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Developing an Autonomous Hovercraft for Benthic Surveying in Very Shallow Waters

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Benthic surveys in very shallow water (< 1 meter) are often carried out by remote sensing methods such as LiDAR, satellite imagery, and aerial photography, or by written observations paired with GPS point measurements and underwater video. Remote sensing can be helpful for large scale mapping endeavors, but the optical methods commonly used are limited in their effectiveness by cloud cover and water clarity. In situ surveys are often carried out manually and can therefore be quite inefficient. A proposed alternative method of small scale, high resolution mapping is an autonomous, amphibious hovercraft, fitted with high frequency single-beam and side-scan sonar instruments. A hovercraft can move seamlessly from land to water which allows for convenient and simple deployment. The sonar instruments are attached to a boat-shaped outrigger hull that can be raised and lowered automatically, enabling data collection in water as shallow as 10 cm. These data are used to extract seafloor characteristics in order to create detailed maps of the research area that include information such as sediment type, presence and extent of flora and fauna, and small-scale bathymetry.