Online Proceedings

Poster Session 3

Balcony, Easel 100

2:30 PM to 4:00 PM

NDVI Imaging of Submerged Aquatic Vegetation

Carter Kraus, Junior, Aeronautics & Astronautics
Orion Mackenzie (Orion) Black Brown, Junior, Mechanical Engineering
Mentor: Rick Rupan, Oceanography
Mentor: Fritz Stahr

Chlorophyll concentration is an indicator of plant health, but is challenging to quantify. As a result, normalized difference vegetation index (NDVI) imaging was developed to help solve this problem by making use of of chlorophyll's varying reflectance of light waves. This is a proven and powerful tool for observing terrestrial vegetation, allowing for efficient monitoring of living plant populations worldwide. However, no research had been published regarding the use of NDVI for submerged aquatic vegetation, thus our team sought to apply the technique to an aquatic environment, specifically seagrass beds in Queensland, Australia. Seagrass provides both nutrition and habitat for marine life, as well as carbon dioxide storage. The ability to monitor seagrass ecosystems is essential to understand and, in turn, preserve them. We saw NDVI imaging as a potential improvement to current seagrass monitoring methods and conducted experiments to find what issues this technique has in the underwater environment. After testing many aspects of NDVI imaging on in-situ seagrass beds and other test environments, we ultimately found it was not a viable option. This is largely due to basic optical transmission characteristics of water.

Poster Session 4

Commons East, Easel 78

4:00 PM to 6:00 PM

The Accuracy of Dead Reckoning Method Used in Ecomapper Tracking

Jingyang Wu, Sophomore, Aeronautics & Astronautics
Mentor: Fritz Stahr
Mentor: Rick Rupan, Oceanography

Dead reckoning is the process of calculating one's current position by using a previously determined position, or fix, and advancing that position based upon known or estimated speeds over elapsed time. It is typically used when external systems, such as GPS satellites or acoustic tracking, are unavailable to track a vehicle relative to earth-fixed coordinates. When used on an autonomous underwater vehicle (AUV) it cannot account for the influence of tidal currents changing the vehicle's displacement without influencing internal speed and heading data. My research experiments with an Ecomapper AUV in Australia in September 2016 illustrate the influence of such tidal currents on dead-reckoning AUV tracks. The experiment was completed at the Morton Bay Research Center of Queensland University and the research data were collected by Ecomapper AUV from designed runs. As a result, the comparison of actual AUV track with the predicted one that was calculated by Matlab with the application of Dead reckoning method showed how much the tidal current influenced the predicted track, and how to reduce this difference by setting the AUV's heading with the tidal current in particular angles. The results are useful for planning new AUV missions in similar tidal currents for reducing position errors generated by this technique.