Ninad Jadhav

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Education

Harvard University	Cambridge,
Ph.D. in Computer Science, School of Engineering and Applied Sciences	MA, USA
Thesis title: "Real–time Wireless Sensing at the Edge for In Situ Multi-Robot Deployment"	June 2025
Arizona State University	Tempe, AZ,
M.S. in Computer Science, Ira A. Fulton School of Engineering	USA, 2019
SRM Institute of Science and Technology	Chennai, TN,
B.Tech. in Computer Science and Engineering	India, 2014

Research Experience

Harvard University	Cambridge,MA
Postdoctoral fellow, School of Engineering and Applied Sciences	present
Harvard University	Cambridge,MA
Ph.D researcher in Computer Science, School of Engineering and Applied Sciences	2020 – 2025
Advisor: Prof. Stephanie Gil	
Project CETI	Dominica
Developing autonomous robot systems for sperm whale monitoring.	2023 – present
Arizona State University	Tempe, AZ
Graduate Researcher in Computer Science Ira A. Fulton School of Engineering	2019 – 2020
Advisor: Prof. Stephanie Gil	

Publications

Stars (*) next to the names in author list indicates equal contribution

Journals

[J1] **N. Jadhav**, Meghna Behari, R.J. Wood, and S. Gil, "WiSER-X: Wireless Signals-based Efficient Decentralized Multi-Robot Exploration without Explicit Information Exchange", *In preparation*, Preprint available here: `https://arxiv.org/abs/2412.19876`.

[J2] **N. Jadhav***, S. Bhattacharya*, D. Vogt, Y. Aluma, P. Tonessen, A. Prabhakara, S. Kumar, S. Gero, R.J. Wood, and S. Gil, "Reinforcement learning-based framework for whale rendezvous via autonomous sensing robots", *Science robotics*, 9 95, eadn7299, 2024.

[J3] A. Maalouf, **N. Jadhav**, K. Jatavallabhula, M. Chahine, D. Vogt, R.J. Wood, A. Torralba, and D. Rus, "Follow Anything: Open-Set Detection, Tracking, and Following in Real-Time", *IEEE Robotics and Automation Letters (RA-L)*, 9, 3283-3290, 2023.

[J4] **N. Jadhav***, W. Wang*, D. Zhang, O. Khatib, S. Kumar, and S. Gil, "A wireless signal-based sensing framework for robotics", *The International Journal of Robotics Research (IJRR)*, 41, 955 - 992, 2022.

Conferences

[C1] S. Bhattacharya*, **N. Jadhav***, H. Izhar, K. Li, K. George, R.J. Wood, and S. Gil, "Real-time Remote Tracking and Autonomous Planning for Whale Rendezvous using Robots", *International Symposium of Experimental Robotics (ISER)*, 2025.

[C2] M. Chahine∗, W. Yang∗, A. Maalouf, J. Siriska, **N. Jadhav**, D. Vogt, S. Gil, R. J. Wood, and D. Rus, "Decentralized Vision-Based Autonomous Aerial Wildlife Monitoring", *International Symposium of Experimental Robotics (ISER)*, 2025.

[C3] B. Dijkstra, **N. Jadhav**, A. Sloot, M. Marcantoni, B. Jayawardhana, S. Gil, and B. Haghighat, "WiFi-CSI Sensing and Bearing Estimation in Multi-Robot Systems: An Open-Source Simulation Framework.", *40th Anniversary of the IEEE International Conference on Robotics and Automation (ICRA@40)*, 2024. Available: https://arxiv.org/pdf/2410.01398.

[C4] **N. Jadhav**, W. Wang, D. Zhang, S. Kumar, and S. Gil, "Toolbox Release: A WiFi-Based Relative Bearing Framework for Robotics", *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 13714-13721, 2022.

[C5] M. Cavorsi, **N. Jadhav**, D. Saldaña, and S. Gil, S "Adaptive Malicious Robot Detection in Dynamic Topologies", *IEEE 61st Conference on Decision and Control (CDC)*, 2236-2243, 2022.

[C6] S. Krishnan, Z. Wan, K. Bhardwaj, **N. Jadhav**, A. Faust and V.J. Reddi, "Roofline Model for UAVs: A Bottleneck Analysis Tool for Onboard Compute Characterization of Autonomous Unmanned Aerial Vehicles", *2022 IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS)*, 162-174, 2022.

[C7] W. Wang, **N. Jadhav**, P.A. Vohs, N. Hughes, M. Mazumder, and S. Gil, "'Active Rendezvous for Multi-Robot Pose Graph Optimization using Sensing over Wi-Fi", *International Symposium of Robotics Research (ISRR)*, 832-849, 2019.

Peer Reviewing

- Robotics and Automation Letters (RA-L) - 2021,2022.
- Autonomous Robots (AuRo) - 2023.
- IEEE International Conference on Robotics and Automation (ICRA) - 2025
- IEEE International Conference on Intelligent Robots and Systems (IROS) - 2025
- IEEE MIT Undergraduate Research Technology Conference (URTC) - 2025

Awards and Recognition

- RBR50 Robotics Innovation Awards 2025.
- Harvard SEAS News
  "New methods for whale tracking and rendezvous using autonomous robots."
- EurekaAlert
  "New methods for whale tracking and rendezvous using autonomous robots".
- The Robot Report
  "Project CETI uses AI and robotics to track down sperm whales."

Research Mentoring

Harvard University Cambridge,MA
Undergraduate and Graduate mentor 2023 – present

- Meghna Behari (Harvard UG -> Amazon Robotics)
- Steven Cho (Harvard UG -> ETH Zurich MSc.)
- Carla Paillardon (ETH Zurich MSc., visiting student at Harvard)

Teaching

Harvard University   Cambridge,MA
Teaching Assistant, Multi-Robot Systems: Control, Communication, and Security   Spring 2022

- Awarded the Certificate of Distinction in Teaching for the Spring 2022 semester by Harvard's Office of Undergraduate Education; featured in Harvard Magazine.
- Integrated "WiFi-as-a-sensor" for signal directionality estimation into the coursework, enabling students to utilize it in their final projects.
- Co-designed and co-developed three mini-workshops to teach students the basics of robot control and sensing using ROS with LoCoBot and Turtlebot ground robot platforms equipped with LiDAR, RGBD Camera, and Wifi-as-a-Sensor.
- Designed and evaluated a search-and-rescue-themed final project for the class, guiding multiple student teams toward successful deployment on robot platforms.

Arizona State University   Tempe, AZ
Teaching Assistant, Introduction to Artificial Intelligence   Spring 2020

- Gained experience teaching both in-person and online formats.

Arizona State University   Tempe, AZ
Teaching Assistant, Coordination and Control of Multi-Robot Systems   Fall 2019

Arizona State University   Tempe, AZ
Course-work grader, Introduction to Artificial Intelligence   Spring 2019

Research Overview

Harvard University   Cambridge,MA
Ph.D researcher in Computer Science, School of Engineering and Applied Sciences   2020 – 2025

- Developed real-time WiFi-based signal directionality estimation capability for robots using onboard sensors and computing platforms such as Raspberry Pi and UP Square board, with opensource project in C++.
- Development and theoretical analysis of algorithms to enable wireless signal directionality estimation by leveraging arbitrary 3D motion of a drone. Analyzed the impact of positional measurement errors from visual-inertial odometry on directionality estimation.
- Designed and developed a battery-powered waterproof drone payload featuring algorithms for real-time on-board very high frequency (VHF) signal directionality estimation using software-defined radio; conducted field tests in the Caribbean Sea with beacons for marine wildlife tracking.
- Developed algorithms for efficient distributed multi-robot exploration of unknown environments under severe communication bandwidth constraints, utilizing heterogeneous sensing modalities such as LiDAR, Ultra-Wide Band, and WiFi.
- Gained extensive hands-on experience with building quadcopters, Pixhawk drone flight controllers, open-source firmware (PX4 and ArduPilot), MAVSDK, and interfacing with motion capture systems (Optitrack and Vicon) and drone peripherals such as first-person-view (FPV) required for autonomous deployment at sea.
- Deployed ROS-based SLAM and exploration algorithms on various customized ground robot platforms, including Turtlebot, ROSbot, LoCoBot, iRobot Create, Leo Rover and ArudRover.

Project CETI   Dominica
Developing autonomous robot systems for sperm whale monitoring.   2023 – present

- Gained experience in the design, development, and deployment of autonomous quadcopters with sensing payloads for tracking and autonomous tagging of sperm whales in the Caribbean Sea.
- Conducted four science expeditions in Dominica, each spanning approximately 3 weeks, involving 10 hours per day on a catamaran. Co-led two expeditions, managing day-to-day task planning and coordination with

Project CETI's marine operations team.

- Gained experience in setting up and deploying autonomous drones, sensors to detect very high-frequency radio beacons, and underwater acoustic hydrophones at sea from a catamaran for real-time rendezvous with sperm whales during their surfacing periods.
- Collaborated with a multi-disciplinary team consisting of marine biologists and roboticists towards developing novel solutions that leverage autonomous robots for scaling biological data collection and visual observations of sperm whales.

Arizona State University Tempe, AZ
Graduate Researcher in Computer Science Ira A. Fulton School of Engineering 2019 – 2020

- Developed an active rendezvous approach using WiFi-based signal directionality sensing to minimize pose estimation errors during distributed mapping with a team of robots.

Arizona State University Tempe, AZ
M.S. in Computer Science, Ira A. Fulton School of Engineering 2017 – 2019

- Developed a localization system using WiFi beacons for mobile ground robots.

References

Prof. Stephanie Gil
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Prof. Robert J. Wood
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Prof. Shane Gero
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