



AscendTech Technologies Inc.



Monmouth County, NJ - USA

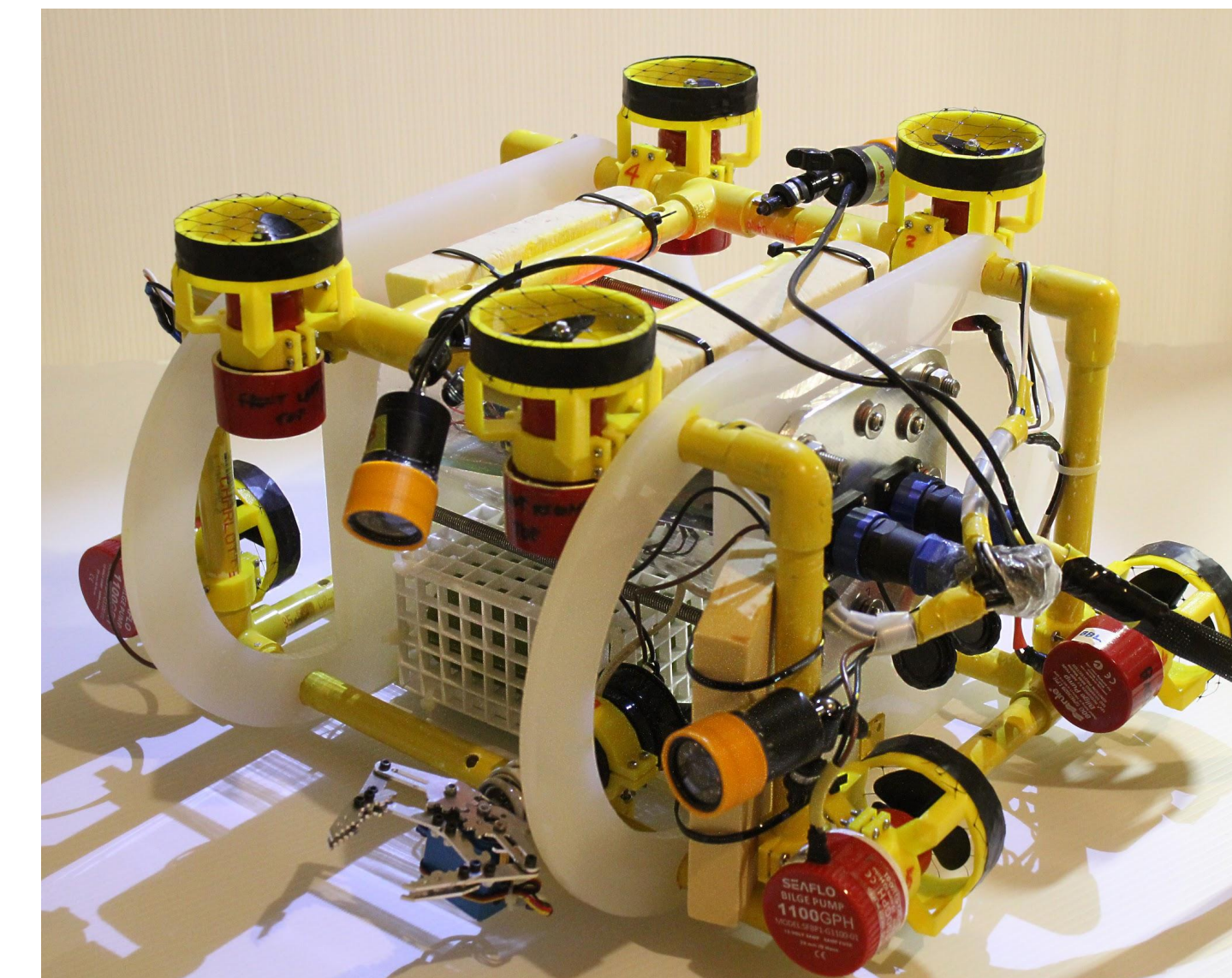
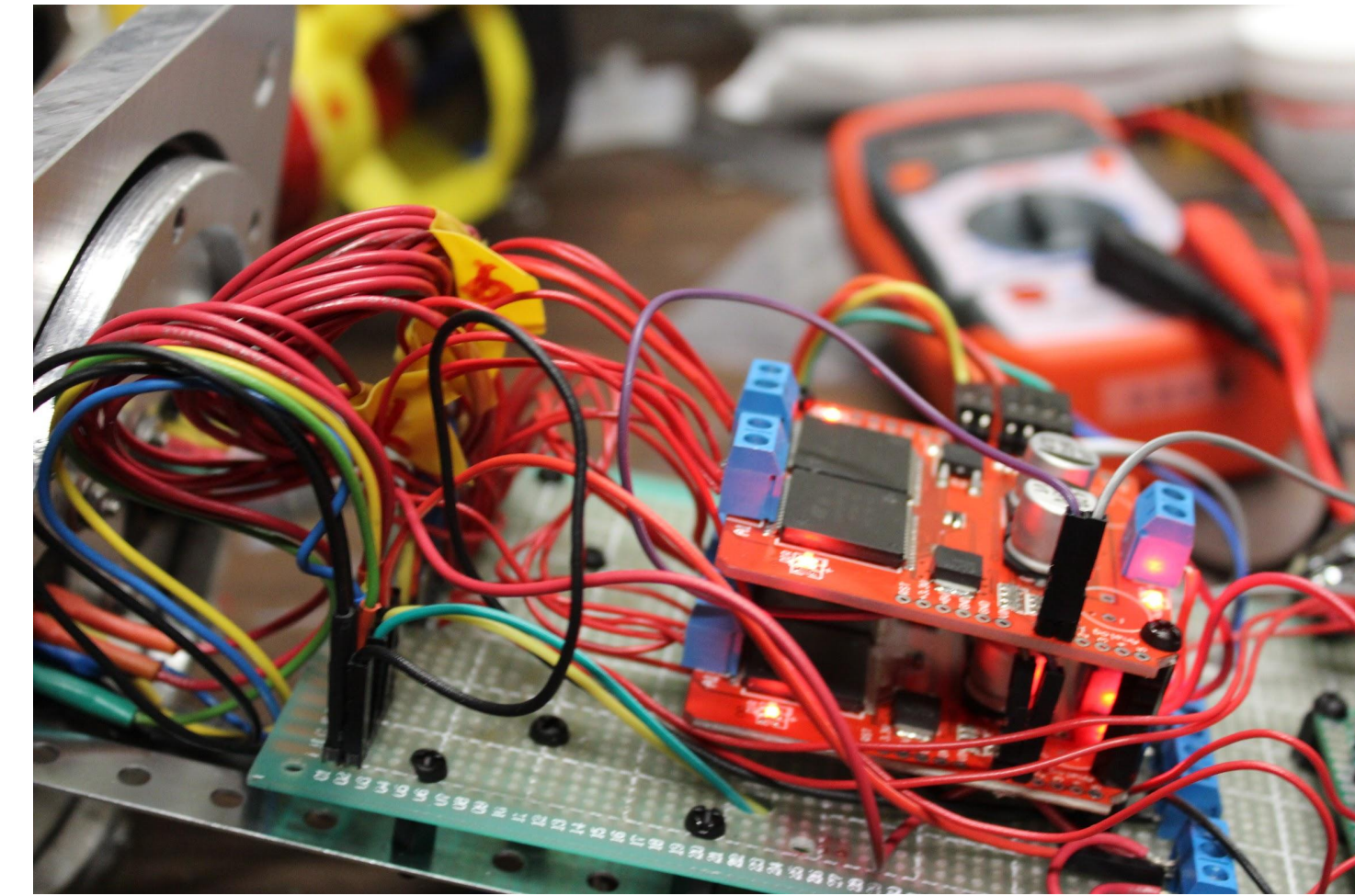
Mission: To teach and learn through the shared robotics experience and promotion of technology education.

ABSTRACT

AscendTech Technologies Inc. designed and manufactured Archelon, a remotely-operated vehicle (ROV) capable of streamlining commerce as well as benefiting the health and safety of the general public.

Archelon features powerful, advanced image-processing software as well as a robust, modular, economical design. With innovative payload tools and operated by eight bilge pump motors, the Archelon ROV is perfect for operating in precarious conditions to address the issues on our sea ports and water fronts.

Below: Bottomside Electronics
Original Photography: Alice Lai



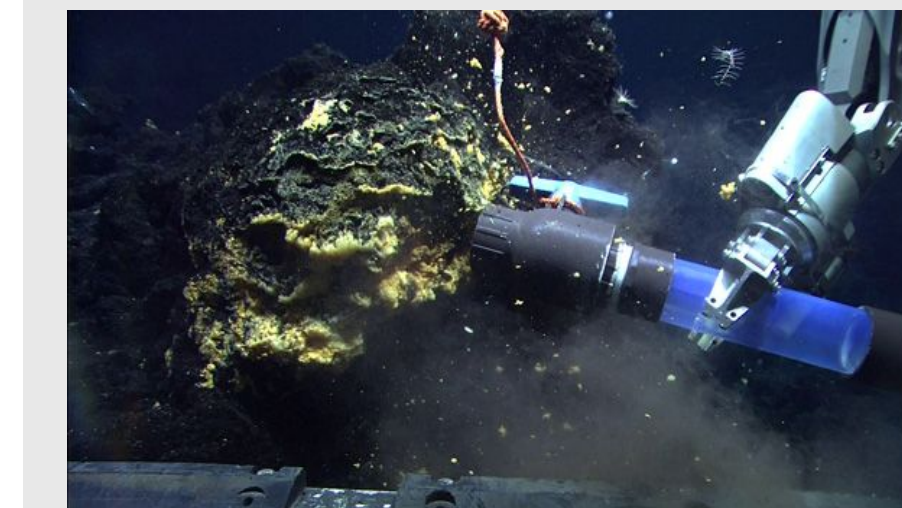
Above: Completed ROV
Original Photography: Alice Lai

Below: Metal Claw Manipulator
Original Photography: Alice Lai



THEME

As one of the busiest ports in the world, the Port of Long Beach acts as a major center for maritime trade between the U.S. and Asia. It generates a revenue of approximately \$180 billion a year, and is justly recognized as an integral part of the modern-day economy ("Facts at a Glance"). Unfortunately, with all of the activity and vessel traffic, the Port of Long Beach is not immune to accidents and pollution. Chemicals and rogue cargo fall into the water, and many thousands of dollars are spent yearly simply trying to clean up after these activities.



(above): Manipulator arm of the Quest 4000 ROV collects sample of microbial mats

Source: MARUM, University of Bremen and NOAA-Pacific Marine Environmental Laboratory.

Harsh ocean environments, severe weather conditions, and other factors render certain diving expeditions dangerous ventures. As such, the maritime industries are in need of safe and reliable methods to help manage their work. Remotely Operated Vehicles (ROVs) are the perfect robotic applications to make commerce more efficient as well as to protect health and safety. With powerful functionality and efficiency, ROVs are the superior technology to apply to these underwater situations. Although ROVs vary in complexity, all have visual devices that can document sights of the environment. ROVs additionally can have supplementary end effectors, such as measuring devices and claws. These devices are imperative for scientific activities in environments that would be harmful to humans, ranging from mapping coordinates of hazardous cargo containers to assessing the contamination of sediment areas. Not only are ROVs a crucial part of the maritime trade industry, but they are also essential to protecting the public health and safety by removing hazardous chemicals and materials. It is because of these robotic applications that we are able to ensure the safety, health, and commerce of the everyday American citizen.

Works Cited

Facts at a Glance. (n.d.). Retrieved from <http://www.polb.com/about/facts.asp>

COMPANY INFO



Above: Staff (from left to right)

Alissa Tsai, Chief Executive Officer

Grade 12, Intended Major: Mechanical Engineering

Jaden Weiss, Chief Technology Officer

Grade 10, Intended Major: Computer Science

Alice Lai, Chief Operations Officer

Grade 11, Intended Major: Computer Engineering

Rishi Salwi, Chief Financial Officer

Grade 10, Intended Major: Electrical Engineering

Eric Zheng, Chief Production Officer

Grade 10, Intended Major: Mechanical Engineering

Team Members:

Alisa Lai,
Arihant Jain,
Kaishawn Williams,
Katrina Florendo,
Matthew Rosivack,
Sam Alws



COMMUNITY

Goal: Get kids interested in STEM

- Hosted and taught non-profit Arduino Workshop
 - 30 children and adults attended
- Presented at World Maker Faire
- Volunteered at Howell Barnes & Noble Mini Maker Faire
- Planning to work with Rutgers School of Engineering and Project Orrca to clean up local waterways

DESIGN RATIONALE

Motors

Benefits/Rationale:

- Inherently waterproof
- Most efficient bilge pump motors; chosen for maximum thrust per power
- 4 triple bladed propellor vertical motors
- 4 triple bladed propellor horizontal motors
- 3D printed, custom-designed motor attachments
- Mesh grille over propellers for safety

Mission: Controlling motion for the Archelon ROV

Cameras

Benefits/Rationale:

- 3 cameras focused on specific locations for operator use:
 - Claw
 - Forward drive
 - Distance Measurement
- Advanced powerful image-analysis software

Mission: Conveying quality graphical data to operators; identifying materials and determining distance between objects underwater utilizing advanced image analysis

Agar Sampler

Benefits/Rationale:

- Passive payload tool
- Simplistic design reduces risk of failure or damage

Mission: Collect agar samples from the seabed

Claw

Benefits/Rationale:

- Sturdy design allows firm grip of objects
- Versatility provides a wide range of applications

Mission: Conduct hyperloop construction, remove and replace water fountains, collect sediment samples, and help activate RFID sensors on cargo containers

Buoyancy

Benefits/Rationale:

- Two foam blocks on top for positive buoyancy (floatation)
- Singular weight box located in bottom to allow for adjustable negative buoyancy (sinking) without risk of dropping weights into the water

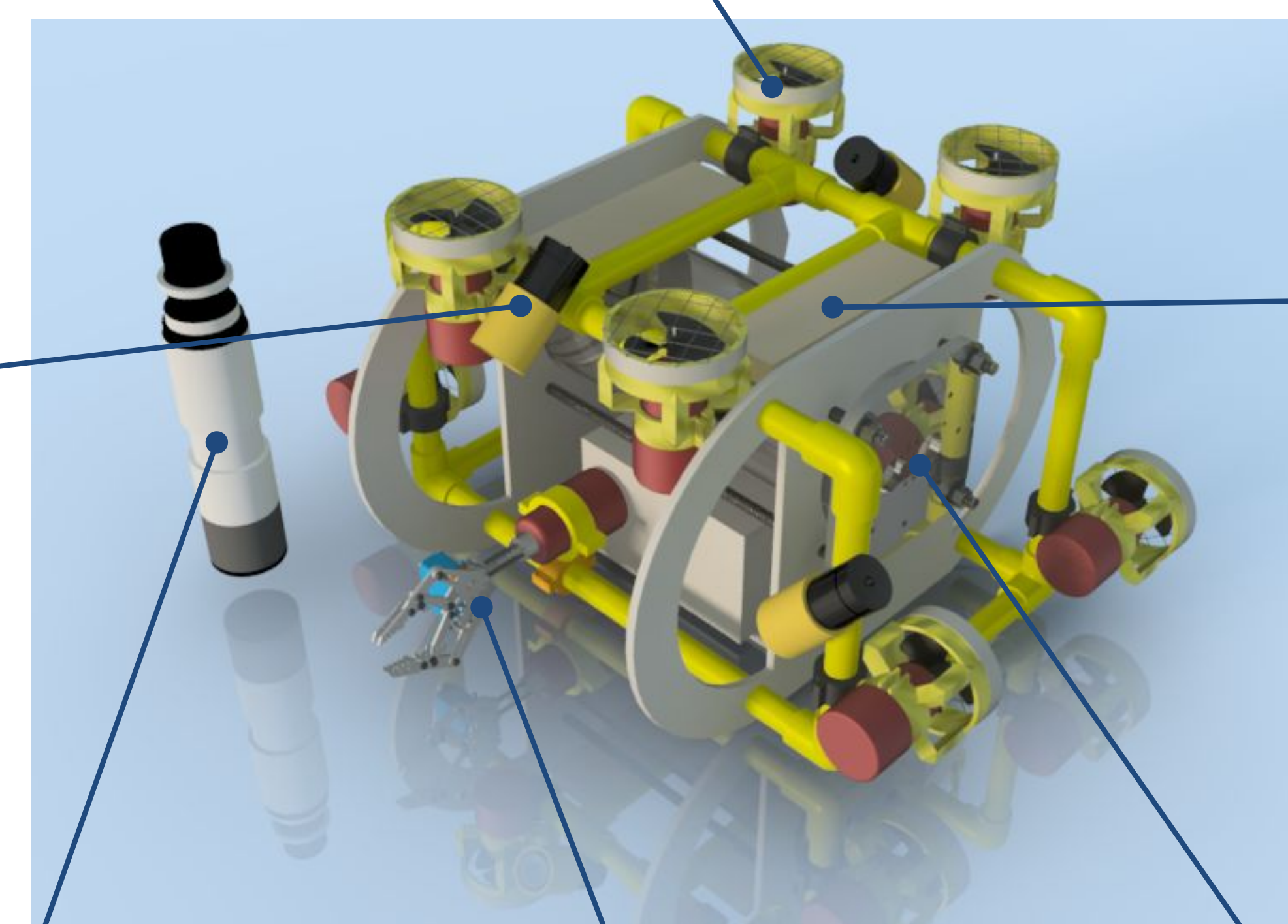
Mission: Retaining neutral buoyancy in water to ensure ROV is easily controllable

Control System

Benefits/Rationale:

- Acrylic tube with aluminum endcap plates house the bottomside AVR microcontroller and H-Bridges
- Cluster of Odroid XU4s control the bottomside electronics

Mission: Controls behavior of robot and output robotic sensor feedback to land operators



3D CAD Drawing of Completed ROV With Mounted Payload Tools; Made in Autodesk Inventor 2017 by Alissa Tsai

COMPANY EVAL.

This year, the company saw a dramatic improvement in the organization and efficiency of the overall design process. These improvements gave the company the tools needed to overcome challenges and construct a fully functional ROV. In the future, the company plans to enhance the electronics system by replacing older components, simplifying the wiring system, and investing in a printed circuit board. The team also plans to increase its presence in the community through organized community events and workshops.

ACKNOWLEDGEMENTS

AscendTech 4-H would like to acknowledge the following individuals and organizations for their guidance and support for our many endeavors:

- **Ulric Gordon-Lewis** for his 3D printers and machine shop
- **Monmouth University and Add-On Pools** for providing pools for testing
- **Rosalie DiSimone-Weiss** for leading the 4-H club
- **Yunchu Ku, Yung-Hui Lai, ChengMao Tsai, Gary Weiss** for leading the 4-H Club

