2006 Abstract Form – Internal-Only Projects (no external funding). Deadline for abstract submission is 8:00 a.m. on July 18th.

ABSTRACT FORM

Project Title:	002 AUV Imaging
Project Manager/PI:	Kim Reisenbichler (Bruce Robison, Steve Haddock, Ken Smith, Jim Barry (co-PI's))
Lead Scientist:	Kim Reisenbichler
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Project Description:

The AUV's potential capabilities as an unattended surveying platform provide a unique advantage for both midwater and benthic research projects. Automating the survey and transecting tasks that presently use ROVs will expand the scope of these measurements while increasing their resolution. Edie Widder's work with the Eye-in-the-Sea has readily proven how advantageous an imaging solution can be for benthic science, and how unexpectedly rewarding the results of reviewing the imagery may be.

Most importantly for scientists, the ability to gather underwater images can be applied to a variety of difficult oceanographic problems. This type of platform/sensor combination will also allow expansion of MBARI's existing video-transect time-series and free the ROVs for other work. In addition to the existing transect work, this system is very useful for the low-speed AUV control augmentation project.

Recent developments in highly sensitive mega-pixel imaging sensors, high-intensity LEDs and video storage, and the capability to reduce the size of existing imaging systems will allow us to capture high-quality images for ecological studies of community composition and structure, as well as dynamic aspects related to behavior patterns.

We would like to adapt some of these new imaging systems for use on the AUV. Realizing that maximizing the viewing range of this type of system is paramount to its ultimate success, we propose a combined traditional forward looking (for midwater) and down-looking (for benthic) video imaging system with several different wavelength lights (i.e. white, red, & infrared), to see what is in the path of the vehicle, and a side looking 360° green-laser scanning system, that will scan an image of the tube of water that the vehicle is moving through, to maximize the scanning distance and see what may have avoided the vehicle or is lurking in the shadows. This combination of sensors will provide a unique view of both midwater and benthic biology. We plan on developing a system that can be directly connected to an embedded computer to allow streaming the video to a storage device or existing network, like MARS, for real-time viewing. Such an imaging system may be mounted on other autonomous, moored or cabled platforms with little modification.

Examples of measurements which could be achieved are carbon flux rates (imaging marine snow), dynamics of physical changes in the canyon, sediment plumes, surveys of midwater and benthic organisms (including difficult-to-access canyon walls), and even small scale patchiness of fluorescence using laser excitation.

Imaging is a core instrument technology with numerous important applications. Developing this instrumentation at MBARI could lead to many unique scientific and engineering applications.