THORNTON LAB.

Ocean Perception

Department of Mechanical and Biofunctional Systems
Center for Integrated Underwater Observation Technology

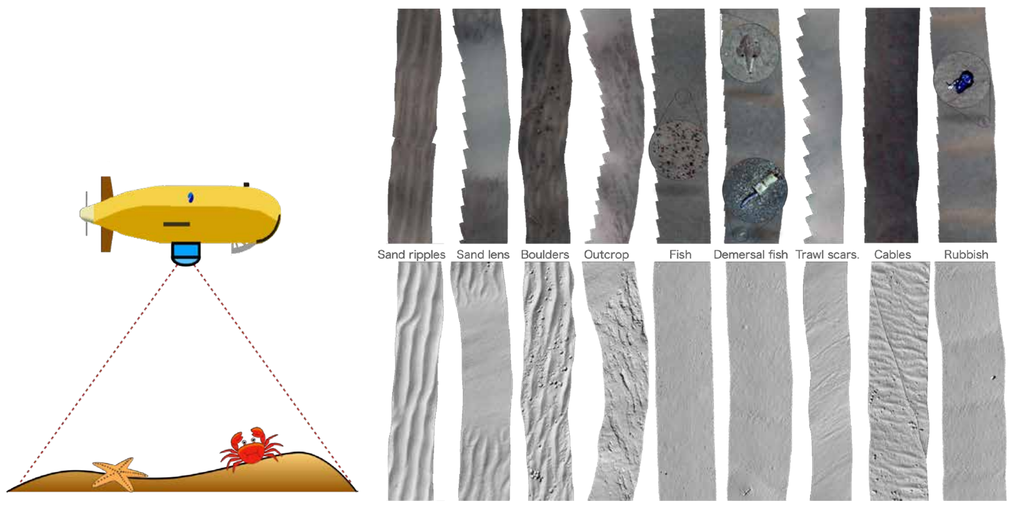
Underwater Photonics

http://ocean.iis.u-tokyo.ac.jp

Robotic Sensing and Autonomy for Scalable Seafloor Monitoring

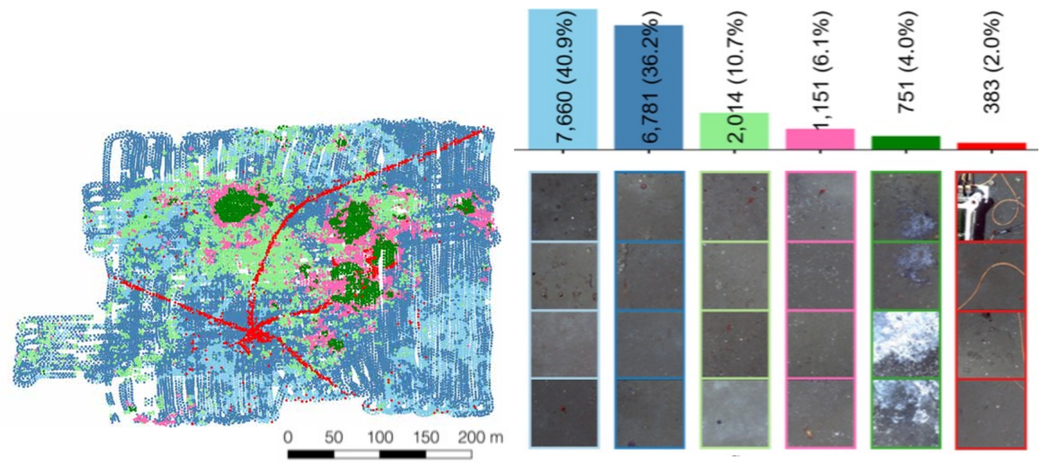
The ocean produces half the oxygen we breath and an increasing proportion of the food we consume. It is also home to the subsea cables that make the internet work and transmit renewable energy needed to meet global decarbonization targets. Monitoring the ocean and infrastructure we put in it is challenging because water limits the range of both our platforms and the signals they use to sense and communicate. Our laboratory develops the sensing and intelligence needed for robotic submersibles to interpret and efficiently summarize their observations so that they can operate independently for longer and monitor larger areas without relying on the physical human presence to support their operation.

High-resolution seafloor mapping



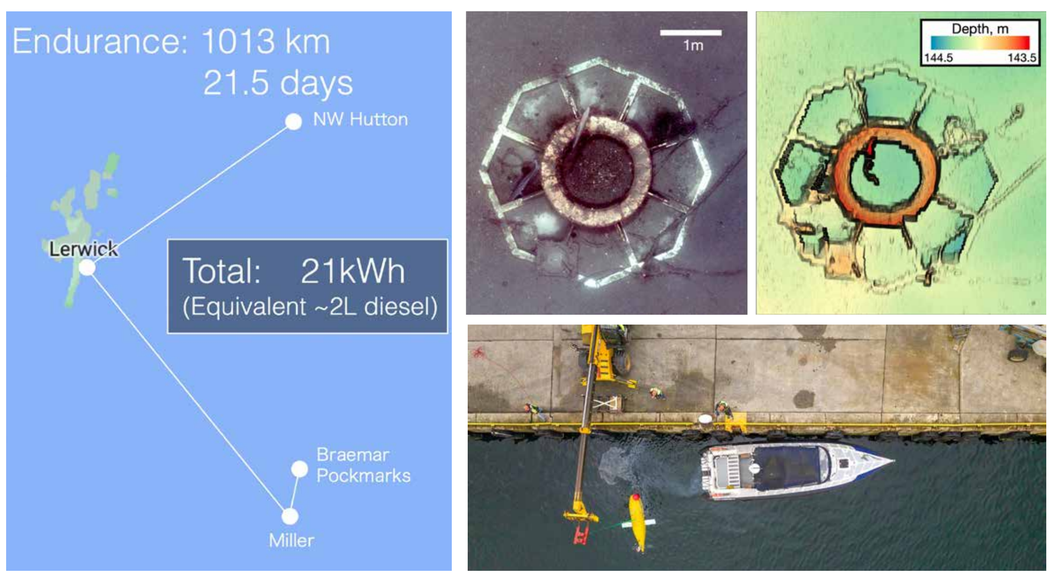
Mobile sensing to gather mm-resolution images and shape information for km-extent whole site survey

Automated scene understanding



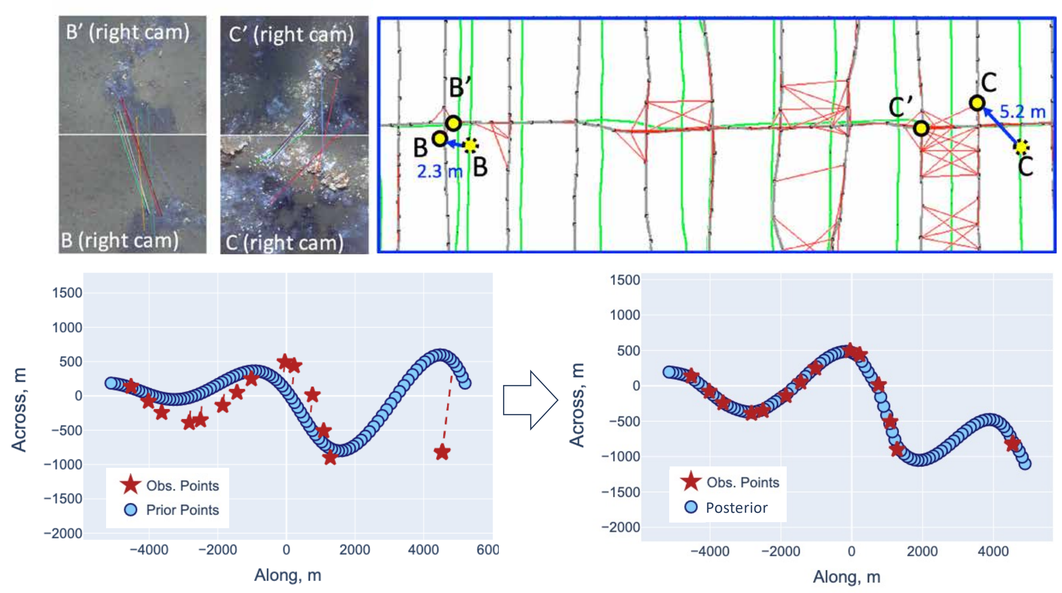
Self-supervised deep-feature learning for efficient scene understanding and summary

Over-horizon remote awareness



Remote awareness and mission management over satellite bandwidths for ship-free robotic operation

Intelligent navigation and planning



Advanced localization and path planning based on environment priors and sensor observations