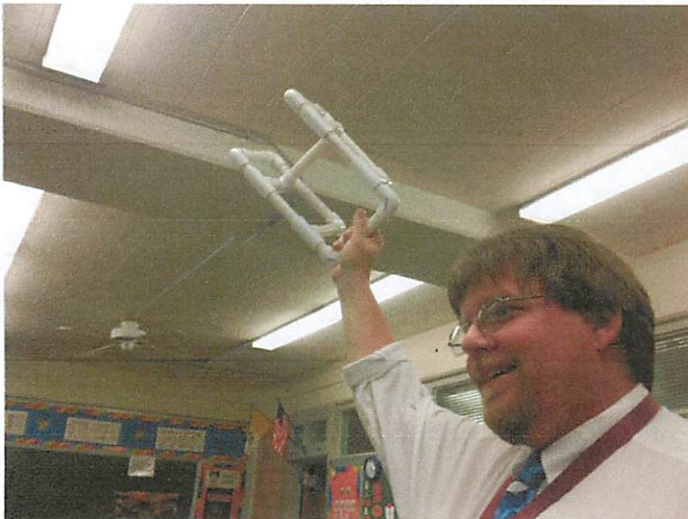


St. Martin of Tours



“We are better together”



SMT SeaPerch
St. Martin of Tours School
Independence Mission Schools
Mr. Scott Jackson and Mr. Charles Pavonarius

5701 Loretto Ave.
Philadelphia, PA 19124
(215) 535-2962

Table of Contents

List of References	1
Naval Engineering Principles	2
Design and Engineering Process	3
Figure 1	4
Figure 2	5
Figure 3	6
Figure 4	7
Figure 5	8
Experimentation	9
Naval Scenario	10
Teamwork – List of Team Members	11
Teamwork – The Seaperch Agreement	12
Distribution of Tasks	13
Discussion of Challenges	14
List of Materials Used/Bill of Materials	15

List of References

¹<http://en.wikipedia.org> (various articles)

²<http://www.phillyseaperch.org/learning-modules.html> (particularly “Parabolic Flight”, “Buoyancy for Middle School”, and “Vectors MS Content Brief”)

³<http://www.dictionary.com>

⁴<http://c2.com/cgi/wiki?EngineeringPrinciples>

⁵<http://prime.jsc.nasa.gov/ROV/applications.html>

1

2

3

4

5

1

Naval Engineering Research

Some of the terms we have learned are port, starboard, propulsion, thrust, ROV, center of gravity, and buoyancy³. We have used our vocabulary in a way that we can communicate when we are controlling our SeaPerch by using the terms port and starboard, which means left and right while controlling the SeaPerch. Another term we can use is buoyancy which means the ability to float.

We learned about propulsion and thrust² which is the act of moving forward. We learned that by using the left and right engines we can turn our vehicle to go through the course. By using the top motor, we can make elevate the SeaPerch.

Finally, we learned about balance and the center of gravity². Without finding the center of gravity, the vehicle would list to one side or sink completely.

As a team participating for the first time, we have learned many different things about naval engineering and the principles involved in making a remote operated vehicle.

Design and Engineering Process

We made a decision during the first week that we'd be successful if we constructed the vehicle without modifications since it is our first time doing SeaPerch. We worked on modifications for the 2016 challenge. We received homework to draw a modification (Examples in Figures 1, 2, and 3). Later we tried a PVC extension (see photo below) but ultimately we have gone with an electromagnet purchased from Amazon and a switch from Radio Shack.

We attempted to make the SeaPerch lighter and faster. We used the engineering theories of buoyancy, maintainability, and integrity. We want the SeaPerch to serve its intended purpose to complete both tasks. We want the SeaPerch to stay together in the water. We discussed ways to lighten the SeaPerch, but time constraints kept us from completing all the modifications.



Figure 1

Control it right
tetan, or give it to
me.

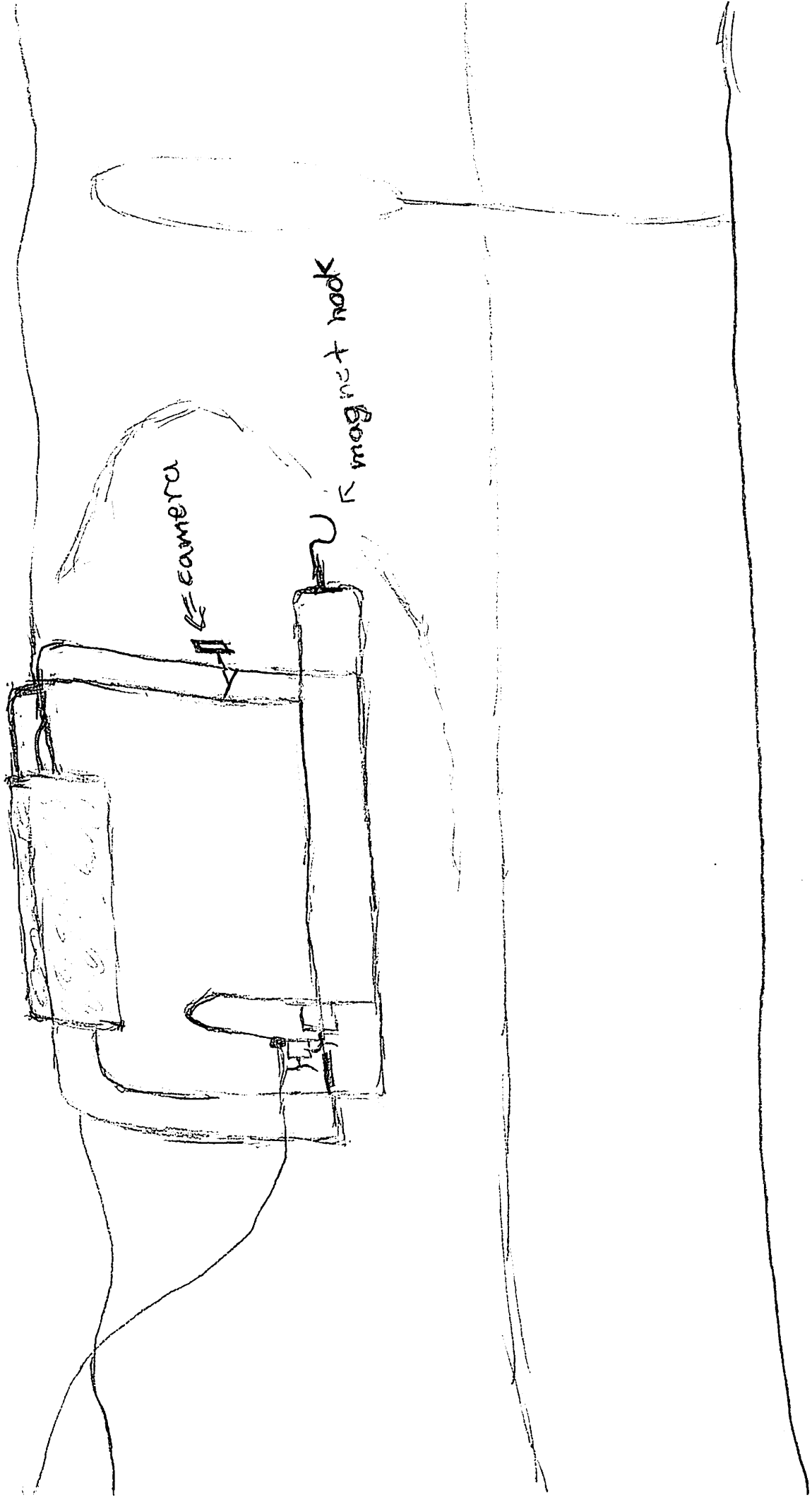


Figure 2

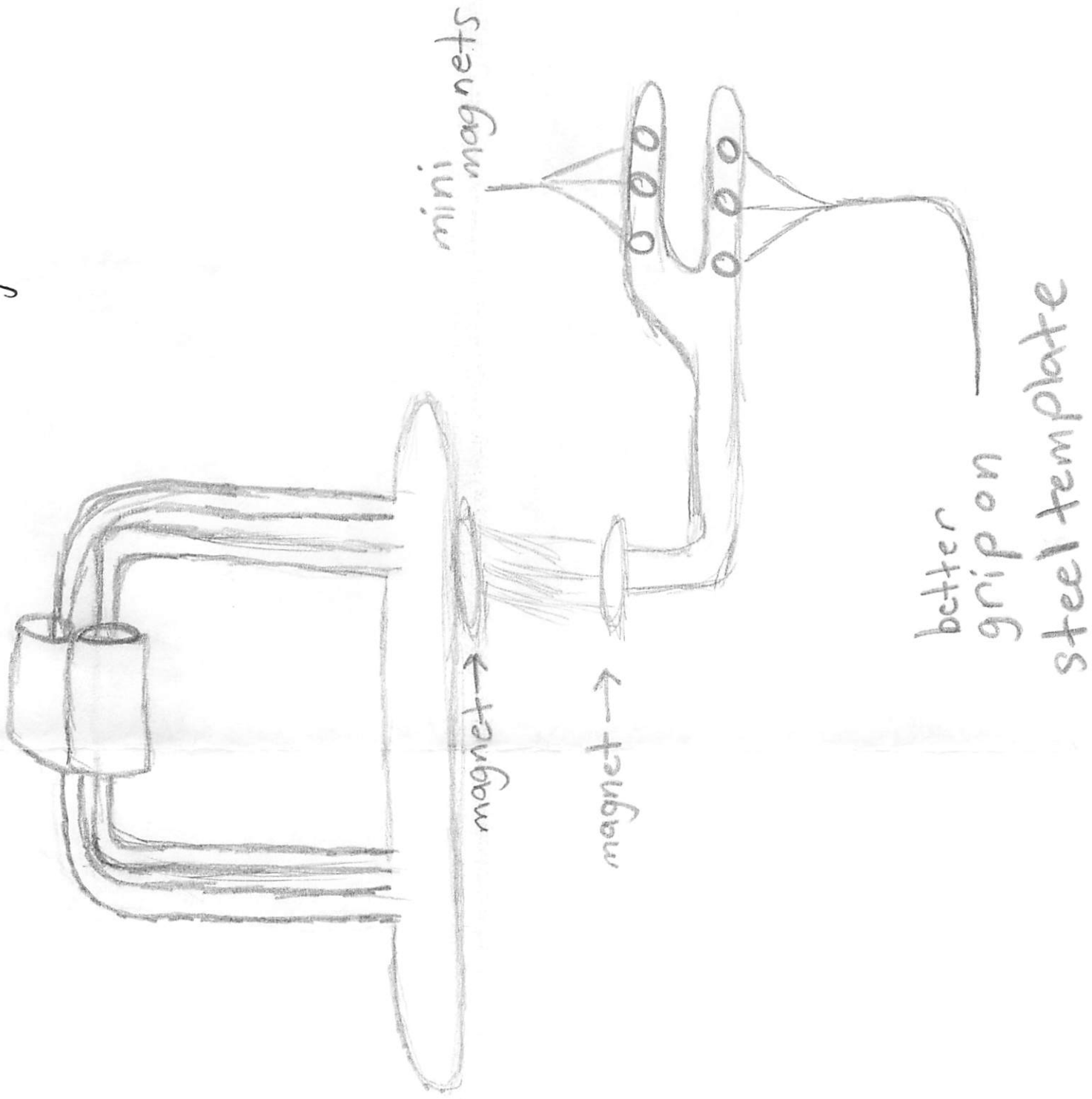


Figure 3

Removable during
switching

between courses

Electro-
Magnet



used to
pick up
metallic
objects. ↓

stick/pole
used to pick
up objects

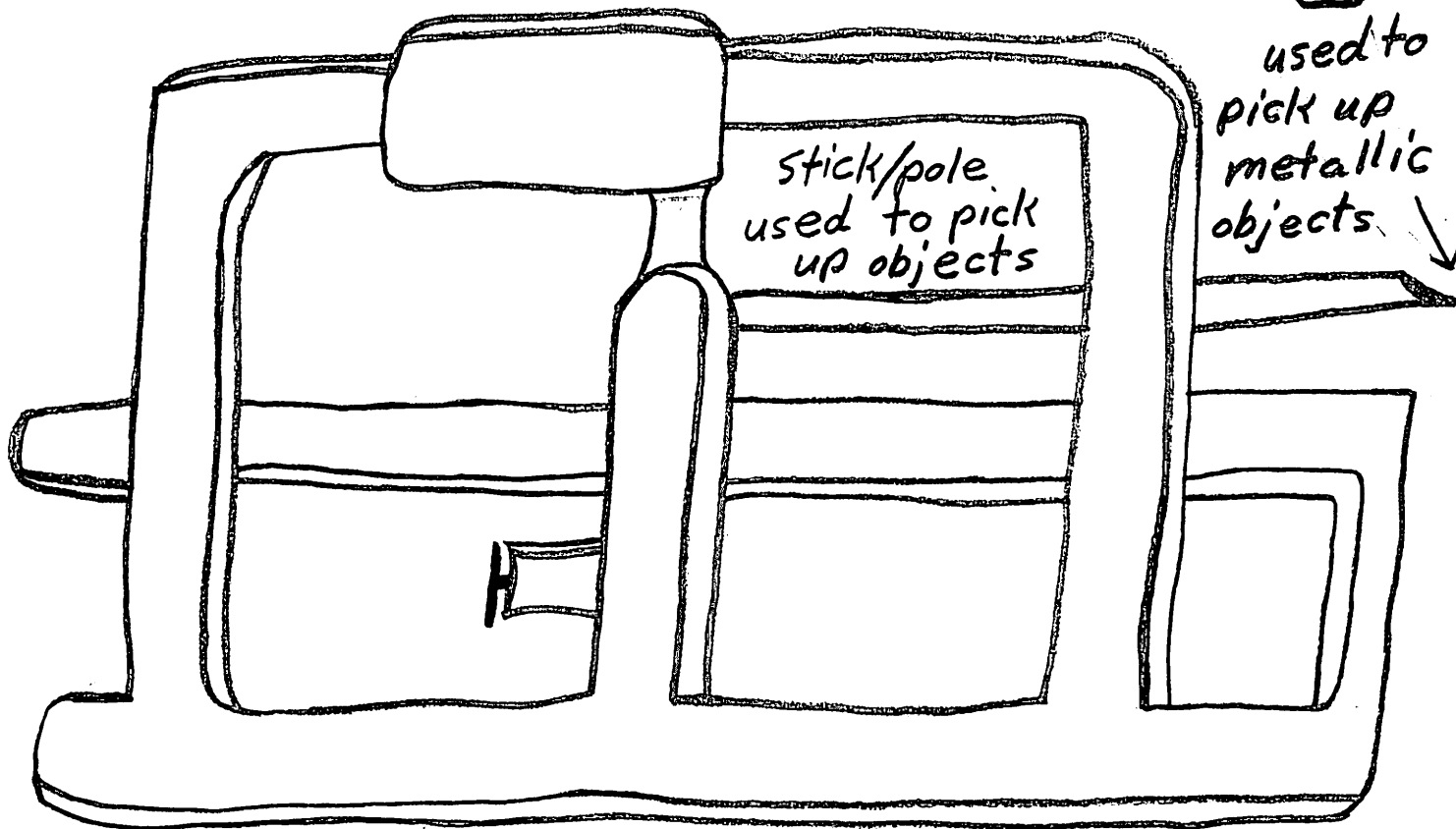
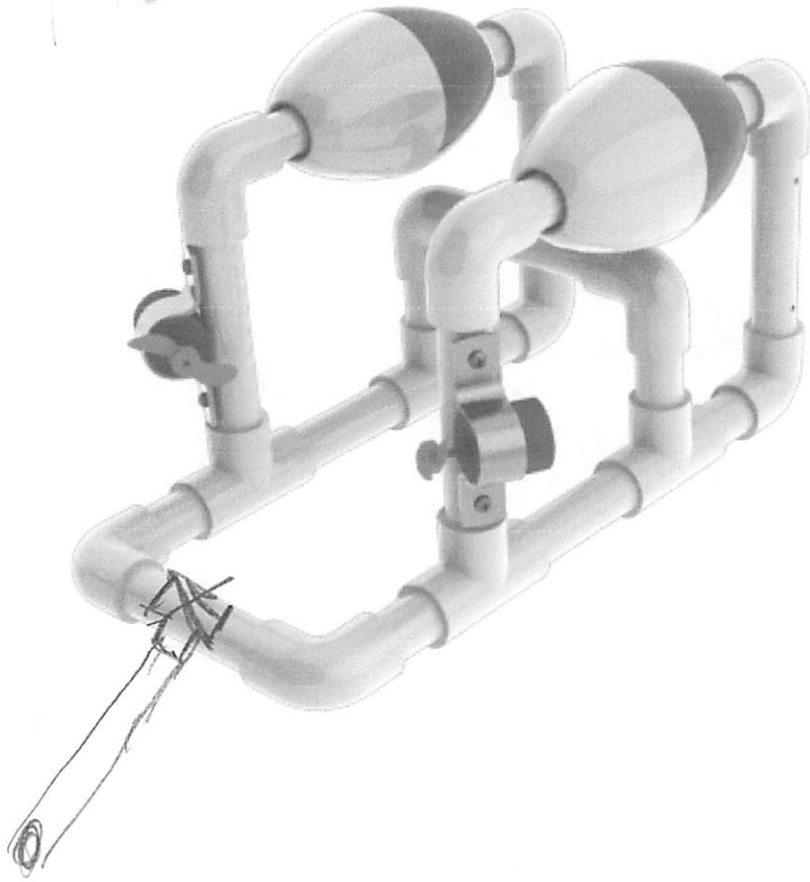


Figure 4



- PVC 4 way
- PVC pipe 4"?
- PVC elbow
- 2 wire ties
- balance back

Figure 5



26.5 by 7 by 7 basket with holes
*trim to fit perch

Experimentation

Our biggest challenge was the control box. We did troubleshooting, first proving that the motors worked by hooking the motors to the control box that the moderates created at their practice day in January. Once we knew that the motors worked, we began troubleshooting the control box since we proved that the motors were not broken. At this time, we are still working on the control box and we are seeking help from a moderator who has done SeaPerch in the past.

We also attempted to make a homemade electromagnet from a power source. We found that we could not remove the E plates from the power source. So we purchased an electromagnet and solenoid from Amazon. We will work on the electromagnet in the time before the competition.

Naval Scenario

Some ways to use a Sea Perch are mine recovery, marine salvage, and underwater cave exploration.⁵

The machine can be used for mine recovery. It can use the electromagnet to carry the mines out of the way of cruising ships. It helps keep the population of the sea creatures. It keeps the water clean from pollution.

It goes through open holes into the plane to try to find the black box. The black box records the plane's instruments and it records the pilots' voices before the crash to find out what happened. It can also grab the parts of the plane that has been scattered. Like planes, the machine can find boats.

Also it can be used for underwater cave explorations. It can go through tight spaces. It also can collect minerals that can be attracted by magnets. Lastly it can stay in the water for a long time.

Teamwork

Team Members

Jordan Borrero	Grade 7
Nicole Colon	Grade 8
Kevin Gomez	Grade 6
Andy Ha	Grade 7
Rafael Holguin	Grade 8
Bryant Howe	Grade 6
Cameron James	Grade 7
William O'Shea	Grade 7
Anayah Rivas	Grade 7
Kiana Sampson	Grade 7
Tejan Sesay	Grade 7
Sean Sulaiman	Grade 6
Tomas Vallejo	Grade 7

Moderators

Scott Jackson
Charles Pavonarius



Sea Perch Agreement

At our first meeting, we signed off on the following agreement. It is included here as a kind of “constitution” about teamwork.

As part of the 2016 SeaPerch team I agree to the following statements:

I will practice science lab safety rules.

I will treat the equipment, tools, and kit as if it is my own.

I will arrive ready to learn and perform at every session.

I realize that this is a school activity and should be treated as such.

I recognize time is valuable and I will make the most of my time in SeaPerch.

I will treat my teammates with respect.

I will work hard because my teammates expect me to work hard.

I recognize that this is a challenge.

I was chosen because my teachers believe that I can rise to this challenge.

I know that everyone makes mistakes.

I agree to encourage my teammates.

I realize that this is new to everyone on our team.

I realize I will not always get to do the job that I want to do.

I believe that we can win but the treasure is being able to take part.

I will learn and have fun.

By signing below we agree to these statements.

Distribution of Tasks

- 🐾 Our entire group shares ideas before each session to determine the roles of each participant. We form two groups working toward different goals but working in collaboration.
- 🐾 We helped each other get the precise measurements. We learned that we have to measure the pipe twice in order to be as accurate as possible.
- 🐾 To ensure safety, we helped each other with the drill. One participant would hold the drill and the other would watch the vice. We'd take turns.
- 🐾 We helped each other assemble, wrap, seal, and secure the motors.
- 🐾 We worked in groups on the notebook with brainstorming. We used our strengths as typists and creative thinkers
- 🐾 Our advisors made sure that everyone was able to try using each tool even if we weren't on the team that was completing the task.

Discussion of Challenges

Some of the challenges we faced were learning how to use the tools. None of the students had ever used a PVC cutter. Most of the students had never used a vice, a soldering iron, and a drill. We learned how use tools safely because if you're careful, it's not dangerous.

The next challenge we faced was the time factor. Letting everyone try the tools and then participate in the construction. There were thirteen students and three motors so some students had to work on other projects that were not part of constructing the SeaPerch.

Our largest challenge has been the control box. We have worked for a month on the control box and as of April 5, we still have gotten the control box to work. We have even created a second circuit board after we melted the first one with the soldering iron. We believe, however, that we will have a working control box by April 12 when we are scheduled to test at the Seaport Museum.

The biggest lesson we learned is that engineering is fun and that we can do it. It is an accomplishment to be able to make our SeaPerch team and complete the tasks. We will be able to use the skills gained in SeaPerch if we go into careers in engineering. Even if we don't go into engineering, we've learned to use tools, lab safety, and teamwork.

Jordan said, "It makes me feel like I can do engineering in high school and major in it in college. I get to experience it early. I think what I learned in SeaPerch will stay with me for a long time."

Materials

1. Standard kit
2. Purchased PVC for practice (not used in ROV construction)
3. Purchased one (1) uxcell electromagnet the cost of \$10.90 from Amazon
4. Purchased one (1) switch from Radio Shack at the cost of \$4.49
5. Will need to purchase a mount, most likely wire, for the electromagnet. We have this on hand but I estimate the wire to be 50 cents. Attached is an order for wire that is \$3.39 a pound.
6. Wire ties, will use as many as 10, ten wire ties are 42 cents. Attached is an order for a bag of 100 6" ties.
7. We also may need some PVC pipe, two feet is available from Pool and Spa Parts Today for 92 cents.

Bill of Materials

Electromagnet	\$10.90
Switch	\$4.49
Wire	\$0.50
Wire Ties	\$0.42
PVC pipe, 2'	\$0.92
Total	\$17.23

Pool and Spa Parts Today

Search for a product

HOME CONTACT US BLOG SHIPPING & RETURNS RSS SYNDICATION

HOME PLUMBING PVC FITTINGS AND PIPE PVC PIPE PVC PIPE PER FOOT PVC | PVC PIPE SCH40 3/4" PER FT | 42030

CATEGORIES

- Horizon Pool and Spa Parts
- Pool Chemicals
- Spa and Fountain Chemicals
- Water Testing Kits and Test Strips
- Automatic Pool Cleaners
- Pool Cleaning Tools and Accessories
- Pumps Complete
- Filters Complete
- In Floor Cleaning Systems
- Lighting and Parts
- Salt Cells
- Salt Systems and Parts
- Chlorinators and Parts
- Alternative Sanitizers
- Automatic Pool Cleaner Parts
- Baskets
- Automation
- Blowers
- Equipment Slabs
- Deck, Tile, Plaster, Pebbletec Repair
- Filter Parts
- Replacement D.E. Filter Grids
- Replacement Filter Cartridges
- Pump Parts
- Replacement Pump Motors and Parts
- Heaters and Parts
- Heat Pumps and Parts
- Matrix Orings and Kits
- Lube, Silicone, Plumbing and Pool Repair
- Gauges
- Spa Parts
- Parts Portal
- Inflatables, Toys, and Games
- Inter-Fab Handrails, Ladders, and Diving Boards
- Intermatic Pool Timers and Switches
- Plumbing
- Pentair Vac Mate and Parts
- Electrical Products

PVC | PVC PIPE SCH40 3/4" PER FT | 42030



CRESLINE WEST INC

\$0.46

SKU:
42030

Weight:
1.00 LBS

Availability:
In Stock and Ready to Ship!!!

Shipping:
Calculated at checkout

Quantity

1

ADD TO CART

ADD TO WISHLIST

PRODUCT DESCRIPTION





PVC | PVC PIPE SCH40 3/4" PER FT | 42030

WARRANTY INFORMATION

FIND SIMILAR PRODUCTS BY CATEGORY

PRODUCT REVIEWS

CUSTOMERS WHO VIEWED THIS PRODUCT ALSO VIEWED

 <p>PVC LASCO PVC PIPE SCH40 1/2" PER FT 1/2" pipe 42015</p> <p>\$0.33</p> <p>Not Rated Yet</p> <p>Add To Cart</p>	 <p>PVC LASCO PVC PIPE SCH40 1-1/2" PER FT 1-1/2" Pipe 42070</p> <p>\$1.12</p> <p>Not Rated Yet</p> <p>Add To Cart</p>	 <p>PVC LASCO PVC PIPE SCH40 3" PER FT 3" Pipe 42111</p> <p>\$1.69</p> <p>Not Rated Yet</p> <p>Add To Cart</p>	 <p>KwikRepair KwikRepair Coupler 2"x2" 89-600-1085 Discontinued</p> <p>\$10.41</p> <p>Not Rated Yet</p> <p>Add To Cart</p>
--	--	--	---

WISHLIST (HTTPS://ZENITHINDUSTRIES.NET/MY-ACCOUNT/MYACCOUNT-WISHLIST/) /



(http://zenithindustries.net)

(http://zenithindustries.net/cart/)

SHOPPING BAG

CHECKOUT DETAILS

ORDER COMPLETE

DESCRIPTION

QUANTITY

SUBTOTAL



(http://zenithindustries.net/cart/?

remove_item=13111c20aee51aeb480e6bd988cd8cc9&_wpnonce=1bb105ed93)

(http://zenithindustries.net/product/er70s-6-mig-wire-035in-x-10lb-spool/)

ER70S-6 MIG WIRE .035IN X 10LB SPOOL

(HTTP://ZENITHINDUSTRIES.NET/PRODUCT/ER70S-6-MIG-WIRE-035IN-X-10LB-SPOOL/)

\$3.39

-	10	+
---	----	---

\$33.90

CALCULATE SHIPPING

Select a country...

State / county

Postcode / Zip

UPDATE

(http://eepurl.com/bSEGqj)

Due to unforeseen circumstances we currently cannot accept Amex credit cards. We can notify you as soon as this changes

p://zenithindustries.net/cart/

RADIOSHACK THANKS YOU.

RADIOSHACK
2327 COTTMAN AVE STE G
PHILADELPHIA, PA 19149-1008
(215) 338-4711

6402072		\$2.99
30/40W REPLACEMENT SOLDERING T		
2750022		\$4.49
ON/OFF TOGGLE SWITCH 40A		

SubTotal		\$7.48
Tax	8.00%	\$0.60
TOTAL		\$8.08

Cash		\$9.00
CHANGE		\$0.92

Total Items Sold: 2

NOTICE: The last valid return date under our 'Return Policy': [A] for wireless handsets, wireless, accessories, tablets, laptops, PCs, cameras, GPS, and radar detectors is 14 days from date of purchase, [B] for RadioShack-branded clearance products (exchange only) is 7 days from date of purchase, and [C] for all other merchandise is 30 days from date of purchase. Any other last valid return dates printed on this receipt or on any store signage do not apply to these items. Return privileges do not affect your warranty Rights.

Effective 02-08-15 the warranty on RadioShack brands of merchandise is now limited to 30 days from date of purchase regardless of any warranty paperwork included with a product or any information on the receipt or posted on signs in the store.

All Sales are final on merchandise marked as clearance except as indicated above.

Store: 012101 Register: 05 Tran: 9815
Operator: KA Sales Associate: KA
Ticket #: 059815 4/3/2016 3:58:07 PM





Details for Order #111-9243471-5036261

Print this page for your records.

Order Placed: April 3, 2016

Amazon.com order number: 111-9243471-5036261

Order Total: \$7.75

Not Yet Shipped

Items Ordered

Price

1 of: *Solder Sucker- desoldering pump*

\$5.85

Sold by: SFT, Inc ([seller profile](#))

Condition: New

2 of: *Elenco Soldering Iron Holder*

\$4.80

Sold by: Amazon.com LLC

Condition: New

1 of: *uxcell® 12V 0.31A 10Kg Electric Lifting Magnet Electromagnet Solenoid 30x22mm*

\$10.90

Sold by: Saim's Store ([seller profile](#))

Condition: New

Shipping Address:

Scott Jackson
5450 ROOSEVELT BLVD
PHILADELPHIA, PA 19124-1045
United States

Shipping Speed:

Standard Shipping

Payment information

Payment Method:

Beneficial Bank Debit Card | Last digits: 5934
Gift Card

Item(s) Subtotal: \$26.35
Shipping & Handling: \$5.66

Total before tax: \$32.01

Estimated tax to be collected: \$0.74

Gift Card Amount: -\$25.00

Grand Total: \$7.75

Billing address

Scott Jackson
1714 RHAWN ST APT 2B
PHILADELPHIA, PA 19111-2959
United States

To view the status of your order, return to [Order Summary](#).

[Conditions of Use](#) | [Privacy Notice](#) © 1996-2016, Amazon.com, Inc. or its affiliates