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*The Boldrewood Towing Tank at the University of Southampton was designed in-house and built following high standards to be at the forefront of physical testing for many years to come. It features a combination of conventional proven systems as well as the latest technology, which includes both above and underwater Qualisys systems that can also be combined for hybrid measurements.*

## Boldrewood Towing Tank

Qualisys motion capture technology is versatile and has allowed the university to develop new experimental methods used for education, research and commercial projects. The flexibility offered by the setup and various camera arrangements enables model dynamics to be measured in air, in water and across the water surface.

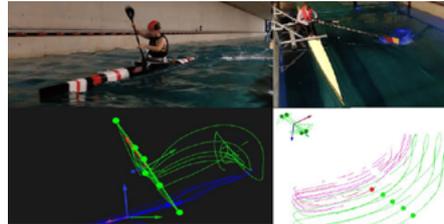
### SYSTEM SETUP



- 6 Qualisys UW Cameras
- 4 Qualisys 5+ Cameras
- 4 Qualisys 5+ Wide-Angle

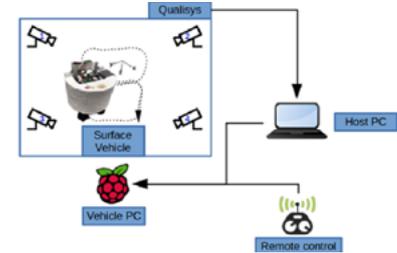
The above water system consists of 4 wide-angle cameras and 4 narrow angle cameras. This offers an infinity of combinations, but experience shows that three different arrangements cover most of the work

undertaken in the Boldrewood towing tank. The system calculates real-time six degrees of freedom data from rigid bodies that can be accessed by using Qualisys' SDK.



### SPORTS ENGINEERING

The application of these techniques has enabled Sports Engineering research into aquatic sports. One project consisted of measuring the behavior of a free running kayak. Both the hull and the paddle handle were acquired as rigid bodies and, thus, their respective motions measured. Another project assessed hydrodynamic performance of a rowing oar. Both systems have also been used to capture the kinematics of a freestyle swimmer's body and arms, both above and below the water.



### AUTONOMOUS SURFACE VEHICLE

The ASV "SMARTY" is a 3DOF surface vehicle equipped with an onboard computer, WiFi and Bluetooth connections, and gyroscope and accelerometer sensors and a camera. The ASV can be operated either by a remote controller, or in autonomous mode using the information obtained from the motion capture system, via a host computer. There are many possibilities for future work, such as dynamic positioning tests in various configurations of wind and waves and self-propelled maneuvering experiments.

