Boston University

Electrical & Computer Engineering

EC463 Senior Design Project

**Second Prototype Testing Plan**

***SharkCam***

## 

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## by

Team 28

SharkCam

Team Members

Liron Dubin (ME)

Brett Senders (ME)

Kevin Vasquez (ME)

Sophia Delia (CE)

Alex Hureaux-Perron (EE/CE)

## 

## Testing Goals:

1. Test Raspberry Pi “battery hat” power supply
   1. Test simultaneous powering of motor, distance sensor, and Pi computer
   2. Test motor under load with mount and column
      1. Test stability, comment on improvements
2. Test control of robot from client on the local network
   1. Test network connection
   2. Test that control of robot is maintained after device experiences “interrupt” from obstacle
3. Test web app on mobile device
   1. Test app is able to acquire camera permissions (if necessary)
   2. Test app is able to capture photo

## Required Materials

Hardware:

* Shark Robot
* GL-MT300N-V2 Router
* Raspberry Pi 3 A+
  + Battery Hat Power Supply
  + ToF sensor VL53L4CD
  + Stepper Motor CX 28BYJ48 with driver
* Motor Mount
* Column

Software:

* Python scripts & MQTT API
  + Motor control script
  + ToF sensor readings script
  + Robot control script
* RoboPad testing interface (if needed for debugging)
* Web App
* Expo Go Mobile Application
* React Application

## Testing Overview

The second prototype testing campaign will evaluate and demonstrate several key subcomponents of the design to ensure they behave as expected before they are integrated. These will include powering all hardware devices with the battery hat power supply, control of the robot over a local network using the Raspberry Pi, and opening the mobile device camera from the React application.

## Testing

### Power Supply

#### Procedure

1. Connect Raspberry Pi to battery hat power supply using GPIO pins
2. Connect motor mount to stepper motor and insert column
3. Connect stepper motor controller to power supply using USB and to Pi using GPIO
4. Connect time of flight sensor to Pi using GPIO
5. Power on Pi (one click “on”, two click “off”)
6. Run scripts to rotate motor and read output from sensor

#### Criteria

* Motor mount should securely support column
* Power supply should simultaneously power Pi, sensor, and motor while motor is under load

### Robot Control

#### Procedure

1. Run control test script with robot unimpeded and uninterrupted
2. Run control test script and interrupt operation by triggering bumper after it has left the dock

#### Criteria

* Pi should successfully connect to robot and return “Code 0”
* Robot should leave dock, begin cleaning, and pause at the specified interval, for the specified number of times, for the specified duration and then return to dock
* Robot should resume following routine after being interrupted by a collision

### Web App

#### Procedure

1. Open React application using Expo Go
2. Open front camera view
3. Open rear camera view

#### Criteria

* Application should load on mobile device
* Application should access device’s camera
* Application should switch between front and rear cameras

## Results:

* Battery hat successfully powered Pi, stepper motor, and distance sensor
  + Stepper motors rotated
  + Distance sensor reported distance over serial connection
* Updated design for motor mount was not fabricated at time of testing
  + Old design supported column but was not very stable
* Pi connected to robot
* Robot followed commands in both the uninterrupted and interrupted trials