

**In Situ Stereo Imaging + Image Processing = Habitat**

**Overview:** HabCam V5 is the fifth generation HabCam vehicle designed to be towed at a speed of 3 to 6 kts while taking high resolution color stereo image pairs of the sea floor, thus a track approximately 100-120 nautical miles is imaged each 24 hours of operations. Optical imagery is collected at a width of approximately 0.75 to 1.25 meters (total ~170,000 - 260,000 square meters/ day) and at a rate of 5-6 images per second providing about 50% overlap to aid in mosaicing continuous strips. Side by side stereo pair images are fused into a single image at the time of acquisition allowing precise stereo referencing with metadata such as latitude, longitude, temperature, salinity, chlorophyll, light absorption, dissolved oxygen, and other environmental data. In addition, a synthetic aperture 480 kHz side scan acoustic system collects 3D bathymetry and backscatter to a range of ~100m on either side of the vehicle. Information gained at the meter scale from the optics can be projected to the full extent of the acoustics.

**Power and Communications:**  
240 VAC is provided down a electro fiber optic cable to provide Gigabit Ethernet connectivity to the electronics package.

**Data Storage and Image Processing:**  
Stereo pair images are taken at 6 Hz, sent up the cable to the ship where a computer immediately processes each image in a software workflow for light field optimization, color correction, rectification, and point cloud production for 3D viewing of the seafloor.

**Advanced Processing Option:**  
Point clouds may be draped over side scan bathymetry to provide a 3D surface viewable in appropriate visualization software. Using Deep Learning, Substrate classification and labelling of a variety of target types from scallops to man made objects may be completed in real-time as the vehicle is towed allowing habitat maps and target locations to be created in real-time.

**Applications:**  
Habitat characterization, surveying commercially important species (scallop, clam, lobster, etc.), pipe and cable inspection, seafloor surveys for wind farm emplacement, environmental impact studies, harbor sureys.

**Specifications:**

Sensors	
Stereo camera package	28 Mpixel machine vision cameras
lenses	12mm FOV 1m @ 3m altitude
CTD	Sea Bird 37 or equivalent
Plankton	CPICS imaging system
sonar	Teledyne benthos C3D side scan sonar

Data Storage	
Removable solid state drive:	2 TB
Transmission of all data to surface	30 TB

Data communication	
Fiber optics	Gigabit Ethernet over copper

Power	
Voltage:	240 VAC

Dimensions	
Length x height	4 x 2'
Air weight	90 lbs

Towing hardware	
electro-fiber-optic-cable, 0.68" or 0.5" triple armor	
winch, 20,000 pull, render at 18,000 lbs, electro-hydrolyic	

