Triton

Team 11
October 20, 2016

Triton

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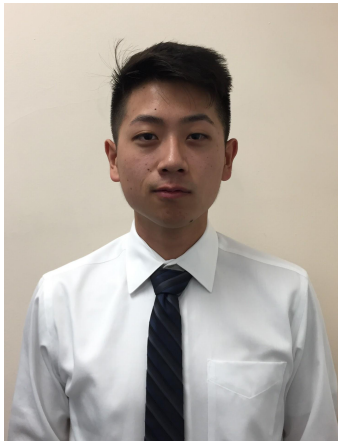
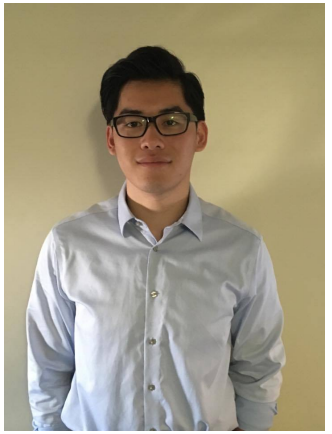
Calvin Tran, EE



Kevin Tong, ME



Tony Hua, ME

- Advisor: Prof. Andras Moritz
- Advisor: Prof. Frank Sup

What is the problem?

- Currently no economical solution monitoring underwater biological phenomena over extended periods
- Not much existing data on the river herrings mating patterns because no means of collecting data

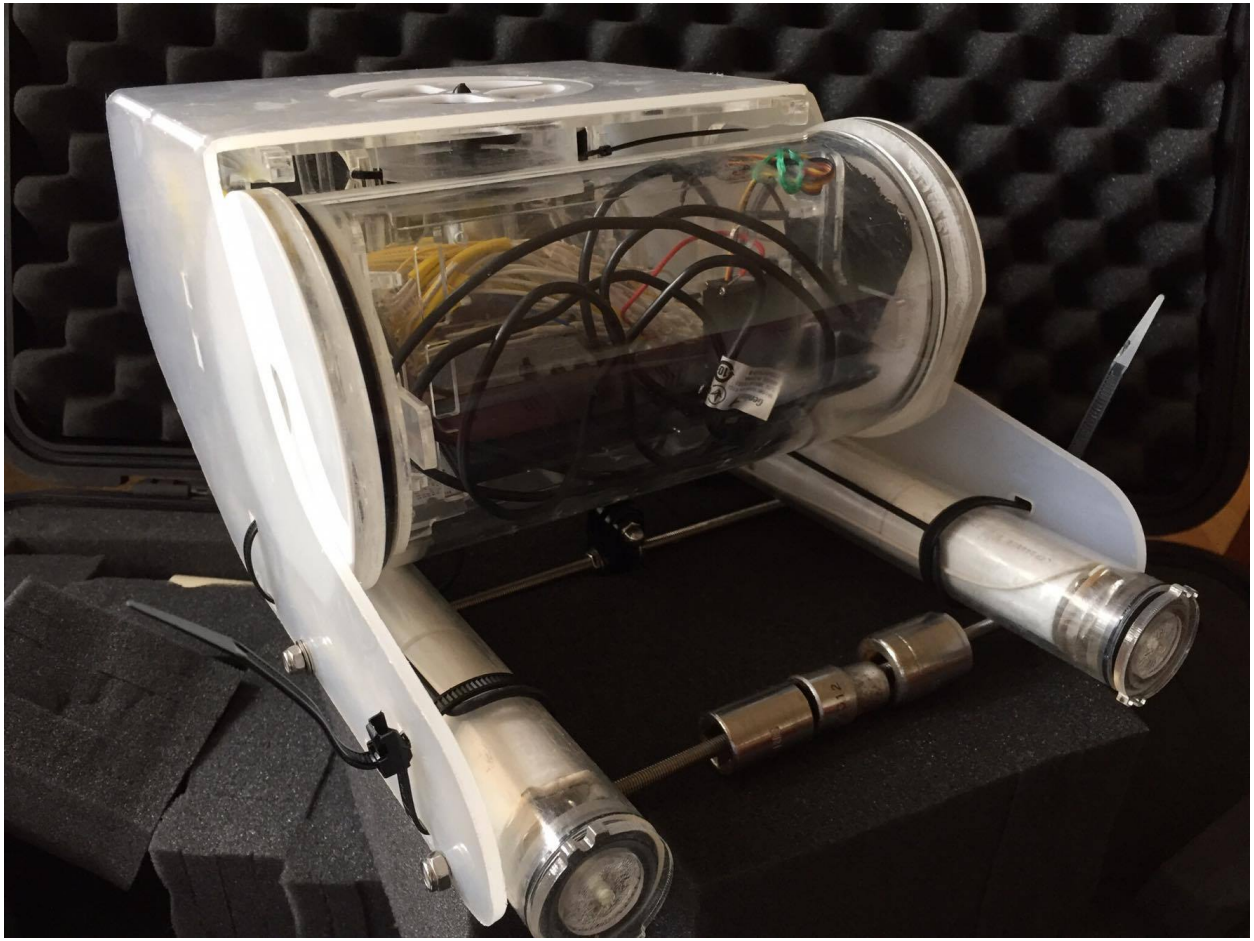
What are river herrings?

- Collective term used to refer to alewives and blueback herring fishes
- Coastal MA home to these two species
- Spend most of their lives in ocean then return to spawn in rivers
  - Spawning occurs late March through June

How significant is the problem?

- St. Croix River--river herring population declined from 2,624,700 fishes in 1987 to 1,299 in 2004
- River herrings cover for upstream migrating salmon
- Fished species are dependent on river herring
  - population decline now negatively affecting commercial fisheries

Our Solution: Triton



Our Solution: Triton

- Datalog of eggs location
  - Location calculated using WiFi
  - Saved footage up to 3 hours/72GB
- Improve vehicle stability
  - Integration of IMU, compass, and depth sensors
  - Closed-loop orientation control model
- Increase run-time from 2 hours to 3 hours
  - External power supply
- Increase travel distance
  - WiFi signal increases range to 300 feet

Requirements Analysis: Specifications

- Able to operate up to 20 feet in depth
- Operational distance of up to 300 feet from base station
- Able to achieve run time and HD quality video feed up to 3 hours
- Capable of storing 3 hours of footage
  - 1080p, 72 Gigabytes of data
- Able to readjust its orientation through control loop

Requirements Analysis: Inputs and Outputs

Inputs:

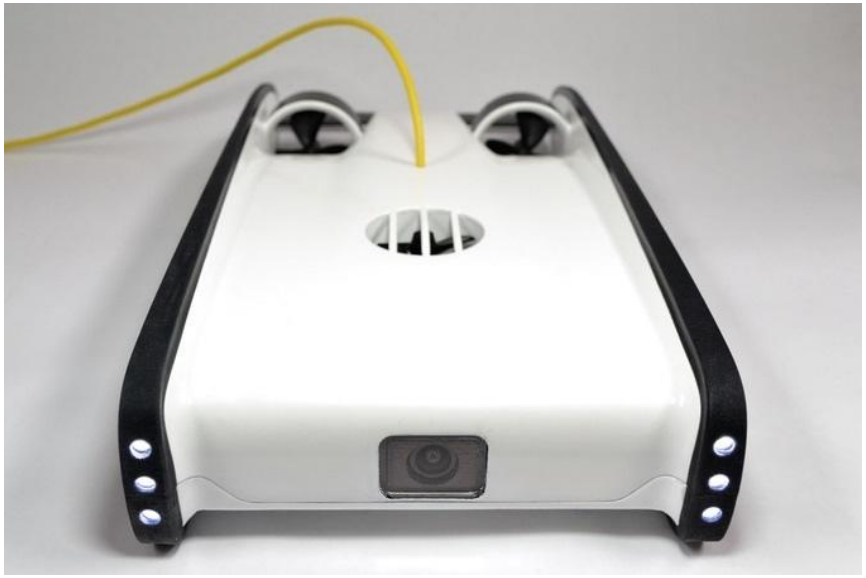
- IMU, depth, compass
- HD 1080p Webcam
- User control

Outputs:

- Orientational data/depth
- Live video feed
- Distance reading

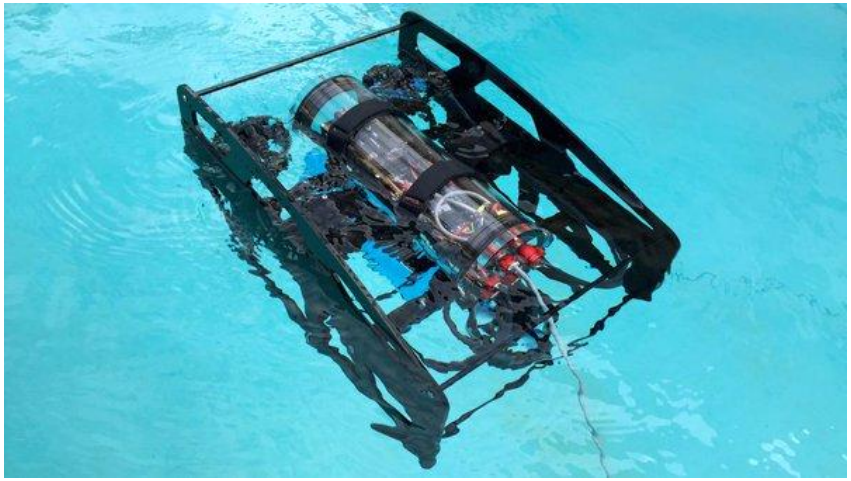
Design Alternative 1: Trident Drone

- Costs $1,200.00
- Radio buoy for tetherless communication
- Run time up to 4 hours
- Gyro stabilization, Depth hold, Heading hold
- Not available until early 2017

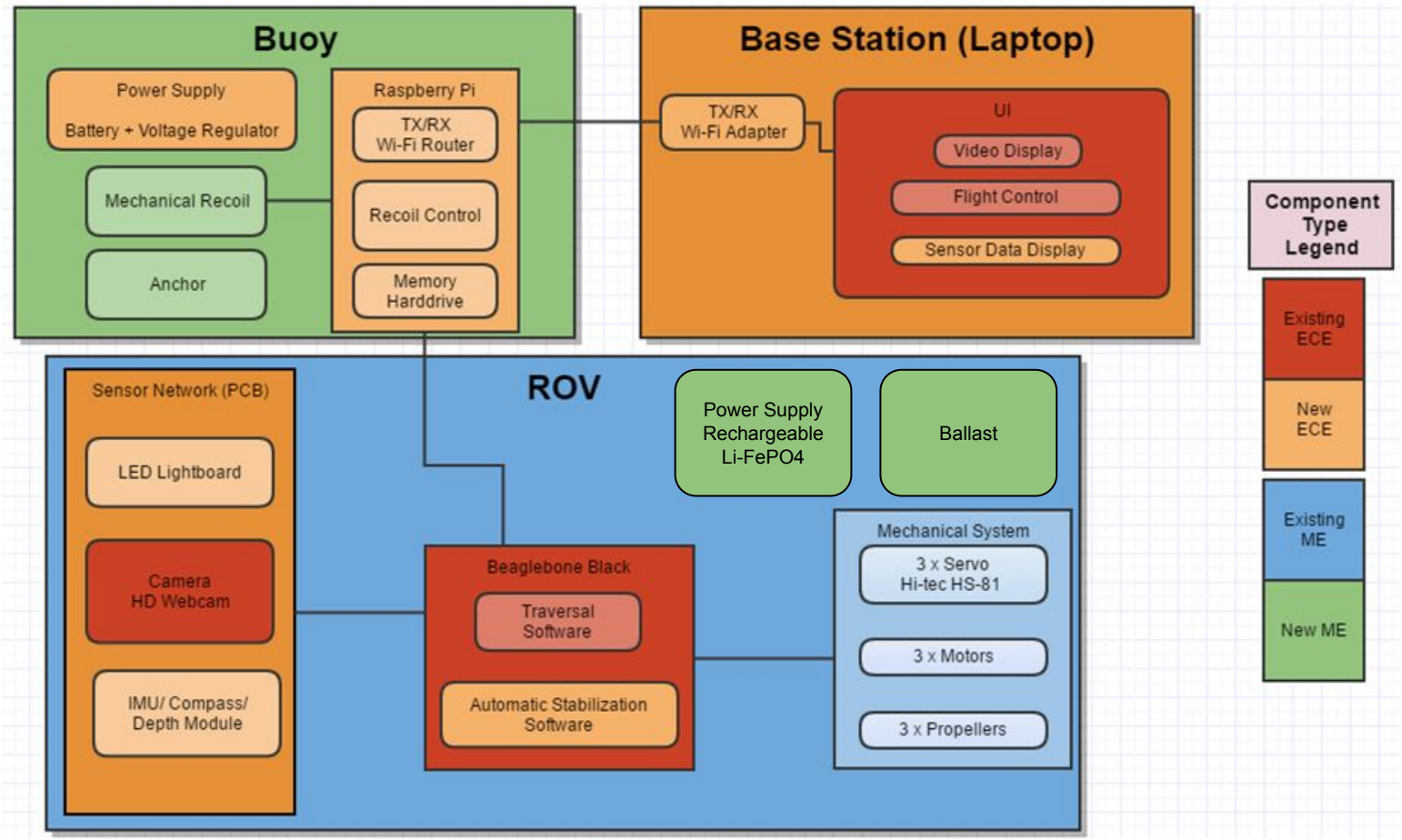


Design Alternative 2: BlueROV

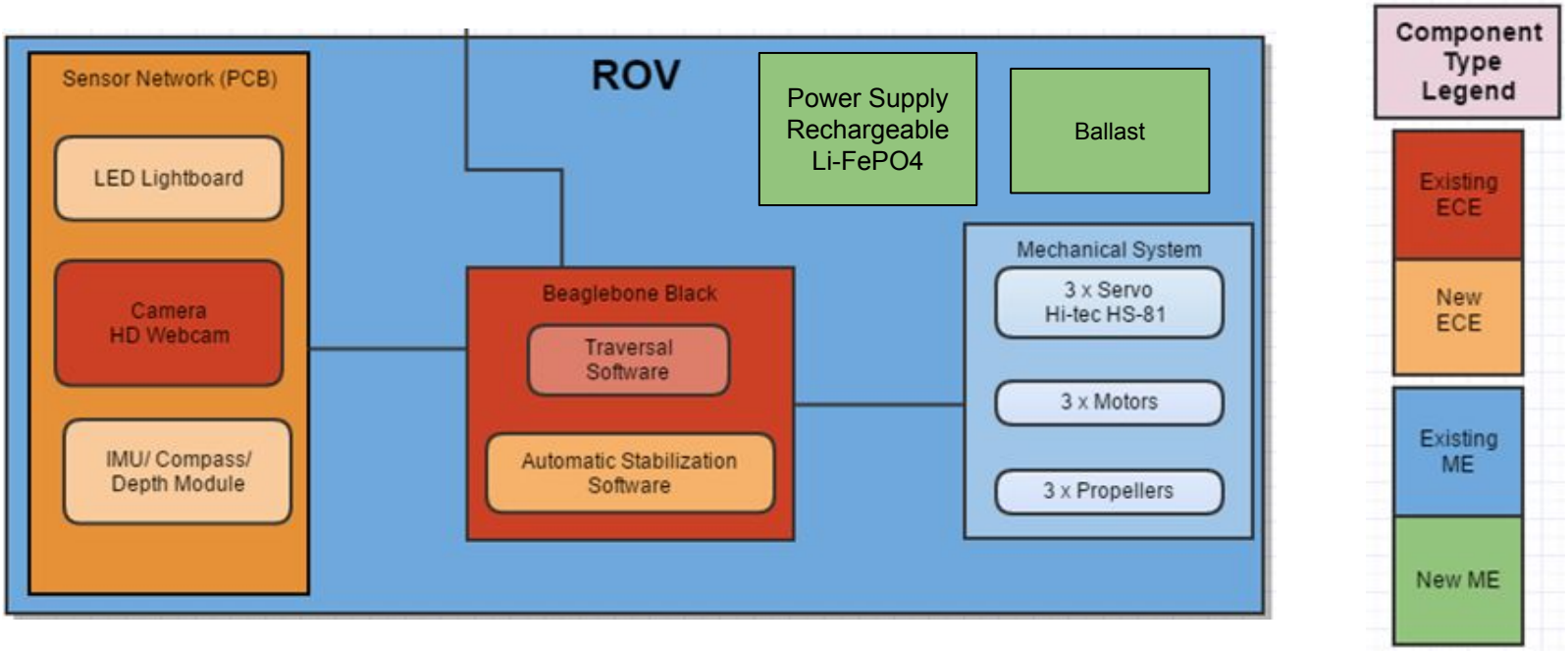
- Costs $1290.00
- Six-degree-of-freedom
- 6 Adjustable thrusters
- 3DR PixHawk autopilot software
- No camera for filming
- No LED lights



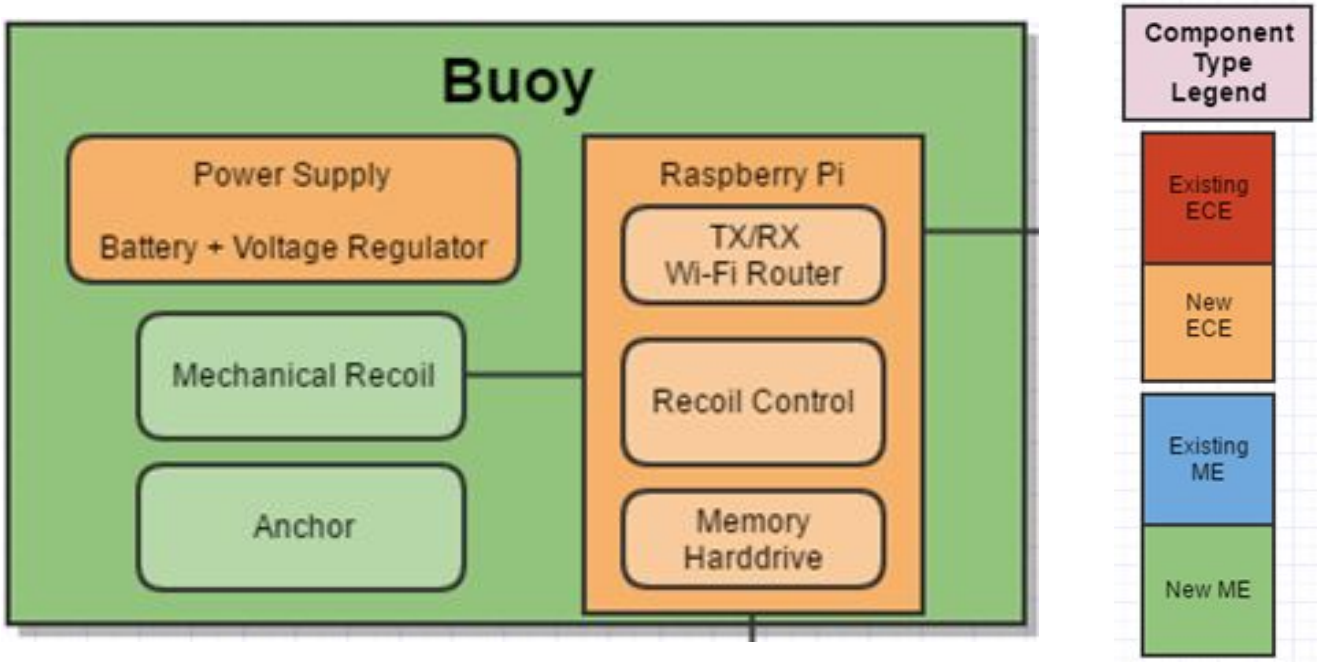
Main Block Diagram



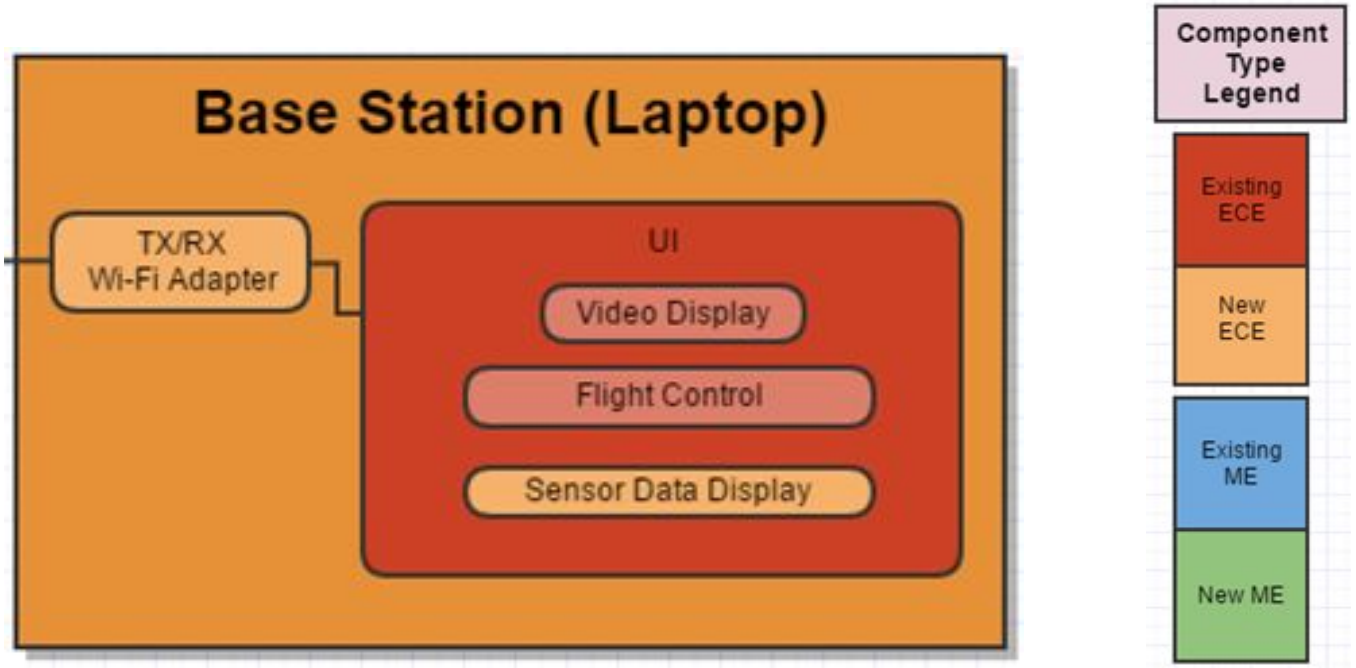
ROV


ROV
Sensor Network (PCB)
LED Lightboard
Camera
HD Webcam
IMU/ Compass/
Depth Module
Beaglebone Black
Traversal
Software
Automatic Stabilization
Software
Power Supply
Rechargeable
Li-FePO4
Ballast
Mechanical System
3 x Servo
Hi-tec HS-81
3 x Motors
3 x Propellers
Component
Type
Legend
Existing
ECE
New
ECE
Existing
ME
New ME

Buoy

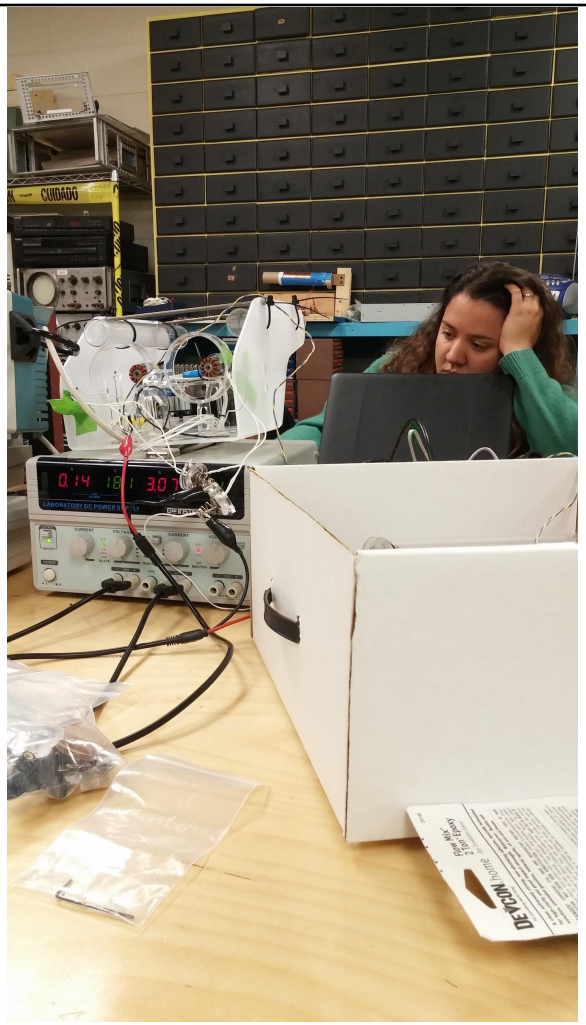

Buoy
Power Supply
Battery + Voltage Regulator
Mechanical Recoil
Anchor
Raspberry Pi
TX/RX
Wi-Fi Router
Recoil Control
Memory
Harddrive
Component
Type
Legend
Existing
ECE
New
ECE
Existing
ME
New ME

Communication system



Current ROV Issues

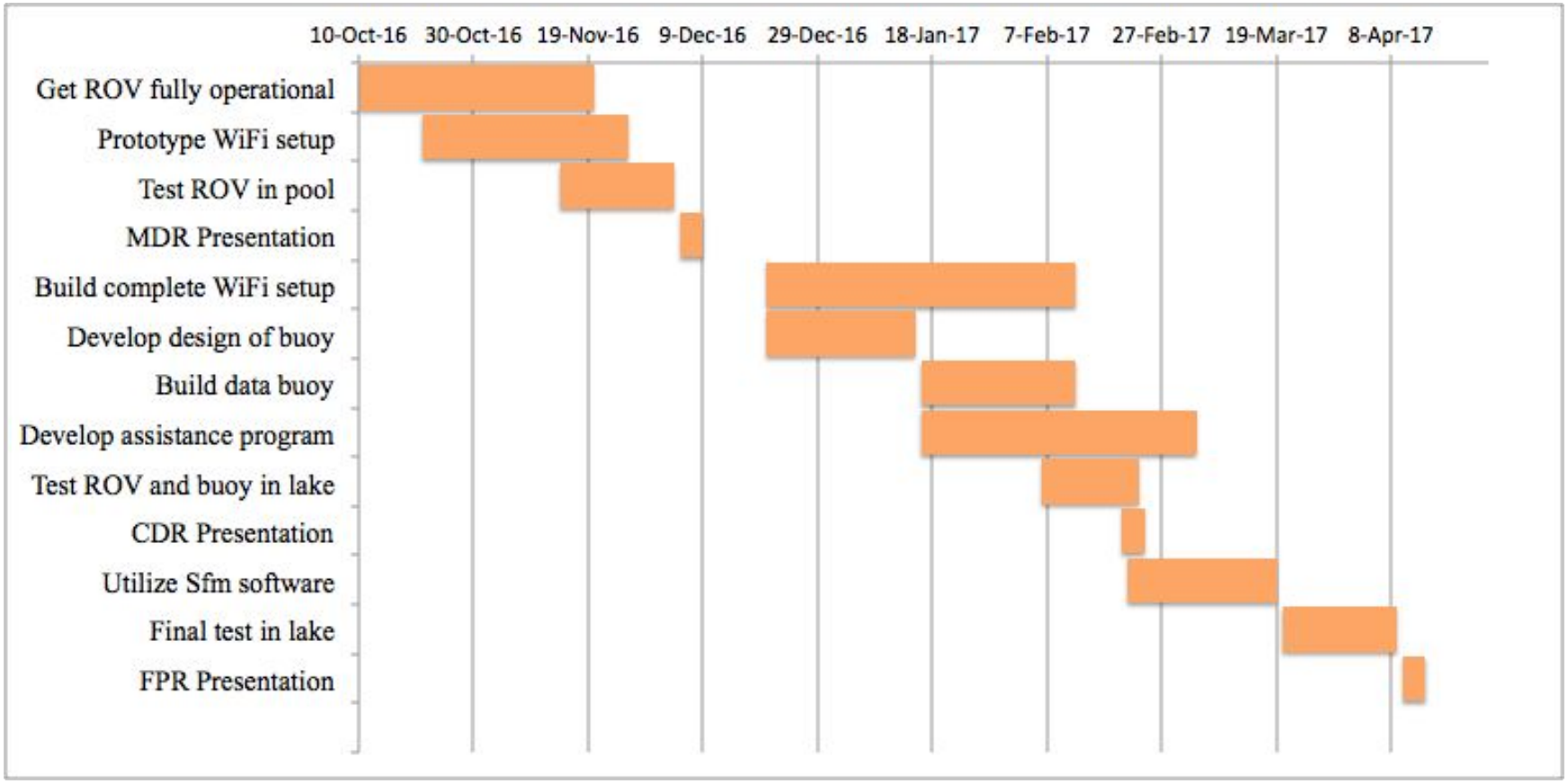
- Cannot maintain depth underwater
- Water leakage
- Motors running nonuniformly
- Unresponsive microprocessor



Proposed MDR Deliverables

- Demonstration of OpenROV in pool
  - Live video stream
  - Responsive flight controls
  - Maintains depth underwater
- Prototype of WiFi setup
  - Working range of around 300 feet
  - Showcase of video feed and controls through WiFi

Proposed Timeline



Estimated Cost

Expenses	
USB WiFi Module	$19.95
IMU/Compass/Depth Module	$120.00
BeagleBone Black	$55.00
Buoy Frame Materials	$30.00
PCB	$70.00
12-Volt Power Supply + Cable Power	$31.81
Total	$326.76

Thank You

Questions?