

Boise State University
ScholarWorks

2020 Undergraduate Research Showcase

Undergraduate Research and Scholarship
Showcases

4-24-2020

Nautical Research Platform for Water-Bound Experiments

Dillon J. Eyer
Boise State University

Monica Leibowitz
Boise State University

Amanda White
Boise State University

Zachariah Vandeventer
Boise State University

Heather Dyer
Boise State University

See next page for additional authors

Authors

Dillon J. Eyer, Monica Leibowitz, Amanda White, Zachariah Vandeventer, Heather Dyer, Andrew Byrd, Dustin Nguyen, Terek Zimmerman, Hugh Sheldon, Morgan Hill, Jeremy Bouchard, Jessica M. Mueller, Adam Torek, Kalynn Cotton, Jose Escobosa, Tyler Johnson, Nathan Sundquist, Zuly Lapa, Ryan Olson, Carolyn Murrey, David Maldonado, Aidan McConnehey, Keaton Poe, Libbie Luevanos, Andrew Handzel, Steve Swanson, Gus Engstrom, Megan Gambs, and Gunes Uzer

Nautical Research Platform for Water-Bound Experiments



PRESENTED BY:
**Microgravity Undergraduate
Research Team**

BACKGROUND:

Conducting research in lakes and rivers requires large crews and heavy-duty equipment, making even simple tests costly and time consuming (as seen in **Figure 1**). We have taken our previous research in autonomous Unmanned Surface Vehicles (USVs) for NASA and applied our efforts to relieving this problem.



Figure 1*: USGS conducting a water-bound experiment.

REQUIREMENTS

Our team developed requirements for the project to best guide our solution; the most important of which being basic safety guidelines during operation as to not harm the operator or the vessel itself. It must accommodate a variety of equipment and be modular during operation. In addition, the system must be operable by only one operator, or by means of autonomous GPS navigation.

DESIGN

The vessel was conceptually modeled after conventional watercraft, giving it exceptional stability while affording portability and modularity. The figures to the right (**Figure 2, 3, and 4**) demonstrate these design goals with a single deep keel and easy dual-actuating hatches on top.

Figure 1*: Image taken from the USGS Website, 2015.
<https://www.usgs.gov/news/cape-cod-susceptible-potential-effects-sea-level-rise>

Making water-bound experiments fast and modular

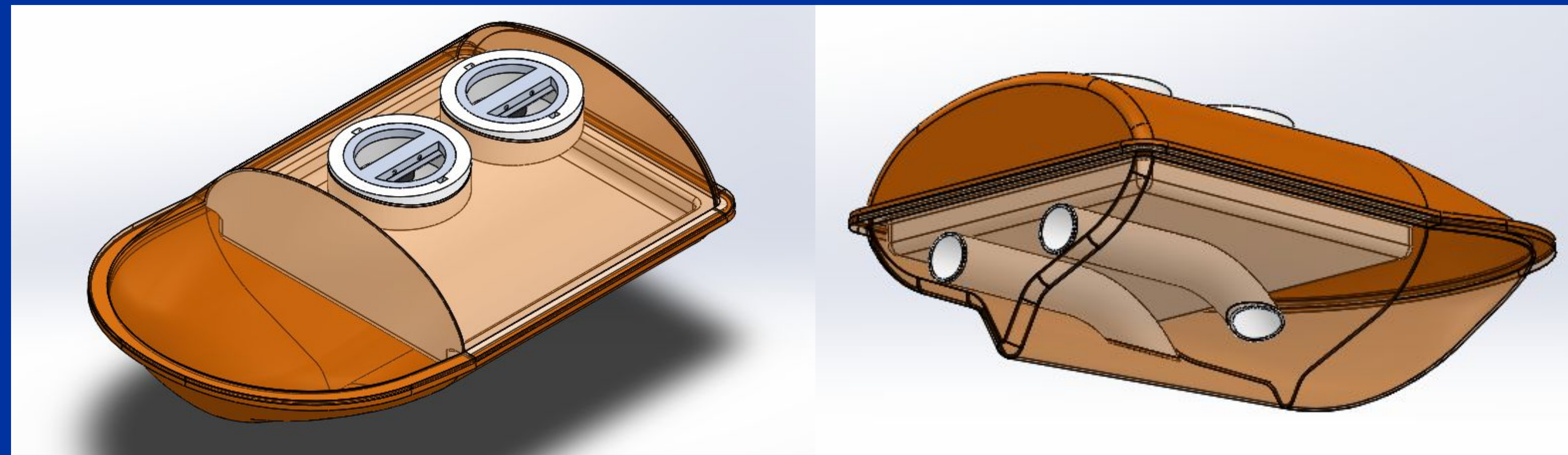


Figure 2: Isometric view showing the storage compartment inside.

Figure 3: Bottom view showing the deep single keel of the conceptual design.

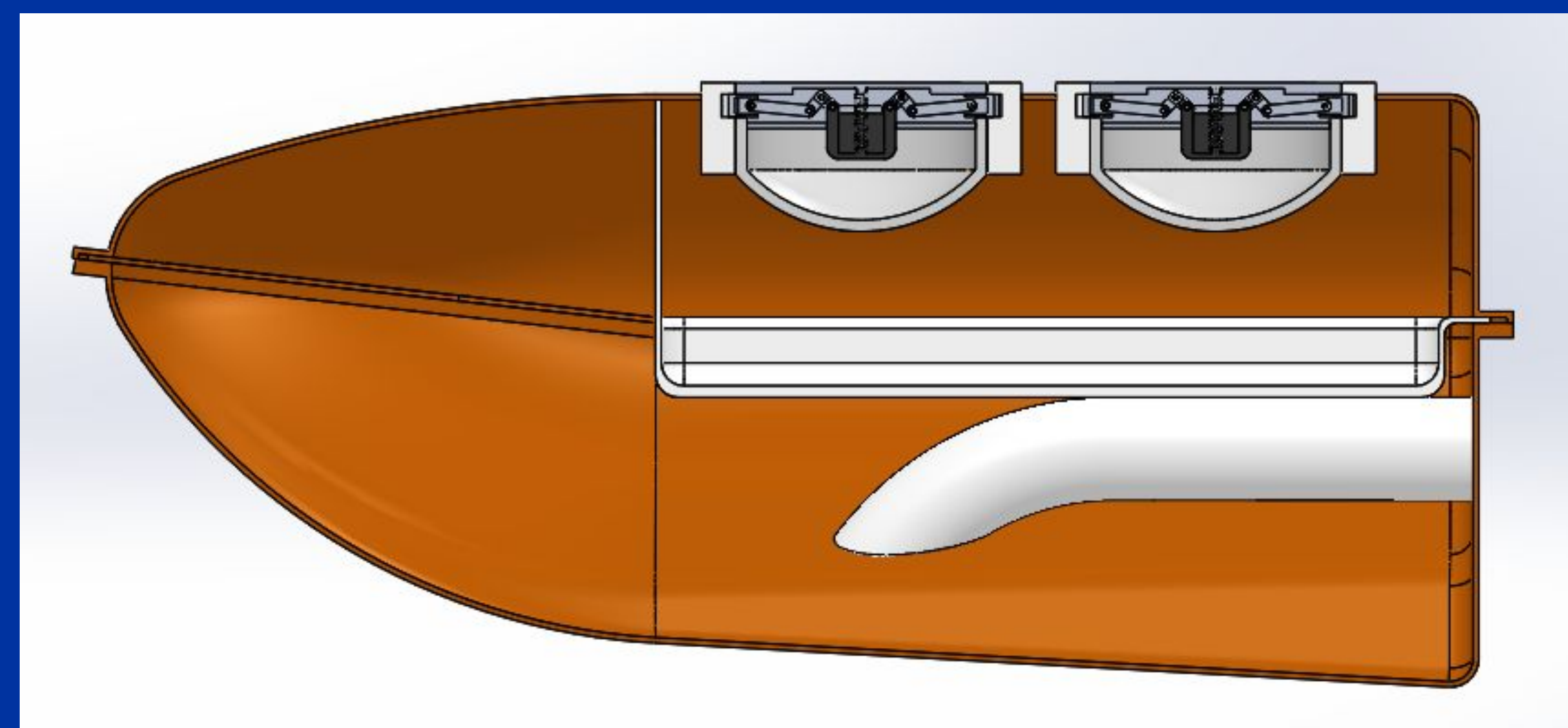


Figure 4: A side view showing the dual-actuating latches on top of the vessel.

STATUS

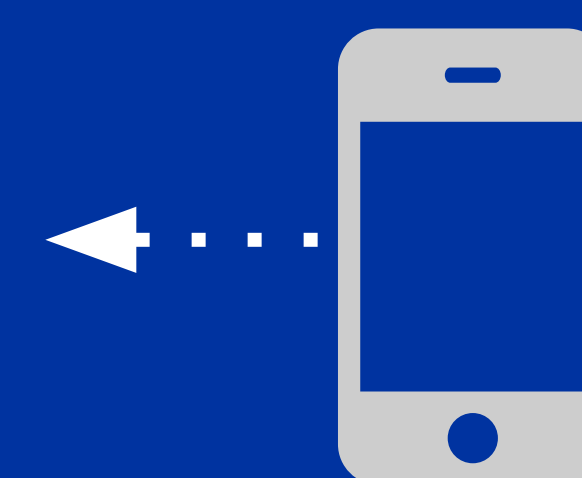
Currently, we were preparing our first prototype utilizing mostly off the shelf components. The Pixhawk flight system has been chosen to handle navigation and remote control while a small kayak is being used for the vessel's hull. The project's progress has halted to comply with university research procedures during this pandemic, with plans to resume as soon as possible. An updated photograph can be seen in **Figure 5**.



Figure 5: Top down image of our current prototype ready for assembly.

 Dillon Eyer, Monica Leibowitz, Amanda White, Zachariah Vandeventer, Heather Dyer, Andrew Byrd, Dustin Nguyen, Terek Zimmerman, Carolyn Murrey, Hugh Sheldon, Morgan Hill, Jeremy Bouchard, Jessica Mueller, Adam Torek, Kalynn Cotten, Jose Escobosa, Tyler Johnson, Nathan Sundquist, Zuly Lapa, Ryan Olson, David Maldonado, Aidan McConnehey, Keaton Poe, Libbie Luevanos, Andrew Handzel, Dr. Steve Swanson, Gus Engstrom, Megan Gambs, Dr. Gunes Uzer

We would like to thank the Idaho Space Grant Consortium for their financial contributions to our research.



Feel free to send us an email with further inquiries!