

# Underwater Robotics Applied To STEM Education: A Time-Sensitive Discovery In Marine Archeology

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## Overview

- Put commercial underwater robots into student hands
- Have them gather data over historical shipwrecks
- Teach them real field robotics including operations
- Archeology, history, math, marine science sneak in



Sidescan sonar of a shipwreck in York



Sinking of HMS Charon during Battle of Yorktown



ROV image of encrusting organisms on debris field near HMS Betsy



Students reverse engineer the system diagram of the ROV

## Impacts and Indicators

- Intense interest in operating robot
- Inquiries about tech careers in marine robotics
- Students problem-solve when things go wrong
- Interest in how sensors really work
- Very positive teacher feedback
- GA Tech will visit with their ROV, and study our approach
- Partnering with National Park Service to reach 500,000 annual visitors to Yorktown
- Formal evaluation spring 2012



Having installed the sonar and GPS, students conduct a pre-launch test of the free-swimming AUV

## Deliverables

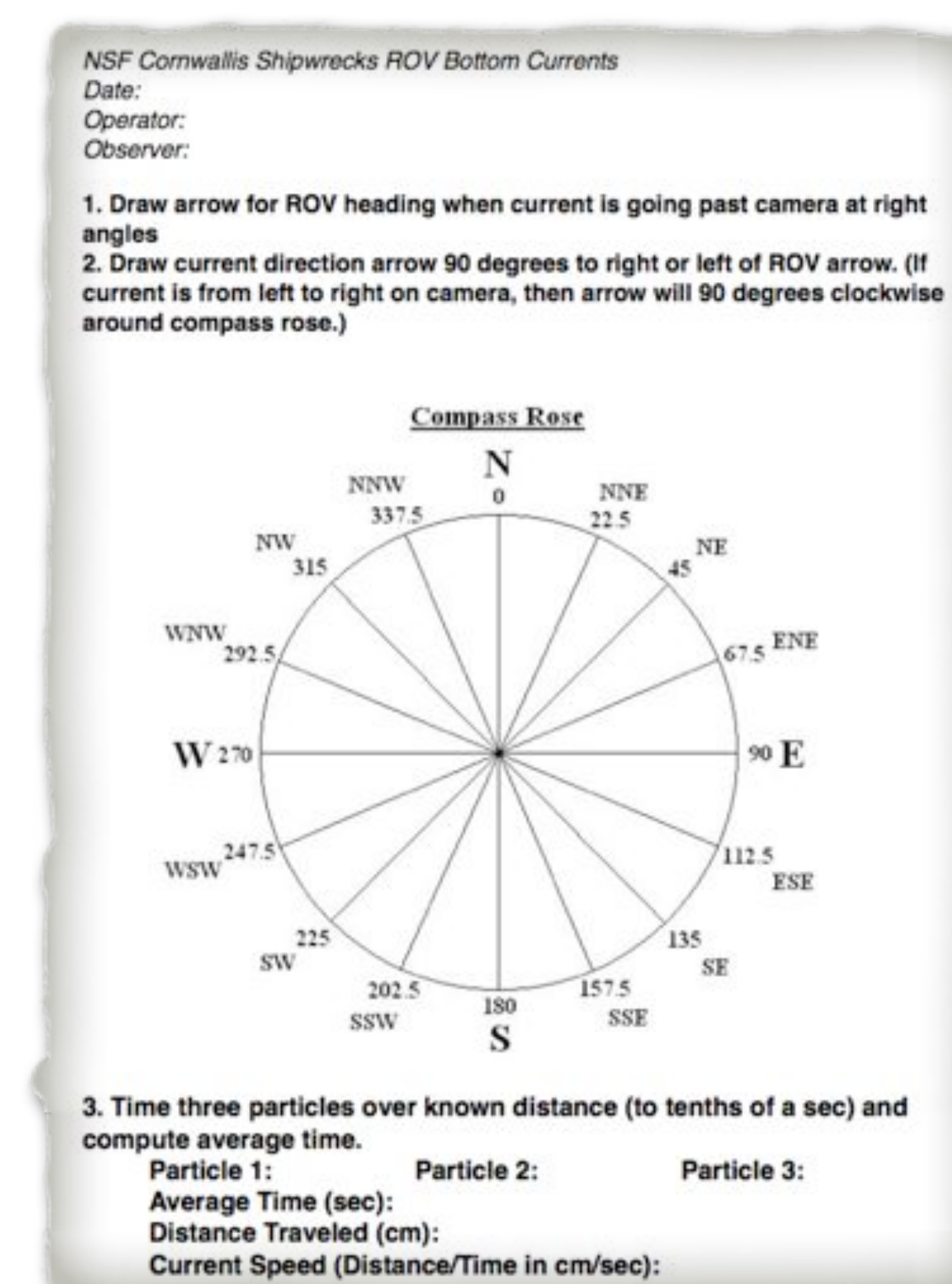
- Driving Seabotix ROV over wreck of the HMS Betsy
- Programming Fetch AUV for autonomous missions
- Gathering environmental data over wrecks
- Lessons on Battle of Yorktown, ROVs and AUVs, Navigation, Marine Science of the Chesapeake Bay
- Web resources for others interested in trying our approach



Tending the umbilical to the ROV requires concentration and skill



Driving the ROV into the shipwreck area and catching a first exciting glimpse of the past



Student-collected data on currents over the wreck provide valuable information for shipwreck monitoring and conservation

## Challenges

- Visibility, weather, hydroids can cause problems
- Less exciting parts of field robotics (safety observer, umbilical tender) require student focus
- Providing continuity of the experience as it unfolds from week to week
- Teaching field robotics to K12 students at a graduate level

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