

Ocean Robotics Education (ORE) Program



A pilot project to improve technology and engineering literacy in 6-12th grades using REMUS and an underwater docking station

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Why is this important?

The ocean is largely unexplored and the ocean coast is dynamic and ever-changing. ORE aims to ignite curiosity about coastal processes and ocean data in students and teachers by creating a direct connection between the ocean, scientists, teachers, and students using hands-on technology. With our new method of collecting estuary and ocean data, students will be able to understand coastal ecosystems and human impacts on them.

Beginning in 2014, the National Assessment of Educational Progress (NAEP) will administer the first nationwide student assessment in technology and engineering literacy. According to the Science and Engineering Indicators 2012 only 3% of high school graduates had taken an engineering course as of 2009. The creation of the ORE Program is intended to fill a void in exposing engineering and technology to 6-12th graders and their educators.

Autonomous Underwater Vehicles (AUVs) serve as a practical hands-on platform for merging Science and Technology. They can swim at various speeds and carry a wide variety of ocean sensors. Understanding the capabilities of ocean technology will strengthen connections between scientists and their communities. AUVs and Ocean Observatories are effective, efficient, and autonomous platforms for students and scientists to study human impacts on our coastal and offshore environments.

What will we use?

Using a proven AUV system, REMUS (Remote Environmental Monitoring UnitS), scientists, educators, and especially curious students will be able to observe how technology can enhance one's access to and, therefore, understanding of the sea, as well as the ability to unravel its many mysteries. Students can learn to program the AUV to run scientific missions and then have the AUV swim back to its underwater docking station in order to download data; they can learn to process and interpret data; and, most importantly, they will have the opportunity to have hands-on experience with AUV technology. In order to expand the reach of the ORE program, a live video camera on the system will be connected to a website accessible by anyone with the web address. ORE will put real data collected by a real world AUV in the hands of scientists and students creating a data set that will be viable to learning and understanding coastal ocean science problems. Understanding problems will help students develop solutions and encourage them to think about their own impacts on the ocean environment.

By exposing students to real world technology, we will encourage a deeper understanding and practical sense of how to conduct real science with real tools, allowing students to strengthen their connection to science, math, and engineering topics covered in their regular classroom settings. Our ultimate goal is to inspire and engage students towards a future career in STEM-related fields.

How will it be used?

Depending on their scientific questions, scientists, teachers and students can choose different sensors to attach to the AUV, such as cameras, sonar, current profilers, temperature and salinity sensors, and turbidity or oxygen sensors in order to find out more about the health of our coastal ecosystems. Students and teachers can access the sea beyond using nets, seigns and salinity kits in knee-high water and reach miles beyond the beach. The REMUS AUV can be used with or without its underwater docking station, making it a mobile platform for collecting data and making scientific observations in any coastal environment. Data will be available through the ORE website for any school or educational program to access.

With proper training and support, teachers can check the REMUS out, much like a library book, and use it on a local field trip. Working with AUV systems, including mission programming, will give students the opportunity to explore science through technology, engineering and math.

Who is participating?

- Woods Hole Oceanographic Institution (WHOI)
- Waquoit Bay National Estuarine Research Reserve (WBNERR)
- National Estuarine Research Reserve System (NERRS)
- Office of Naval Research (ONR)
- Local scientists and engineers
- Students in science, math, engineering and technology programs
- Teachers, coastal decision makers, community members



Find out more about REMUS at remus.whoi.edu



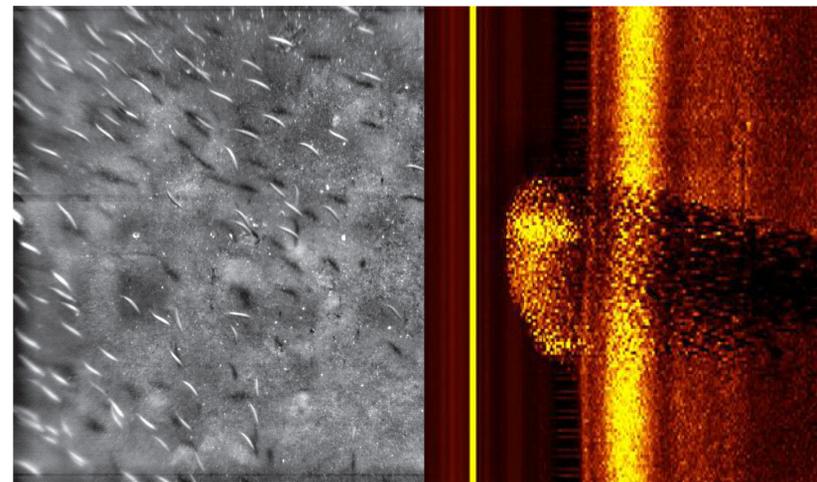
Hands-on technology for students to utilize



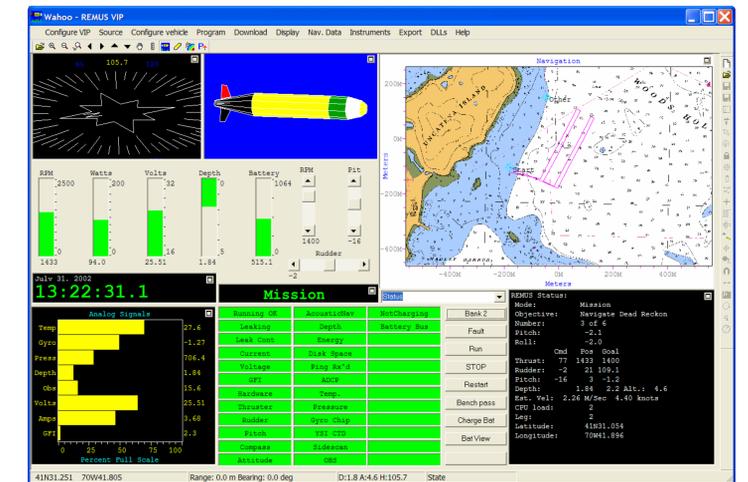
Real world experimentation



Mobile platform for collecting data and making scientific observations



Different sensors can be used on the AUV for various scientific questions



Data will be available for any school or educational program to access

