

ME, ECE, BE Capstone Design Programs

Team #5: Hydraulic Steering Assist:

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Background

- Crawfish season usually runs from January-May, nearly everyday of the week
- Sponsor's employees have 6-8 hours to run 1,400 crawfish traps throughout one day
- Operation takes two men: one operating the boat and the other working the crawfish traps
- Sponsor's goal for the team is to design a system that would allow one man to operate the boat hands-free while running the traps in the allotted eight hours

Objective

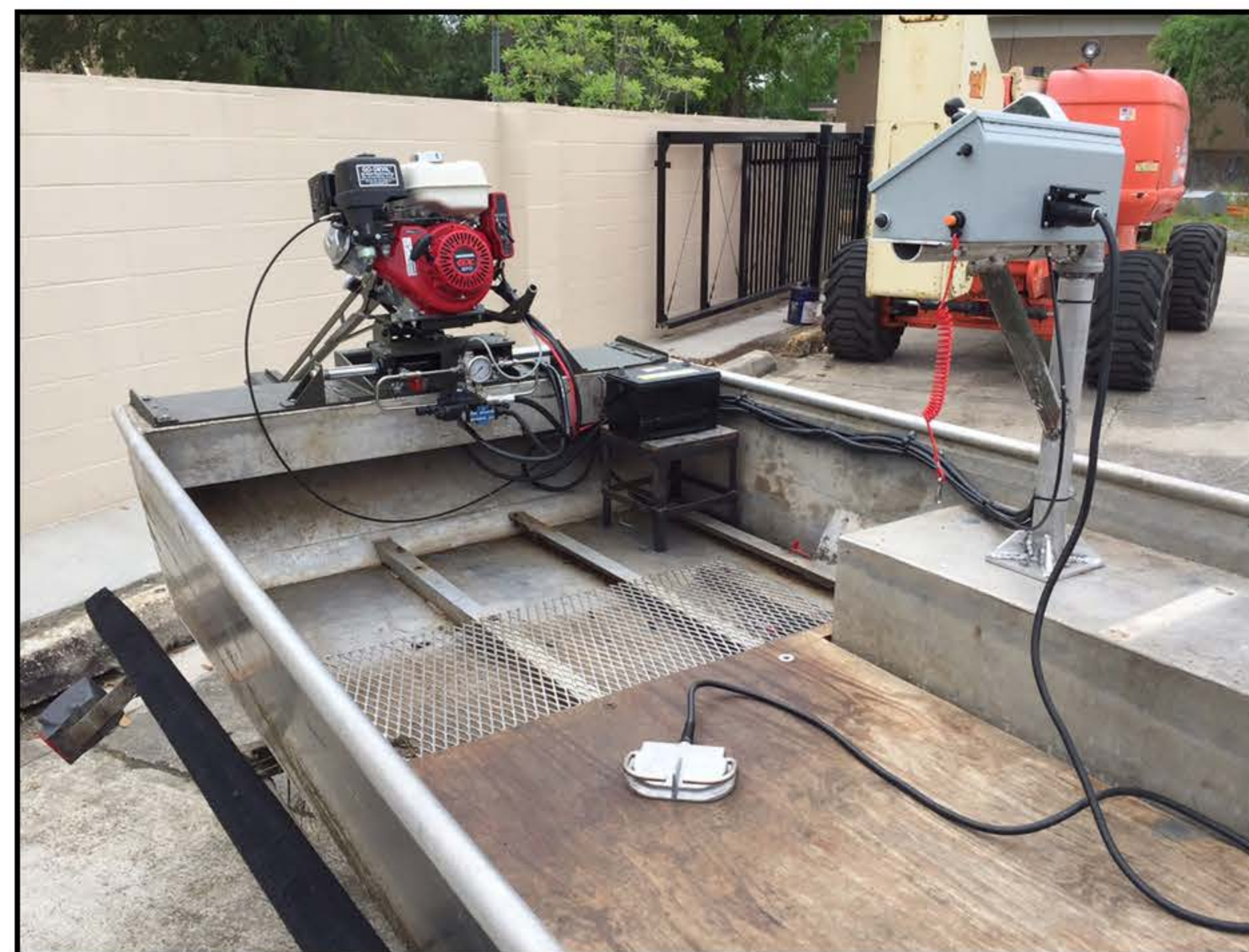
- To provide a system compatible with a 9 HP Go-Devil engine, engineered to:
 - provide hands-free steering from the center of the boat
 - reduce the existing manpower of a commercial crawfishing boat from two men to one man, without sacrificing productivity

Key Qualitative Constraints & Engineering Specifications

Critical Qualitative Constraints		
Specification Number	Qualitative Constraint	Accomplished
QC-1	One man operable	✓
QC-2	Meets USCG standards	✓
QC-3	Engine returns to center	✓
QC-4	Hands-free steering	✓
QC-5	Controlled from the center of the boat	✓
QC-6	Water resistant	✓

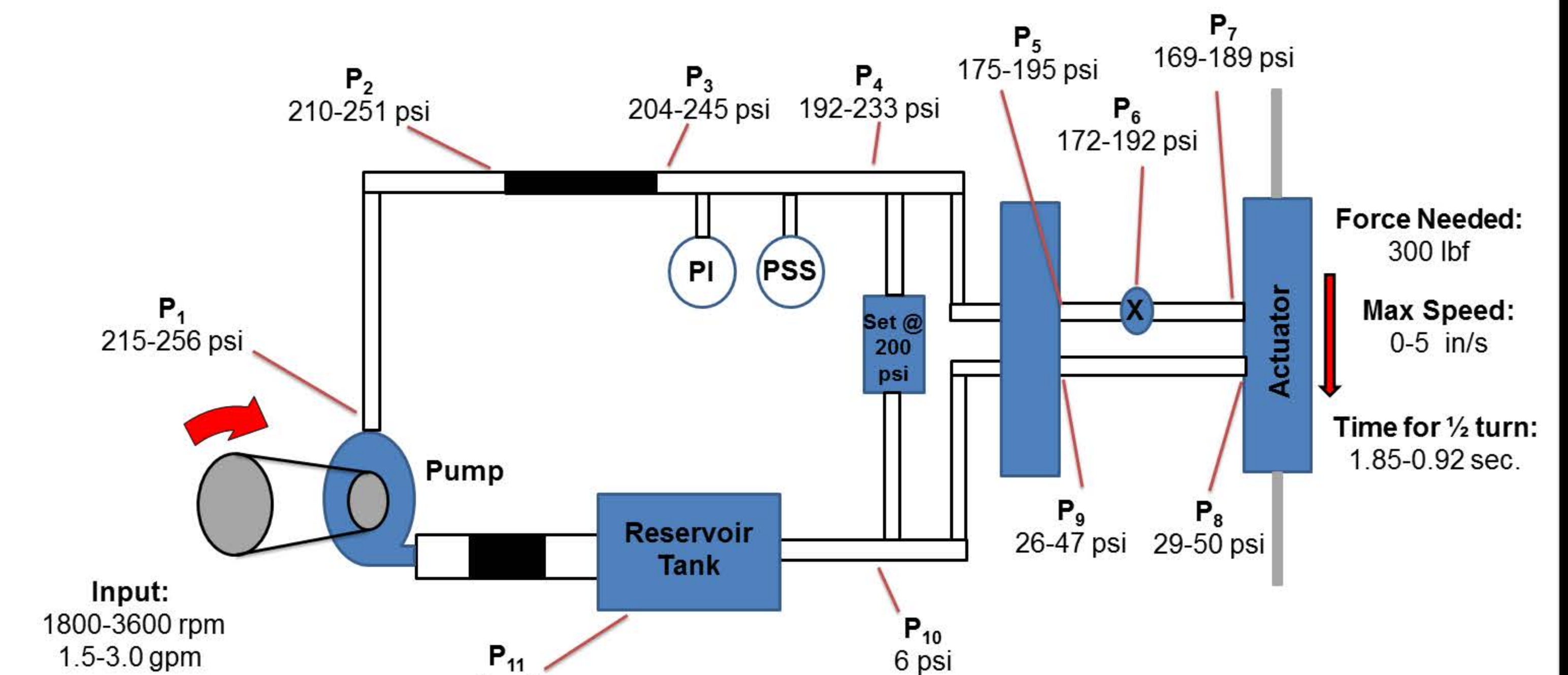
Engineering Specifications				
Specification Number	Measurable Engineering Specification	Requirement	Testing Results	Accomplished
ES-1	Max angle of rotation	≥ 30 degrees	35 degrees	✓
ES-2	Boat turning diameter	≤ 40 feet	14 feet	✓
ES-3	Actuator speed	≤ 5 in/s	0-5 in/s	✓
ES-4	Motor power loss	≤ 1 HP	0.48 HP	✓
ES-5	Control system lag time	≤ 2 seconds	Negligible	✓
ES-6	Control system amperage	≤ 3 amps	2 amps	✓
ES-7	Average # adjustments/Trap	≤ 3	1.5	✓
ES-8	% Time spent adjusting	≤ 25%	2.3%	✓
ES-9	% Time added by our system	≤ 25%	±18%	✓

Project Design



The final design prototype

Engineering Analysis



Schematic above shows hydraulic system breakdown of our design

Testing



Team member running the crawfish traps via foot pedal



Sponsor's employee approving of the team's prototype



Foot pedal controls motor direction and allows all hands for crawfishing



Compression spring to keep the motor in the water at all times

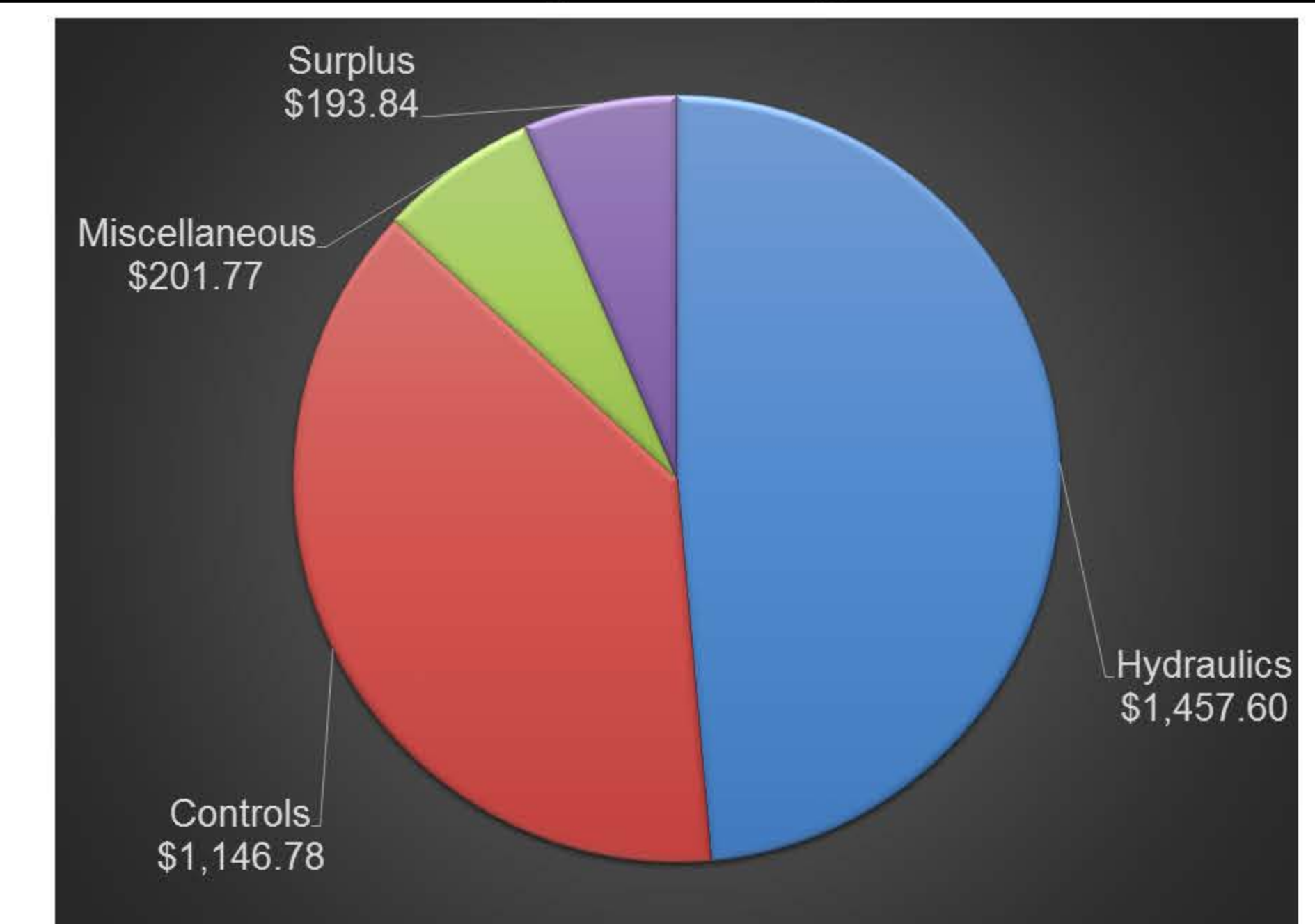


Limit switches allow the motor to return to center



Neutral start-in-gear and kill switch provide safety features for the prototype

Project Budget



The total budget for the design team is \$3,000