Drone Whale Tagging Cradle and Tide Gate Sensors

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CATS Tag Drone Cradle

CATS Tags are generally deployed with a long carbon fiber rod. The researchers must first drive a small boat up to the whales and then manually tag them. The proximity of the boat when tagging can startle the whale and can be dangerous to researchers on the boat doing the tagging. Not to mention the fact that a whale may dive before they can get close enough to tag it. Dropping a tag with a drone fixes most of these issues. While a larger drone may disturb whales, it's nothing when compared to a whole boat.

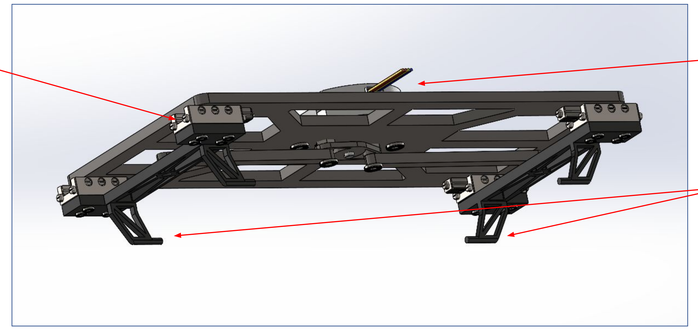
A DJI Matrice successfully tagging a whale. PC: Ocean Alliance.

Tide Gate Sensors

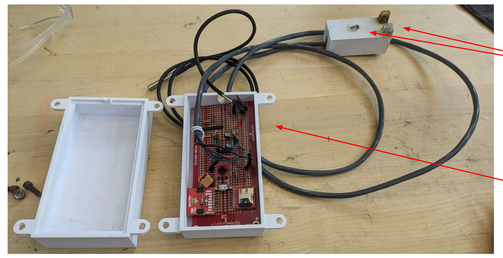
A tide gate. PC: Lower Nehalem Watershed Council.

This sensor package was a project that a previous intern, Anabel Baker, began last summer. Its purpose was to collect data from both sides of a tide gate to allow for data collection on how an open tide gate influenced water on the landlocked side. To accomplish this, we employed a temperature sensor, conductivity sensor, and laser height sensor. This allows us to calculate things such as salinity, point in the tidal cycle, temperature, and more for a given time.

Design:



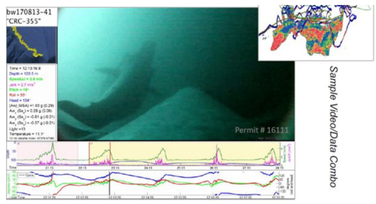
Our design differs from others in that it interfaces with the bolts already on the CATS tags. This not only leads to better stability through 4 attachment points to the tag, but also does not require modifying the tag itself before deployment. A modified tag has worse hydrodynamics when compared to a stock tag. The system works with pins that interface into the tag. These pins are mounted on rails and are pushed apart with a stepper motor. While another common design with a single pin is what we will likely end up producing, testing of this design may go forward.



The design was updated by giving it a new weather-proof housing, putting the board together on a solderable breadboard, and optimizing the conductivity sensor. For the conductivity sensor, we added an H bridge to switch polarities on the contacts. This allowed for more even corrosion and dissipation of bubbles that formed on the surface of the contacts which increased resistance, throwing the readings off. The contacts were also changed from aluminum to stainless steel, slowing the rate at which they corroded.

Future:

If this design does go forward, our main focus will be on reducing the weight of the whole cradle as well as adding holding torque to the stepper motor. A lighter cradle will allow for better maneuverability and longer flight time. More holding torque will allow for a more secure grip on the tags. Holding torque can be increased by mechanical means such as gearing, electrical by providing higher voltage to the stepper, since it will only be operating for less than a second per tag, and swapping out to a larger stepper.



CATS Tag Data and Video. PC: Customized Animal Tracking Solutions.

Going forward, we will try to optimize the sensor package's power consumption, as well as taking more accurate readings. This will be accomplished through calibration, possibly switch out some components, and adding a sleep function to the code. Redesigning housings will also allow for better waterproofing, which has been an issue that results in corrosion