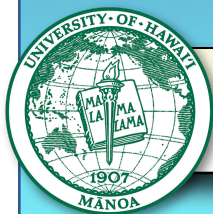


STOMP@HI

A Q U A B O T I C A

UNIVERSITY OF HAWAII SCIENCE OUTREACH PROGRAM



Student Packet



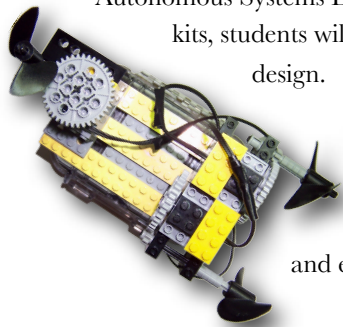
AN INTRODUCTION TO AQUABOTICA

The Student Teacher Outreach Mentorship Program pairs University of Hawai'i students with local K-8 educators who want to implement engineering activities in their classrooms or after school programs.

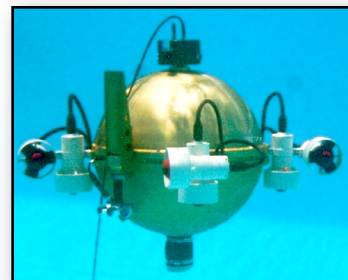
Targeted towards students in grades of K-8, this program brings together graduate students, undergraduate students and teachers in the classroom for a week-long presentation designed to introduce topics from hydrodynamics, engineering, mathematics and autonomous control to students using an exciting hands on approach. The students will learn concepts such as mechanics, buoyancy, viscosity and autonomy which will immediately be applied towards their own AUV design using a LEGO Mindstorm robotic kit. The program culminates in a presentation of the students AUV design.

The topics covered during the program relate to actual research currently underway at the University of Hawai'i (UH). Students will be introduced to the Omni-Directional Intelligent Navigator (ODIN), an autonomous underwater vehicle (AUV) being developed at the UH

Autonomous Systems Laboratory (ASL). With the help of Lego MindStorm robotic kits, students will design their own AUV, seeing firsthand the results of their design.



The STOMP@HI program brings students in to direct contact with the science research being conducted in their own backyard through a hands-on, and exciting method which will stimulate their interest in math, science and engineering.



ODIN - Omni-Directional Underwater Navigator
ODIN is a sphere-shaped, eight-thrustered underwater robotic vehicle capable of instantaneous movement in all 6 degrees-of-freedom motions from both a tethered and autonomous mode.

STOMP@HI - INTRODUCTION

This section will have student activities, pictures and examples that follow along with the presentation. It will allow the students to follow along and keep this packet as a reference. It will also include references to outside information such as websites, books, etc. Following is an outline of what it includes.

STOMP@HI, Aquabotica is designed to teach you about science and underwater technology. The mentors that visit your class are research scientists from the University of Hawai'i currently working on projects such in robotics. You will learn answers to some basic questions, such as:

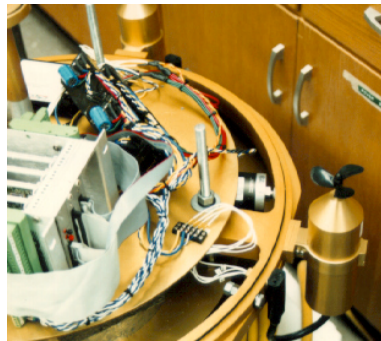
- What is hydrodynamics?
- What is buoyancy?
- What is density?
- What is viscosity?
- What kind of things go underwater? People? Robots?
- What is a professor?
- What is the University of Hawai'i like?
- How does one build a submarine?
- What does autonomous mean?
- What is required to build an underwater vehicle?

STOMP@HI - ACTIVITIES DAY 1

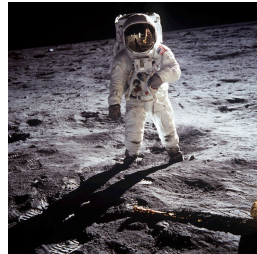
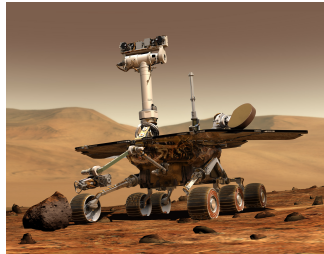
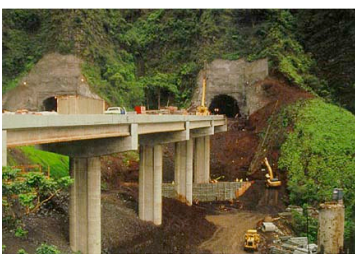


Holmes Hall

University of Hawai'i at Manoa

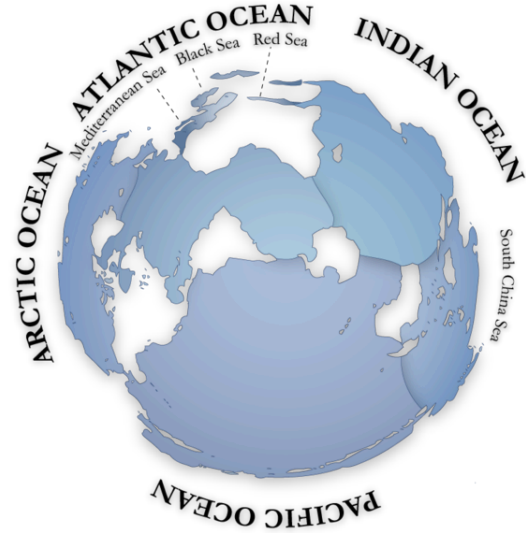


Say hello to ODIN.



What do engineers do?

STOMP@HI - ACTIVITIES DAY 1



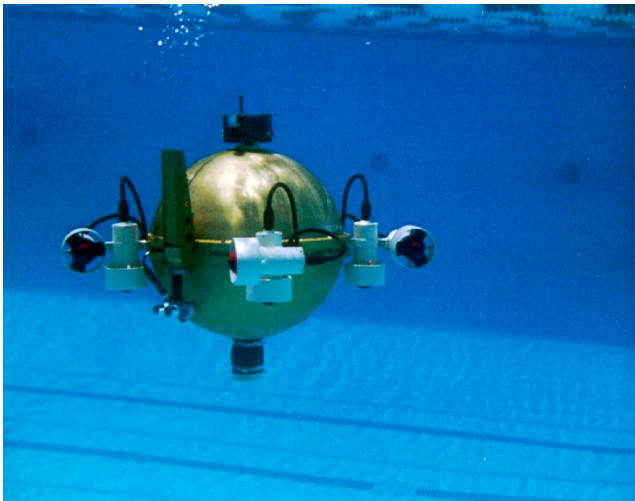
The Ocean



Ship



Submarine

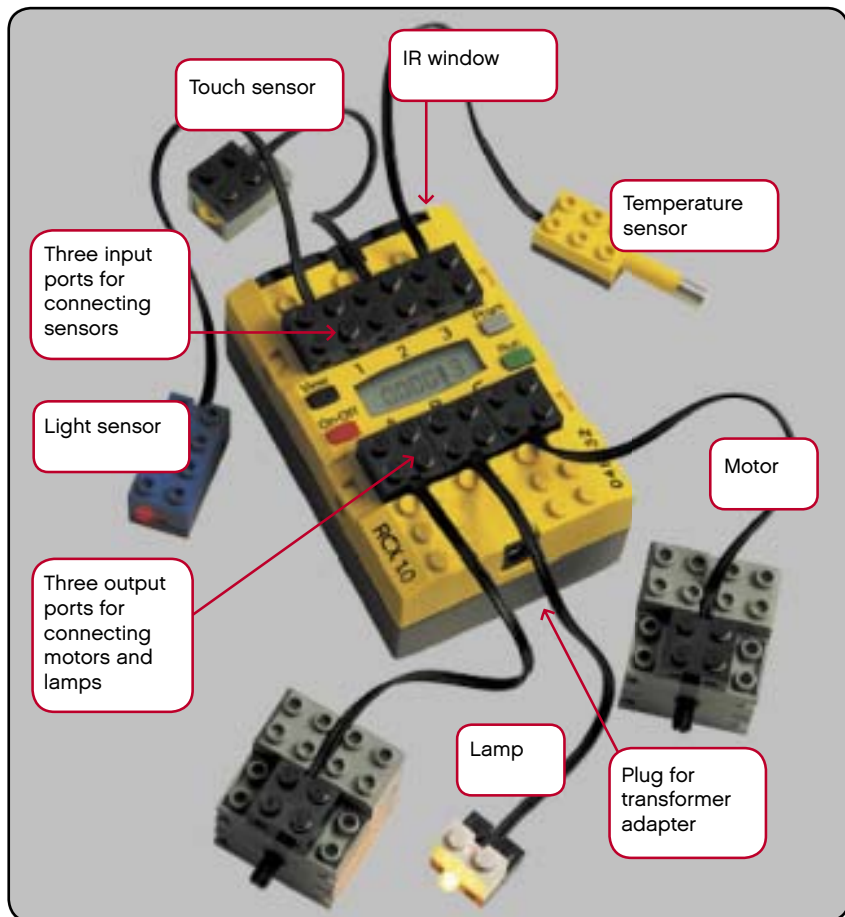


AUV



ROV

STOMP@HI - ACTIVITIES DAY 1

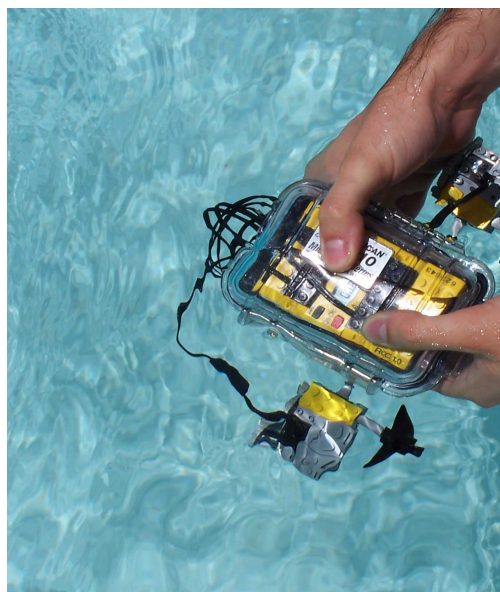
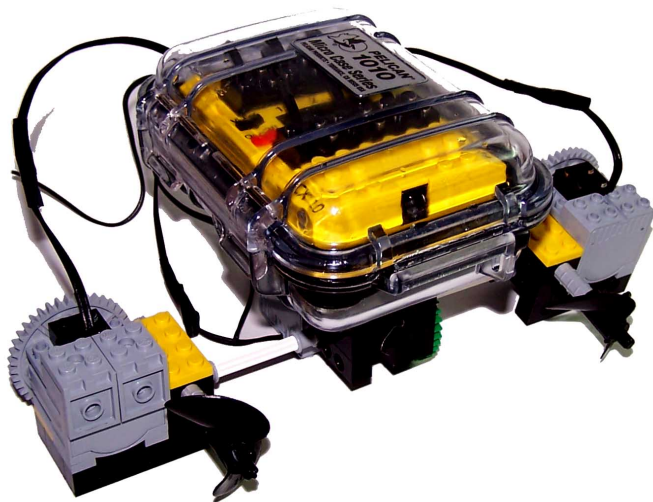


Serial (COM port) Infrared Tower, requires a 9 volt battery



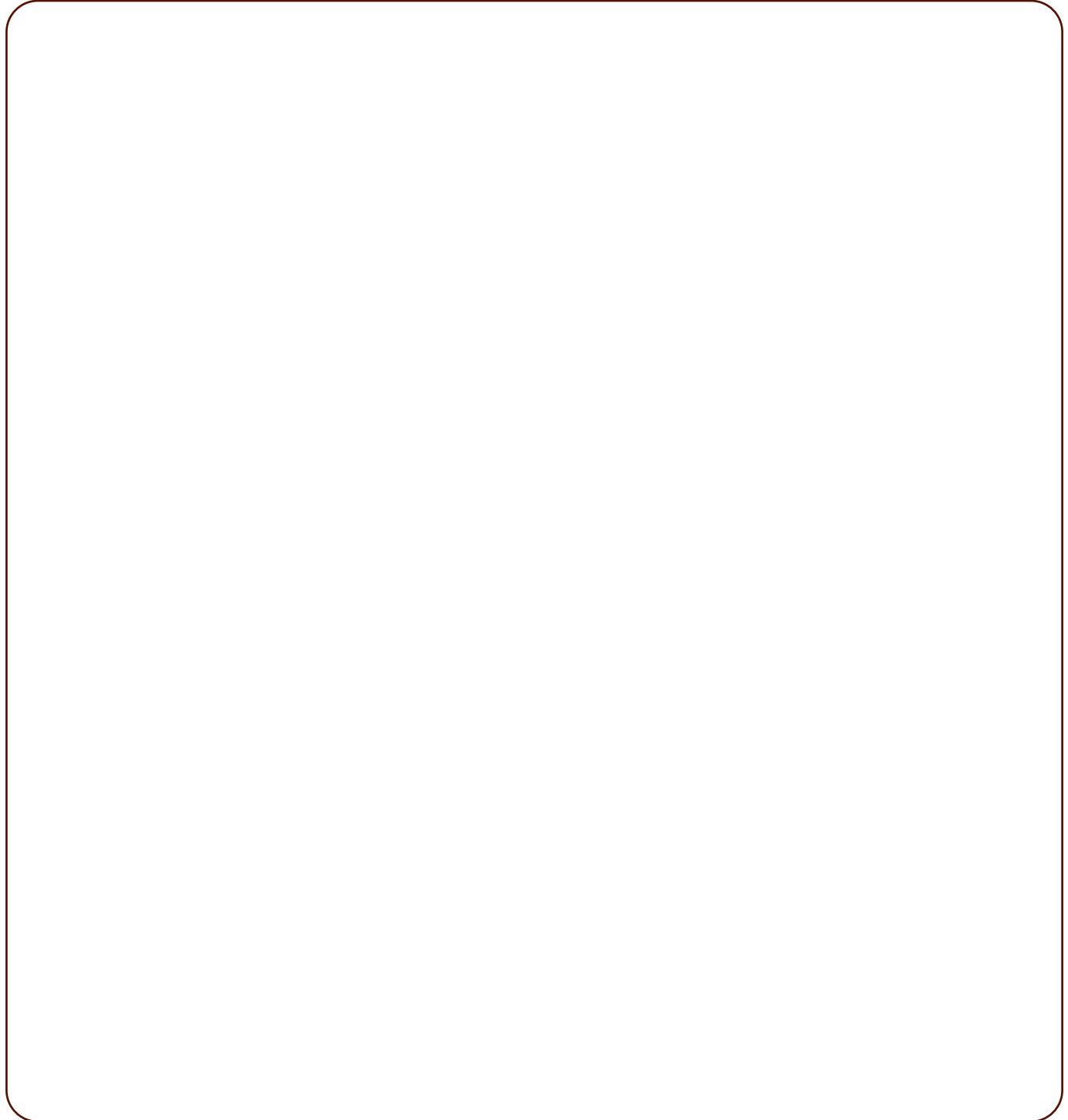
USB Infrared Tower

LEGO Mindstorm Pictures



STOMP@HI - ACTIVITIES DAY 1

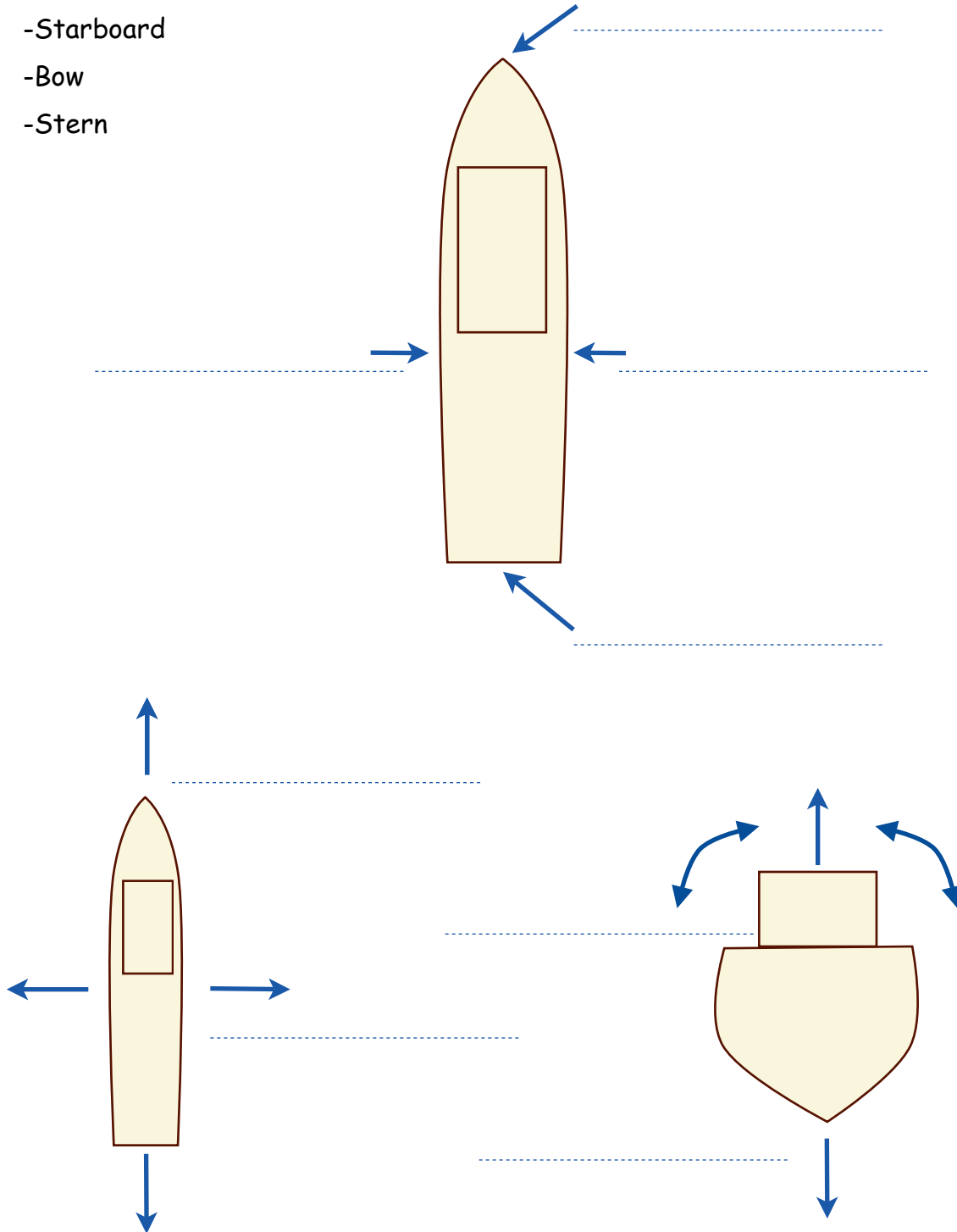
In the space below, design and draw your own underwater vehicle. Describe what it does and label the parts. Be creative!



STOMP@HI - ACTIVITIES DAY 2

Label the sides of the ship with:

- Port
- Starboard
- Bow
- Stern



Which one is surge, sway, heave & roll?

STOMP@HI - ACTIVITIES DAY 2

Distance - Measure of how far apart things are.

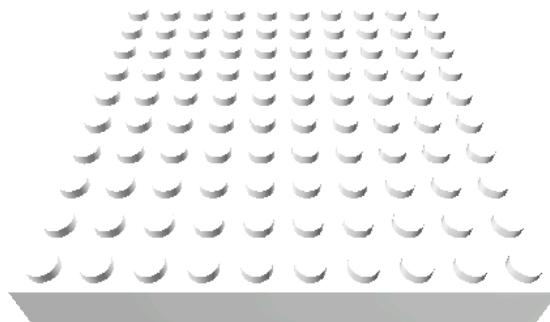
Length: _____



Area - Measurement of the size of a surface.

Length: _____

Width: _____

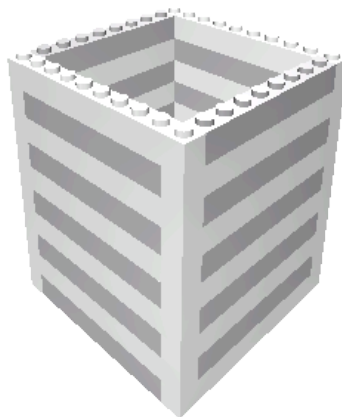


Volume - Measurement of how much space something occupies or holds.

Length: _____

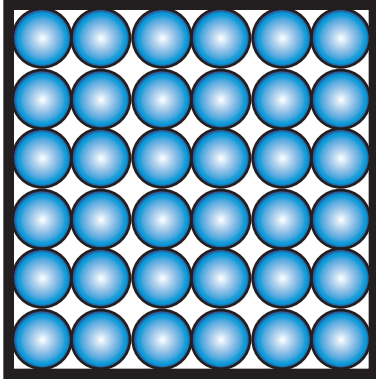
Width: _____

Height: _____

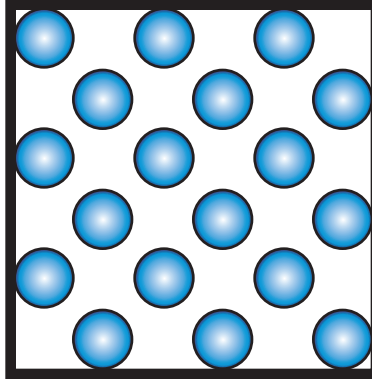


STOMP@HI - ACTIVITIES DAY 2

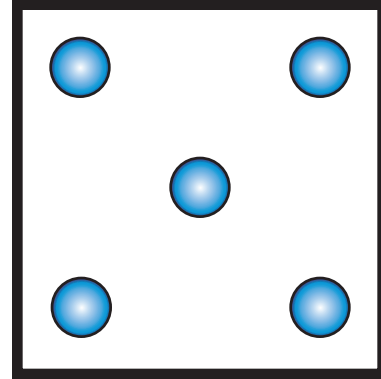
Density - Which one is the most dense? The least dense?



Solid



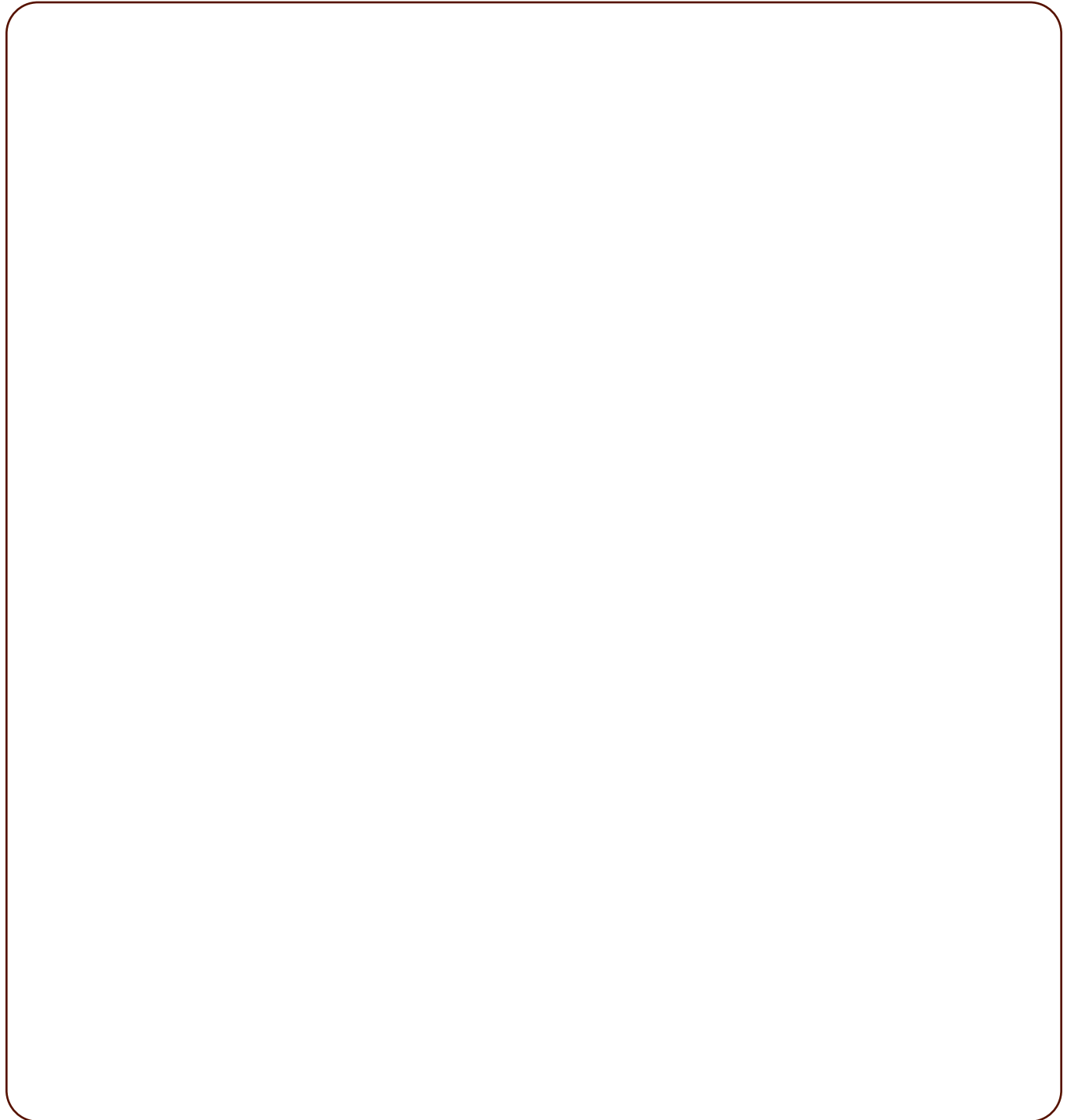
Liquid



Gas

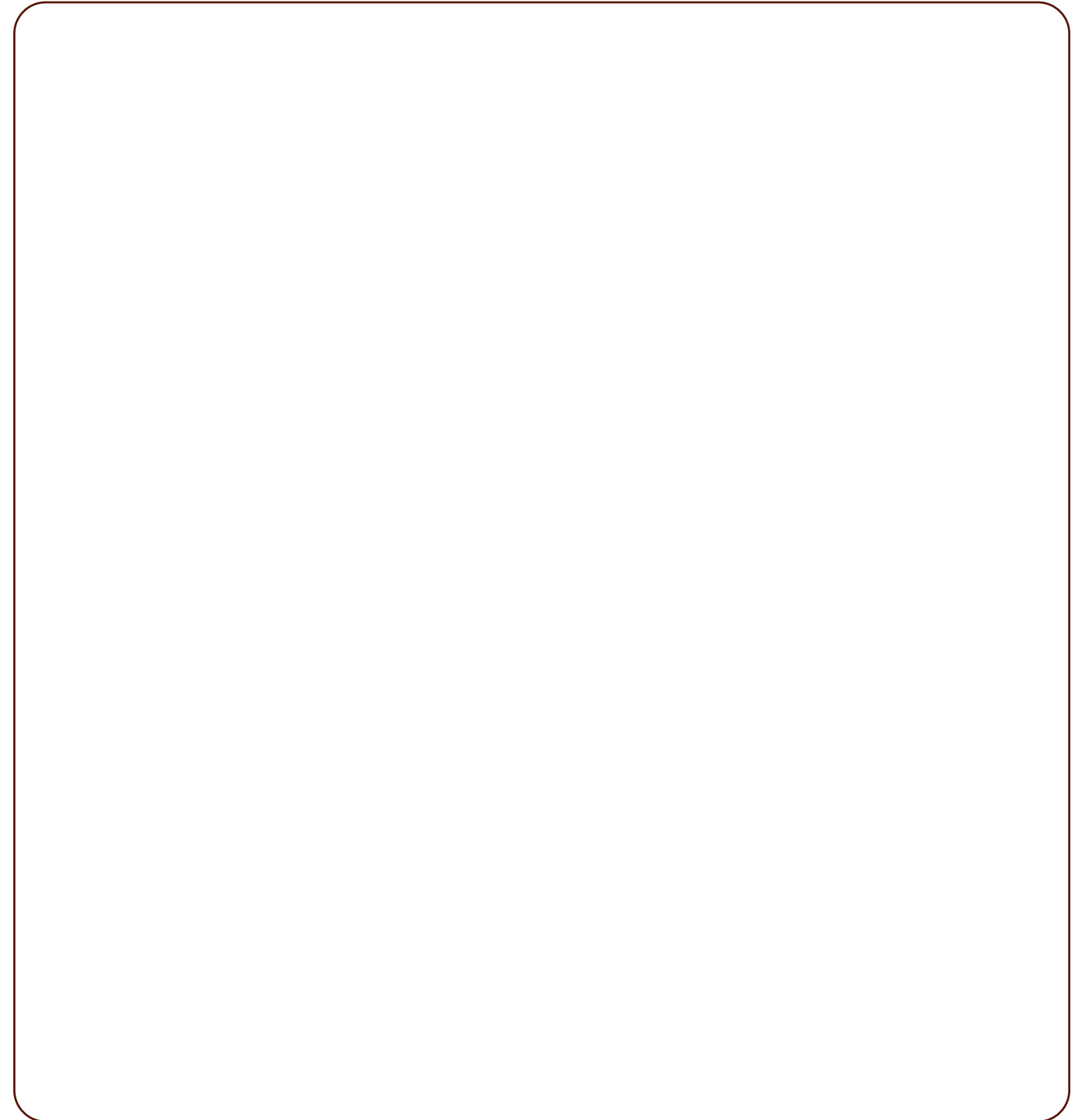
STOMP@HI - ACTIVITIES DAY 4

In the space below, draw a picture of your final AUV. What changes have you made since the first AUV? Why did you make these changes?



STOMP@HI - ACTIVITIES DAY 3

Vector, acceleration and viscosity illustrations. This page not complete.



STOMP@HI - ACTIVITIES DAY 4

Autonomy - This page to have pictures of AUV's with descriptions of what they do and how they are unique. This page not yet complete.