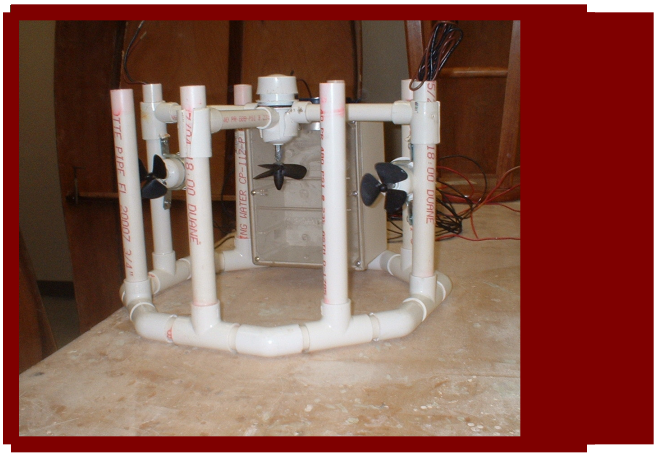
"Hamsterrahmen"



Palm Beach Lakes Community High School ROV club

Team Piranha

Team Members:

Langtry Chowdhury – Class of 2005

Maurice Saddler – Class of 2005

Erin Engler – Class of 2006

John-Marc Doit – Class of 2007

Amanda Roberts – Class of 2008

Instructors and Mentors:

Captain Gidget Greco

Mr. Bradbury

Mr. Shewmaker

Perry Slingsby Systems

Abstract:

The Palm Beach Lakes ROV club for the 2004-2005 school year started off with the accumulation of many great ideas and great people. Drawing on our experiences from previous years at competition we all gathered together and drew our ideas for this years ROV. Once the details of this year's mission were received we altered our designs accordingly. We all gained a new insight into the increasing technology in ROVs after a visit to one of our sponsors. We also had the chance to consult with various mechanical and electrical engineers on the design for our ROV and its electronics. It was after said consultations that we decided to incorporate relays into our designs, a first for our team. In addition to the relays, some changes in this years design include opting to create a smaller and thinner tether, as well as, creating a different method of liquid extraction. Our current challenges include the placement and operation of our vast system of relays, and how to make our layout more streamlined and visually pleasing. Our team, while small, is very decisive and we have managed to quickly work out matters such as jobs and obligations concerning the ROV and its launch. The last few months have also been dedicated to increased fundraising and the seeking of sponsorships. Team Piranha as a whole is extremely excited about our trip to Huston.

Design Rationale:

Our design for our ROV was the result of much planning and revision. We have spent countless hours adjusting our frame to meet our needs. The octagonal shape of our ROV is designed to allow us the most opportunities to mount equipment while still having a manageable size. The size of our ROV was the product of trial and error. Originally we started out with a frame that was sixty centimeters by sixty centimeters to give us an idea of our maximum size. From there we slowly downgraded until we got down to forty-two by thirty-three centimeters, the size we deemed able to fit all of our components while still giving us our desired maneuverability. This small size helped not only to ease transport but also made our ROV cost-efficient.

This year we decided to use bilge pumps and propellers as our propulsion system. We chose this method because our past experiences dictated that this would be not only the most time but cost efficient method. Our propulsion system utilizes right and left hand propellers for horizontal movement and a propeller with slightly more torque for vertical movement.

Our methods used for completing the tasks draw on past designs with the integration of new ideas. Our means of probe extraction for example relies on a suction box. This box uses a 750 GPH bilge pump to provide enough suction to capture the probes and store them. We chose this idea because it has proven to be an effective method in the past and showed promise for this year. We are relying on the tried and true method of a manipulator arm to establish the communication link. We chose this system because we felt that from years of practice we had perfected our arm. The fluid extraction strategy we are using this year is one of our most innovative ideas to date. Last years method included the use of an air pump, making our tether both bulky and unruly. To remedy this situation we updated our method to a descending syringe that effectively captures the fluid. Our temperature probe is most simply defined as an underwater thermometer that is mounted onto our frame. This simplicity allows us to collect an actuate reading without complicating our design. All of these design components contributes to what we hope to be the best ROV in our history.

Piranha teammates working on wiring

Challenges:

No success is achieved without first facing challenges. One of our first and probably most continuous challenges is one we face every year. That is setting and maintaining the schedule that governs the design and construction of our ROV. Understandably, school and home life do not always allow for daily attendance. To remedy that problem, we began trying to set aside both Tuesdays and Thursdays for our meetings. This soon proved to be not enough time for building and brainstorming, so we increased our meetings to three times a week, Tuesday through Thursday. We found that this allowed us the optimum amount of time to work on the ROV.

As is to be expected, tempers did flare occasionally in the workshop. Thanks to some careful mediating and our devotion to the project, we managed to work out all of our disagreements and our team has become stronger for it.

The hurricanes that hit and devastated our state also delayed our process. Four hurricanes hit Florida early in the 2004-2005 school year, making us miss weeks of school and work time as our community tried to rebuild from the turmoil of the hurricanes.

In addition to weather, we also had a challenge when it came to the original shape and design of the ROV. We had many ideas and coming to an agreement on what shape and size would best suit our needs was achieved through hours of consideration and experimentation. This is another situation where our teamwork paid off tremendously. Without the support of all our members, the design would be put back up for revision. We had decided early on that a unanimous vote would be a key factor in the selection of a design.

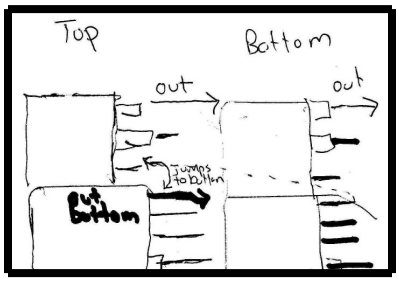
Another challenge proved to be exceptionally formidable. This was the securing of necessary funds for our trip. In addition to our expenses for the ROV itself, we all had to procure sufficient monies to pay for travel expenses. Through a barrage of fundraisers including raffle tickets, candy sales and catalogs we all grappled to meet our goal. Another key factor in obtaining our funds was through the generosity of others via sponsorships and donations. Various companies, organizations and individuals gave to our club without their kind contributions a lot of our accomplishments would not be possible.

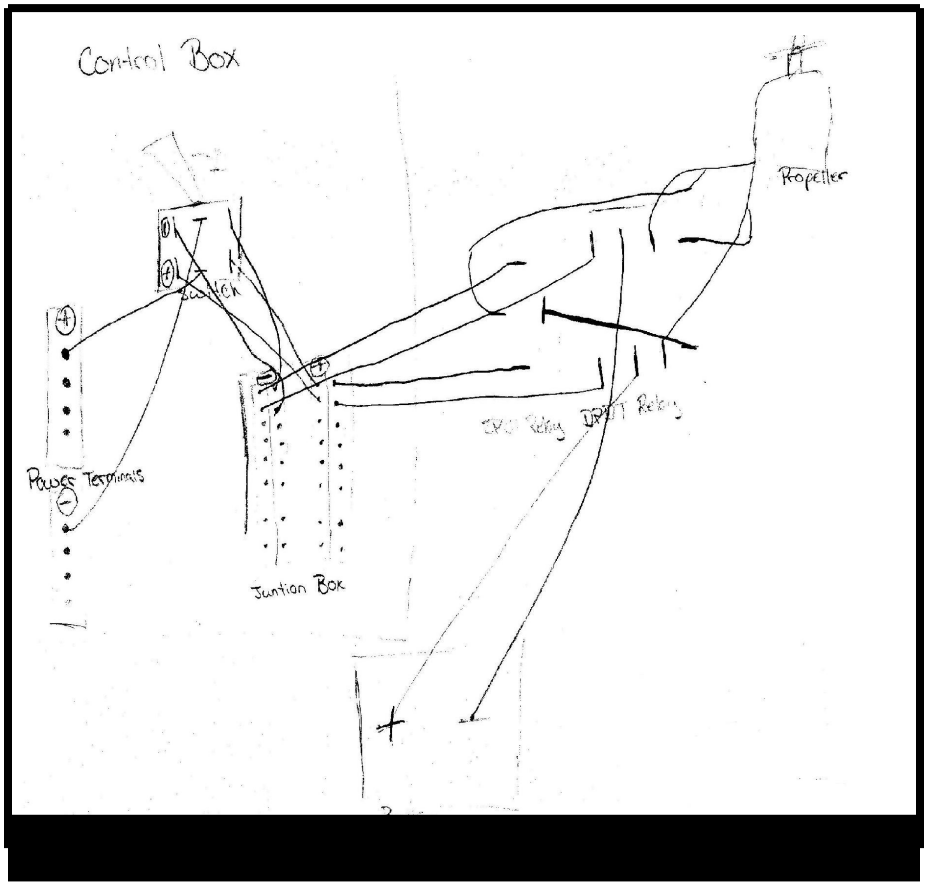
Troubleshooting:

Throughout this year we as a team have employed many methods of troubleshooting. Our main method consisted of a complex process of trial and error. For example, in the photo below, we were testing out a circuit of our relays. We connected each component with temporary holdings, and began a test operation. We found that our desired outcome was not achieved; our motor would not operate in reverse when triggered by a switch. To remedy this problem, we assessed our connections and reviewed our diagrams and saw where the problem laid. We quickly fixed the mislaid connections and commenced our testing once again. We continued this process until we achieved the desired result.

Our team working to test relay circuits

Wiring Diagrams:





Lessons and skills:

During the course of this year, our team has learned numerous things. We have seen that we, as a team, can accomplish more then we ever thought possible. Our friendships have grown, as has our technical knowledge.

As the focus this year was wiring, all of our members learned the importance of wiring safety. In our experiences this year with the ROV and wiring in general, we have found that a lack of knowledge, and a keen imagination can lead to many unwanted results. Thus, wiring safety and the knowledge needed to properly operate wiring

devices became a focal point for our team and by far the most valuable lesson learned this year.

In addition to safety, the measurements entwined with electrical applications are also a part of our newly acquired knowledge. Before this year, amps, watts, and volts were a mystery to our team. We knew the measurements, but the meaning behind them proved elusive. This year allowed us to obtain the practical experience that brought these measurements to life. As we reflect back on this year with our ROV we treasure the things that we have learned about our vehicle and ourselves.

Improvements:

This year has brought along many new methods for us. We have learned the value of good organization and teamwork. Next year we plan to defeat our problem of inefficient time management by setting aside time early in the year for planning and team development. One of our major set backs this year was the fact that many of our team members were inexperienced with ROVs and many of the tools we use to build them. This will be remedied in future years with a plan to devote our time before we receive the design specifications to the advancement of our team's skills. We feel that this will allow us to practice the necessary techniques that will increase our building efficiency and make a truly magnificent ROV in coming years.

Career, Technology, or Organization:

The Deep Space Network is a system of antennas that stretches internationally. NASA uses this network to direct the various vessels it sends into space as well as to coordinate various astronomy observations that take place. The Deep Space Network allows the engineers and communications specialists at NASA to "speak" with the Galileo spacecraft. As delays in communication between Jupiter and Earth can vary up to 50 minutes, the precise workings of the Deep Space Network are a vital part of the NASA space missions.

The Galileo spacecraft itself is also a very interesting device. Even though its original mission only entailed a 23-month journey around Jupiter, the Galileo craft was durable enough to survive and complete various extensions to its mission criteria. With its legendary descent probe, Galileo became the first spacecraft to ever directly measure the atmosphere of Jupiter. Galileo also managed to find evidence of liquid water not only on Europia, but also on two of Jupiter's other moons, Ganymede and Callisto. These discoveries make Galileo, as well as the Deep Space Network that controls it, an extraordinary advancement indeed.

Deep Space Network Antenna

Information obtained at:
http://deepspace.jpl.nasa.gov/dsn/
http://www.jpl.nasa.gov/news/fact_sheets/galileo0309.pdf

Budget/Expense Sheet

Period:

School Name: Palm Beach Lakes High School

From: 8/1/05

Instructor Greco, Bradbury, Shewmaker

To: 5/24/05

Funds

Date	Deposit or Expense	Description	Amount	Balance
8/1/2004	deposit	Palm Beach Lakes reimbursement from 6/2004		
10/7/2004	deposit	James Walker - alumnus	$ 1,789.65	$ 3,188.71
12/16/2004	deposit	Penny wars	$ 100.00	$ 3,288.71
1/14/2005	deposit	Penny wars	$ 191.10	$ 3,479.81
1/20/2005	deposit	Penny Wars	$ 105.95	$ 3,585.76
1/24/2005	deposit	Penny wars	$ 102.00	$ 3,687.76
1/24/2005	deposit	donation: Bagley's	$158.15	$ 3,845.91
1/25/2005	expense	Bradbury-ROV materials	$255.00	$ 4,100.91
1/27/2005	deposit	MATE - building materials	$ 24.68	$ 4,076.23
1/27/2005	deposit	Penny Wars	$100	$ 4,176.23
2/21/2005	expense	Shewmaker- ROV material	$ 95.00	$ 4,271.23
2/21/2005	expense	John-marc- ROV materials	$ 34.52	$ 4,236.71
2/23/2005	deposit	donations; Bank of America, Mohler, Goldberg	$ 25.74	$ 4,210.97
3/3/2005	expense	Shewmaker- ROV material	$ 244.00	$ 4,454.97
3/3/2005	deposit	donation: Edgeworth	$ 67.50	$ 4,387.47
3/10/2005	deposit	donations: anonymous	$ 85.00	$ 4,472.47
3/17/2005	expense	Greco-ROV materials	$ 158.60	$ 4,631.07
3/29/2005	deposit	donation: Anspach	$ 79.14	$ 4,551.93
4/26/2005	expense	Shewmaker- ROV material	$200	$ 4,751.93
4/26/2005	expense	Greco-digital camera (2) raffle 1, keep 1	$ 131.75	$ 4,620.18
4/26/2005	expense	John-marc- ROV materials	$ 360.98	$ 4,259.20
4/26/2005	deposit	donation: Palm Beach Auto Auction	$ 32.44	$ 4,226.76
5/3/2005	expense	Shewmaker- ROV material	$ 100.00	$ 4,326.76
5/3/2005	expense	Bradbury-ROV materials	$ 33.79	$ 4,292.97
5/11/2005	expense	Engler-ROV materials	$ 91.15	$ 4,201.82
5/14/2005	expense	John-marc- ROV materials	$ 7.20	$ 4,194.62
5/20/2005	expense	Greco- Continental Airlines 5 airline tickets	$ 16.11	$ 4,178.51
5/24/2005	expense	Bradbury-ROV materials	1,196.95	$ 2,981.56
			11.46	$ 2,970.01

Acknowledgements:

Our team would like to thank all of the wonderful people and organizations that helped to make this year's ROV the masterpiece that it has become:

- The faculty and students at Palm Beach Lakes High School for their support and fundraising help; we especially thank Principal Nate Collins, for his approval of our trip and for providing us the facilities needed for us to complete our project.
- Perry Slingsby Systems for their mentorship. Their technical assistance and the tours of their facility allowed us some much-needed insight.
- Our sponsors for their financial support; they includes Larry and Gloria Bagley, James Walker, the Marine Industries Association of Palm Beach County, as well as, the companies Anspach, and the West Palm Beach Auto Auction.
- We would also like to extend our deepest thanks to all of our families who supplied transportation, time, energy and encouragement.