

DAVID PORFIRIO

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RESEARCH INTERESTS

My research intersects *user experience*, *robotics*, and *artificial intelligence*, in order to design and evaluate innovative user interfaces that enable seamless human-robot task communication. This is *important* because of the enormous potential that robots have to positively impact daily life. However, this is *difficult* because humans struggle to articulate their needs.

EDUCATION

PhD	University of Wisconsin–Madison (UW–Madison), Madison, WI, USA Computer Sciences	2018-2022
MSc	UW–Madison, Madison, WI, USA Computer Sciences	2016-2018
BS	University of Arizona (UA), Tucson, AZ, USA Double degree (hon) in computer science and physiology Minor in mathematics Summa cum laude	2011-2016

WORK & RESEARCH EXPERIENCE

Computer Scientist Adaptive Systems Section Navy Center for Applied Research in Artificial Intelligence United States Naval Research Laboratory	2024-Present
NRC RAP Postdoctoral Fellow Adaptive Systems Section Navy Center for Applied Research in Artificial Intelligence United States Naval Research Laboratory Advisor: Dr. Laura Hiatt	2022-2024
Doctoral Research People and Robots Laboratory UW–Madison Computer Sciences Department Advisors: Drs. Bilge Mutlu & Aws Albarghouthi Committee: Drs. Bilge Mutlu, Aws Albarghouthi, Maya Cakmak, & Kevin Ponto Thesis: <i>Authoring Social Interactions Between Humans and Robots</i>	2016-2022
Research Intern Nokia Bell Labs, New Providence, NJ, USA (Virtual) Mentors: Drs. Martin Carroll, Kedar Namjoshi, Itai Segall	Summer 2021
Undergraduate Senior Thesis UA Department of Computer Science Advisor: Dr. John Kececiloglu	2015-2016
Undergraduate Research UA Department of Computer Science Advisors: Drs. E. Fiona Bailey and Joanna Masel	2013-2014

CONFERENCE PAPERS

1. **Porfirio, D.**, Hsiao, V., Fine-Morris, M., Smith, L., & Hiatt, L. Bootstrapping Human-Like Planning via LLMs. In Proceedings of the 2025 International Conference on Robot and Human Interactive Communication. *Under review*.
2. **Porfirio, D.**, Roberts, M., & Hiatt, L. (2025, May). Uncertainty Expression for Human-Robot Task Communication. In Proceedings of the 24th International Conference on Autonomous Agents and Multiagent Systems (AAMAS). *In press*. Acceptance rate: 24.5%
3. Lee, C., **Porfirio, D.**, Wang, J., Zhao, K., & Mutlu, B. (2025, April). VeriPlan: Integrating Formal Verification and LLMs into End-User Planning. In Proceedings of the 2025 CHI Conference on Human Factors in Computing Systems (pp. 1-19). Acceptance rate: 25.1%
4. **Porfirio, D.**, Roberts, M., & Hiatt, L. M. (2025, March). An Interaction Specification Language for Robot Application Development. In 2025 ACM/IEEE International Conference on Human-Robot Interaction (HRI). *Best Short Contribution Award*. Acceptance rate: 43.5%
5. Stegner, L., Hwang, Y., **Porfirio, D.**, & Mutlu, B. (2024, July). Understanding On-the-Fly End-User Robot Programming. In Proceedings of the 2024 ACM Designing Interactive Systems Conference (pp. 2468-2480). Acceptance rate: 25%
6. **Porfirio, D.**, Roberts, M., & Hiatt, L. (2024, March). Goal-Oriented End-User Programming of Robots. In Proceedings of the 2024 ACM/IEEE International Conference on Human-Robot Interaction (pp. 582-591). Acceptance rate: 25%
7. **Porfirio, D.**, Roberts, M., & Hiatt, L. (2023, August). Guidelines for a Human-Robot Interaction Specification Language. In 2023 IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN) IEEE.
8. **Porfirio, D.**, Stegner, L., Cakmak, M., Saupé, A., Albarghouthi, A., & Mutlu, B. (2023, March). Sketching Robot Programs On the Fly. In 2023 18th ACM/IEEE International Conference on Human-Robot Interaction (HRI). ACM/IEEE. Acceptance rate: 25%
9. **Porfirio, D.**, Stegner, L., Cakmak, M., Saupé, A., Albarghouthi, A., & Mutlu, B. (2021, May). Figaro: A Tabletop Authoring Environment for Human-Robot Interaction. In Proceedings of the 2021 Conference on Human Factors in Computing Systems (CHI) (pp. 1-15). Acceptance rate: 26%
10. **Porfirio, D.**, Saupé, A., Albarghouthi, A., & Mutlu, B. (2020, April). Transforming robot programs based on social context. In Proceedings of the 2020 conference on human factors in computing systems (CHI) (pp. 1-12). Acceptance rate: 24%
11. **Porfirio, D.**, Fisher, E., Saupé, A., Albarghouthi, A., & Mutlu, B. (2019, October). Bodystorming human-robot interactions. In Proceedings of the 32nd Annual ACM Symposium on User Interface Software and Technology (UIST) (pp. 479-491). ACM. Acceptance rate: 24%
12. **Porfirio, D.**, Saupé, A., Albarghouthi, A., & Mutlu, B. (2018, October). Authoring and verifying human-robot interactions. In The 31st Annual ACM Symposium on User Interface Software and Technology (UIST) (pp. 75-86). ACM. *Best Paper Award*. Acceptance rate: 21%

JOURNAL PAPERS

1. Hwang, Y., Lee, C., **Porfirio, D.**, Hiatt, L. M., and Mutlu, B., “Formal Methods in Robot End-User Development: Progress, Gaps, and Opportunities”. *Under review*.
2. Xiong, K., McEntee, J. P., **Porfirio, D. J.**, & Masel, J. (2017). Drift barriers to quality control when genes are expressed at different levels. *Genetics*, 205(1), 397-407.

3. Shumway, K. R., **Porfirio, D. J.**, & Bailey, E. F. (2015). Phonation-related rate coding and recruitment in the genioglossus muscle. *Experimental brain research*, 233(7), 2133-2140.

WORKSHOP PAPERS

1. Praveena, P., Schoen, A., Gleicher, M., **Porfirio, D.**, & Mutlu, B. (2023, October). Petri Nets for the Iterative Development of Interactive Robotic Systems. In 2023 AAAI Fall Symposium Series on *Unifying Representations for Robot Application Development* (UR-RAD).
2. Stegner, L., **Porfirio, D.**, Roberts, M., & Hiatt, L. (2023, October). Considerations for End-User Development in the Caregiving Domain. In 2023 AAAI Fall Symposium Series on *Unifying Representations for Robot Application Development* (UR-RAD).
3. **Porfirio, D.**, Roberts, M., & Hiatt, L. (2023, March). On a Standardized Logical Representation for Human-Robot Interaction. In 2023 AAAI Spring Symposium, *HRI in Academia and Industry: Bridging the Gap*. *Best Paper Nominee*
4. **Porfirio, D.**, Sauppe, A., Cakmak, M., Albarghouthi, A., & Mutlu, B. (2023, March). Crowdsourcing Task Traces for Service Robotics. In 2023 18th ACM/IEEE International Conference on Human-Robot Interaction (HRI).
5. Pelikan, H., **Porfirio, D.**, Winkle, K. (2023, March). Designing Better Human-Robot Interactions through Enactment, Engagement, and Reflection. In 2023 18th ACM/IEEE International Conference on Human-Robot Interaction Workshop on *Human-Robot Conversational Interaction* (CUI@HRI).
6. **Porfirio, D.**, Cakmak, M., Sauppe, A., Albarghouthi, A., & Mutlu, B. (2021, May). Interaction Templates: A Data-Driven Approach for Authoring Robot Programs. In 2021 12th Annual Workshop on Evaluation and Usability of Programming Languages and Tools (PLATEAU).
7. **Porfirio, D.**, Sauppe, A., Albarghouthi, A., & Mutlu, B. (2019, March). Computational Tools for Human-Robot Interaction Design. In 2019 14th ACM/IEEE International Conference on Human-Robot Interaction (HRI) (pp. 733-735). IEEE.

Acceptance
rate: 31%

GRANTS AND GIFTS

Jerome and Isabella Karle Distinguished Scholar	2024-2025
Awarded \$25,000 for equipment and travel at the U.S. Naval Research Laboratory	
Microsoft Dissertation Grant	2021
Awarded \$21,148 for dissertation research	
Quori Robot Program	2018
Co-authored a winning proposal that secured a robot donation for UW–Madison.	
Galileo Circle Scholar	2015
Gifted \$1,000 from UA donors for research accomplishments	

FELLOWSHIPS

Jerome and Isabella Karle Distinguished Scholar	2024-present
Supports a full-time appointment at the U.S. Naval Research Laboratory	
NRC Postdoctoral Research Fellowship	2022-2024
Stipend with travel support at the U.S. Naval Research Laboratory	
Cisco Graduate Student Fellowship	2021-2022
Selected by the UW–Madison Computer Sciences Department	

NSF Graduate Research Fellowship Stipend at the UW–Madison Computer Sciences Department	2017-2022
Advanced Opportunity Fellowship Selected by the UW–Madison Computer Sciences Department	2016, 2020

HONORS AND AWARDS

Best Paper Award HRI '25, <i>Short Contributions</i>	2025
Best Paper Nominee 2023 AAAI Spring Symposium, <i>HRI in Academia and Industry: Bridging the Gap</i>	2023
Robotics Perception and Learning Summer School, KTH Royal Institute of Technology Invited to attend	2022
Microsoft Research AI Breakthroughs Invited to participate as a young researcher	2020
Heidelberg Laureate Forum Invited to attend as a young researcher	2019
HRI Pioneers Invited to participate as a young researcher	2019
Best Paper Award UIST '18	2018
Excellence in Undergraduate Research Award Selected by the UA Department of Computer Science	2016
Galileo Circle Scholar Selected by the UA Department of Computer Science	2015
National Hispanic Scholar Selected by the National Hispanic Recognition Program	2011
Dean's List with Distinction Awarded during six semesters at UA	2011-2016

TEACHING EXPERIENCE

Guest Lecturer, University of Maryland, College Park - <i>CMSC 722, AI Planning. Fall 2024.</i>	Fall 2024
Grandparents University Instructor, UW Duties: designing and teaching two-day lecture and lab sessions for UW alumni families. - <i>Social Robotics. July 2019.</i> - <i>Social Robotics. July 2018.</i>	Summers 2018-2019
Teaching Assistant, UA Duties: holding office hours and grading assignments - <i>CSC 352, Systems Programming and Unix. Summer 2015.</i>	Summer 2015
Section Leader, UA Duties: teaching lab sessions, holding office hours, and grading assignments - <i>CSC 245, Introduction to Discrete Structures. Fall 2015.</i> - <i>CSC 127B, Introduction to Computer Science II. Spring 2015.</i> - <i>CSC 227, Program Design and Development. Fall 2014.</i>	Fall 2014 - Spring 2015

Student Preceptor, UA

Spring 2012

Duties: assisting the professor during lectures and holding office hours
- *CHEM 151, Chemical Thinking I. Spring 2012.*

INVITED TALKS

George Mason University Title: <i>End-User Development for Human Robot Interaction: A Shifting Paradigm</i>	April 2025
HRI Workshop on <i>The Road to Reliable Robots</i> Title: <i>Evaluating Systems for Robot Application Development</i>	March 2025
Johns Hopkins University Title: <i>Robot Application Development: A Shifting Paradigm</i>	April 2024
Colorado School of Mines Title: <i>Authoring Social Interactions Between Humans and Robots</i>	March 2022
University at Buffalo Title: <i>Authoring Social Interactions Between Humans and Robots</i>	February 2022
Montana State University Title: <i>Authoring Social Interactions Between Humans and Robots</i>	February 2022
Talking Robotics Title: <i>Authoring Social Interactions Between Humans and Robots</i>	December 2020

MENTORSHIP

Ph.D. Committee Member for the Following Students

Saad Elbeleidy (2024)—*Colorado School of Mines*

Mentor for the Following Students

Evan Conway (2024-Present)—*US Naval Research Laboratory*

Nhi Tran (2023-Present)—*US Naval Research Laboratory*

Madeline Forsythe (2024)—*US Naval Research Laboratory*

Kyle Wang (2019-2022)—*UW Madison*

Linda Wu (2019-2020)—*UW Madison*

Mikayla Buford (2019-2020)—*UW Madison*

Laik Ruetten (2020)—*UW Madison*

Ezra Boley (2019)—*UW Madison*

Evan Fisher (2018)—*UW Madison*

ACADEMIC SERVICE

Event Organization

ACM/IEEE International Conference on Human-Robot Interaction (HRI) <i>Program committee (PC) member</i>	2024-2025
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Unifying Representations for Robot Application Development (AAAI Fall Symposium Series) <i>Lead Organizer</i>	2023-2024
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Designing Human-Robot Interactions: A StEER Tutorial (NordiCHI Tutorial) <i>Co-organizer</i>	2024
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End-User Development for Human-Robot Interaction (HRI Workshop) 2024
Co-lead organizer

Participatory Design and End-User Programming for Human-Robot Interaction (HRI Workshop) 2021
Co-organizer

Referee Service

HRI	- ACM/IEEE International Conference on Human-Robot Interaction	2020-2025
CHI	- ACM Conference on Human Factors in Computing Systems	2022, 2024-2025
AAMAS	- International Conference on Autonomous Agents and Multiagent Systems	2024-2025
CogSci	- Annual Meeting of the Cognitive Science Society	2024-2025
ICRA	- IEEE International Conference on Robotics and Automation	2024-2025
RSS	- Robotics: Science and Systems	2025
THRI	- ACM Transactions on Human-Robot Interaction	2020, 2024
SORO	- International Journal of Social Robotics	2022, 2024
UIST	- ACM Symposium on User Interface Software and Technology	2021, 2025
CSCW	- ACM SIGCHI Conference on Computer-Supported Cooperative Work	2022
HAI	- International Conference on Human-Agent Interaction	2023
TAHRI	- International Symposium on Technological Advances in Human-Robot Interaction	2024
AI-HRI	- AAAI Fall Symposium on Artificial Intelligence for Human-Robot Interaction	2021

TECHNICAL SKILLS

Programming Languages

Python, Golang, Java, Javascript, HTML, CSS, C#, C, PDDL, GDScript

Robotics Tools, Libraries, and Frameworks

ROS1, ROS2, Gazebo Simulator, OpenCV, Unity Game Engine

Robot Platforms

Hello-Robot Stretch 2, Softbank Pepper, Softbank Nao, Temi, iRobot Create 2

Design

Adobe Illustrator, Premiere, & Photoshop. Affinity Designer

AI Planning and Formal Methods

Unified Planning, Z3 Theorem Prover, PRISM Model Checker, NuSMV Model Checker

Data Visualization

Matplotlib, D3.js