

ABSTRACT FORM

(Please note: The complete abstract should be limited to three pages, if possible.)

Project Title: 902106 Niobicon-Based AUV Docking Development

Expected Project Duration (in years): 3

PI	Project Manager	Lead Scientist	Lead Engineer
Hamilton/Hobson	Hamilton/Hobson		Hamilton

(Indicate individuals appropriate for your project. Not all projects need all four positions filled in.)

Project Description:

This project is a technology development effort to enable power and data transfer over a “wire-dock” for an AUV by utilizing the Niobium based self-insulating material demonstrated and patented by Northrop Grumman (Niobicon). A wire-dock arrangement is a divergence from past “cone-dock” efforts and involves the AUV latching onto a vertically oriented mooring wire instead of being guided into a tube by a cone. The advantage is that a seafloor installation is not required. By utilizing the self-insulating Niobicon material developed by Northrop Grumman, we hope to develop a power and data transfer mechanism that works in spite of the fact that the vehicle remains relatively free to slide up and down the mooring wire. The LRAUV team has demonstrated the process of homing and latching onto a vertical wire. This alone has applications for the Park-And-Fly type applications as well as Wave Glider tow out. Adding a power and data transfer capability will provide a complete solution to the docking problem.

In addition to the project description above, please provide one (1) paragraph addressing each of the following topics:

Fundamental Problem

What’s the grand challenge this work addresses? Why should we care? What makes this work relevant to MBARI?

Although the LRAUV has significantly advanced the ability for our AUVs to operate unattended for up to a few weeks, truly remote and extended operations will require battery re-charging (as well as increases in capability and reliability). This work directly addresses this energy need and would be applicable to a variety of energy sources such as deployed battery packs, solar-powered buoys, Wave Gliders, and wave-energy conversion devices. For the last, AUV re-charging is the most likely application of the energy levels generated by the MBARI wave-energy conversion device, so this work is important to realize the promise of that project.

Technology

What engineering & technology is needed to move forward (e.g., sensor, platform, ship, de novo R&D)?

The development and testing of a power-transfer latch that utilizes the Niobicon material to allow power transfer between a mooring wire and an AUV without rigidly constraining the AUV is needed to advance this technology. The LRAUV platform is ideal for performing this development and this project will draw engineering staff from both the LRAUV team and the wave-energy team. The intention is that this project will concentrate specifically on the docking developments and subsequent use of the docking capability will remain in the LRAUV program. Nonetheless, access to the LRAUV platform and development staff is required.

Data

What data will be generated? How will they be managed? Visualization and IP considerations?

No significant data that requires management will be created.

Intellectual Property (IP) Considerations

Do you anticipate a need for a cooperative research and development agreement or licensing arrangement with an external entity? Will the work potentially result in a patentable product or service? Will novel IP be created, and how might it be disseminated (e.g., license agreement and/or collaborations)?

For additional guidance please review MBARI's intellectual property internal web page:
<https://mwww.mbari.org/itd/ip/>.

Yes, this effort depends upon the Niobicon material that Northrop Grumman has patented. We are currently trying to finalize an agreement with them to allow this collaboration to proceed in a manner that protects our existing IP rights, and provides a framework for sharing IP developed by this effort with Northrop Grumman. This is appropriate because we do not anticipate this approach is viable without the Niobicon material and we hope to benefit from Northrop Grumman's interests in licensing their technology to make any results from this project available to the wider AUV industry.

Anticipated Impact

Who are the consumers of the instruments, methods, technology, and data that will be generated within and beyond MBARI? Will the project create tangible connections with other organizations (e.g., academic, NGO, MBA, MBNMS, state or federal agency)?

Initially the results of this project would be used internally by the LRAUV project and applications outside of MBARI will depend upon licensing agreements. Tangible connections with other organizations could result, including collaborations with AUV users from other

*2021 Abstract Form – Internal-Only Projects (no external funding).
Deadline for abstract submission is 8:00 a.m. on Tuesday, June 2nd.*

research organizations and also possibly funding from federal agencies for technology development (e.g. ONR).

Anticipated Outreach Needs

Thinking about the audiences/consumers you highlighted in the question above, do you anticipate needing to create outreach assets to help increase your impact? If so, please specify whether you anticipate needing to work with ITD and also specify what type of asset (graphic, animation, video, etc.) you might need.

N/A

Please provide an overall, high-level estimate of resources envisioned for this project in 2021 to help give a sense of the size of the proposed effort. Detailed scoping is not needed at this stage. Simply mark the appropriate box below.

Budget Category	Minimal	Medium	Significant
Labor		X	
Expense		X	
Ship/Assets	X		

If you anticipate a large ramp-up or increase in resource requests in future years of the project, please include that information below.