

Seth M^cCammon

David Center 332, Mail Stop 61, Woods Hole Oceanographic Institution
Woods Hole, MA 02543

☎ (508) 289 2139 • ✉ smccammon@whoi.edu
🌐 whoi.edu/staff/smccammon

Assistant Scientist at Woods Hole Oceanographic Institution. My main research interests are in developing adaptive sensing techniques to enable robots to reason about their environment as they explore it. I work on developing these techniques for field robotics applications and deploying them on hardware, particularly in the marine domain.

Research Interests

Marine Robotics | Information Gathering | Long-Term Autonomy | Machine Learning | Passive Acoustic Sensing | Multiagent Systems | Planning with Uncertainty | Probabilistic Robotics | Topological Path Planning

Professional Experience

- **Assistant Scientist** - Woods Hole Oceanographic Institution **Feb 2023 - Present**
Applied Ocean Physics & Engineering Department
- **Postdoctoral Scholar** - Woods Hole Oceanographic Institution **Feb 2021 - Feb 2023**
Applied Ocean Physics & Engineering Department
- **Doctoral Research Assistant** - Oregon State University **Sept 2015 - Dec 2020**
Collaborative Robotics and Intelligent Systems Institute
- **Undergraduate Researcher** - Northwestern University **Fall 2013 - Spring 2015**
ARGALLab
- **Undergraduate Research Intern** - Vanderbilt University **Summer 2013**
STORM Lab

Education

- **PhD in Robotics** - Oregon State University Robotics, Corvallis, OR **2020**
Thesis: *Topologically-Guided Robotic Information Gathering*
- **B.S. in Computer Science** - Northwestern University, Evanston, IL **2015**

Publications

Journal Articles.....

- **S. McCammon**, N. Formel, S. Jarriel, T. A. Mooney "Rapid Detection of Fish Calls within Diverse Coral Reef Soundscapes Using a Convolutional Neural Network", *Journal of the Acoustical Society of America*, vol. 157, no. 3, pp. 1665-1683, Mar. 2025.
- K. C. Cavanaugh, T. W. Bell, K. E. Aerni, J. E. K. Byrnes, **S. McCammon**, M. M. Smith, "New Technologies for Monitoring Coastal Ecosystem Dynamics", *Annual Review of Marine Sciences*, vol. 17, 2024.
- **S. McCammon** and G. Hollinger "Topological Path Planning for Autonomous Information Gathering," *Autonomous Robots*, vol. 45, no. 6, pp. 821-842, Sept. 2021.
- **S. McCammon**, G. Marcon dos Santos, M. Frantz, T. P. Welch, G. Best, R. K. Shearman, J. D. Nash, J. A. Barth, J. A. Adams, and G. Hollinger, "Ocean front detection and tracking using a team of heterogeneous marine vehicles," *Journal of Field Robotics*, vol. 38, no. 6, pp. 854-881, Sept. 2021.
- N. Lawrance, R. DeBortoli, D. Jones, **S. McCammon**, L. Milliken, A. Nicolai, T. Somers and G. Hollinger, "Shared autonomy for low-cost underwater vehicles," *Journal of Field Robotics*, vol. 36, no. 3, pp. 495-516, May 2019.
- K. Benoit-Bird, T. Welch, C. Waluk, I. Wangen, P. McGill, C. Okuda, G. Hollinger, M. Sato, **S. McCammon**. "Equipping an underwater glider with a new echosounder to explore ocean ecosystems," *Limnology and Oceanography: Methods*, vol. 16, no. 11, pp.734-749, Nov. 2018.

Refereed Conference Papers.....

- J. Todd, **S. McCammon**, Y. Girdhar, N. Roy, D. Yoerger "Adaptive multi-altitude search and sampling of sparsely distributed natural phenomena" in *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Abu Dhabi, UAE, Oct. 2024
- **S. McCammon**, S. Jamieson, T. A. Mooney, and Y. Girdhar "Discovering Biological Hotspots with a Passively Listening AUV", in *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, Yokohama, Japan, 2024
- Y. Girdhar, N. McGuire, L. Cai, S. Jamieson, **S. McCammon**, B. Claus, J. E. San Soucie, J. E. Todd, and T. A. Mooney "CUREE: A Curious Underwater Robot for Ecosystem Exploration" in *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, London, UK, 2023
- **S. McCammon**, N. Aoki, T. A. Mooney, and Y. Girdhar "Adaptive Online Sampling of Periodic Processes with Application to Coral Reef Acoustic Abundance Monitoring" in *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Kyoto, Japan, Oct. 2022.
- I. Rankin, **S. McCammon**, and G. Hollinger "Robotic Information Gathering using Semantic Language Instructions," in *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, Xi'an, China (virtual), May. 2021.
- **S. McCammon**, D. Jones, and G. Hollinger, "Topology-Aware Self-Organizing Maps for Robotic Information Gathering" in *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems*, Las Vegas, NV (virtual), Oct. 2020.
- **S. McCammon**, T. Welch, C. Waluk, K. Benoit-Bird, J. Barth, and G. Hollinger, "Onboard autonomy system for the Slocum glider," in *Proc. IEEE/MTS OCEANS Conference*, Seattle, WA, Oct. 2019.

- o **S. McCammon** and G. Hollinger. "Topological hotspot identification for informative path planning with a marine robot," in Proc. *IEEE International Conference on Robotics and Automation (ICRA)*, Brisbane, May 2018.
- o **S. McCammon** and G. Hollinger. "Planning and executing optimal non-entangling paths for tethered underwater vehicles," In proc. *IEEE International Conference on Robotics and Automation (ICRA)*, Singapore, May 2017. **Finalist: Best Automation Paper**
- o N. Lawrance, T. Somers, D. Jones, **S. McCammon**, and G. Hollinger. "Ocean deployment and testing of a semi-autonomous underwater vehicle." in *Proc. MTS/IEEE OCEANS Conference*, Monterey, CA, Sept 2016.

Non-Refereed Papers and Abstracts

- o **S. McCammon**, Y. Jia, W. G. Zhang "Predicting Time-Varying Flow Fields with Self Organizing Maps" In Proc. *IEEE OES AUV Symposium*, Boston, MA, Sept. 2024.
- o **S. McCammon**, S Jamieson, T. A. Mooney, Y. Girdhar "Discovering Biological Hotspots on Coral Reefs with a Passively Listening AUV" In Proc. Ocean Sciences Meeting (OSM), New Orleans, LA, Feb. 2024.
- o I. C. Rankin, **S. McCammon**, T. Somers, N. Lawrance, and G. A. Hollinger "Explaining Robot Decisions Using Contrasting Examples" in Proc. *HRI for Explainable Robotics Workshop at IEEE International Conference on Robot & Human Interactive Communication (RO-MAN)*, Busan, South Korea, Aug. 2023
- o **S. McCammon**, F. Jensen, T. A. Mooney, Y. Girdhar "A Visual Acoustic Sensor Emplacement for Long-Term Monitoring of Coral Reef Biodiversity" In Proc. Ocean Sciences Meeting (OSM), Virtual, Feb. 2022.
- o I. Rankin, **S. McCammon**, and G. Hollinger, "Optimized robotic information gathering using semantic language instructions," in Proc. Robotics: Science and Systems Conference Workshop on Robots in the Wild: Challenges in Deploying Robust Autonomy for Robotic Exploration (RSS), virtual, July, 2020.
- o **S. McCammon** and G. Hollinger, "Planning non-entangling paths for tethered underwater robots using simulated annealing," in Proc. *Robotics: Science and Systems Conf. Workshop on Robot Learning and Planning (RSS16)*, Ann Arbor, MI, June, 2016.
- o N. Lawrance, T. Somers, D. Jones, **S. McCammon** and G. Hollinger, "Ocean deployment and testing of a semi-autonomous underwater vehicle," in Proc. *IEEE International Conference on Robotics and Automation Workshop on Marine Robot Localization and Navigation (ICRA)*, Stockholm, May 2016.

Funding Sources

- o "Characterization of 3D Flow Structure in Transient Headland Eddies using Model-Integrated Adaptive Sampling with Multiple AUVs", NSF Collaborations in AI and Geosciences, **S. McCammon** (PI, WHOI), W. G. Zhang (Co-PI, WHOI), J. Caley (Co-PI, Pacific Lutheran University), Amount: \$ 871,084, Funded Dates: 10/1/2025 - 9/30/2028.
- o "Fully Autonomous Recovery of an AUV by an ASV with a Net Capture System", **S. McCammon** (PI, WHOI), Amount: \$79,962, Funded Dates 6/1/2025 - 5/31/2027
- o "Deployment and Rendezvous Planning for a Marsupial AUV/ASV System", WHOI IR+D

(Mellon Joint Initiatives Award). **S. McCammon** (PI, WHOI), Amount: \$39,762., Funded Dates: 2/1/2024 - 12/31/2024

- o "Dense Distributed Spatio-Temporal Monitoring of Coral Reefs", WHOI Interdisciplinary (Mellon Joint Initiatives Award). **S. McCammon** (PI, WHOI), T. A. Mooney (Co-PI, WHOI), Amount: \$100,000, Funded Dates: 6/1/2023 - 5/31/2025
- o "An Ecologically Curious Robot for Monitoring Coral Reef Biodiversity", NSF National Robotics Initiative 3.0, Y. Girdhar (PI, WHOI), T. A. Mooney (Co-PI, WHOI), F. H. Jensen (Co-PI, Aarhus University), **S. McCammon** (Co-PI, WHOI), Amount: \$1,499,986, Funded Dates: 3/1/2022-2/28/2025.

Advising & Mentoring

Current PhD Students:.....

- o Shashank Swaminathan (Co-advised with Brian Williams, MIT)

Thesis Review Committees:.....

- o Alan Papalia (Mechanical Engineering, MIT-WHOI JP) 2024
Topic: *Algorithmic Advances in Range-Aided Navigation*
- o John San Soucie (Mechanical Engineering, MIT-WHOI JP) 2024
Topic: *Inference and Robotic Path Planning over High Dimensional Categorical Observations*
- o Stewart Jamieson (Aero-Astro, MIT-WHOI JP) 2024
Topic: *Enabling Human-Multi-Robot Collaborative Visual Exploration in Underwater Environments*

Undergraduate & High School:.....

- o Baran Moore (WHOI SSF) 2025
- o Kevin Macauley (WHOI Summer Student) 2022
- o Gretchen Rice (Oregon State University NSF REU) 2019
- o Trevor Greenside (Oregon State University NSF REU) 2017
- o Apoorva Prakash (ASE Summer Academy) 2016

Invited Talks

- o "Active Listening on Coral Reefs with an Autonomous Underwater Vehicle"
 - Pacific Lutheran University, Tacoma, WA, Feb 2025
 - Woods Hole Oceanographic Institution, Woods Hole, MA, July 2024, July 2025
 - NASA Jet Propulsion Laboratory, Pasadena, CA, June 2025
 - National Underwater Warfare Center, Newport, RI, June 2025
 - Institute for Human and Machine Cognition, Pensacola, FL, July 2025
 - Curious Minds Dive Camp, Layton, FL, July 2025 (Virtual)
- o "Topologically Guided Robotic Information Gathering"
 - University of Southern California, April 2021, Los Angeles, CA (Virtual)
 - Indiana University, Dec 2020, Bloomington, IN (Virtual)
 - Woods Hole Oceanographic Institution, March 2020, Woods Hole, MA
- o "Autonomous Robots for Ocean Science"

- Pacific Lutheran University, Febuary 2022, Tacoma, WA (Virtual)

Awards and Honors

- o **Finalist: Best Automation Paper - ICRA 2017:** *'Planning and executing optimal non-entangling paths for tethered underwater vehicles'*
- o **Northwestern McCormick Autonomous Robot Design Competition:**
Winner (2013), 3rd Place (2014, 2015), *with Kevin Ye, Daniel Thirman, and Georgiy Mazin*
- o **Myke Minbiole Elegant Engineering Award - 2013:** *with Kevin Ye and Georgiy Mazin*

Service and Outreach

Workshop Organization.....

- o "Robots for Understanding Natural Ecosystems (RUNE)," co-organized with Y. Girdhar, L. Cai, and S. Jamieson to appear at IEEE International Conference on Robotics and Automation (ICRA), Yokohama, Japan, May 2024.
- o "Explainable and Trustworthy Robot Decision Making for Scientific Data Collection," co-organized with N. Ahmed, P. M. Furlong, and G. Hollinger at Robotics: Science and Systems Conf. (RSS) Workshop, virtual, May 2020

Editorships and Review Service.....

- o Associate Editor (Conferences): IEEE Int'l Conf. on Robotics and Automation (2023-Present)
- o Session Chair (Conferences): IEEE AUV Conference (2024)
- o Reviewer (Journals): IEEE Transactions on Robotics, IEEE Access, IEEE Robotics and Automation Letters, Autonomous Robots
- o Reviewer (Conferences & Workshops): IEEE Int'l Conf. on Robotics and Automation (ICRA), IEEE/RSJ Int'l Conf. on Intelligent Robots and Systems (IROS), Robotics Science and Systems (RSS), RSS Pioneers, ICRA RUNE Workshop

Outreach.....

- o New England MATE ROV Regional Coordinator 2022-Present
- o Judge, Regional MATE ROV Competitions (Oregon, New England) 2017-Present
- o Northwestern University Alumni Admissions Interviewer 2020-Present
- o Northwestern University Robotics Club Executive Committee, Founding Member 2014-2015

Personal

- o Citizenship: United States
- o Languages: English