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Form Approved
OMB No. 0704-0188

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1. REPORT DATE 30 SEP 2003		2. REPORT TYPE		3. DATES COVERED 00-00-2003 to 00-00-2003	
4. TITLE AND SUBTITLE Extended Range Optical Imaging System for Autonomous Underwater Vehicles				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Marine Physical Lab, Scripps Institution of Oceanography, La Jolla, CA, 92093				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT This project is a 6.2 program whose goal is to develop a Laser Line Scan System for AUV use. The long term goal of our program is to advance the ???state-of-the-art??? in underwater optical imaging systems via the use of new and innovative technology					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 3	19a. NAME OF RESPONSIBLE PERSON
a REPORT unclassified	b ABSTRACT unclassified	c THIS PAGE unclassified			

Extended Range Optical Imaging System for Autonomous Underwater Vehicles

Jules S. Jaffe

Marine Physical Lab, Scripps Institution of Oceanography, La Jolla, CA 92093-0238

phone: (858) 534-6101 fax: (858) 534-7641 email: jules@mpl.ucsd.edu

Award Number: N00014-02-1-0320

<http://jaffeweb.ucsd.edu>

LONG-TERM GOALS

This project is a 6.2 program whose goal is to develop a Laser Line Scan System for AUV use. The long term goal of our program is to advance the “state-of-the-art” in underwater optical imaging systems via the use of new and innovative technology.

OBJECTIVES

The technical objectives for this project are, as stated, the development of an AUV based imaging system which uses Laser Line Scan technology. The goal of this grant was to fabricate a lab prototype which illustrated our design.

APPROACH

Both computer simulations and the fabrication of a lab-based prototype were planned in the first stages of this program.

WORK COMPLETED

The first stage in this project was to complete a thorough survey of contemporary LLSS (Laser Line Scan System) technology. This was completed in an early phase of this project. The next goal was to complete a survey of available technology which might be used in order to fabricate this “next generation” system. This was also achieved. Finally, a new design was formulated for a low cost, easily fabricated and deployed system (not shown here).

RESULTS

A new system was designed which uses conventional off the shelf technology in order to achieve what is predicted to be “extended range” imaging performance. The design was evaluated by using several modeling programs. In the case of the geometrical optics of the system an optical imaging program was used. In the case of imaging in turbid water, a set of computer simulation programs were used to verify the system’s performance. Results indicate that the system will be capable of performance simmilar to the Laser Line Scan Systems that are currently available from Raytheon or Northrup Gruman at a fraction of the price.

IMPACT/APPLICATIONS

We are currently negotiating with various companies and divisions of the NAVY who are interested in using either our ideas, or having us build them a system.

RELATED PROJECTS

We have been in contact with Linda Mullen who is working on a modulated laser concept which could be incorporated into any future system that we develop. This work is sponsored by ONR. Our previous work was also used as part of the SAX 99 program which was aimed at understanding the interactions of sound with the sea floor.

PUBLICATIONS

Moore, K. D. Digital frame averaging and dark mapping for a video-based underwater imaging spectrometer system. *Applied Optics*. 42 (24):4793-4801, 2003 Aug 20.

PATENTS

A New Underwater Optical Imaging System, J. S. Jaffe, K. D. Moore: (UCSD Docket No.: SD2004-005, application submitted)

HONORS/AWARDS/PRIZES

Jaffe presented a plenary lecture at the International Ocean Optics Meeting in Santa Fe (Nov., 2002).
Jaffe was elected to be a Fellow of the Acoustical Society of America (Dec., 2002).
Jaffe was invited to be a Guest Scholar at the Woods Hole Oceanographic Institution (summer of 2003).