Development of a Testing Platform for an Underwater Surveying Robot to Assess Coral Reef Health

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Global climate change has severely affected the underwater ecosystem, in particular coral reefs. The risk of coral reef bleaching is increasing by a rate of 3.9% per year and severe bleaching increasing at a rate of 4.7% per year. In order to promote their health and reduce these rates, more surveys and monitoring are needed. The first and main method of coral reef surveying is Manta Tow Boarding, and the second is engine-running underwater robots. These methods can be slow, costly, energy-dependent, time-consuming, and in some cases, dangerous and polluting. Therefore, an alternative used in this project was a tethered underwater robot capable of conducting quick underwater surveys. In order to create this, a measuring instrument was developed to record and collect parameters, such as force, speed, and instrument angle, acting on tethered paravanes of different shapes. These parameters were then used to calculate necessary data for the understanding of the dynamics of the robot. Additionally, state-of-the-art hydrodynamics of flat plates and software were used to process the data collected by the instrument after experimentation, and simulations were created showing consistent data. This research has obtained an understanding of the dynamics of the paravanes and presents the paravane shape that tolerates the highest speed and the shape that can go deepest. These findings will be used to create a robot that marine biologists can use to efficiently monitor coral reefs.

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