

Christopher Thierauf, PhD

Research Engineer, Woods Hole Oceanographic Institution

Deep Submergence Lab (DSL), Blake 227

christopher.thierauf@whoi.edu

cthierauf.com

Research engineer in the National Deep Submergence Facility and Deep Submergence Lab at the Woods Hole Oceanographic Institution, supporting deep-sea research and conducting research into robot autonomy. Fieldwork and software development for AUV Sentry.

Research Interest and Expertise

Resilient **long-horizon robot autonomy** with an emphasis on **human-robot interaction** and interpretable **high-level planning** through the use of **cognitive architectures**. Robots that make safe decisions, with capacity to **identify failure** events, **reason about future behavior**, and take human instruction **using language**. AUV Field robotics and their deployment for **at-sea fieldwork**.

How can robots become trusted autonomous partners in scientific exploration?

Education

2025	PhD, Computer Science and Human-Robot Interaction Joint PhD advised by Matthias Scheutz, PhD, PhD. Thesis: "Interpret, Innovate, and Interact: Resilient Robot Strategies for Human Domains". Showed how symbolic AI can be used with subsymbolic AI and machine learning techniques to produce robots capable of understanding, resolving, and communicating failure to human operators using language and cognitive science principles.	Tufts University
	MSc, Computer Science and Human-Robot Interaction Joint masters degree. Coursework in robotics, machine learning, and cognitive science.	Tufts University
2020	Bachelor of Science Computer science, minoring in applied mathematics, with emphasis on robotics.	Wentworth Institute of Technology

Work Experience

2023 - Present	Research Engineer Supporting research with the <i>Sentry</i> deep-sea AUV by developing software, participating in oceanographic field work, and conducting research into resilient robot autonomy.	Woods Hole Oceanographic Institution
2020 - 2023	Graduate Research Assistant (Full-time) Wrote code and developed hardware for resilient robot behaviors in open-world domains. Emphasis on robotics, AI, cognitive architectures, and machine learning.	Human-Robot Interaction Lab, Tufts
Summer 2021	Robotics Engineer (Co-Op)	Thinking Robots, Inc.
Summer 2020	Software Engineer	HRILab, Tufts University
Fall 2019	Robotics Engineer (Co-Op)	Thinking Robots, Inc.
Spring 2019	Undergrad Research Assistant, Human-Robot Interaction	HRILab, Tufts University
Summer 2018	Undergrad Research Assistant, Additive Manufacturing	Wentworth Inst. of Tech.

At-Sea Fieldwork

- 2025 February 16 – March 18. Aboard R/V Thomas G Thompson for AUV Sentry ops to Mariana Trench region to perform magnetometry surveys. Also deployed work on an experimental gravimetry sensor. Software lead, provided mission planning, data, and on-deck support.
- 2025 May 19 – June 6. Aboard R/V Endeavor for AUV Sentry ops to Northeast US Continental Shelf mapping cold seeps. Provided mission planning, data, and on-deck support.
- 2025 February 24 – May 5. Aboard R/V Atlantis for AUV Sentry engineering work, including deploying my research into a custom mission controller system.
- 2025 January 20 – February 18. Aboard R/V Atlantis for AUV Sentry ops to 9°50'N East Pacific Rise alongside HOV Alvin to perform geological mapping and biological camera surveys. Provided software support during deployments and data processing post-recovery.
- 2024 September 1 – September 24. Aboard E/V Nautilus for AUV Sentry ops to American Samoa. Provided software support during deployments and data processing post-recovery.
<https://nautiluslive.org/blog/2024/09/01/exploring-unknown-american-samoa-new-tech>
- 2024 June 19 – July 3. Aboard R/V Atlantis for AUV Sentry ops to Axial Seamount alongside ROV Jason. Provided software support during deployment and data processing post-recovery.
<https://ndsf.whoi.edu/tracking-the-ups-and-downs-of-axial-seamount/>
- 2024 February 15 – March 21. Aboard R/V Atlantis for AUV Sentry ops to 9°50'N East Pacific Rise alongside HOV Alvin. Acting software lead.
<https://www.whoi.edu/press-room/news-release/five-new-hydrothermal-vents-discovered-in-the-eastern-tropical-pacific-ocean/>

Journal Papers

- 2024 **“Toward Competent Robot Apprentices: Enabling Proactive Troubleshooting in Collaborative Robots”**
C Thierauf, T Law, T Frasca, M Scheutz.
In *MPDI Machines*.
- 2023 **“Do this instead’: Robots that Adequately Respond to Corrected Instructions.”**
C Thierauf, R Thielstrom, B Oosterveld, W Becker, M Scheutz.
In *ACM Transactions on Human-Robot Interaction (THRI)*.

Conference Papers

- 2026 **“What Matters for Designing Reliable Systems: A New Taxonomy of Failure Cause-Condition-Effect Relationships Based on AUV Missions”**
C Thierauf, Matthias Scheutz.
In review.
- 2025 **“Deployment and Development of a Cognitive Teleoreactive Framework for Deep Sea Autonomy”**
C Thierauf.
In *IEEE/MTS OCEANS*.
- 2025 **“Design of a Depth Triggered Mechanical Fuse”**
E Rowe, C Thierauf.
In *IEEE/MTS OCEANS*.
- 2025 **“Robots that Learn to Solve Novelty with Self-Generated RL Simulations”**
C Thierauf, M Scheutz.
In *IEEE International Conference on Development and Learning (ICDL)*.

- 2025 **"FLEX: A Framework for Learning Robot-Agnostic Force-based Skills Involving Sustained Contact Object Manipulation"**
S Fang, W Gao, S Goel, C Thierauf, M Scheutz, J Sinapov.
 In International Conference on Robotics and Automation (ICRA).
- 2024 **"Self-Debugging Robots: Fault recovery through reasoning and planning"**
C Thierauf, M Scheutz.
 In IEEE Resilience Week (RWS).
- 2024 **"Fixing symbolic plans with reinforcement learning in object-based action spaces"**
C Thierauf, M Scheutz.
 In International Conference on Intelligent Robots and Systems (IROS).
- 2024 **"Robots That Perform Norm-Based Reference Resolution"**
M Abrams, C Thierauf, M Scheutz.
 In International Conference on Social Robotics (ICSR).
- 2024 **"Automating Dataset Production Using Generative Text and Image Models"**
C Thierauf, M Abrams, M Scheutz.
 In Empirical Methods in Natural Language Processing (EMNLP).
- 2022 **"ACuTE: Automatic Curriculum Transfer from Simple to Complex Environments"**
Y Shukla, C Thierauf, R Hosseini, J Sinapov.
 In Autonomous Agents and Multiagent Systems (AAMAS)
- 2021 **"Robot Development and Path Planning for Indoor Ultraviolet Light Disinfection."**
J Conroy, C Thierauf, P Rule, E Krause, H Akitaya, A Gonczi, M Korman, M Scheutz.
 In International Conference on Robotics and Automation (ICRA).

Teaching

- 2024 **Introduction to Machine Learning (CS-135)** **Tufts University**
 Graduate level course in supervised machine learning techniques, including regression, classification, neural networks. Designed course materials, ran office hours and grading.

Media Appearances

- 2024 **Nautilus Live**
 Interviewed for OET's outreach programming about debugging AUVs at sea.
<https://nautiluslive.org/blog/2024/09/16/auv-sentry-na165-troubleshooting-software-sea>
- 2022 **CBS Boston**
 Performed live robot demo of my own work and lab research for local news station.
<https://www.cbsnews.com/boston/video/boston-hosts-celebration-of-all-things-robotics>
- 2021 **Tufts Now**
 My design and implementation of a disinfection robot.
<https://now.tufts.edu/2021/05/06/building-better-robot-disinfect-covid-and-more>

Public Speaking

- 2026 **Bard College** **Invited Seminar**
 "Robot Partners for Deep Ocean Worlds". Presented for students in *Human-Robot Interaction* and ecology majors at Bard College.

Community Development, Outreach, and Service

- Reviewed for journals (Robotics and Automation Letters, Journal of Open Source Software, Journal of Applied Science and Engineering) and top-tier conferences (International Conference on Robotics and Automation, Robots: Science and Systems) 2022-Present.
- Chaired sessions at IEEE/MTS *OCEANS* in underwater vehicle design and autonomy, judged student poster session. 2025.
- MATE New England Regional Competition: Participated in judging and related tasks. 2025.
- Released, bugfixed, and maintained packages on the ROS repositories. 2020 – present.
- Advise undergraduate clubs and provide technical content in underwater robotics. 2020 – present.
- Supervised 8 undergraduate and masters students in full-time semester-long projects. 2020-2023.
- Mass Robotics Block Party. Represented Tufts HRI program and lab at public event for robot education outreach. 2022, 2023, 2024.
- Co-Chaired two sessions of ASEE-NE local undergraduate conference, judged poster session. 2022.
- Led local chapter of IEEE (WIT IEEE 2016-2020) and ACM (WIT ACM 2016-2018)

Skills

Experimental Design	Experience with constructing qualitative and quantitative human-subject experiments aligned with IRB legal/ethical standards, and relevant certifications.
Tools	Proficiency with Git -based workflows, Linux , CLI, etc. \LaTeX .
Programming Languages	Proficiency with Python , Java, C, C++ . Experience with Assembly, Rust, Prolog.
Frameworks	Expertise in ROS , MoveIt, ROS_Control, DIARC cognitive architecture. Proficient in ROS 2 , OpenCV, PCL. Use of physics simulation systems (Gazebo, PyBullet).
Devices	Custom marine AUV's (5-DoF and 6-DoF), esp. AUV Sentry , mobile manipulators (Boston Dynamics ' Spot ', Fetch Robotics ' Fetch '), 7-DoF arms (Universal Robots ' UR5 ', Kinova ' ULeA '), custom differentially-driven robots, others.
Manufacturing/Debug	Comfort with electrical debug for software (e.g., oscilloscopes for firmware development), 3D CAD tools, manufacturing with 3D printing , mills , lathes, etc.