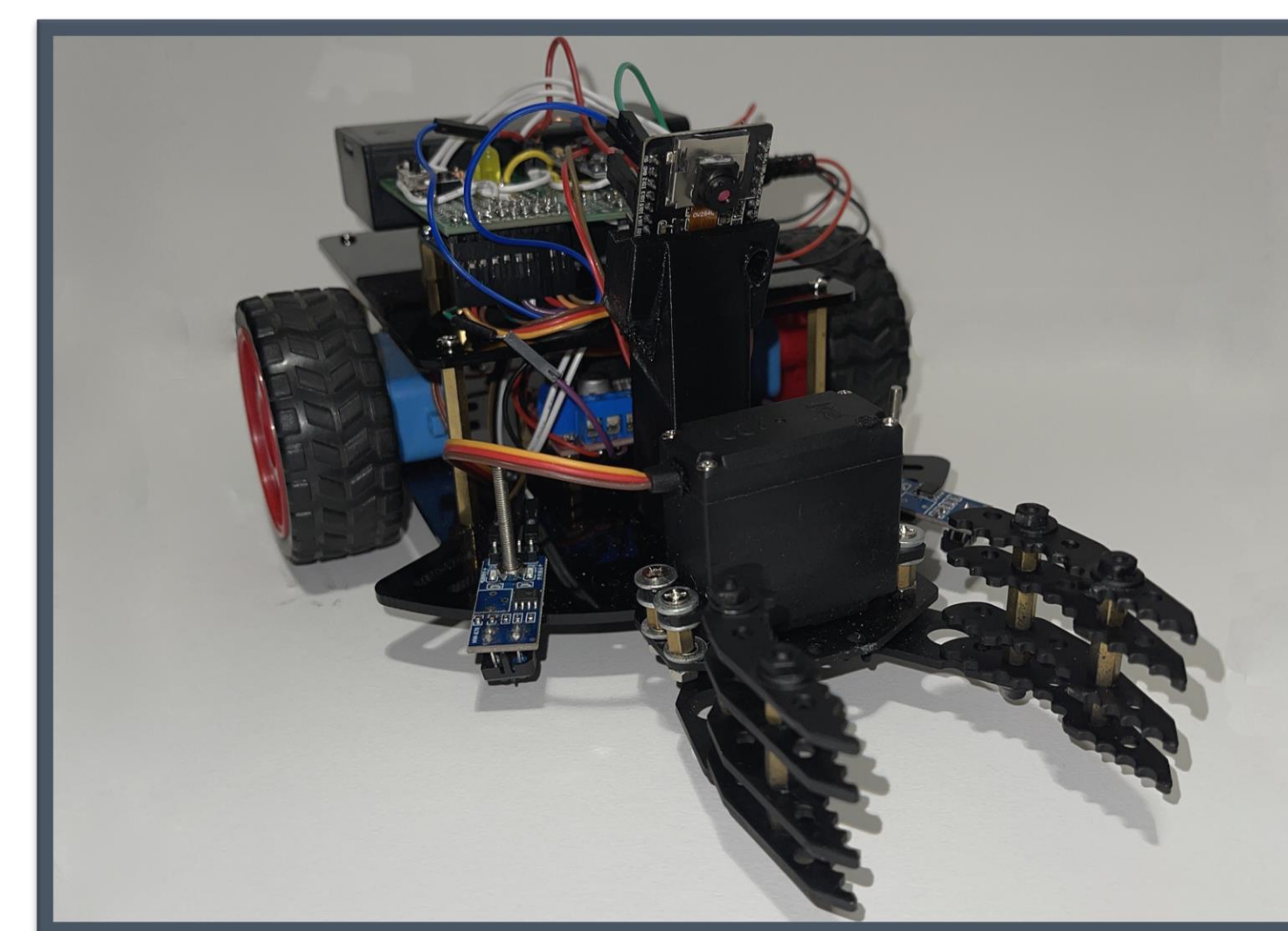
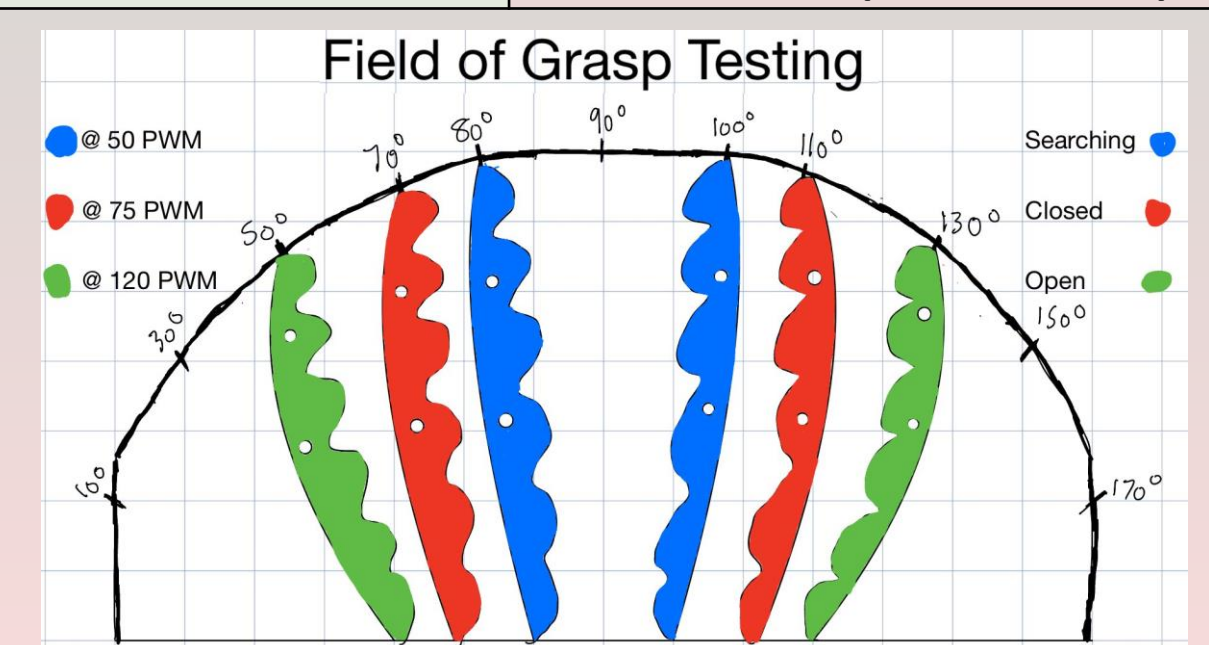
Battery life: 2.07 hours



Gripper Test Results

Gripper Control (Aaron Luna)

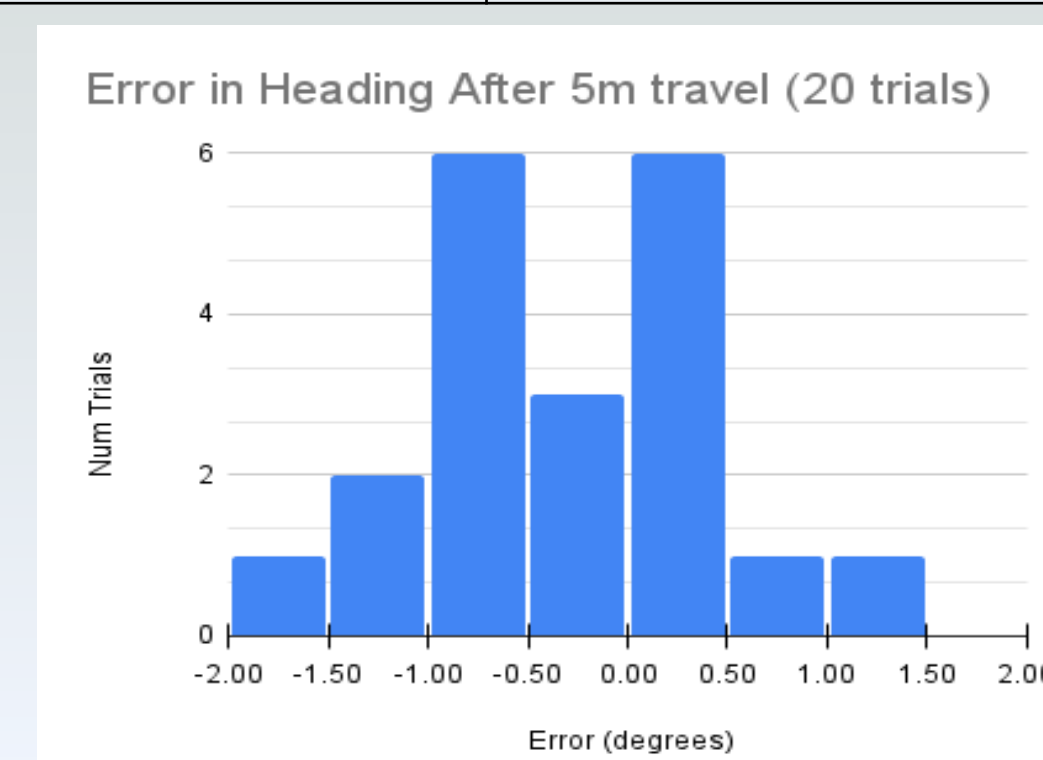
Retrieval	97% (30 trials)
Hold	100% (40 trials)
Release	97% (30 trials)



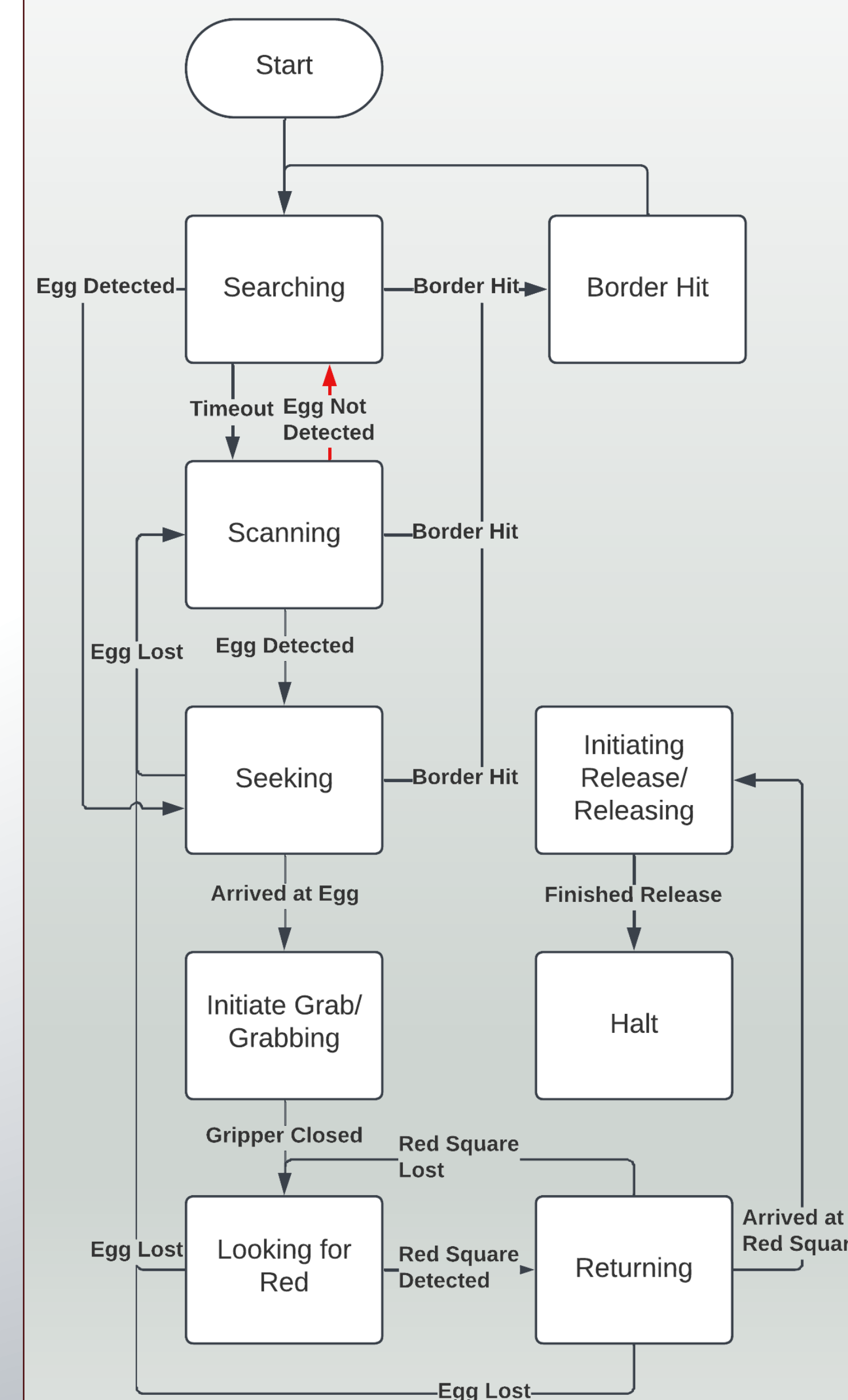
Navigation Test Results

Navigation (Jake Helpinstill)

Gyroscope orientation hold	<1° error over 5m (80%)
Gyroscope heading (dead-reckoning)	1.0% average error across 45°, 90°, and 180°
Egg search pattern	<45s to locate (92%)



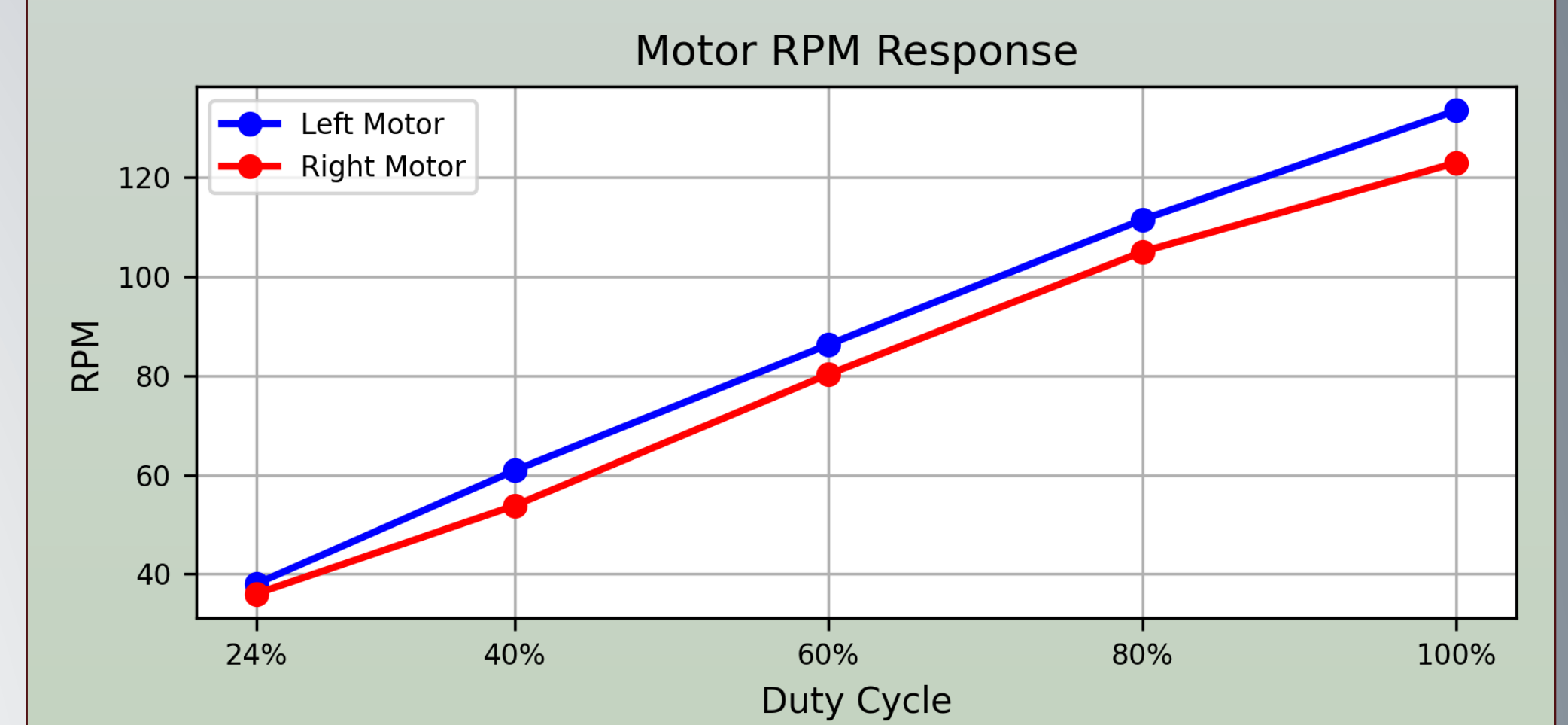
Navigation



Motor Test Results

Motor Control (Hunter Chopskie)

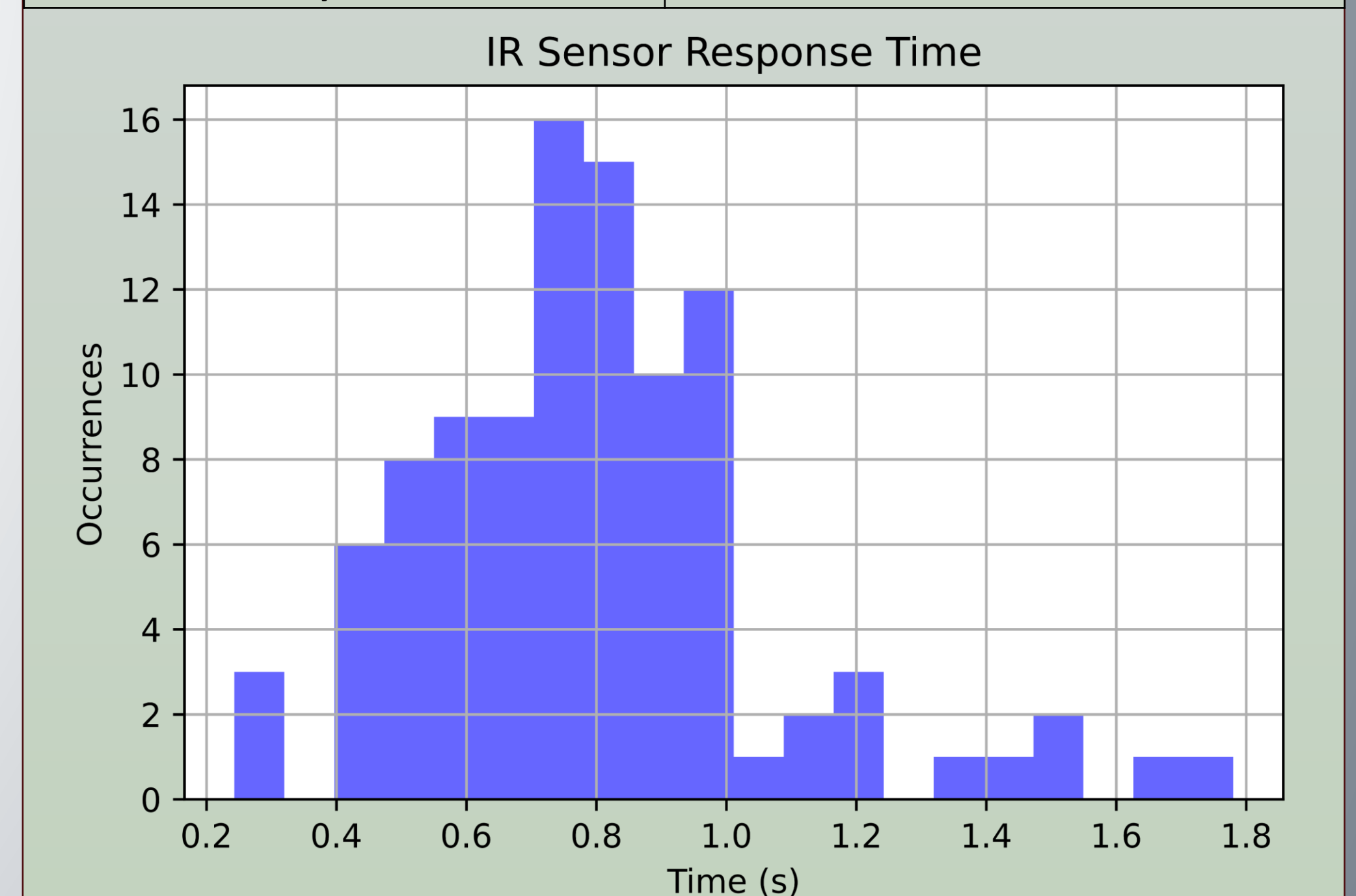
Deviation from straight path travel (100cm)	4.3cm off center(average, expected < 5cm)
RPM offset	Average difference: 8%



Sensor Test Results

Field Detection (Hunter Chopskie)

IR sensor latency	0.8s (average, 30 trials)
RGB red square detection	13.5cm (average, 30 trials)
Functionality in dark room	PASS



Camera Test Results

Object Detection (Carson Holland)

Maximum detectable length	54in
Functionality in dark room	PASS

