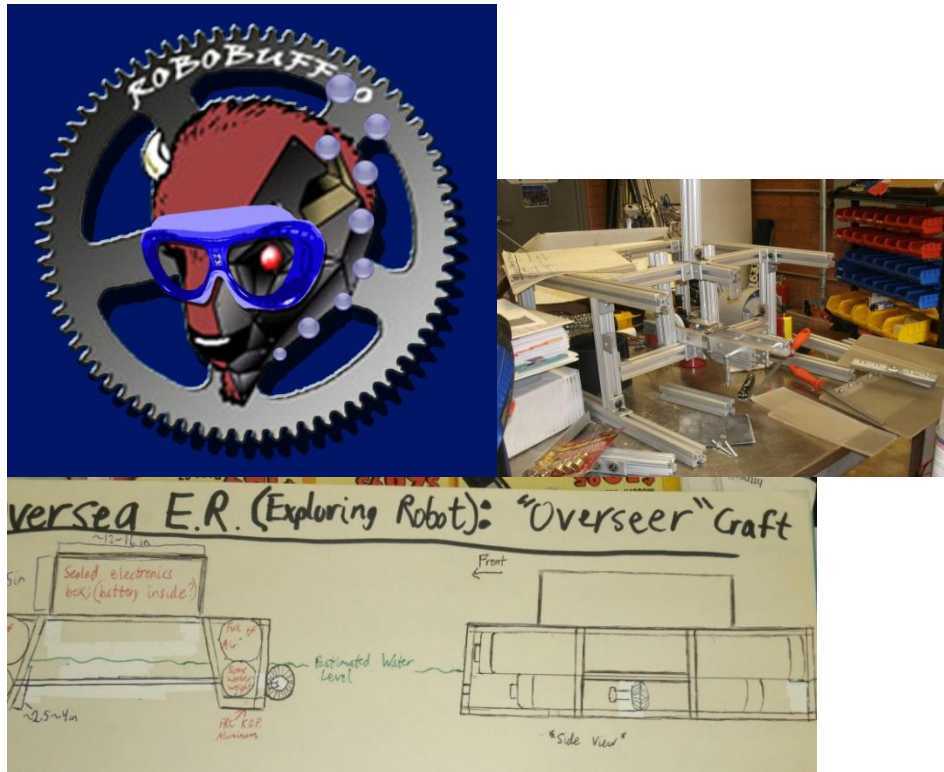


Tempe High School Robotics

“Water Buffalos”

Located in Tempe Arizona



Members: Fabian De La Cruz, Tyler Achey, Alan De La Cruz, Tina Langevin, Lindsay Vermeir, Jesus Bustillos, Dania Simpson, Demis Armenago, Estevan Bustillos

Thrown together by; Tina Langevin, and Alan De La Cruz.

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Abstract

This year we have again, built two robots as a part of our strategy. ‘The Overseer’ and ‘The Underdog’ were built by our most dedicated team members; these two ROVs showcase our efforts. As a part of Tempe High Robotics everyone is held responsible for our final product. We all learn lessons that cannot have a value attached to them, because all experiences are different and hold different values for each individual. We can learn a multitude of things from just one situation. But it’s how we walk away from them that make us who we are. As a team, we are all under stress to achieve a common goal of completing what we have committed to in previous weeks. We have tried to track what people learned throughout the season as far as engineering skills since we cannot fully view how we see the world differently in others senses after a challenge has been met. While some of this is reflection, we all can read through this and find a memory of a past struggle in the shop as well as outside of it. Or of times we have bonded through silliness, lyrics suddenly called out in chorus or even just trying to relax for a moment between ambushes on our project. Our final words before you begin your journey through our lives these last several weeks are, “Welcome to the RoboBuffs.”

Designs

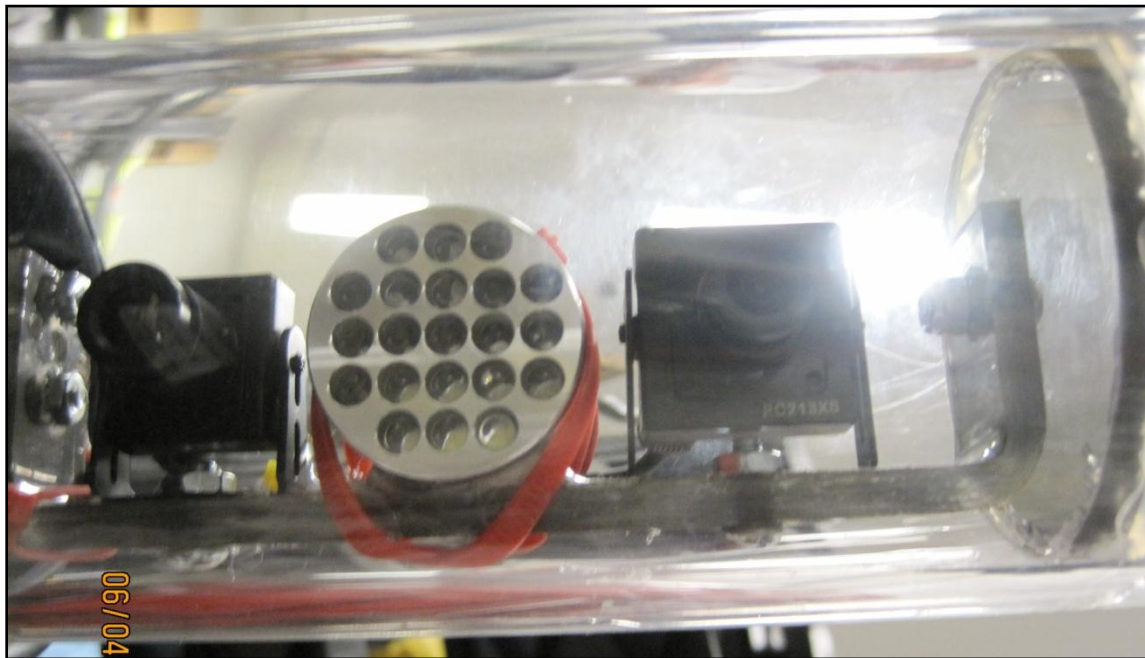
To try to make our design simpler, we decided that we would stick of an older design of an 80/20 extruded aluminum frame. The biggest design change between the past and this year's robot is to alter the dimensions between them due to the amount of materials we have and the size of the objects we will be working with for the challenge. We are using ballast tank to adjust the buoyancy and amount of force our robot can exert.

Our claw however has been through multiple designs and re-designs as we find out more information about our challenge. We started by thinking of re-using our old claw after having to redesign our frame to different dimensions. We had three ideas that we had tinkered with. One had a completely flat surface that relies on the friction and pressure between the two objects. The other was to tailor a claw individually to the game pieces. This would require too much time and materials. Our final idea was to shrink the size of our claw and flatten the curve to slightly cup the object but still gripping the item. Our final design lays somewhere in between.

For our motors we went through great research and trial and error to find what we want to use. We tried recycling the old motors that were fans to try to power even our surface skimmer. These proved to be too weak to move either robot. We tried removing the fans from one set and using the red motors. These we decided should be used for "The Overseer". We finally decided to use bilge pumps that have been connected with hose clamps. We still are testing on the removal and experimentation with the grey covers. We want to experiment with these to see if we want to expand the hold on the grey cover to change the friction between the water and the fan to test if it will change the amount of force exerted or if not bothering the flow on an impellor as opposed to a propeller. We also realized we can switch the polarity of our pumps to change the amount of force we exert.

Underdog and the Overseer

Our team has decided that we want to again take on the challenge of building two robots. Underdog is our main robot that will be working hard to find everything while the Overseer will be a surface skimmer to keep the field illuminated and help us find our targeted locations before we arrive there. Our two programmers are working together to write the code and look at new, more efficient ways to keep power flowing smoothly. The Underdog in theory could fulfill the challenge on its own, however by using both robots finding everything and finishing the challenge will be much faster and take less energy. Both robots will be equipped with LED lights and color cameras to help spot, document, and continue progress through the mission.



Daily entries

April 11, 2011

The team gathered to learn about the mission and was left the homework task of brain storming ideas for our robot and possible gripping mechanisms, as well as a possible strategy. The rules and guidelines that were available at the time were written down for easier reference and easy English translations.

April 13, 2011

Got news that the storage shed was finally moved to our new shop, we got the newer and two veteran members to clean and organize the shed. This was done in order to be organized for NURC and next year for the FTC and FRC challenges as well as any other projects that we may undertake in the upcoming school year. We also found it as a better way of knowing the materials we have to work with for the season and what we need to purchase.

April 15, 2011

We decided that the previous year's original robot "Overseer" would be re-instated as a scout robot and the making of a new robot was discussed and members were told to think of ideas for robot design while keeping in mind the challenges that needed to be accomplished and the fact that prop images and detailed information is not yet available. Overseer will serve as a surface skimmer to help us spot our targets easily and serve as an extra set of eyes and light, a valuable part of our strategy. The initial accessing of the circuits and wires were a challenge in and of itself. We discovered a new way of using epoxy to help create a better seal, but also realized the pros and cons of this method. While it holds a strong seal, it is very difficult trying to re-access the internal material.

April 18, 2011

"Underdog", last year's operational robot, had the ballast tanks taken off and the team's mechanical building crew discussed how to disassemble them in order to have them be re-used for this year's challenge. We wish to use Underdog as our main robot, and have Overseer remain as a side project and only part of our strategy. We plan on stripping any pieces we can from him

to recycle for this year's challenge. A total re-design will be necessary to adapt to the new challenge.

April 20, 2011

The new members of the team were informed of what we did the previous year for NURC and what they could expect for the challenge along with the differences between NURC and the FIRST robotics challenges. After a brain storming session we realized our best bet was to go ahead and re-from our past successes and try to redesign what we had failed at. Our claw must be re-sized to the challenge pieces as well as possibly completely thrown away.

April 22, 2011

The team got together for an ice-cream social to celebrate the excellent job and work effort that was put into the FRC competition and for cleaning the shed as well as to get people to stay interested in the club and give them incentive to work more so that they could later be rewarded once more. Not a lot got done towards the competition, but it definitely raised team moral.

April 25, 2011

An in depth look was taken on Underdog and we explained (with also some discovery) to the new members why it leaked and what was originally planned for its use last year. It was decided that it was necessary to take it apart in order to rebuild it better and get at the cameras and other electronic components that were sealed within.

April 27, 2011

Possibility of ordering new motors and another color camera in order to be used on our scouting robot, more work was done on organizing the shop and storage shed as well as the discussion of playing the game 'assassin' to bond with team mates that we normally do not talk to in order to break the remaining barriers of small groups within the team. Homework for the week; research cheap but reliable color cameras, preferably water proof.

April 29, 2011

Underdog went under the knife once more to try to be fixed. Discovering his leaks or what could lead to a leak is a much more difficult task than one would think. While we believe to have found them all we still discover more places that have become weakened over the course of the year and may break under the pressure of the water at full depth.

May 2, 2011

Ballast tanks have finally had ends removed using 'goo gone' followed by using the heat gun in order to melt away the gasket that had been placed in it last year. This was done to hopefully re-use these caps and not have to order new ones and not have to cut the ends of as we had done to some of the other ballast tanks already. And of course, who doesn't love to play with the heat gun?

May 9, 2011

The claw design was revised and more ideas were thought up in order to get best claw manufactured that could perform the necessary tasks efficiently and with least amount of possibility that life form or other prop would be damaged or become unavailable for use during game. To further help our thought process we practiced using our current claw to capture similarly shaped and sized props. We also reviewed video of past challenges to view other teams ideas, along with why they did or did not work.

May 11, 2011

The poster and presentation were made for a meeting at ITT, our chief sponsors. This was used to review what we need to know about our challenge to succeed and how our team functions beyond competing and fabrication.

May 13, 2011

The team went to ITT's campus in order to showcase this year's FRC and FTC robots. The team from Mountain Point was also there with their FRC robot to help us demonstrate what our team has done this past season with FIRST, while also discussing ideas for the upcoming seasons. During transit we realized our goals for the season of forming a team and maintaining friendships even while others may leave our team.

May 16th, 2011

Our claw we have recognized as a valuable part of our robot. This will decide how accurate we are at gaining our life forms and re-mounting the fuel rods. Many different ideas were discussed but no-one could find one that was not just a re-draft of the old version nor easily constructed in the amount of time we have left to finish and test the robots.

May 20, 2011

Member's tried to recruit more people to join our team; one was successful and brought in a kid that appeared for the meeting. After much confusion we briefed the season for him and had further discussions about the new claw designs. A consensus was still not reached.

May 25, 2011

Team was reminded that additional points were awarded to participating teams that were able charge their batteries with solar power and prove that they have done so.

May 27, 2011

Solar panel portable charging station was set up by a mentor and a team member to re-charge our battery. Programming was reviewed as well as discussing this year's programming and

modifications that would be necessary in order to be able to use the newly acquired Bilge Pumps that will be used on our robot. While we adjust our pumps we began to dissect and experiment with different versions of the pump we could use for our robot.

May 30, 2011

More work done on Engineering notebook, inventory done on shirts that we have and more work was done on this year's robot to appropriately mount motors and ballast tanks for best maneuverability at competition. Arm was rotated and extended further from the frame perimeter. Pro and con session on if we want to use one or two claws. After soaking for three days in a cooler we have decided to use rubber sheeting with a hose clamp to keep our pumps in place. These are then attached to the frame and using a similar method often used on copper tubing to properly attach an L shaped PVC pipe to said pump so we can change directions while driving.

May 31, 2011

Bilge Pump was re-tested and we found that the polarity could in fact be reversed by switching where the wires are connected to the battery. The small plastic rotor was pulled off using a gear puller with the hopes of attaching a new and bigger rotor to it in order to have more power. More work was done on re-making the claw to adapt it so as to look and perform like falcon's claw. Robot frame was modified to fit new components and more talk about how to mount the cameras in relation to the claw occurred. Mechanical/fabrication team discussed the possibility of using servos to rotate the cameras in positions that we thought would be necessary for adequate visibility, talk of using glow sticks as another source of light without using voltage was discussed. On shore electronics board had worked last year so we decided to go with the same concept this year and decided to better the electronics board. Programming was modified to be able to perform in harmony with the modifications that were made to the claw and robot. The possibility of welding a 3/8" thick by 1/2" long rod to attach a rotor onto it for use with the Bilge Pumps that were barely acquired. Claw mechanism, without actual gripper claws, was securely mounted on the robot and electronics board was mainly completed, programming was fixed for easier control and memory of which buttons would be used for what, more team bonding occurred between senior members and one of the new members that would stay behind to continue in robotics next year.

Forecast for the next week before competition

Continue work on the movie, (that we have not started officially) finish compressing the claw, and attach the bilge pumps. If time is left, we shall reattach the acrylic plastic and simplify the design from the elaborate scheme that it is and replace much of the circuits with just some power

and a few servos to control the lights and cameras along with the red motors with the aluminum fan blades to help maneuver through the water.

Innovations

This year our biggest innovations are the use of ABS to allow us to use our cameras to see in all directions. We are mounting our camera and lights on the Overseer using hose clamps and integrated lighting. With the wide angle of the ABS this will let light shine in many directions and illuminate more of the playing field.

The extruded aluminum allows us to make any much needed adjustments to our robot if need be.

The bilge pumps are the biggest thing we are proud of. After much research and experimentation we have altered our pumps to ensure that we gain maximum output and thrust from our motors.

Our claw we love to bring special attention to. This we have created out of a smoky piece of Lexan, aluminum strips, and non-slip traction pads. Both of these items we have found in our storage shed. To try to utilize what we have, we decided to use these materials after finalizing our design. The claw will grip onto the desired object/s using pressure between the two parts of the claw and also grab onto with the pad to ensure that it does not slip or is easily jerked from us if we take a sharp turn.

Skills Gained

We have gained many valuable skills during the process of designing and building this year's ROV. One of the more vital skills we gained was it's always good to have a backup. Finalizing our ideas was much more difficult than we thought. We always had multiple ideas, but often after testing, we found that we could not get the performance we wanted from what we had originally planned to use. Also, we learned that it is much easier to seal a curved surface rather than a flat surface, as you can see was implemented in the design of "The Overseer". Without this skill we would not be competing, or if we did we would not do very well. Another great skill is to think outside the box or be innovative. There are so many problems that pop up so they can't be solved by regular means. One example is our claw. It is made out of so many different things that were just lying around in our shop. By using what we have, we saved time and kept our design simple. And finally the most important skill would use teamwork. Not that it is new to our team, but the very few who participated had all worked together before so we were twice as efficient as we ever were. There were often times that we all would be butting heads in the process over some things, but we all learned how to work together for the common goal and hear each other out before we made decisions.

Expenditures

(May alter slightly between now and competition day)

| | | |
|---------------------------------|----------|------------------|
| 80/20 extruded aluminum | ~3 yards | past season |
| Casting craft casting resin | | \$21.99 |
| 3 19 LED miniflashlights | | \$3.99 each |
| 2 32 LED miniflashlights | | \$5.99 each |
| Black and white camera | | \$50 |
| Color camera | | \$50 |
| 2 Atwood Bilge pumps (2000 gph) | | \$105 |
| 2 rule 1100gph bilge pumps | | \$50 |
| 4in diameter ABS tubing | | \$6 |
| 4in diameter ABS adapter | | \$4.46 each |
| 4in diameter ABS cap | | \$2.35 each |
| Med black ABS cement (Oatey) | | \$4.19 each |
| 5 victors | | past FRC |
| 120 amp circuit breaker | | past FRC |
| LEGO NXT brick | | past FTC |
| Power distribution | | past FRC |
| High technic servo controller | | \$80 |
| Logitech game controller | | \$9 |
| Cabling | | Donated (varies) |

| | |
|---------------------|------------------|
| Control Interface | Donated (varies) |
| 4 Propellers | \$3 each |
| 2 3 blade propeller | \$22 |

Acknowledgements

Thank you to everyone who has helped in the making of these ROVs for your dedication, sweat, hard work and giving us your summer vacation.

Thanks to all of our mentors, for all your guidance and all you do.

Thank you to Chandler High School and Carl Hayden for making this event happen!

And especially Mr. Warner (The Roboboss), without him, we would be nowhere.

And congratulations to our outbound seniors, Fabian De La Cruz and Tyler Achey! Good Luck!

