LIVING MARINE RESOURCES PROJECT 7

Technology Demonstration for Navy Passive Acoustic Monitoring

THE NEED

The Navy is responsible for compliance with a suite of Federal environmental laws and regulations that apply to marine mammals and other marine protected species, including the Endangered Species Act (ESA) and the Marine Mammal Protection Act (MMPA). As part of the regulatory compliance process associated with these Acts, the Navy is responsible for implementing a marine species monitoring program to assess potential impacts from Fleet and Systems Command (SYSCOM) military readiness activities involving active sonar and underwater detonations from explosives and explosive munitions. Passive Acoustic Monitoring (PAM) is a proven means of detecting and classifying vocally active marine mammals.

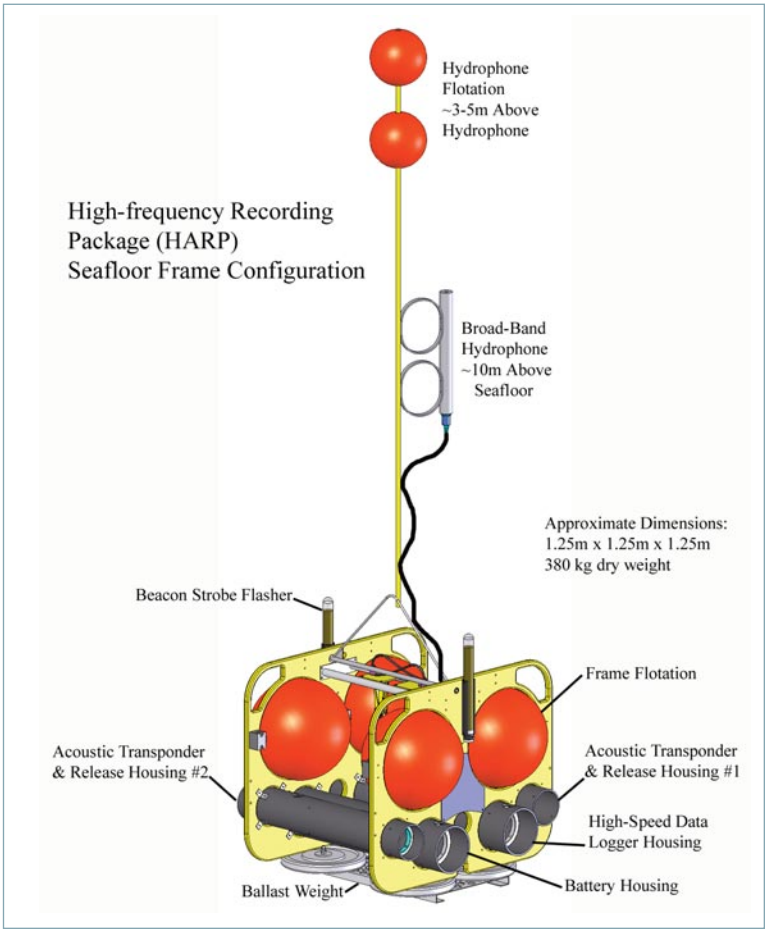
The challenge is designing a PAM system that will collect data at ample bandwidth (> 100 kHz) to detect all marine mammal sounds and with adequate data storage so that sensors may be deployed continuously with infrequent servicing.

THE SOLUTION

The High-frequency Acoustic Recording Package (HARP), currently used on several Navy ranges, is a state-of-the-art recording system that features high bandwidth (up to 160 kHz) and large data storage (5 terabytes) combined with low power requirements. However, evolving mass storage capabilities have rendered the current HARP storage media obsolete. It is the purpose of this project to modify the HARP for new storage media and thereby increase the storage capacity of the Navy's HARP systems.

THE METHODOLOGY

Current HARP data storage is based on IDE (Integrated Drive Electronics), a standard electronic interface for disk storage devices. The American National Standards Institute name for IDE is Advanced Technology Attachment or ATA. More recently the Serial ATA (SATA) interface has become the industry standard. Se-



John Hildebrand, Sean Wiggins and colleagues at the Scripps Institution of Oceanography have developed the HARP for required Navy range acoustic monitoring. Under LMR program support, a new longer-lived, higher storage capacity HARP will be developed and demonstrated. New designs must stand up to challenging deep-sea conditions and not generate system noise that can interfere with recordings of animal sounds.

rial ATA offers several advantages over the parallel ATA interface: reduced cable size and cost, faster and more efficient data transfer. The current HARP system has a maximum storage capacity of 5 terabytes (TB) or 10 TB compressed storage. Once the SATA interface is installed, storage capacity will be increased to 32 TB (64 TB compressed).

THE SCHEDULE

The HARP electronic disk interface will be designed first. Subsequently, it will be installed on a HARP system and tested, first at-sea, and then on a Navy range. After a deployment of several months, data from the new system will be analyzed. Assuming acceptable performance, the SATA drives will be installed on all 13 existing Navy HARP systems, expected to be completed in the spring of 2016.

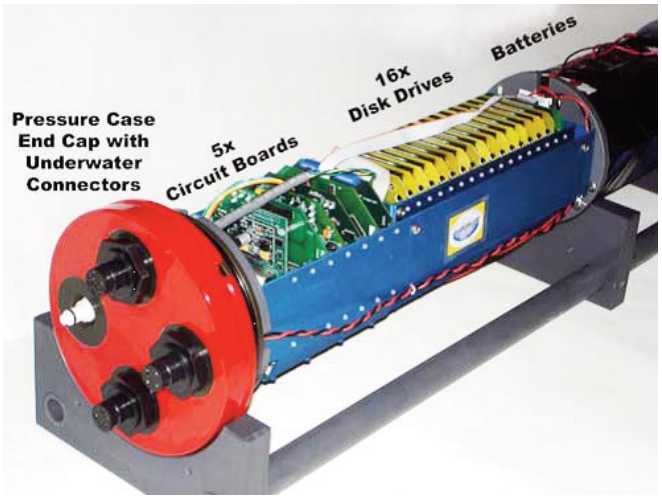
NAVY BENEFITS

Upgrade of currently deployed HARPs for SATA disk storage capacity will yield reduced costs per deployment and potentially fewer service trips for sites that are difficult or expensive to access. The currently used IDE disks are no longer available so upgrade to SATA disks is necessary to keep in service the HARPs currently being used for Navy's marine species monitoring program.

TRANSITION

The project team will notify the HARP user community as soon as the SATA technology has passed testing and verification, so that they can implement the new data storage technology in all existing instruments. The modular nature of the HARP electronics should allow upgrading by replacement of a select set of electronics boards, rather than the need to replace the entire system.

First users include Navy marine species monitoring program participants where these monitoring projects are executed.



HARP data logger with underwater connectors.

For more information about this project, visit www.cetus.ucsd.edu.

ABOUT THE PRINCIPAL INVESTIGATOR

John Hildebrand has served as Professor of Oceanography at the Scripps Institution of Oceanography since 1995. He holds a Ph.D. in Applied Physics from Stanford University and a bachelor's degree in Physics and Electrical Engineering from the University of California, San Diego.

About the LMR Program

The Living Marine Resources (LMR) program seeks to develop, demonstrate, and assess data and technology solutions to protect living marine resources by minimizing the environmental risks of Navy at-sea training and testing activities while preserving core Navy readiness capabilities. For more information, contact the LMR program manager at exwc_lmr_program@navy.mil or visit www.lmr.navy.mil.