ARIZONA STATE UNIVERSITY

Robodevils

Robotics team

2006 Mate ROV competition

Team Members

Dulce Matuz, Jesus Moiza, Oscar Vazquez

Faculty Mentors

Dr. Antonia Garcia, Anita Verdugo

Table of Contents

- Abstract……pg1
- Design Rationale……...pg2
- Onboard Wiring……..pg4
- Software Used……pg5
- Costs……pg6
- References……..pg7

Abstract

This year is the first year that the ASU robotics team, The Robodevils, has competed in this competition. Therefore we have decided to use a straight up approach in the building of our ROV. We built a ROV that utilizes a stranded wire, multiple-element tether which will facilitate the use of onboard power.

The size of our ROV was determined by the size of our thrusters, which have a peak power of 8.7 Newton/ Meters this meant that our ROV will be fairly small. The small size of this ROV will allow for easy maneuverability which will allow the team to take maximum advantage of the time allotted. The team chose to name our ROV, Rovodevil 1, because it is a sun devil but it also is a ROV and it is the fist ROV we had ever built as a team.

Design Rationale

This year we decided to use onboard power on our ROV. This chose turned out to influence most of the other choices that we made in the building of our ROV, from the size of the thruster to the size of the cameras as well as to the overall size of the ROV. We also decided to use onboard power because it allows for a thinner more flexible tether that in turn provides for a more flexible ROV. We choose a 12 Volt Direct Current sealed lead acid battery, because it is small enough to fit or robot but also because it has a enough amp hours for this purpose and also serves as a buoyancy compensator to help us in achieving our goal of becoming neutrally buoyant.

This ROV will have a grabber or a manipulator and will be located in the very front of the ROV and will be placed at a 45˚ angle below the horizontal. This strategically placed grabber will allow to the ROV to be able to pick the cable connectors from the bottom of the pool but it will also be able to open and plug the cable connectors into the trawl resistant frame. We will have two thrusters for horizontal and two for vertical motion. We believe that this will provide enough power to complete the mission in a fast and accurate manner.

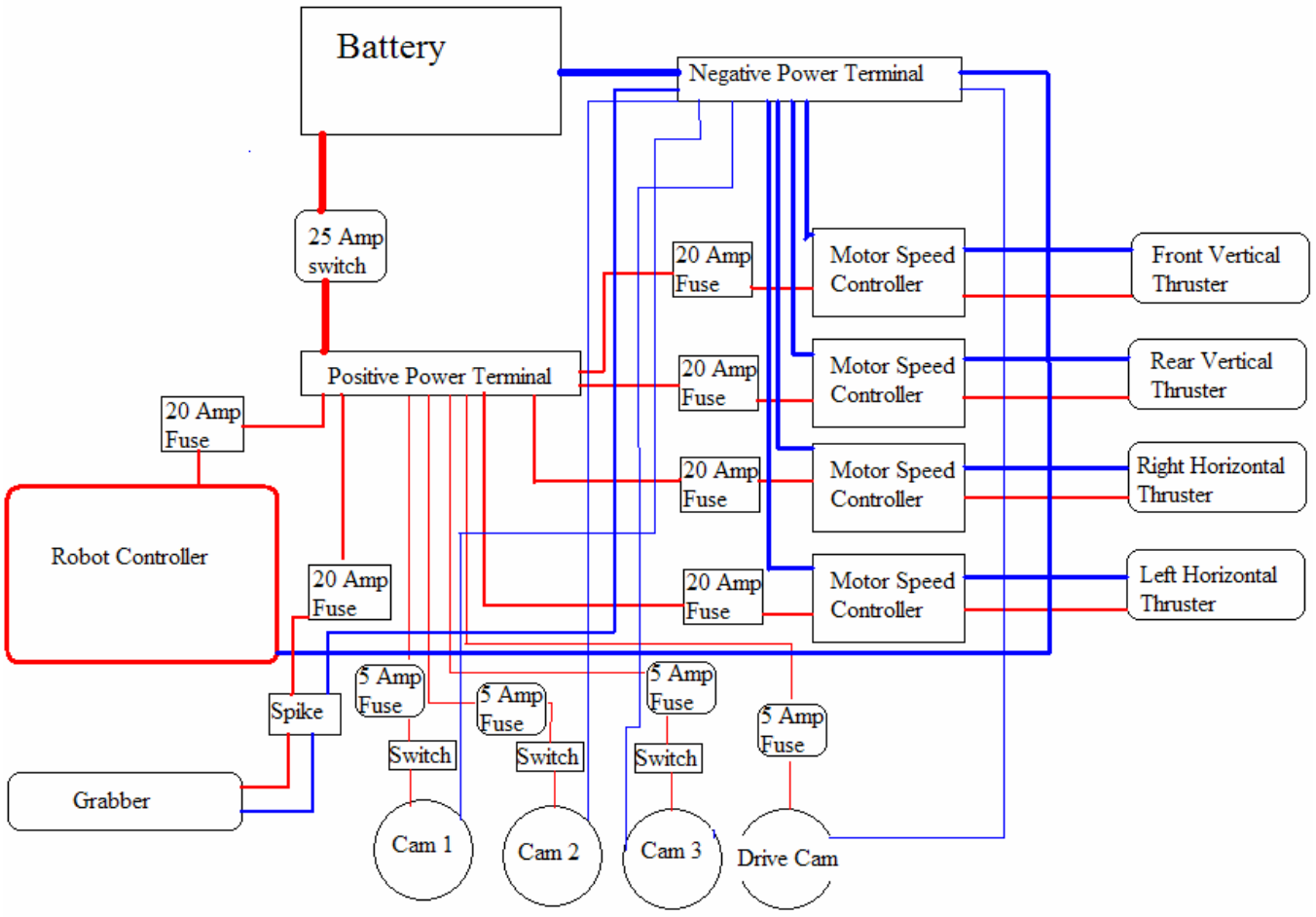
We will have four onboard cameras, one to look at the grabber, one to look at the bottom of the pool, one to look back and a driving camera. The positioning of the

cameras will provide a full view of all the necessary components required in the fulfillment of the mission.

We decide to use a 15 element 22 gouge stranded wire tether in our system due to the fact that it is flexible, light weight and fairly straight forward. The use of this tether will simplify the control process.

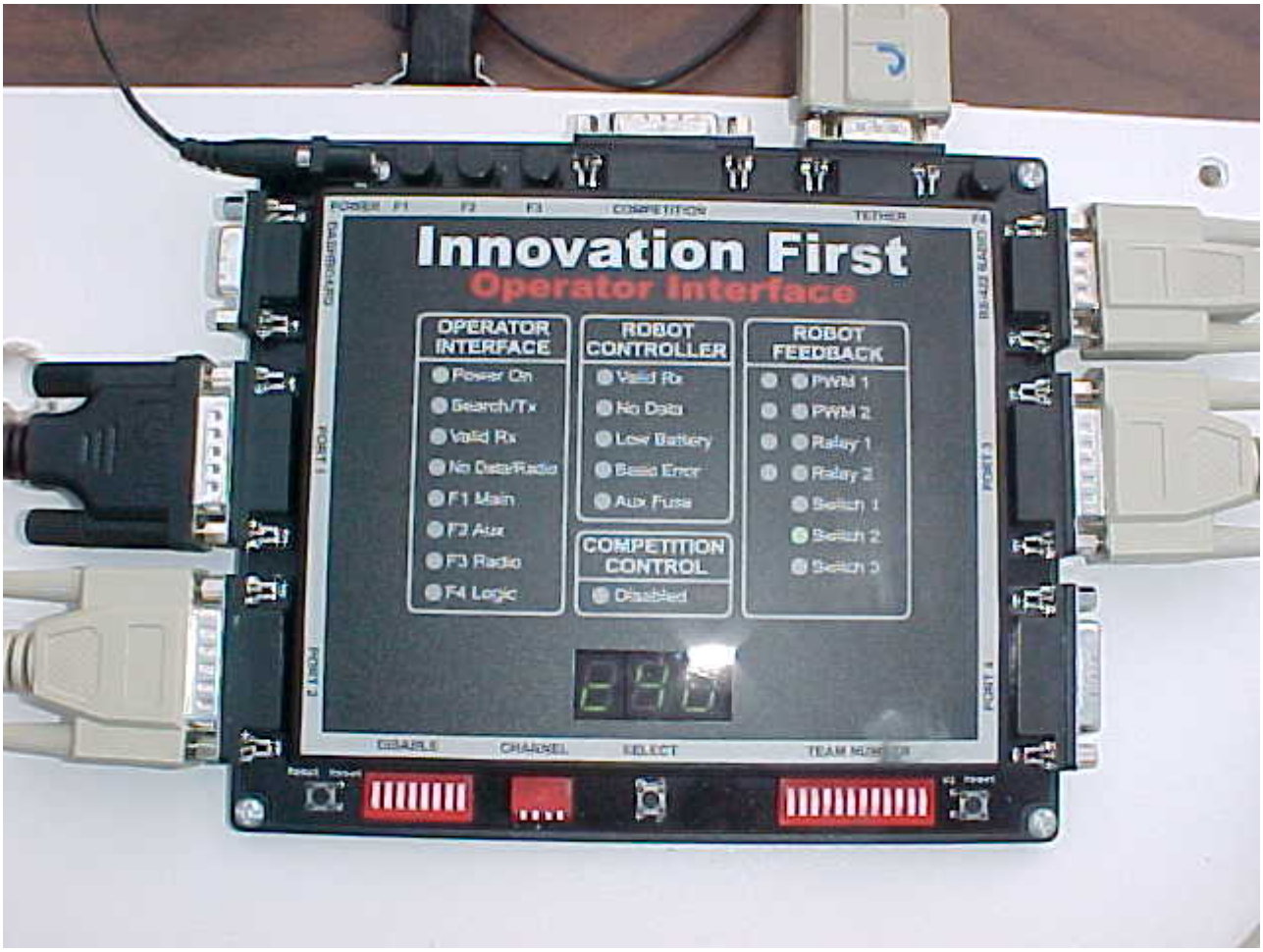
Our ROV requires three operators- one tether manager, one pilot and a switch operator.

Onboard Wiring Schematics



Software Used

The Software that controls our ROV is called P Basic it is one of the fist widely available programming languages that the general public could use therefore it is fairly easy to use.



http://www.nuge.com/~yaaarc/may2001/mvc-379s.jpg

P Basic is the program that will control the operator interface and robot controller pasts of our ROV.

ROV Building Costs

Vendor	*Item*	*Quantity*	*Total $*
Home Depot	Screw Driver Set	1	10.00
Home Depot	Drill Set (includes flathead and Philips head bits)	1	100.00
Home Depot	Hammer	1	8.00
Home Depot	Nuts, Bolts, and Washers	1 set with various sizes	25.00
Home Depot	Fiber Glass Angle .3cmx 2.54cm at 90˚	18.3m	90.00
Home Depot	Saw (power or manual) A miter saw will be preferable	1	100.00
Home Depot	Dremmel with cutting bits	1	80.00
Home Depot	T-square	1	8.00
Home Depot	Measuring Tape	1	13.00
Home Depot	Duct Tape	4	20.00
Home Depot	Zip ties	1 Set	15.00
Home Depot	Wrench Set	1	15.00
Home Depot	Ratchet Set	1	50.00
Home Depot	Safety glasses	10	60.00
Home Depot	Wire Stripers/Cutters	1	20.00
Home Depot	Soldering Gun	1	30.00
Home Depot	Solder	3	20.00
Home Depot	Grinder	1	60.00
Home Depot	Multi-meter (volt and conductivity)	1	50.00
Home Depot	Power Strips	2	40.00
Home Depot	Adhesive Materials (epoxy, silicon)	5	25.00
Home Depot	Pipe fittings	10	30.00
Home Depot	Plexi Glass	3 sheets 1.8m X 1.21m	64.00
Home Depot	Mouth guards	1 Pack	10.00
Home Depot	Master Tool Kit (Misc. items including saws, lights, power tools)	1	279.00
Seabotix	Thrusters for propulsion and maneuvering robot	7 at $250 apiece	1,750.00
Seabotix	robotic arm in order to grasp and carry objects as part of the mission	1	1,000.00
Harrington Plastic	Fiberglass to construct the robot body	80 feet @ $4.90	120.00
Edmund Scientific	Fiber Optic Tool kit (for communication with robot)	1	209.00
Edmund Scientific	Fiber Optic Elements (1 meter long each) @ $12.95 each	5	64.75
Edmund Scientific	Fiber Optics Demonstration Kit (to train members and build communication system)	1	695.00
Parts Express	Miniature Cameras to guide robot movement and arm tasks	2 at $124 each	248.00
Sales tax and shipping	8%		424.70
Totals			**5,733.45**

References

- http://www.nuge.com/~yaaarc/may2001/mvc-379s.jpg
- Walt Ahland, Lights Camera Action, 806 W. Impala Circle, Mesa, Arizona 85210-5996 sales@lights-camera-action.net
- Southwest Fasteners
- Ira P. Fulton Foundation
- The Home Depot