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INTRODUCTION

My research interests concern marine robotics and developing systems and capabilities for exploring and understanding the oceans. This includes the sensory pipelines through which these robots perceive their environment, the autonomous behaviors by which they respond to their environment, and the physical mechanisms with which they maneuver throughout their environment.

EDUCATION

Ph.D. in Mechanical and Oceanographic Engineering (2013) MIT/WHOI Joint Program
Thesis Title: Computational Strategies for Understanding Large Underwater Optical Image Datasets
B.S. in Mechanical Engineering, Minor in **Biology**, *Magna Cum Laude* (2007) Virginia Tech

RESEARCH EXPERIENCE

Research Engineer at WOODS HOLE OCEANOGRAPHIC INST., Woods Hole, MA (6/2014 - present)
Ocean Systems Laboratory
Postdoctoral Investigator at WOODS HOLE OCEANOGRAPHIC INST., Woods Hole, MA (8/2013 - 5/2014)
Deep Submergence Laboratory, Ocean Systems Laboratory

TEACHING EXPERIENCE

Instructor at FALMOUTH ACADEMY, Falmouth, MA (7/2016, 7/2017)
Falmouth Academy Summer Programs: "Fundamentals of LEGO Robotics"
Teaching Assistant and **Grading Coordinator** at VIRGINIA TECH, Blacksburg, VA (8/2005 - 5/2007)
Department of Engineering Education: ENGE 1024: Engineering Exploration

EDUCATION AND COMMUNITY SERVICE

Proposal Reviewer - University of Houston Technology Gap Fund (2018)
Manuscript Reviewer - Methods in Oceanography (2017), International Conference on Intelligent Robots and Systems (2016), IEEE Journal of Oceanographic Engineering (2015)
Student Poster Session Judge - IEEE/OES AUV Conference, Tokyo, Japan (2016), MTS/IEEE OCEANS Conference, Seattle, USA (2019)
High School Science Fair Judge - Falmouth Academy, Falmouth MA (2016-19)

MEDIA AND OUTREACH

Smith, Marcus. "**Discovering the San Joss \$17 Billion Treasure**" *Constant Wonder*. BYU Radio. (9/2019)
Keynote Speaker, *Marion Natural History Museum* - Marion, MA (6/2019)
Fraser, Doug. "**Searching for a \$17 Billion Underwater Treasure.**" *What We Do*. Podcast Audio. (5/2019)
Keynote Speaker, *Friends of Scouting Luncheon* - Charlottesville, VA (3/2019)
Keynote Speaker, *Sail Martha's Vineyard Dinner Lecture Series* - Vineyard Haven, MA (1/2018)

PATENTS

- Austin, T.C., Purcell, M., Jaffre, F., **Kaeli, J.W.**, Allen, B., Littlefield, R. “Asymmetric Propulsion and Maneuvering System,” WHOI, assignee. US Patent 9873499B2. 23 Jan. 2018.
- Kaeli, J.W.**, Littlefield, R. “Passive Ballast System and Methods of Using Same,” U.S. Provisional Patent Application 62/572,808, October 16, 2017.
- Jaffre, F., **Kaeli, J.W.** “Rotational Feedback Control System and Method.” U.S. Provisional Patent Application 62/853,775, May 29 2019.

PUBLICATIONS

- Kaeli, J. W.**, Littlefield, R. and Jaffre, F. *Asymmetric Propulsion: Thrust and Maneuverability from a Single Degree of Freedom*. Proceedings of MTS/IEEE OCEANS, Seattle, WA (2019).
- Kaeli, J. W.**, Packard, G., Grund, M., Fiester, C., Poole, J., Tebo, D., and Purcell M. *Online Summaries as a Framework for Perception and Planning in Marine Robotic Systems*. Proceedings of MTS/IEEE OCEANS, Seattle, WA (2019).
- Kaeli, J. W.**, Packard, G., Fiester, C., Tebo, D., and Purcell, M. *A Range-Only Acoustic Localization Technique for Marine Robotics Applications*. Proceedings of MTS/IEEE OCEANS, Seattle, WA (2019).
- Littlefield, R., Soenen, K. Packard, G., and **Kaeli, J.** *Seafloor Cable Based Navigation and Monitoring with Autonomous Underwater Vehicles*. Proceedings of MTS/IEEE OCEANS, Seattle, WA (2019).
- Packard, G., Collins, J., Farr, N., Fiester, C., Gardner, A., Grund, M., **Kaeli, J.**, McRaven, C., Pelletier, L, Purcell, D., and Ware, J. *New AUV Adaptive Behaviors for Subsea Data Exfiltration*. Proceedings of MTS/IEEE OCEANS, Seattle, WA (2019).
- Littlefield, R.H., Jaffre, F., and **Kaeli, J.W.**. *AUV Propulsion and Maneuvering by Means of Asymmetric Thrust*. Proceedings of IEEE/OES AUV, Porto, Portugal (2018).
- Kaeli, J.W.** *Do AUVs Dream of Electric Eels?* Oceanography 30(2):169-171 (2017).
- Sayre-McCord, R. T., Murphy, C., **Kaeli, J.W.**, Kunz, C., Kimball, P., and Singh, H. *Advances in Platforms and Algorithms for High Resolution Mapping in the Marine Environment*. In Sensing and Control for Autonomous Vehicles (pp. 89-119). Springer International Publishing (2017).
- Kaeli, J.W.**. *Real-time anomaly detection in side-scan sonar imagery for adaptive AUV missions*. Proceedings of IEEE/OES AUV, Tokyo, Japan (2016).
- Kukulya, A.L., Bellingham, J.G., **Kaeli, J.W.**, Reddy, C.M., Godin, M.A., and Conmy, R.N. *Development of a propeller driven long range autonomous underwater vehicle (LRAUV) for under-ice mapping of oil spills and environmental hazards: An Arctic Domain Center of Awareness project*. Proceedings of IEEE/OES AUV, Tokyo, Japan (2016).
- Durden J.M., Schoening, T., Althaus, F., Friedman A., Garcia, R., Glover, A.G., Greinert, J., Stout, N.J., Jones, D.O.B., Jordt, A., **Kaeli, J.W.**, Kser, K., Kuhnz, L.A., Lindsay, D., Morris, K.J., Nattkemper, T.W., Osterloff, J., Ruhl, H.A., Singh, H., Tran, M., and Bett, B.J. *Perspectives in visual imaging for marine biology and ecology: from acquisition to understanding*. In: Hughes, R.N.; Hughes, D.J.; Smith, I.P.; Dale, A.C., (eds.) Oceanography and Marine Biology: An Annual Review, Vol. 54. Boca Raton, FL, CRC Press, 1-72, 470pp (2016).
- Aronson, R.B., Smith, K.E., Vos, S.C., McClintock, J.B., Amsler, M.O., Moksnes, P.O., Ellis, D.S., **Kaeli, J.W.**, Singh, H., Bailey, J.W., Schiferl, J.S., van Woesik, R., Martina, M.A., Steller, B.V., Deal, M.E., Lazarus, S.M., Havenhand, J.N., Swalethorp, Kjellerup, S., and Thatje, S. *No Barrier to Shoreward Expansion of Bathyal King Crabs on the Antarctic Shelf*. Proceedings of the National Academy of Sciences (2015).
- Kaeli, J.W.** and Singh, H. *Online Data Summaries for Semantic Mapping and Anomaly Detection with Autonomous Underwater Vehicles*. Proceedings of IEEE/MTS OCEANS, Genova, Italy (2015).
- Kaeli, J.W.**, Leonard, J.J., and Singh, H. *Visual Summaries for Low-Bandwidth Semantic Mapping with Autonomous Underwater Vehicles*. Proceedings of IEEE/OES AUV, Oxford, MS (2014).
- Kaeli, J.W.** *Computational Strategies for Understanding Underwater Optical Image Datasets*. PhD Thesis, Massachusetts Institute of Technology and Woods Hole Oceanographic Institution (2013).

- Eastman, J.T., Amsler, M.O., Aronson, R.B., Thatje, S., McClintock, J.B., Vos, S.C., **Kaeli, J.W.**, Singh, H., and La Mesa, M. *Photographic survey of benthos provides insights into the Antarctic fish fauna from the Marguerite Bay slope and the Amundsen Sea*. Antarctic Science (2012).
- Kaeli, J.W.**, Singh, H., Murphy, C. and Kunz, C. *Improving Color Correction for Underwater Image Surveys*. Proceedings of IEEE/MTS OCEANS, Kona, HI (2011).
- Kaeli, J.W.**, Singh, H., and Armstrong, R.A. *An Automated Morphological Image Processing Based Methodology for Quantifying Coral Cover in Deeper-Reef Zones*. Proceedings of IEEE/MTS OCEANS, Boston, MA (2006).
- Snook, J.S., Lohani, V.K., Lo, J., Sirvole, K., Mullin, J., **Kaeli, J.W.**, and Grin, H. *Incorporating a 3-D Interactive Graphics Programming Language into an Introductory Engineering Course*. Proceedings of ASEE Annual Conference, Portland, OR (2005).

FIELD WORK

- Tunnel Inspection**, *Lochaber Hydroelectric Scheme*, Fort William, Scotland (4/2016, 3/2017, 10/2017)
REMUS Tunnel Inspection Vehicle, acoustic tracking for 15 mile multibeam sonar survey of aqueduct
- Search for Galleon San José**, *ARC Malpelo*, Western Caribbean (6/2015, 11/2015)
REMUS 6000, side scan sonar surveys, high-resolution optical still camera resurveys, photomosaicking
- Antarctic ASPIRE**, *R/V N.B. Palmer, R/V Oden*, Western Antarctica (11/2010-1/2011)
SeaSLED towed camera system, imaging invasive predatory crabs, MATLAB GUI development
- Imaging Benthic Habitats**, *R/V Walton Smith*, Gulf of Mexico (9/2010)
SeaSLED towed camera system, imaging benthic habitats affected by Deepwater Horizon oil spill
- Multiple Naval Exercises and Demonstrations**
Multibeam sonar ship hull surveys, Newport, RI (5/2008), Eckernförde, Germany (8/2008)
Range-only active target reacquisition, imaging sonar target surveys, Panama City, FL (8/2009, 9/2010)
Autonomous reactive behaviors, Point Judith, RI (5/2017)

AWARDS

- George G. Panteleyev Award** for improving graduate student life at WHOI (2014)
- Dean's List of Instructors** at Virginia Tech (fall 2005, fall 2006)
- Dean's List of Students** at Virginia Tech, *all semesters* (fall 2002 - spring 2007)
- Eagle Scout Award** (2001)