Chris A. Murphy, PhD

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Education

Ph.D. **Computer Science & Oceanographic Engineering,** Massachusetts Institute of Technology and Woods Hole Oceanographic Institution (MIT / WHOI) Joint Program in Oceanography, MA, 2012. *Advisor:* Hanu Singh. *Thesis:* "Progressively Communicating Rich Telemetry from Autonomous Underwater Vehicles via Relays"

S.M. **Electrical Engineering & Computer Science,** MIT / WHOI Joint Program, MA, 2008. *Advisor:* Hanu Singh. *Thesis:* "Lossy Compression and Real-Time Geovisualization for Ultra-Low Bandwidth Telemetry from UUVs"

B.S. **Electrical & Computer Engineering,** Franklin W. Olin College of Engineering, Needham, MA, 2006. *Capstone Project:* "Stereo Vision on an FPGA for Field Robotics" for John Deere Corporation.

Experience

2012- **Active DoD Security Clearance**

2016- **System Architect, Lightweight Vehicles**, Bluefin Robotics / General Dynamics Mission Systems

Principal Investigator (PI) for $4M+ internal R&D program developing next generation lightweight Autonomous Underwater Vehicles (AUVs)

PI for cross-domain system-of-systems exercise with US Navy, launching multiple 5" SandShark AUVs from Heavyweight "Carrier" AUV, which then communicated via aerial vehicle to shore for retasking

Responsible for technical roadmap governing future of 5", 9", and 12" diameter AUV platforms

2014-2016 **Lead Scientist, Strategic Systems**, Bluefin Robotics Corporation

Managed $2.7M DARPA contract to completion, including award of additional funding

Crafted DARPA and ONR proposals for advanced technology programs

Responsible for direction of new low-cost and small-diameter AUV after DARPA-funded development

Led development of vehicle communications hardware with waterproof housing and novel HTML5 UI

2012-2014 **Software Engineer**, Bluefin Robotics Corporation

Led multi-year internally funded R&D effort to develop novel acoustic and Iridium communications architecture for Autonomous Underwater Vehicles (AUVs)

- Defined requirements for, and managed development of, communications software architecture
- Primary responsibility for implementation in C++, including oversight of engineering team
- Oversaw deployment of software on seven AUVs, including for Malaysian Airlines MH370 search

This effort (TOPICS) is credited with changing acoustic communication from a corporate weakness to a strength.

Developed new software product (Bluefin Witness®) which employs wavelet compression and a novel HTML5 user interface to enable review of AUV sensor data over low-bandwidth acoustic modem links

2012-2014 **Visiting Scholar**, Franklin W. Olin College of Engineering

Taught required mechatronics project course, Principles of Engineering, three times over two years

Switched course from PIC-based curriculum to Arduino-based curriculum, including all new lab exercises

2006-2012 **Graduate Research Fellow**, Deep Submergence Lab (DSL), Woods Hole Oceanographic Institution (WHOI)

One of two primary software developers for several SeaBED AUVs, responsible for:

- Development of communication, networking, image processing, and mission planning capabilities
- Training NOAA employees and non-engineer operators on robotic software and hardware
- Months of at-sea experience operating AUVs in remote environments, including under polar ice

Key Skills

- Broad understanding of maritime autonomous systems and maritime technologies generally
- Comfortable writing proposals, managing small teams, interfacing with customers, managing cost and schedule
- Extensive background in GNU/Linux (especially Debian/Ubuntu) for servers, embedded systems, and desktops
- Well versed in TCP/IP networking, serial communication, robotics autonomy packages (ROS, LCM, MOOS), and GIS
- Fluent in Python, C++, C, JavaScript, HTML5, CSS3, MATLAB; familiar with C#, PHP, Java, SQL, Verilog, Perl, bash

Honors, Awards and Professional Activities

2015	Earl Ewing Hays Award from WHOI for "imaginative and unique contribution to ocean engineering"
2011-	Member, American Society for Engineering Education (ASEE)
2006-	Member, Institute of Electrical and Electronics Engineers (IEEE)
2006	NSF Graduate Research Fellowship Program Honorable Mention
2005	WHOI Summer Student Fellowship
2002	Franklin W. Olin Scholarship – Full Undergraduate Tuition + Room Scholarship for 4 years
–	Eagle Scout

Selected Publications

G. Williams, T. Maksym, J. Wilkinson, C. Kunz, **C. Murphy**, P. Kimball, and H. Singh, "Thick and deformed Antarctic sea ice mapped with autonomous underwater vehicles," *Nature Geoscience*, 2014.

C. Murphy, "Data Quality Monitoring with Witness," *Proceedings of IEEE AUV Conference,* Oxford, MS, 2014.

C. Murphy, J. M. Walls, T. Schneider, R. M. Eustice, M. Stojanovic, and H. Singh, "CAPTURE: A Communications Architecture for Progressive Transmission via Underwater Relays with Eavesdropping," *IEEE Journal of Oceanic Engineering*, vol. 39, no. 1, 2014.

C. Murphy, "TOPICS: A modular software architecture for high-latency communications channels," *Proceedings of IEEE/MTS OCEANS Conference,* San Diego, 2013.

C. Murphy and H. Singh, "Wavelet Compression with Set Partitioning for Low Bandwidth Telemetry from AUVs," Fifth *ACM International Workshop on UnderWater Networks (WUWNET) Conference*, Woods Hole, 2010

C. Kunz, **C. Murphy**, H. Singh, C. Willis, R. A. Sohn, S. Singh, T. Sato, C. Roman, K. Nakamura, M. Jakuba, R. Eustice, R. Camilli, and J. Bailey, "Toward Extraplanetary Under-Ice Exploration: Robotic Steps in the Arctic," *Journal of Field Robotics,* vol. 26, no. 4, 2009.

R. A. Sohn **et al.**, "Explosive volcanism on the ultraslow-spreading Gakkel ridge, Arctic Ocean" *Nature*, no. 453, pp. 1236-1238, 2008.

— Full publication list available upon request —