Kalvik Jakkala

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Research Interests

My research lies at the intersection of machine learning and robotics, with a particular emphasis on environmental monitoring and autonomous systems. I develop algorithms for sensor placement and informative path planning, with current work focusing on enabling autonomous underwater vehicles to perform efficient inspection and monitoring tasks in challenging marine environments.

Keywords: Informative path planning, sensor placement, marine robotics, Bayesian learning

Research Experience

Postdoctoral Researcher, Texas A&M University **Oct 2024—Present**
Designing path planning algorithms for autonomous underwater vehicles to enable efficient infrastructure inspection in marine environments.

Bayesian Sensor Placement and Informative Path Planning **May 2020—Sep 2024**
Developed efficient methods for sensor placement and informative path planning in both continuous and discrete domains. Achieved solutions at least an order of magnitude faster than prior state of the art, enabling real-time deployment on resource-constrained robots.

Research Intern, GE Research **May 2023—Aug 2023**
Created a low size, weight, and power-optimized Bayesian framework to explain and justify predictions of pre-trained deep neural networks.

Pose Estimation and Action Recognition with mmWave Radar **May 2019—May 2020**
Designed and evaluated deep learning models for human pose estimation and activity recognition using mmWave radar data.

User Recognition with WiFi and mmWave Radar **Jan 2018—May 2020**
Developed deep learning algorithms for gait-based user identification using signals from WiFi routers and mmWave radars.

Publications

[1] **Kalvik Jakkala**, Saurav Agarwal, Jason O'Kane, and Srinivas Akella. "Informative Path Planning with Guaranteed Estimation Uncertainty". Under Review. 2026. URL: https://www.itskalvik.com/publication/uncertainty-guaranteed-ipp/.

[2] **Kalvik Jakkala** and Jason O'Kane. "Low-Cost Underwater In-Pipe Centering and Inspection Using a Minimal-Sensing Robot". Under Review. 2026. URL: https://www.itskalvik.com/publication/underwater-in-pipe-centering/.

[3] **Kalvik Jakkala**, Jason O'Kane, and Srinivas Akella. "Schur-MI: Fast Mutual Information for Robotic Information Gathering". Under Review. 2026.

[4] **Kalvik Jakkala** and Srinivas Akella. "Fully Differentiable Adaptive Informative Path Planning". In: *IEEE International Conference on Robotics and Automation, ICRA*. May 2025, pp. 5431–5437. URL: https://www.itskalvik.com/publication/sgp-aipp/.

[5] **Kalvik Jakkala** and Srinivas Akella. "Fully differentiable sensor placement and informative path planning". In: *The International Journal of Robotics Research* (2025). URL: https://www.itskalvik.com/publication/sgp-foundation/.

[6] **Kalvik Jakkala** and Srinivas Akella. "Multi-Robot Informative Path Planning from Regression with Sparse Gaussian Processes". In: *IEEE International Conference on Robotics and Automation, ICRA*. IEEE, 2024. URL: https://www.itskalvik.com/publication/sgp-ipp/.

[7] **Kalvik Jakkala** and Srinivas Akella. *Bayesian Sensor Placement for Multi-source Localization of Viruses in Wastewater Networks*. 2023. URL: https://www.itskalvik.com/publication/wastewater/.

[8] **Kalvik Jakkala** and Srinivas Akella. *Efficient Sensor Placement from Regression with Sparse Gaussian Processes in Continuous and Discrete Spaces*. 2023. URL: https://www.itskalvik.com/publication/sgp-sp/.

[9] Ekkasit Pinyoanuntapong, Ayman Ali, **Kalvik Jakkala**, Pu Wang, Minwoo Lee, Qucheng Peng, Chen Chen, and Zhi Sun. "GaitSADA: Self-Aligned Domain Adaptation for mmWave Gait Recognition". In: *20th International Conference on Mobile Ad Hoc and Smart Systems, MASS*. IEEE, 2023. URL: https://www.itskalvik.com/publication/sada/.

[10] **Kalvik Jakkala** and Srinivas Akella. "Probabilistic Gas Leak Rate Estimation Using Submodular Function Maximization With Routing Constraints". In: *IEEE Robotics and Automation Letters, RA-L* (2022). URL: https://www.itskalvik.com/publication/graph-ipp/.

[11] **Kalvik Jakkala**. "Deep Gaussian Processes: A Survey". In: *CoRR* abs/2106.12135 (2021). URL: https://www.itskalvik.com/publication/dgp/.

[12] Prabhu Janakaraj, **Kalvik Jakkala**, Arupjyoti Bhuyan, Zhi Sun, Pu Wang, and Minwoo Lee. "STAR: Simultaneous Tracking and Recognition through Millimeter Waves and Deep Learning". In: *12th IFIP Wireless and Mobile Networking Conference, WMNC*. IEEE, 2019. URL: https://www.itskalvik.com/publication/star/.

[13] **Kalvik Jakkala**, Arupjyoti Bhuyan, Zhi Sun, Pu Wang, and Zhuo Cheng. "Deep CSI Learning for Gait Biometric Sensing and Recognition". In: *Third International Balkan Conference on Communications and Networking, BalkanCom*. 2019. URL: https://www.itskalvik.com/publication/csi/.

[14] Akarsh Pokkunuru, **Kalvik Jakkala**, Arupjyoti Bhuyan, Pu Wang, and Zhi Sun. "NeuralWave: Gait-Based User Identification Through Commodity WiFi and Deep Learning". In: *44th Annual Conference of the Industrial Electronics Society, IECON*. IEEE, 2018. URL: https://www.itskalvik.com/publication/neuralwave/.

EDUCATION

Ph.D. in Computer Science, University of North Carolina at Charlotte **Aug 2018—May 2024**
Concentration: Machine Learning and Robotics
Thesis: Efficient Bayesian Sensor Placement and Informative Path Planning
Advisor: Dr. Srinivas Akella

M.Sc. in Computer Science, University of North Carolina at Charlotte **Aug 2018—May 2021**
Concentration: Artificial Intelligence, Robotics, and Gaming
GPA: 4.00 / 4.00

B.Sc. in Computer Science, Wichita State University **Aug 2014—May 2018**
Minor: Mathematics
GPA: 3.45 / 4.00

TEACHING EXPERIENCE

Teaching Assistant, University of North Carolina at Charlotte **Jan 2021—May 2024**
Assisted in teaching and mentoring graduate students in the following courses:
- Machine Learning (ITCS 8156)
- Algorithms and Data Structures (ITCS 8114)
- Optimization for Machine Learning and Data Science (ITCS 8010)

B.S. Teaching Fellow, Wichita State University **Aug 2016—May 2018**
Co-instructed, graded, and tutored undergraduate students in the following programming courses:
- Object-Oriented Programming (CS 311)
- Data Structures (CS 300)
- Introductory C++ Programming (CS 211)

SERVICE/AWARDS

Associate Editor **Sep 2025—**
- IEEE International Conference on Robotics and Automation (ICRA)

Reviewer **Jan 2022—**
- IEEE International Conference on Robotics and Automation (ICRA)
- IEEE International Conference on Intelligent Robots and Systems (IROS)
- IEEE International Symposium on Multi-Robot & Multi-Agent Systems (MRS)
- IFAC Conference on Control Applications in Marine Systems, Robotics and Vehicles (CAMS)
- International Journal of Robotics Research (IJRR)
- IEEE Robotics and Automation Letters (RA-L)
- Ocean Engineering

UNC Charlotte GSSF Grant Recipient **May 2022**
- Awarded the UNC Charlotte Graduate School's Summer Fellowship (GSSF) grant

Deans Honor Roll **May 2018, May 2017, Dec 2016, Dec 2014**
- Recognized for outstanding academic performance by the Dean's office

Vice President, Association for Computing Machinery (ACM) **Aug 2015—Dec 2016**
- Helped to manage the local chapter of ACM and organized educational events on campus

Vice President, Institute of Electrical and Electronics Engineering (IEEE) **Aug 2015—Dec 2016**
- Helped to manage the local chapter of IEEE and organized educational events on campus

SKILLS

Programming Languages: Python, C/C++, Matlab, Bash
Libraries & Frameworks: TensorFlow, PyTorch, OpenCV, ROS, Pyro, GPflow, NumPy, JAX
Platforms & Tools: Linux, Docker, Slurm, OpenStack, AWS, Microsoft Azure, Google Cloud Platform (GCP)