

Toby Schneider

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Born: February 8, 1985—New Haven, CT, USA

Nationality: United States of America

Current employment

2013- *Oceanographic Engineer (part-time)*, GobySoft, LLC, Mashpee, MA. <http://gobysoft.org>.

2020- *Senior Scientist (part-time)*, JPAanalytics, LLC, Falmouth, MA. <http://jpanalytics.com>.

Former employment

2012-2013 *Postdoctoral Associate*, Massachusetts Institute of Technology, Cambridge, MA.

Areas of specialization

marine robotics, software engineering, ocean acoustics, physics.

Education

2013 PhD in Oceanographic Engineering. Massachusetts Institute of Technology, Cambridge, MA and Woods Hole Oceanographic Institution, Woods Hole, MA. Thesis entitled *Advances in Integrating Autonomy with Acoustic Communications for Intelligent Networks of Marine Robots*.

2007 BA in Physics with Honors, Magna Cum Laude. Williams College, Williamstown, MA

Recent research experience

2013- *GobySoft, LLC*. Nested autonomy middleware for marine robots. Networking techniques for bandwidth-constrained marine physical links.

2020- *JPAanalytics, LLC*. Software frameworks for next generation acoustic modem and networking systems.

2007-2014 *Laboratory for Autonomous Marine Sensing Systems, Massachusetts Institute of Technology*. Net-

working techniques and autonomy for undersea robotic communications. (H. Schmidt).

2013-2015 *Robotics, Vision, and Sensor Networks, Computer Science and Artificial Intelligence Laboratory (CSAIL), Massachusetts Institute of Technology.* Networking over difficult links for land robots in hazardous environments. (S. Teller).

Publications & talks

Selected recent conference papers & talks

- 2022 Lindzey, L., Vandor, I., Schneider, T., Kaiser, C., Jakuba, M. (2022) “CoExploration for Adaptive AUV Survey.” Presented at the IEEE/OES Autonomous Underwater Vehicles Symposium (AUV) 2022, Singapore, September 2022.
- 2021 Schneider, T., Schmidt, H., and Randeni, S. (2021), “Self-Adapting Under-Ice Integrated Communications and Navigation Network.” Presented at the UComms 2021 Conference, Lerici, Italy (virtual attendance).
- 2021 Schneider, T., Randeni, S., and Schmidt, H. (2021), “Fast, Cheap and Good: Development of a high performance communications and navigation system for High Latitude AUV deployments using a Virtual Ocean.” Presented at the Antarctic and Southern Ocean Forum 2021, Hobart, TAS, Australia (virtual attendance).
- 2020 Randeni, S., Schneider, T., and Schmidt, H. (2020), “Construction of a High-Resolution Under-Ice AUV Navigation Framework using a Multidisciplinary Virtual Environment.” Presented at the IEEE AUV Conference, St. Johns, NL, Canada.
- 2018 Schneider, T. and Schmidt, H. (2018), “NETSIM: A Realtime Virtual Ocean Hardware-in-the-loop Acoustic Modem Network Simulator.” Presented at the UComms 2018 Conference, Lerici, Italy.
- 2016 Schneider, T. (2016), “Goby3: A new open-source middleware for nested communication on autonomous marine vehicles.” Presented at the IEEE AUV Conference, Tokyo, Japan.
- 2015 Schneider, T., Petillo, S., Schmidt, H., and Murphy, C. (2015), “The Dynamic Compact Control Language Version 3.” Presented at the IEEE OCEANS Conference, Genova, Italy.

Journal articles

- 2022 Randeni, S., Schneider, T., Bhatt, E., Viquez, O. and Schmidt, H. (2022), “A high-resolution AUV navigation framework with integrated communication and tracking for under-ice

deployments.” *Journal of Field Robotics*.

- 2013 Schneider, T. and Schmidt, H. (2013), “A State Observation Technique for Highly Compressed Source Coding of Autonomous Underwater Vehicle Position.” *IEEE Journal of Oceanic Engineering*.
- 2013 Schneider, T. and Schmidt, H. (2013), “Model-based Adaptive Behavior Framework for Optimal Acoustic Communication and Sensing by Marine Robots.” *IEEE Journal of Oceanic Engineering*.
- 2010 Schneider, T. and Schmidt, H. (2010), “Unified Command and Control for Heterogeneous Marine Sensing Networks.” *Journal of Field Robotics*.

Selected honors & awards

- 2013 Defense Advanced Research Projects Agency (DARPA) Director’s Coin, Awarded at the DARPA Robotics Challenge 2013 Trials for critical networking assistance and personal integrity.
- 2007 Presidential Fellowship, MIT
- 2007- Phi Beta Kappa Member, Williams College
- 2007- Sigma Xi Student Member, Williams College

At-sea cruise experience as major technical contributor or lead:

- 2023 WinterFest23: Collaborative micro-UUV deployment and demonstrations.
- 2020 ICEX20: Integrated Communications and Navigation Network with an under-ice AUV.
- 2017-2019 SS-DTE: MCM AUV Neutralizer Test-bed.
- 2016 ICEX16: Passive acoustics with an AUV under the Arctic ice.
- 2013-2017 DASH-ST6, ST8A-C, ST10, ST12: Deep sea tracking using AUVs.
- 2011-2013 MBAT11, MBAT12, MBAT13: Collaborative active tracking.
- 2012 TIGER12: Three-hop heterogenous network.
- 2012 CYBORG12: Human-vehicle collaboration.
- 2011 CAPTURE11: Multi-hop imagery sending.
- 2009 CHAMPLAIN09: Telemetry of scalar CTD data based on thermocline detection.
- 2009-2011 SWAMSI09, SWAMSI11: Collaborative seafloor target detection.
- 2008-2010 GLINT08, GLINT09, GLINT10: Collaborative passive tracking.

Technical skills

Computer languages: C++ (C++03, C++11, C++14), C, Python, SQL, MATLAB.

Robotic Middleware experience: Goby3, MOOS-IvP, ROS, LCM.

GNU/Linux expertise: Advanced configuration and usage, native software (e.g. C/C++) build configuration (make, CMake), Debian package development and deployment, embedded ARM (e.g. NVIDIA Jetson, Raspberry Pi, Gumstix, Beagleboard) systems, VCS proficiency (git, subversion, bazaar), CI/CD (e.g. CircleCI, Github Actions, Gitlab Runners).

Open source project management: Goby Underwater Autonomy Project (<https://github.com/GobySoft/goby>), DCCL (<https://github.com/GobySoft/dccl>)