

Senior Design Team #21

RoboSub

Project Lead: Kyle Miller

Members: Santiago Franco, Darryl McGowan, Sondra Miller, Gregory Robertson, Stuart Royal, Alex Smith

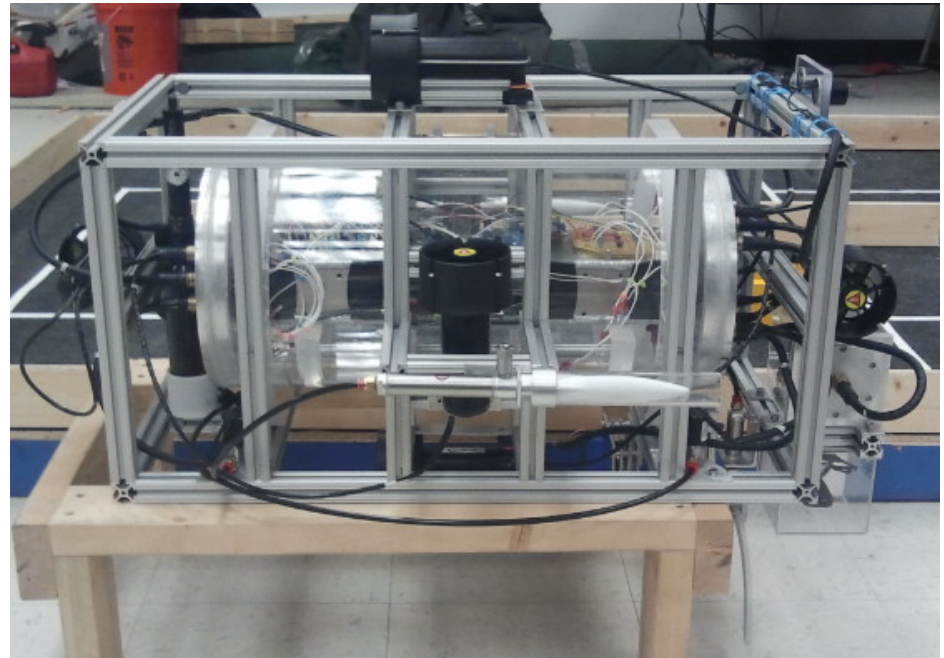
Advisors: Dr. Clark, Dr. Harvey, Dr. Frank

Project Overview

- Build an Autonomous Underwater Vehicle (AUV) under 125 lbs. to compete in 2013 RoboSub competition
- Needs to complete complex tasks involving:
 - Artificial intelligence
 - Computer vision
 - Autonomous control
- Designed for easy troubleshooting

Existing Design

- **Pros**
 - Already constructed
 - Acceptable heat dispersal
 - Flexible design
- **Cons**
 - Over target weight of 85 lbs.
 - Difficult to access electronics
 - Unstable electronics
 - No intelligence

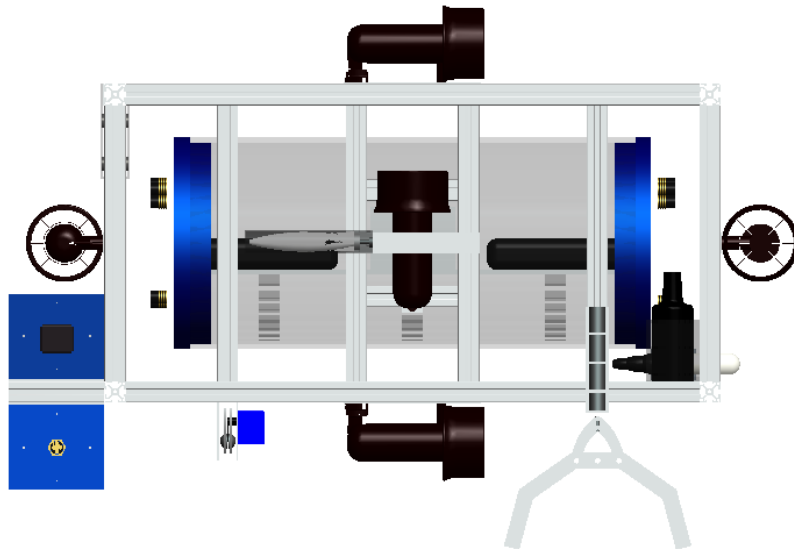


Mechanical Design Considerations

1. Keep existing design
2. Redesign endcaps
 - Put all connectors on one end
 - Add handle
3. Complete redesign
 - Box hull
 - Frame only on bottom
 - Connectors on baseplate

Mechanical Design #1

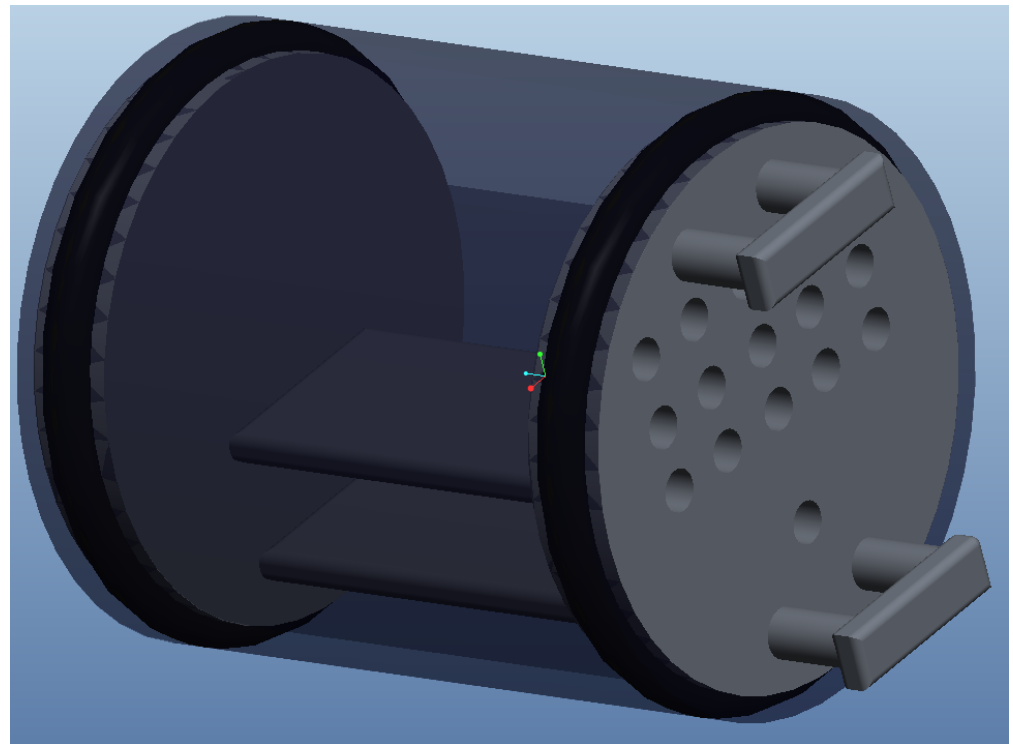
- Reuse old frame and casing design
 - Focus on improving electronic selections
 - Focus on programming system



» View of last year's design

Mechanical Design #2

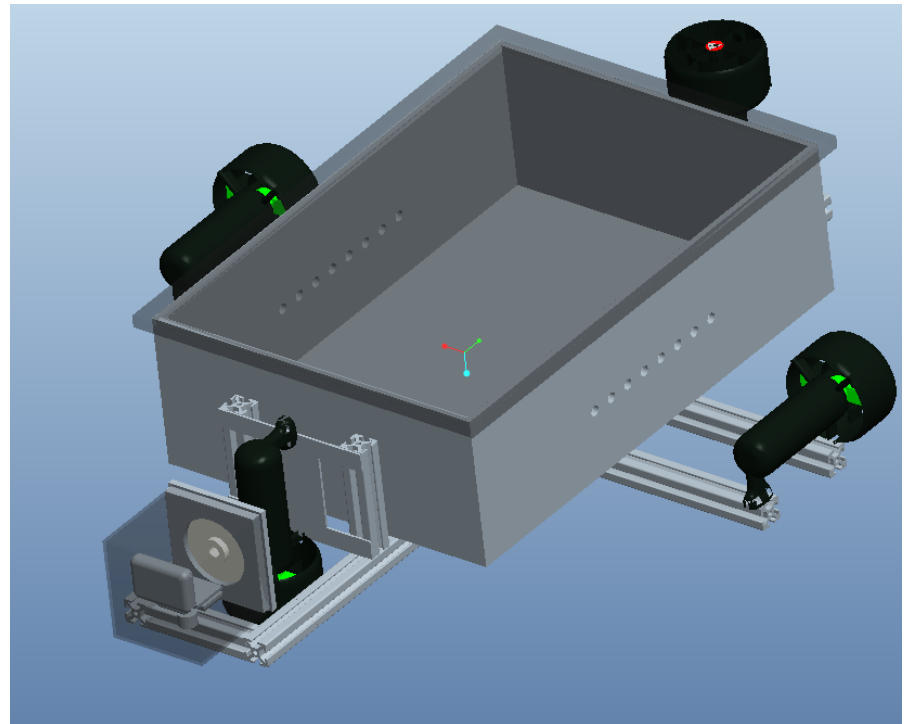
- Keep frame, change the casing endcaps
 - Would improve accessibility
 - Low cost



angled view of redesigned endcaps

Mechanical Design #3

- Complete redesign of frame and case design
 - Make it lighter
 - Easier access
 - More work
 - Costly



angled view of new design

Mechanical Design Selection

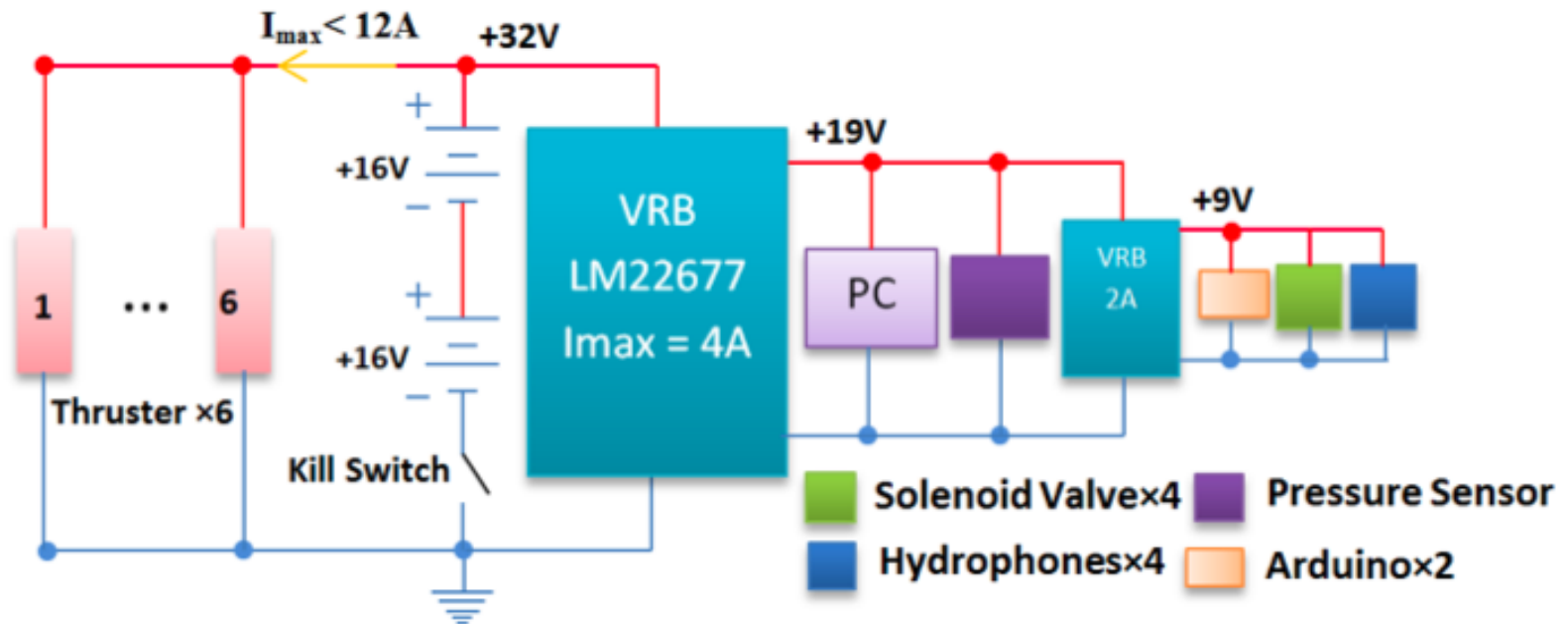
- Chose design #3
 - Allowed maximum accessibility
 - Easiest fabrication
 - Lightest weight

	Weight	Accessibility	Cost	Reproducibility	Building Time	Total
Weight	.25	.3	.2	.05	.2	1
Concept 1	5	1	10	1	10	5.6
Concept 2	4	4	6	4	8	5.2
Concept 3	8	10	3	8	4	6.08

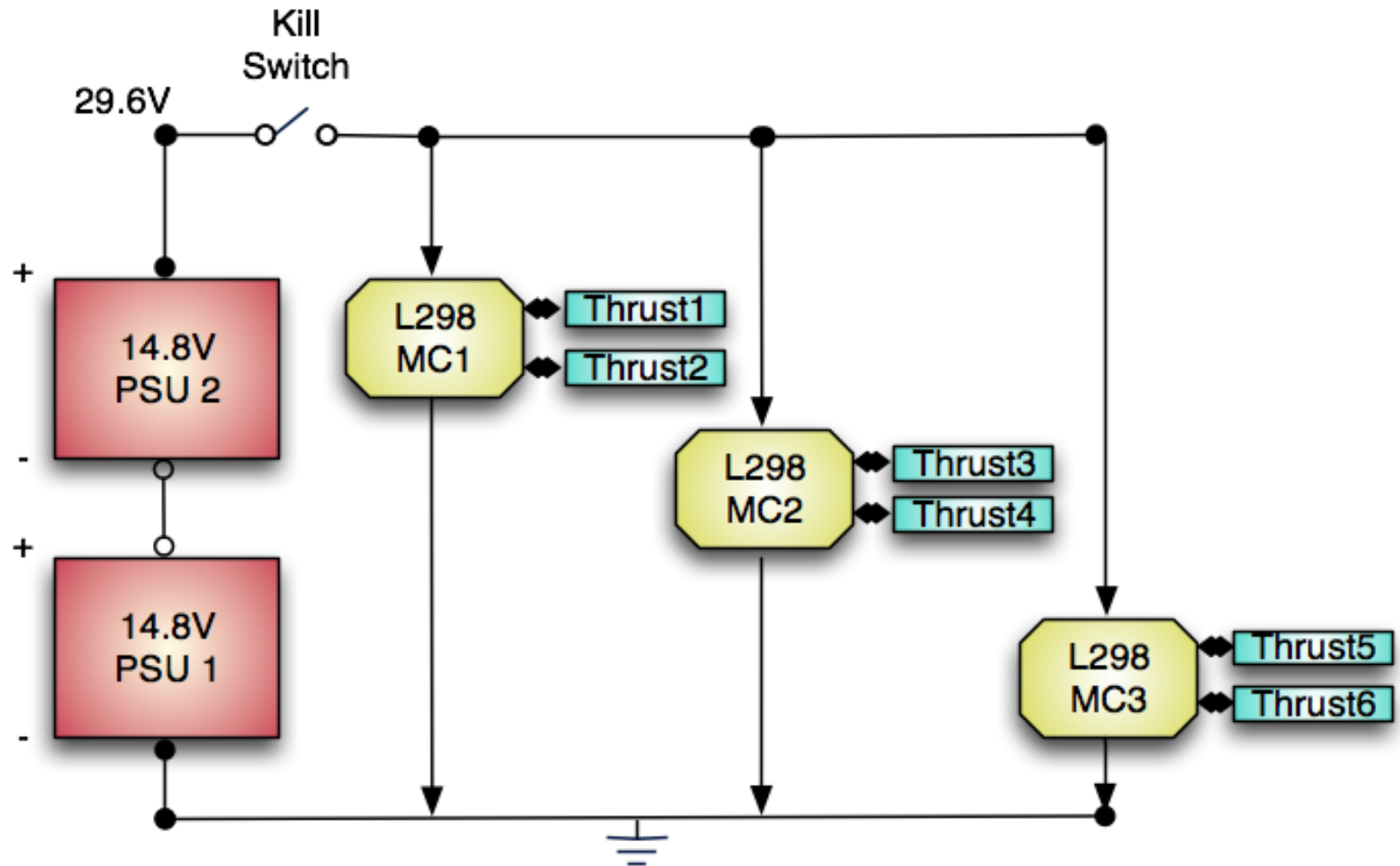
Power System Design

- Single power source (2011 design)
 - Existing design
 - Fewer batteries lowers weight
 - Less hull space
- Power source for each subsystem
 - Reduce current fluctuations
 - More adaptable voltage output for each device
 - If a battery malfunctions, it will not damage every component
 - Stable voltage regulation from manufactured VR's

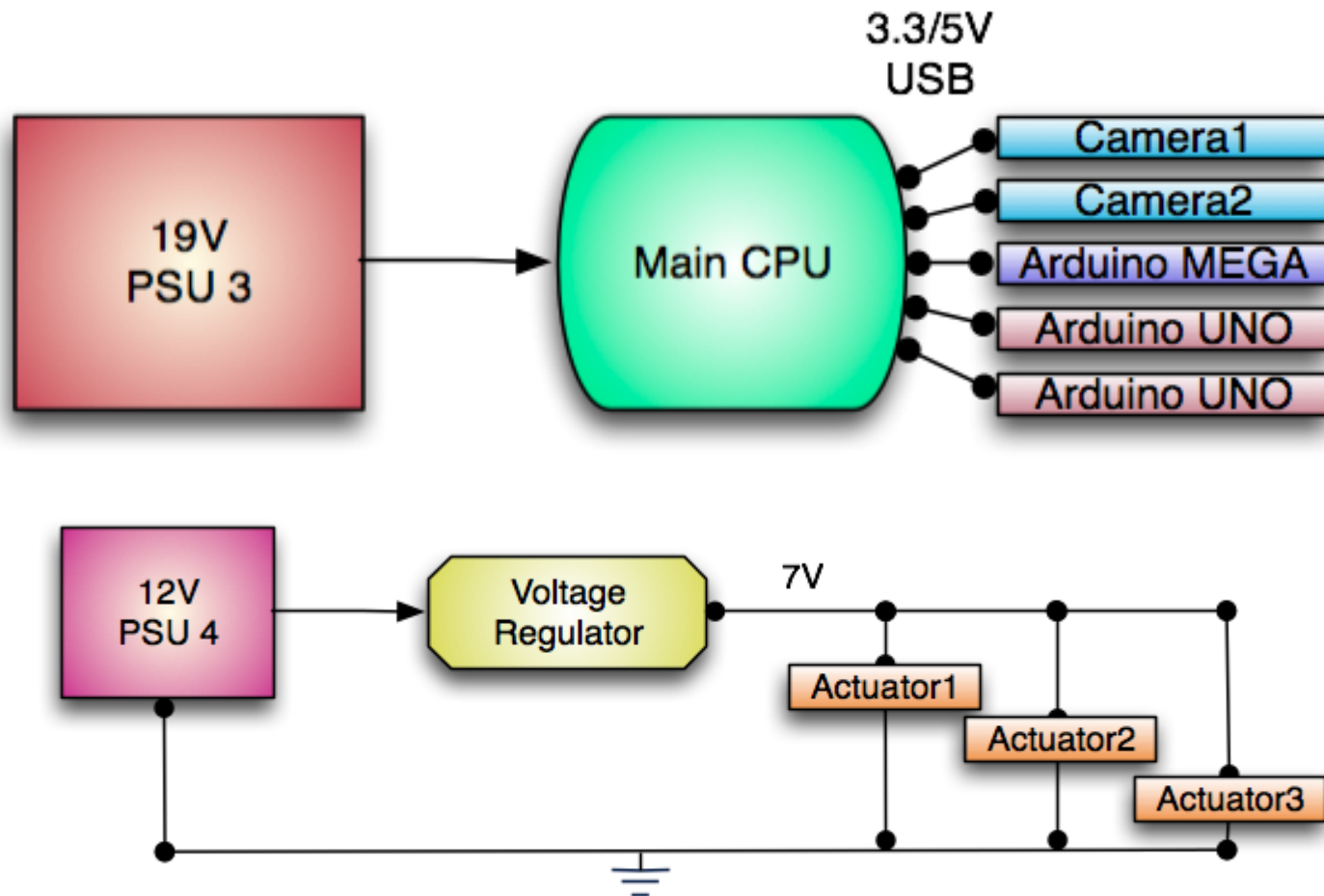
Power System 2011 design



Power System Configuration



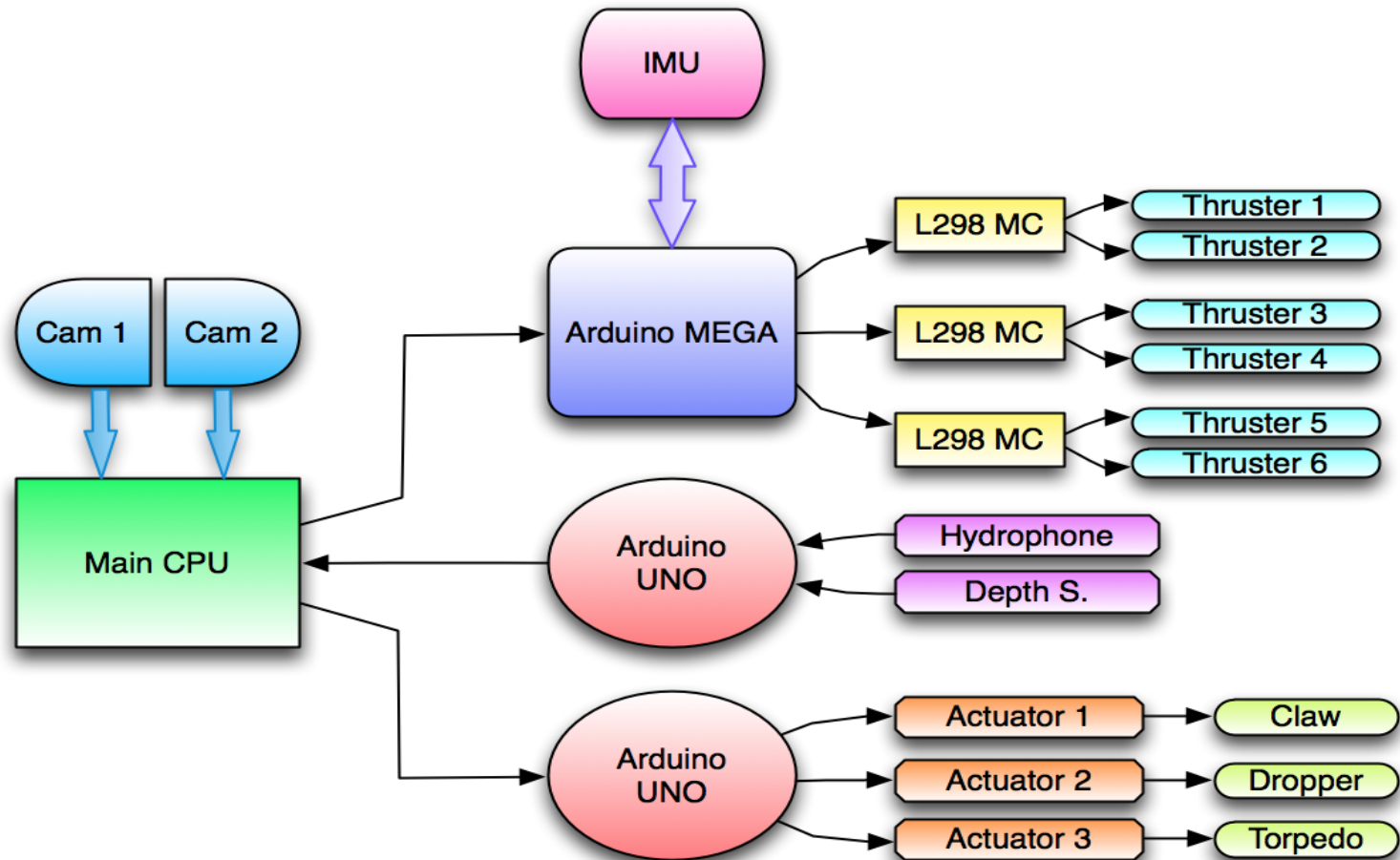
Power System Configuration (cont)



Computer System Design

- Based on last year's design choices
- Main Controller
 - Laptop system running Windows XP
 - Handles bi-directional communication with each subsystem
- Motor Control:
 - Controller on 1 Arduino MEGA
 - Internal Sub Balance via IMU
 - Sends Serial data to L298 H-Bridge
- Sensor/Actuator Control
 - Arduino Interprets serial data. Communicates with Main Controller

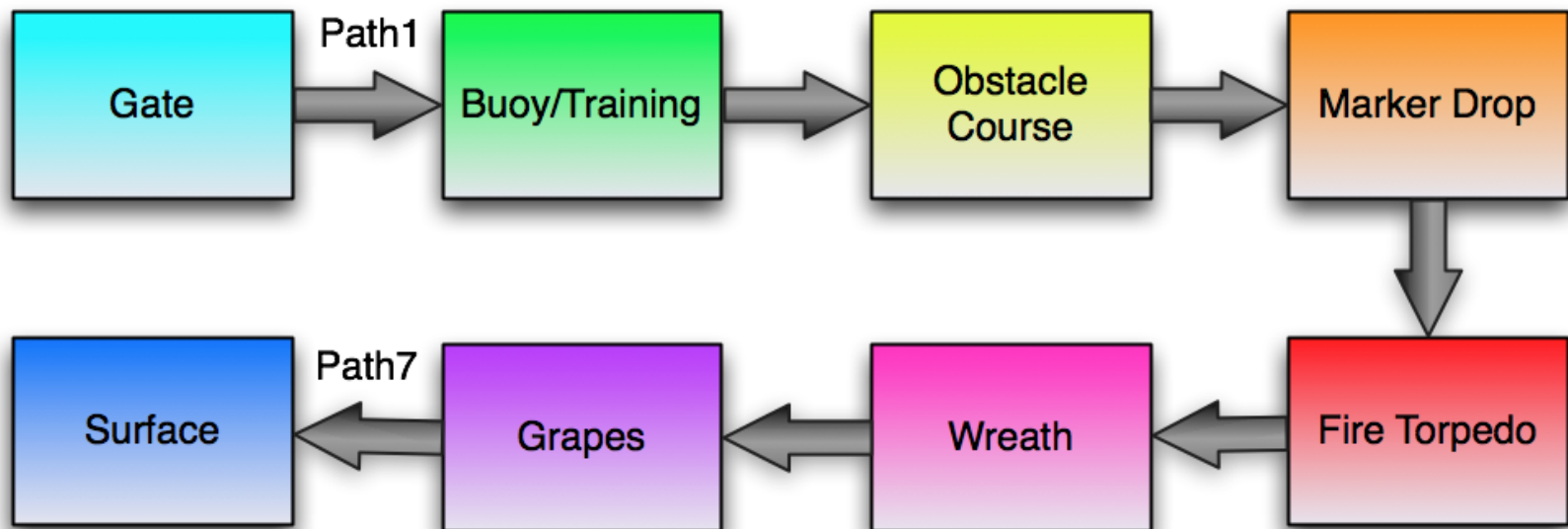
Hardware Configuration



Top Level Mission Controller

- Top level software that will control overall decision making of the sub
- Implemented as a state machine with states for each task
- Each task's state will have a state machine coordinating actions at the current task

Top Level Mission Controller



References

2012 RoboSub CoE website