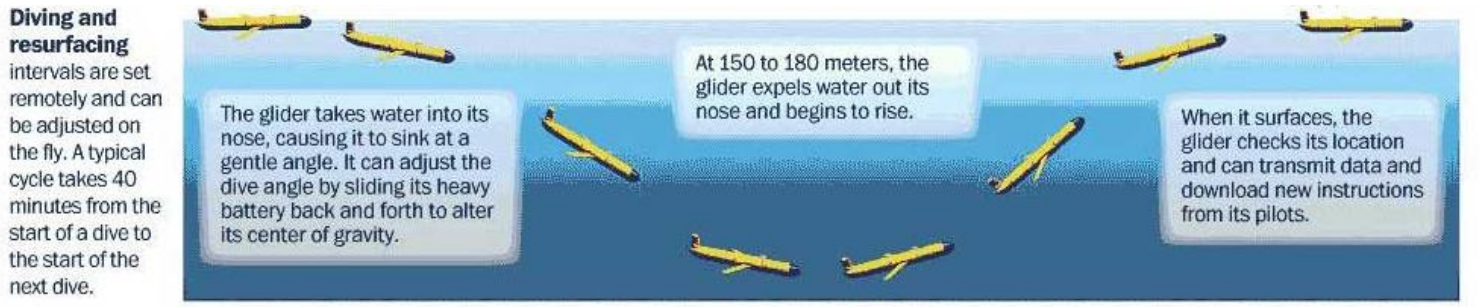
SeaGlide – Small-Scale Underwater Glider

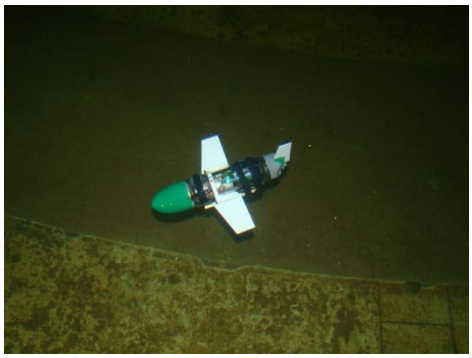
Introduction

An underwater glider is a non-tethered, autonomous robot that has no propeller and uses very little energy. It moves by changing its buoyancy, often by taking in or expelling water. This change in buoyancy causes the glider to rise and sink in the water. As the glider travels up and down, its wings generate lift, which propels the glider forward.



Underwater gliders can run for months at a time and cover great distances on very little power. Gliders carry sensors that can help scientists better understand and model the ocean. In 2009, Rutgers University's Scarlet Knight (RU 27) became the first AUV to cross the Atlantic Ocean. It made 11,000 dives and 11,000 ascents to the surface during its 221 day voyage that covered approximately 7,400 km.

Carderock's small-scale underwater glider, SeaGlide, operates on the same basic principles as the Scarlet Knight. It has a buoyancy engine, pitch control, wings, and a rudder as well as sensors. With lift provided by its wings, it glides forward both as it dives and as it rises. A pressure sensor collects data to determine depth and position over time. This information can be correlated with data from a temperature sensor.



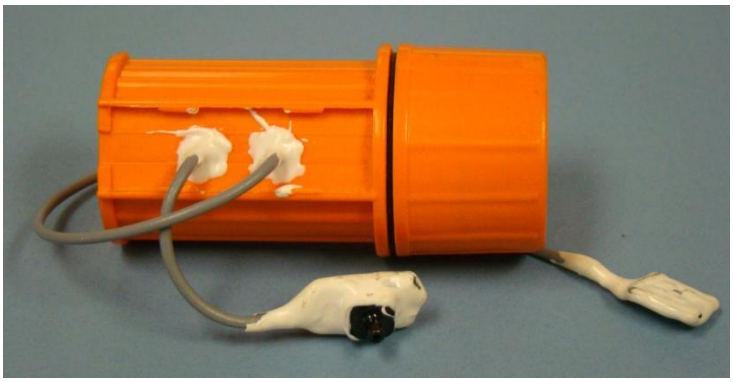
SeaGlide in a Dive

Arduino Pro Mini

SeaGlide kit builders first learn about basic electronics and then progress to circuit board soldering and programming with Arduino Pro Mini microcontrollers. They build servo driven buoyancy engines, each with a large 100cc syringe and a moveable mass, to manage buoyancy and pitch. A critical final step is to ballast gliders for proper underwater flight.

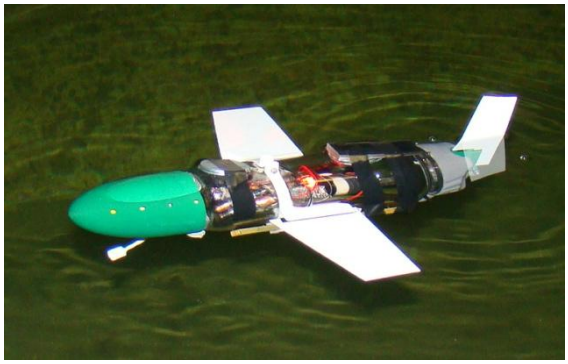
SeaGlide Sensor Pod

New developments in the SeaGlide project include a sensor pod, which measures temperature and pressure. Most electronics are housed in a waterproof case with waterproofed sensors exposed to the outside aquatic environment.

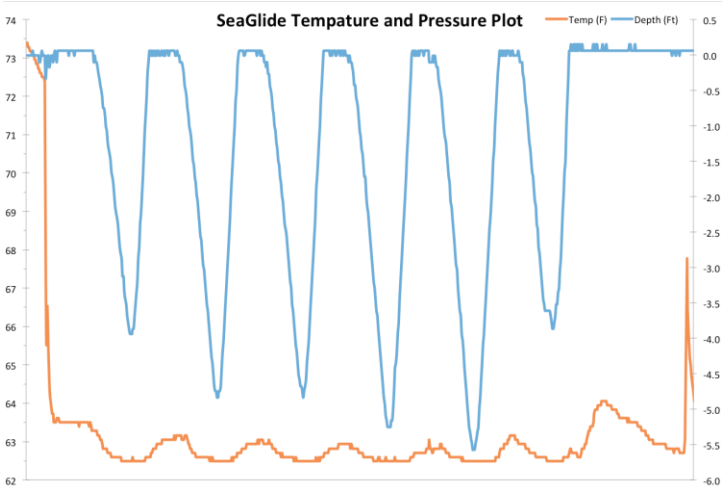


SeaGlide Sensor Pod for Temperature and Pressure

The sensor pod is housed within a plastic nosecone on the bow of the glider. The pressure sensor is outside the pod, but inside the free flooding nosecone. The nosecone shields the pressure sensor from dynamic pressure caused by the motion of the glider. The temperature sensor protrudes from the nosecone in order to measure temperature outside the boundary layer. This allows for more accurate measurement of the surrounding water



SeaGlide with Nosecone and Sensors



Depth &Temp over Time from 0-6ft. Depth (6 Yo Cycles)

Data is recorded on a microSD card inside the sensor pod. After a sampling run, the microSD card is retrieved and data is transferred to a computer for analysis.