

2005 Abstract Form – Internal-Only Projects (no external funding). Deadline for abstract submission is 8:00 a.m. on July 27th.

ABSTRACT FORM

*NOTE: Continuing projects should enter the same internal project number **AND** use the project title from the previous year.*

Project Number:	900250
Project Title:	A Quantitative Low-Light Imaging Module for MBARI's AUV
Project Manager/PI:	Kim Reisenbichler (B. Robison & S. Haddock Co-PIs)
Lead Scientist:	Kim Reisenbichler
Lead Engineer:	Lance McBride

Project Description:

World-class Problems

- 1st problem: Achieve effective quantification of the diversity of marine species, demonstrated by scientific publication.
- 2nd problem: Determine if marine species are actively avoiding the observation system.

By developing a transecting capability on AUVs used on autonomous observatory infrastructures, we have the potential to do unattended quantitative assessments of marine species diversity. This capability will allow MBARI's scientists to continue leading the research of gelatinous plankton, which cannot be surveyed by nets or acoustics. These zooplankton have tremendous impacts on marine communities and we need the tools to study them. The successful completion of this project will ultimately allow much of the ROV time currently dedicated to midwater transecting to be used for other purposes and will lessen the need for quiet ROV systems.

Following a successful feasibility project, as well as a continuing investigative effort (using resources from the principal investigators to demonstrate the proposed solutions), we have incorporated the positive feedback from last year's proposal process to generate a modified approach to these world-class problems. Furthermore, given the interest generated by discussions with parties from outside the institute, we believe that external researchers will adopt the solutions we propose, once the advantages of the technology have been demonstrated.

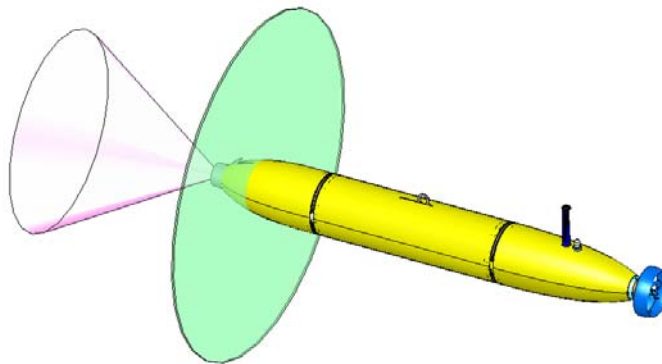
The primary problem we address is one of balance. This project attempts to balance a set of requirements from several unique perspectives of how the system will be used. Some would say that there are two basic parameters that characterize an underwater vision system: limiting distance, and resolution. Therefore any design involving underwater vision systems must balance the two parameters with available technology. Further, there is a need to balance vehicle operational requirements (the necessity for rugged equipment) with the availability of ruggedized technology. Many cutting edge systems aren't ready to simply be bottled and dropped in the ocean.

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This project also attempts to balance new technology with old technology, to allow us to record a unique view of our oceans. None of the individual technologies applied are fundamentally new, or groundbreaking. The basic principles behind the technologies have been known for decades. However, the combination of these individual technologies and the platform, “the system”, comprises a paradigm shift in how the technology will be used.

Our revised approach removes the retracting mechanical arms of the earlier concept and replaces the structured lighting approach with range-gated, or pulsed, illumination to eliminate preliminary scattering. Also, instead of bracing the SPLAT screen (required for bioluminescent work) with the retracting mechanical arms, it will be formed by a cylindrical, wire mesh tube that conforms to the front of the AUV body. In addition to the forward-looking, range-gated, high-resolution video system, we propose a 360° side-looking, laser-line scanner to detect remote animals that are avoiding the system. The proposed module will also contain Steve Haddock’s AUV mounted bioluminescent identification module (which complements the video data), as well as traditional CTD instruments to support on-going time-series datasets. The module could alternately house an optical plankton counter, being proposed by Francisco Chavez. We maintain the digital nature of the capture, compression, archival and analysis of the video imagery, realizing that either the products of Duane Edgington’s AVED project or a human expert could perform the analysis.

In addition to the primary benefits such a system will bring to the scientists at MBARI and other institutes, the byproducts of the system indirectly increase public interest in ocean exploration and management through publication of images and public education through publication of scientific findings.



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Abstract Phase: LABOR Resource Request Form

Project Title: 900250
Project Manager: A Quantitative Low-Light Imaging Module for MBARI's AUV
Lead Scientist: Kim Reisenbichler (B. Robison & S. Haddock Co-PIs)
Lead Engineer: Kim Reisenbichler
 Lance McBride

Please place an "X" to the left of the resources you expect to need for this project, as well as next to "<10" (less than) or ">10" (more than) to indicate estimated need.

Research: IAG					
	Research: SAD/Software Engineer		< 10 days		> 10 days
Development					
x	Development: Electrical Engineer		< 10 days	x	> 10 days
x	Development: Software Engineer		< 10 days	x	> 10 days
x	Development: Mechanical Engineer		< 10 days	x	> 10 days
	Development: Support Engineering		< 10 days		> 10 days
x	Development: Machinist		< 10 days	x	> 10 days
ITD					
x	ITD: Video Lab/Samples Tech		< 10 days	x	> 10 days
x	ITD: Technical Writer	x	< 10 days		> 10 days
DMO					
	DMO: Ocean Observatory Tech		< 10 days		> 10 days
	DMO: CTD Instrumentation Tech		< 10 days		> 10 days
	DMO: Diver		< 10 days		> 10 days
COO					
	COO: IS Administrator		< 10 days		> 10 days