

BEACH MULE

The Beach Boys

PRESENTATION OVERVIEW

Problem

Solution

Constraints

Subsystems

Level II
Diagram

Challenges

Future
Plans

MEET THE TEAM



Team Lead/Power Lead:
Garrett McLaurin

Assisted Wheels Lead:
Nick Gray

Controls Lead:
Saurav Josan

Microcontroller Lead:
Ryli Cruz

Tracking Lead:
Christian Watson

Team Advisor:
Dr. David Wallace



MEET JOHNNY

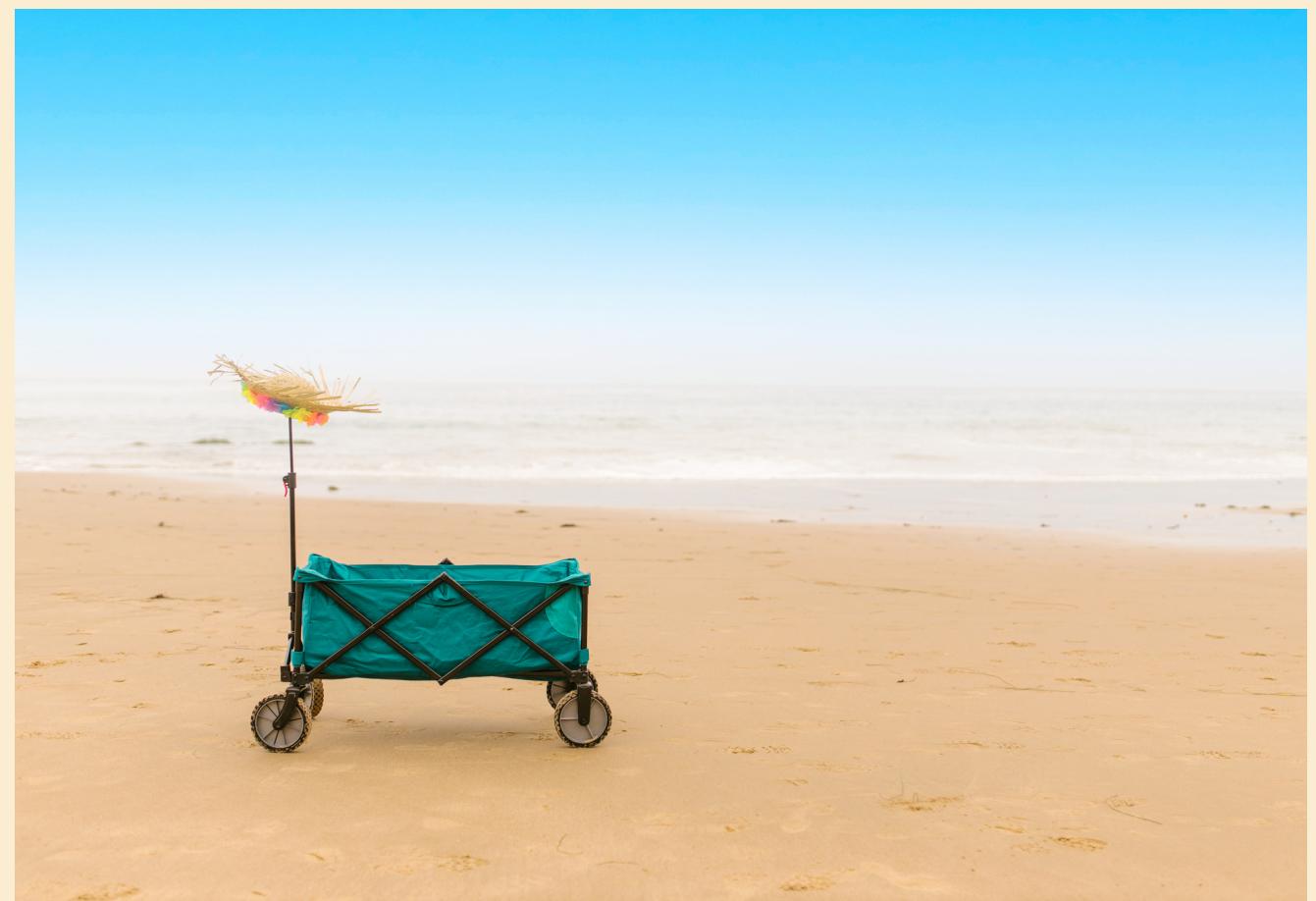
Johnny is a husband, a father, and a pet owner. He has 3 kids and a dog. Johnny has a stressful job and works hard to provide for his family.



Johnny
Age 36
Male

JOHNNY'S PROBLEM

- Hassle of transporting multiple beach items
- No hands-free option
- Physical Challenge of Pushing/Pulling Cart





SOLUTION FOR JOHNNY

Introducing the Beach Mule, an advanced beach cart used to improve your beach experience

- Auto Pilot Mode
- Assisted Drive Wheels
- Built for All Beach Terrain

Worry less, relax more

TARGET AUDIENCE

- Families
- Those with difficulty lifting/carrying
- Beach cleaning organizations
- Beach Enthusiasts



COMPETITIVE ADVANTAGE

My Sandhopper

- More expensive
- Cannot track user
- Add-ons come at extra cost

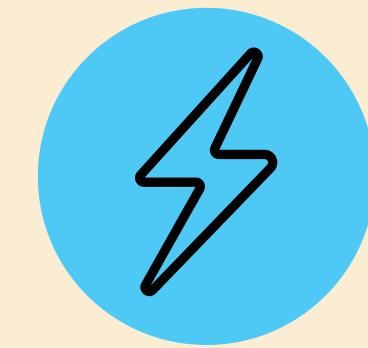
Beach Mule

- Less expensive
- User friendly
- Autopilot setting

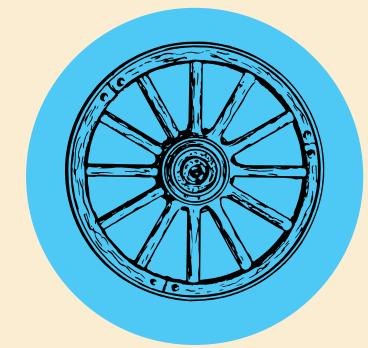


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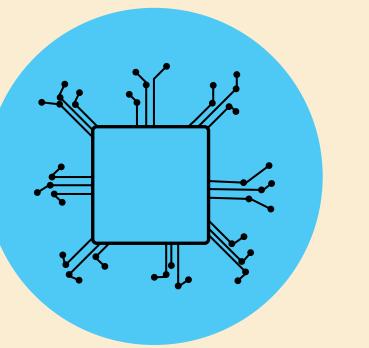
SUBSYSTEMS



Power



Assisted
Wheels



Controls

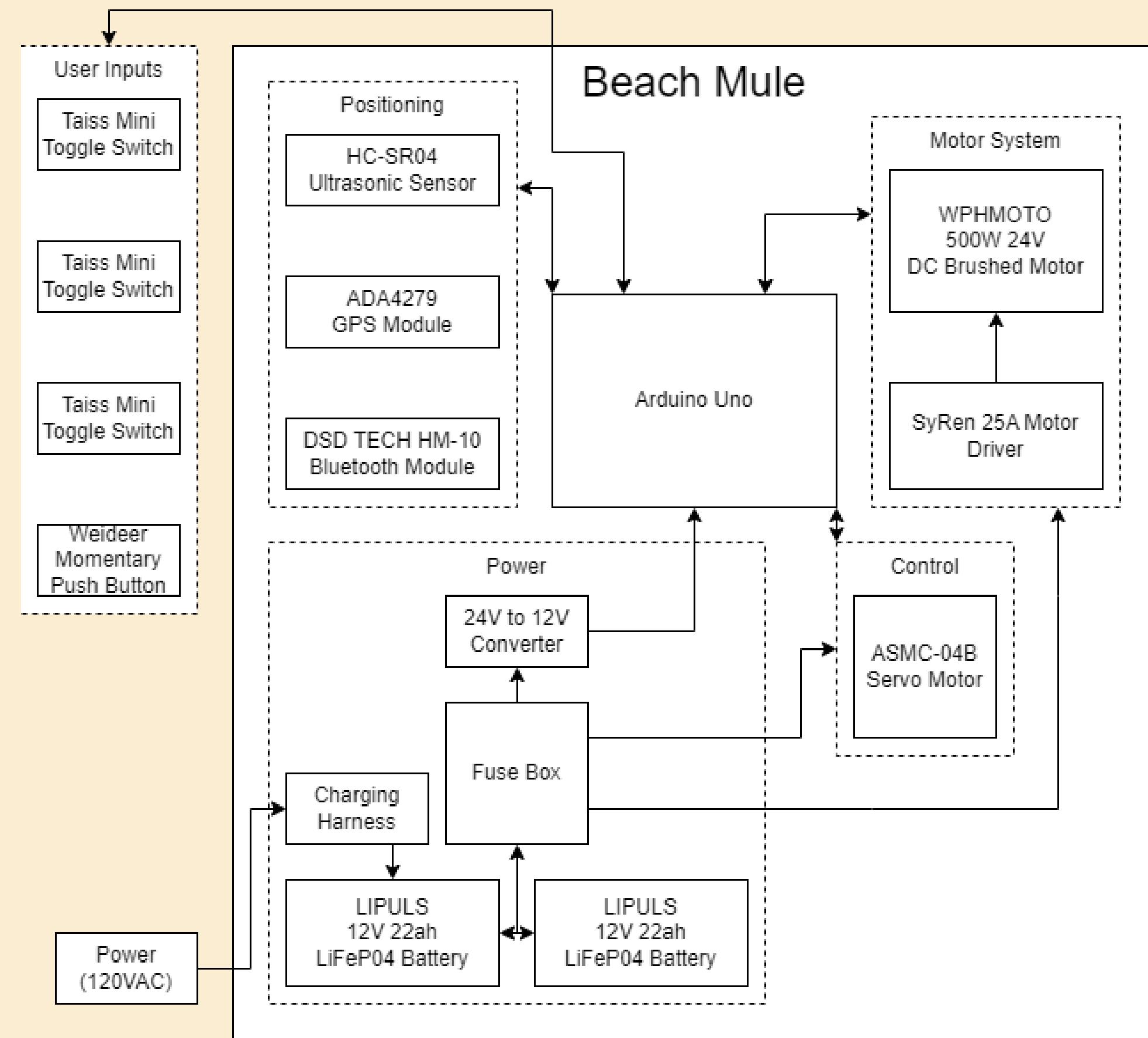


Microcontroller



Tracking

DESIGN OVERVIEW



MICROCONTROLLER

Arduino Uno

1. Motor Driver

- Control the motor RPM and current draw

2. Tracking System

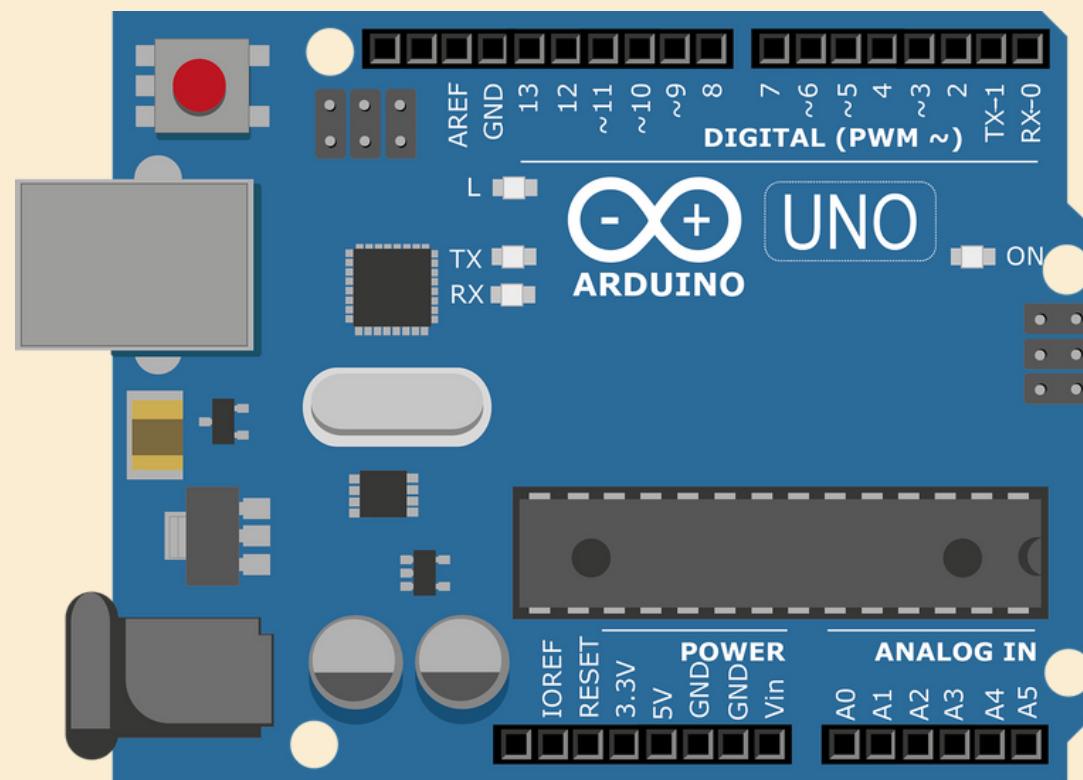
- Follow the user

3. Servo

- Steer the cart

Standard

- IEC 60757 - coordinated wire color



POWER

- 2x12V batteries to produce 24V 22ah
- Estimated hour of continuous run time
- 12 terminal 12V-32V fuse box (safety)
- 24V to 12V/5A (60W) DC converter
- Average current draw: 2.2A
- LiFePO4 batteries
 - Lighter than SLA with the same output



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ASSISTED WHEELS

- 10 inch pneumatic tires
- 500W 24V DC brushed motor
- SyRen 25A motor controller
- 180kg/cm servo motor
- Sealed ball bearing



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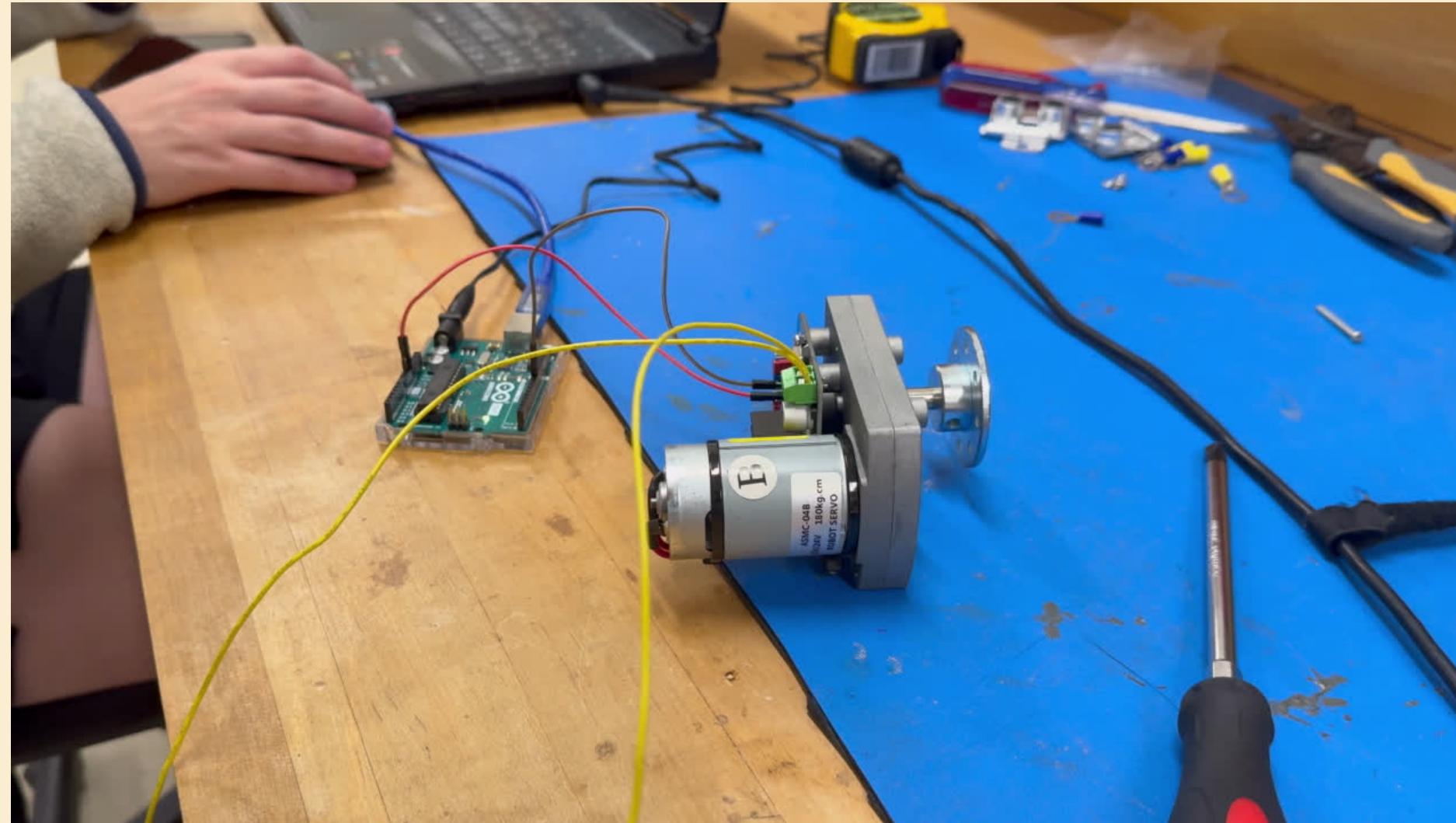


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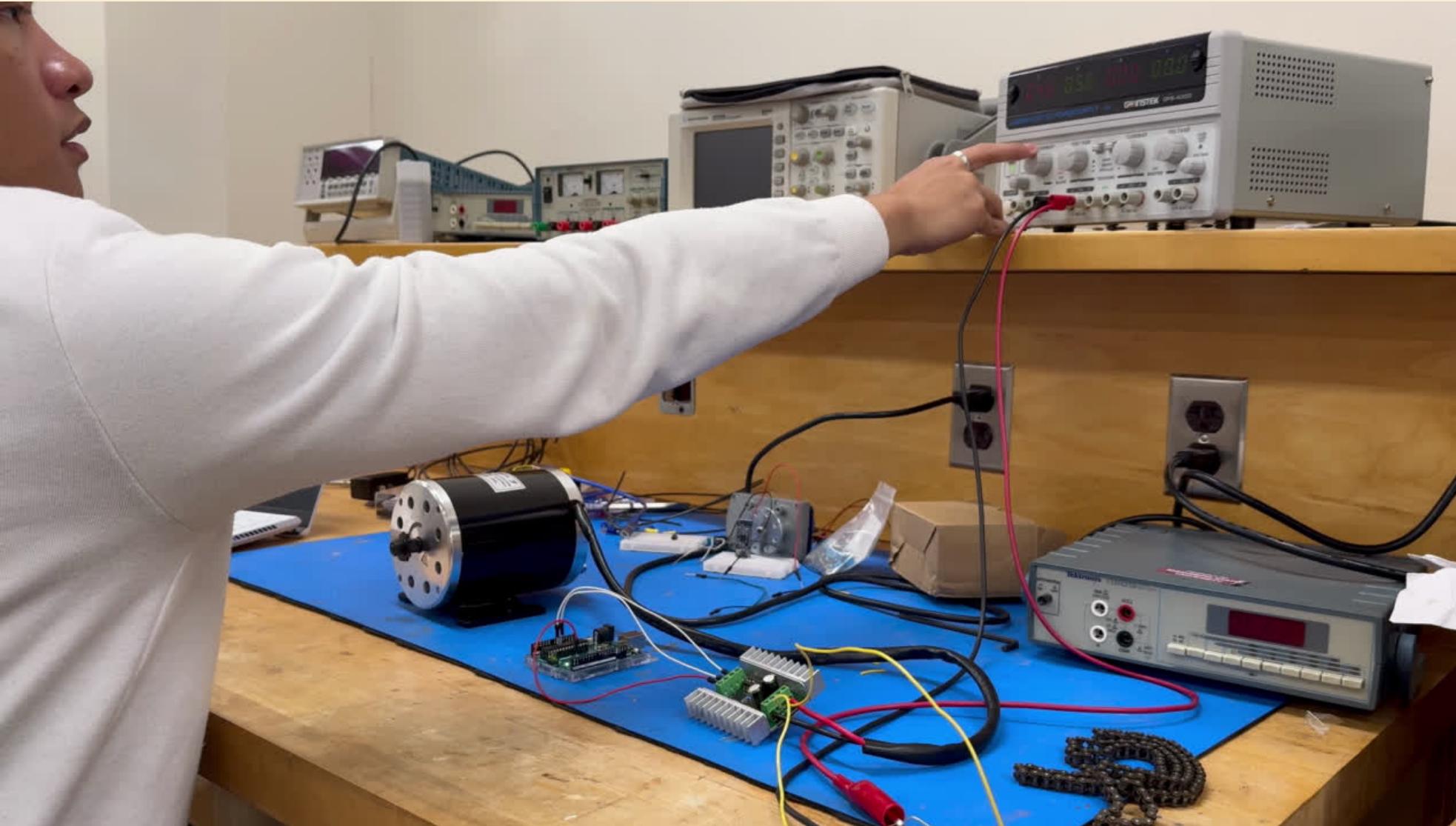
Constraints/Standards

- IEC 60757 - coordinated wire color
- Follow speed

ASSISTED WHEELS



ASSISTED WHEELS



CONTROLS

1. Weideer Button
 - 16mm 6A/125V
2. Taiss Toggle Switches
 - 6A/125V

Constraints/Standards

- IEC 60757- coordinated wire color



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TRACKING

ULTRASONIC SENSOR DISTANCE US-100

1. Detection Distance

- 2 cm – 450 cm

2. Power and Logic Voltage/Current

- DC 2.4V~5.5V/2mA

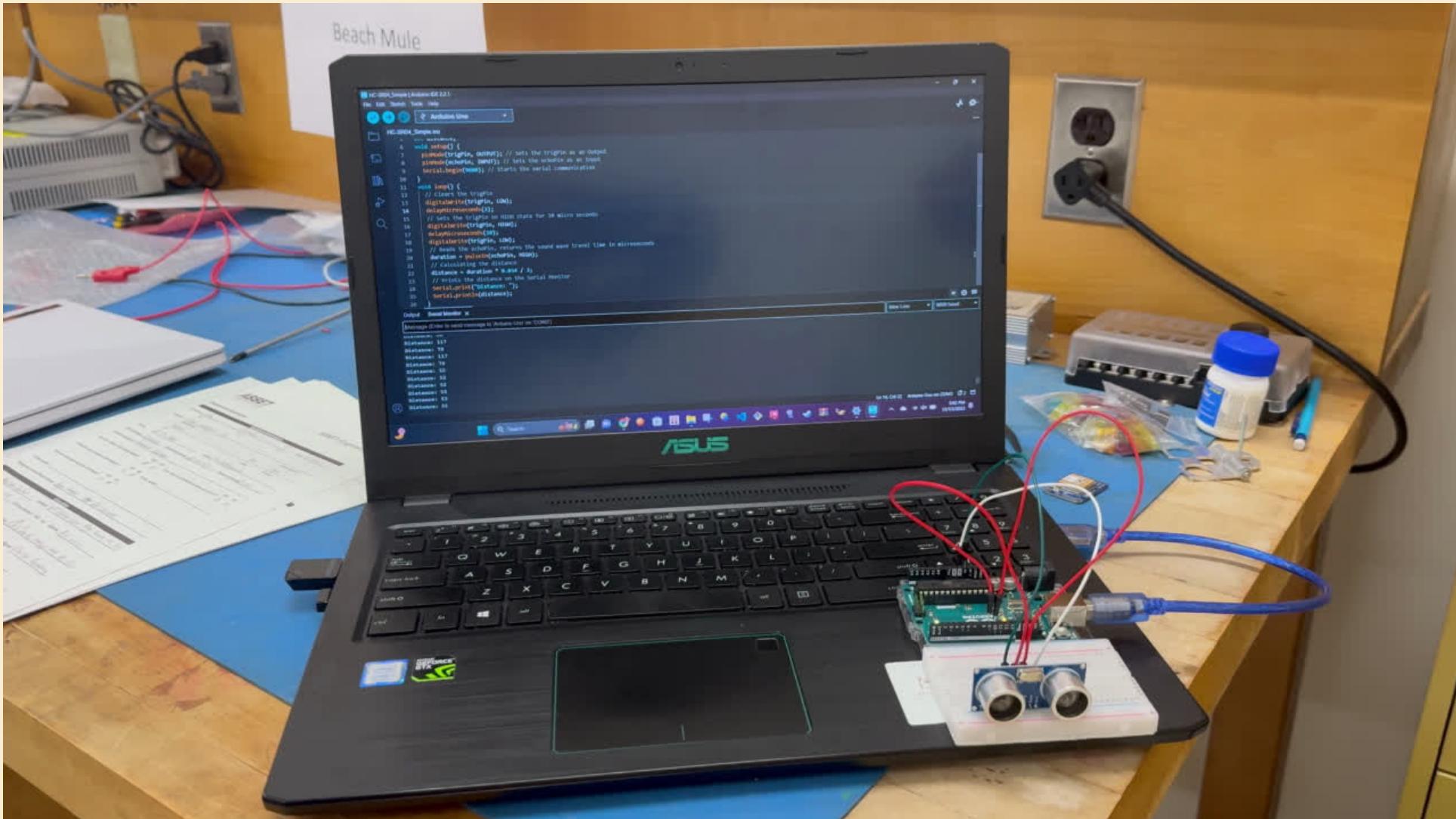
Constraints/Standards

- IEC 60757
- IP 67



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TRACKING



TRACKING

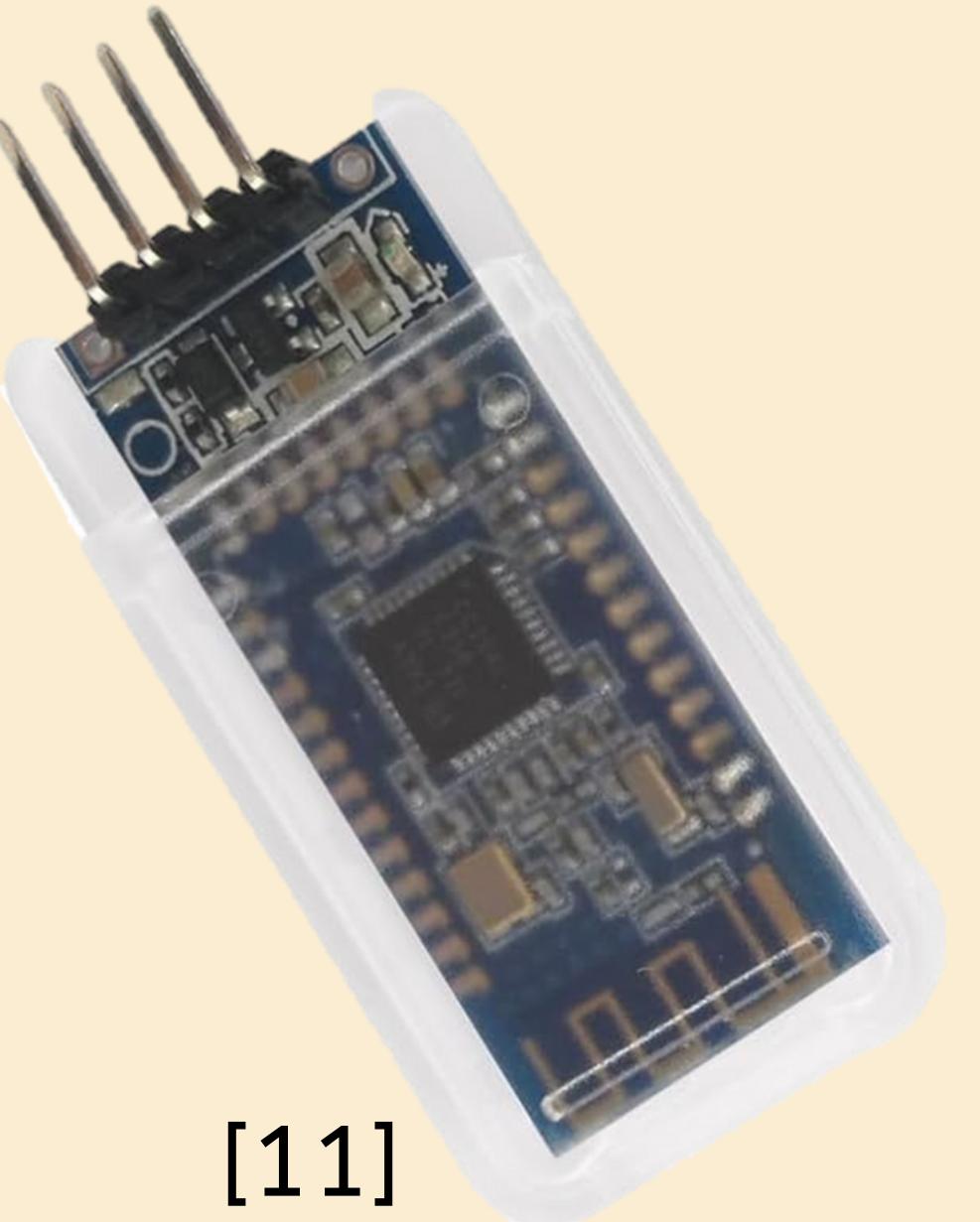
DSD TECH HM-10 Bluetooth 4.0

1. Detection Distance
 - 10 m
2. Power and Logic Voltage/Current
 - 3.6 – 6 V, draws 10 mA
3. Bluetooth Compatibility
 - iOS 7 – later

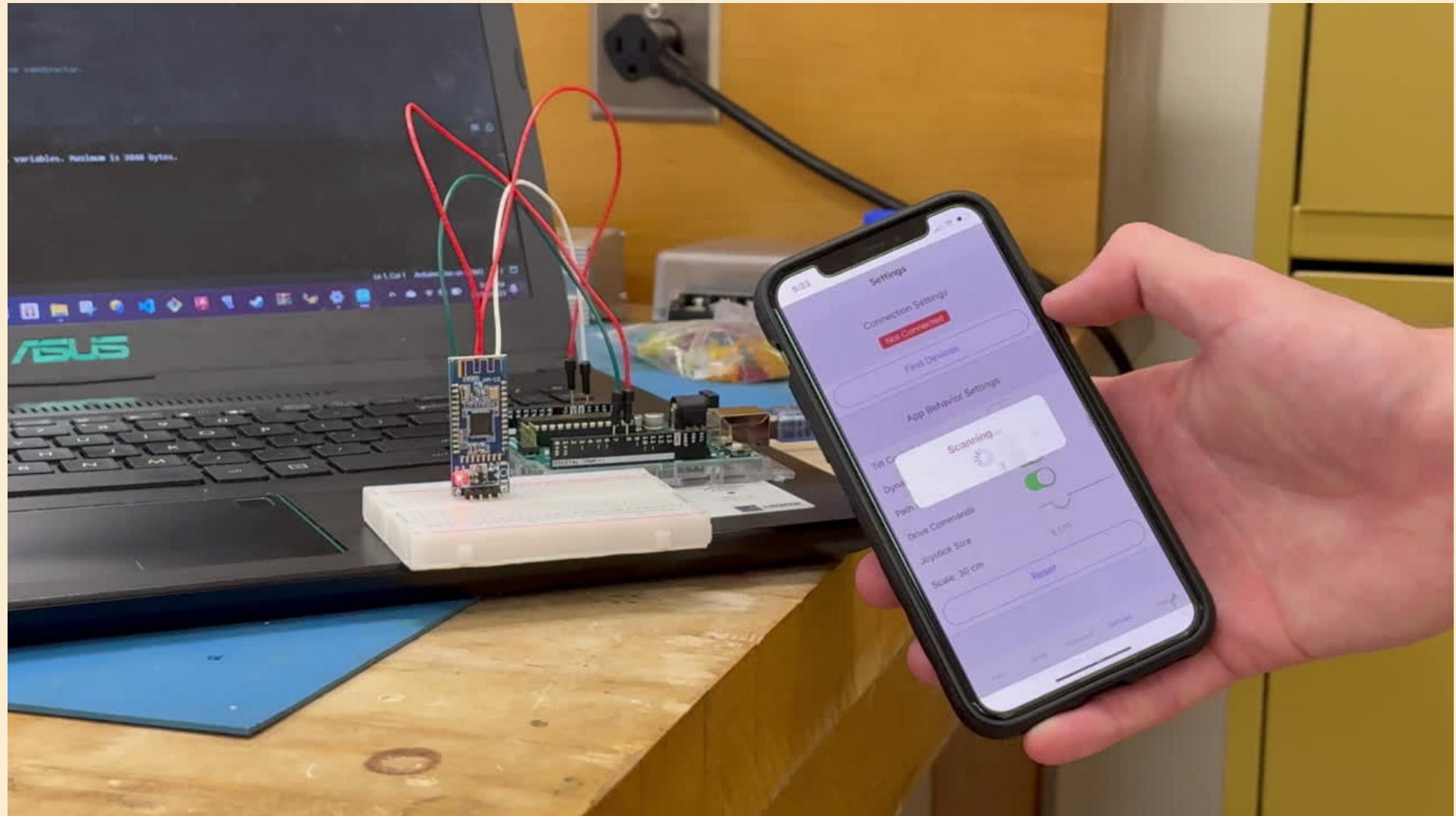
Constraints/Standards

- IEC 60757
- IP 67

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TRACKING



TRACKING

ADA4279 GPS Module

1. Detection Distance

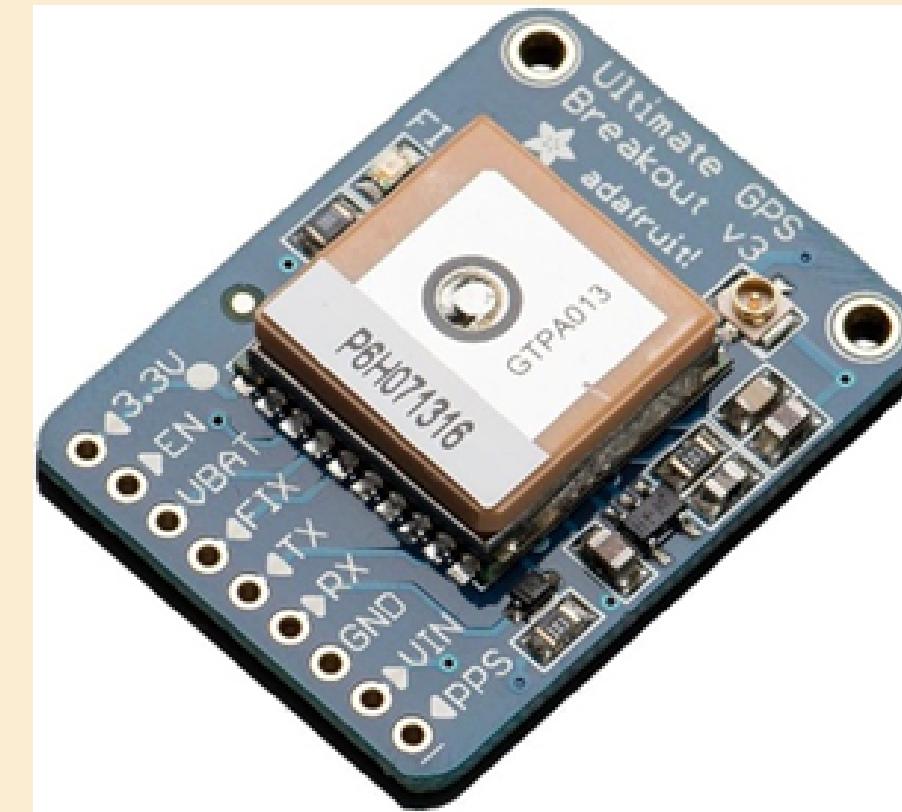
- 1-3 m

2. Power and Logic Voltage

- 3.0 – 5.5 V

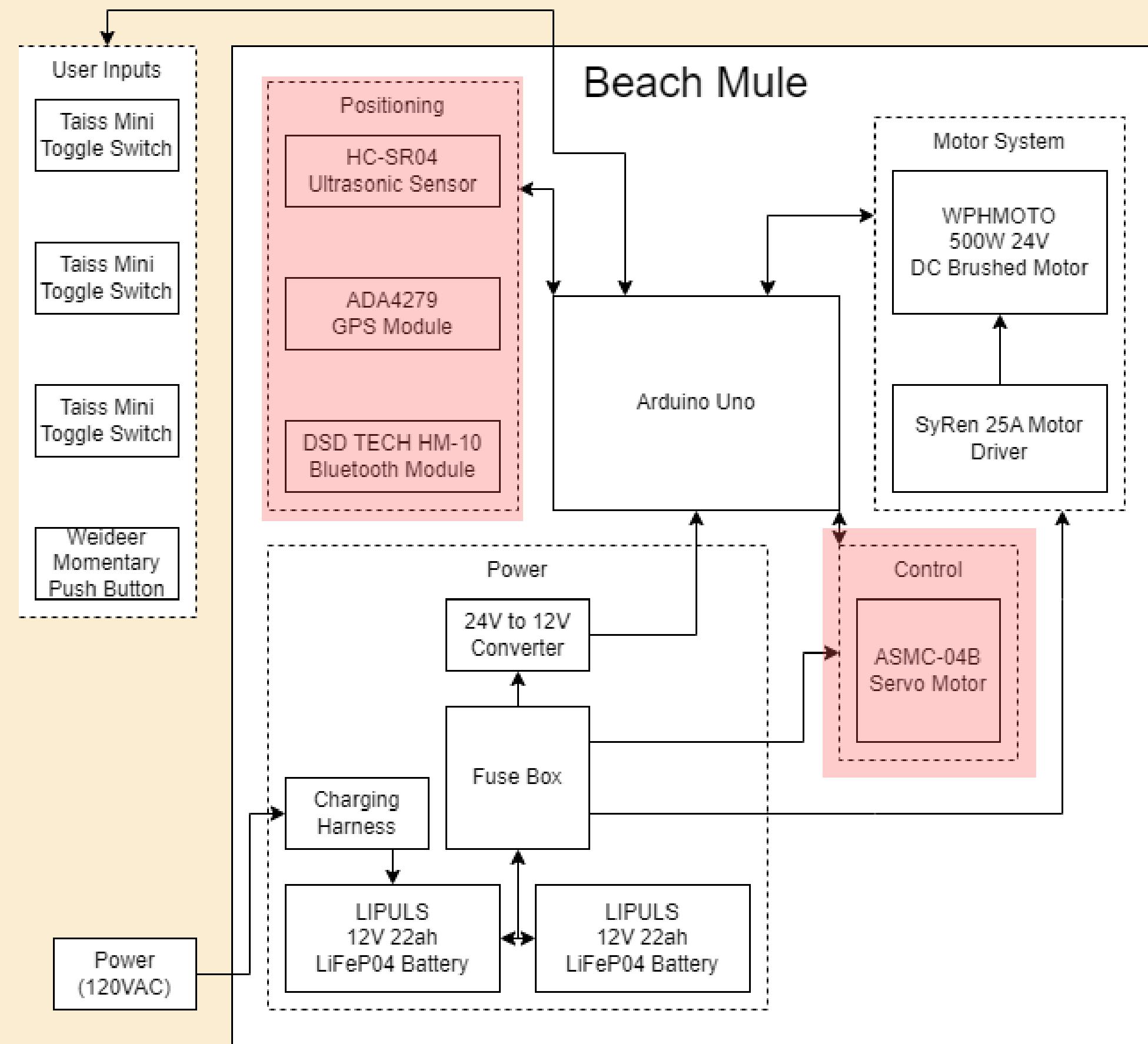
Constraints/Standards

- IEC 60757
- IP 67



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LEVEL II DESIGN DIAGRAM



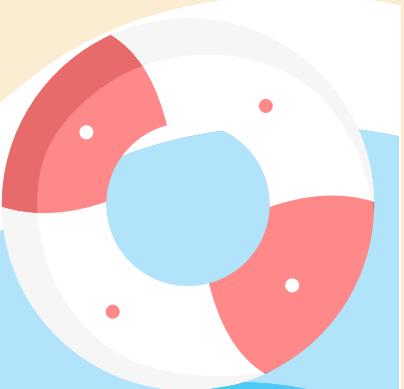
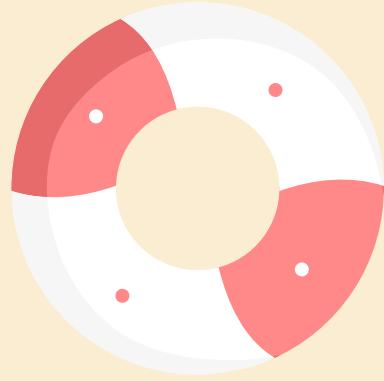
CHALLENGES

ORDERING PARTS

- Order early
- Differing shipping times
- Switching parts

WHEELS

- Servo motor placement
- Axle replacement
- Rear wheel ball bearing
- Rear wheel linchpin



LESSONS LEARNED

- Discuss part options with all members
- Research thoroughly when selecting parts
- Give maker space ample time for modifications

DESIGN II OVERVIEW

Test components
and subsystems

Incorporate
subsystems
into the frame

Improve
appearance
and
functionallity

CONCLUSION

The Beach Mule is built for people like Johnny who want to go to the beach and relax without the stress of carrying all their items. The Beach Boys hope this product provides a safe and long-lasting way to help consumers worry less and relax more!!



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THANK YOU