

RESEARCH INTERESTS

My research lies at the intersection of machine learning and robotics, with a focus on approximate inference (Bayesian learning) and path planning. Currently, I am investigating sparse Gaussian processes to tackle critical issues in robotics. These include generating explainable DNN predictions, sensor placement, multi-robot informative path planning, and robot motion planning.

RESEARCH EXPERIENCE

Bayesian Sensor Placement and Informative Path Planning May 2020—

Researching approaches for efficient sensor placement and informative path planning in continuous and discrete domains. My current approach is at least an order of magnitude faster than the prior SOTA, thereby enabling real-time deployment on resource-constrained robots

Explaining, Justifying, and Quantifying Uncertainty of DNNs (Internship at GE Aerospace) May 2023—Aug 2023

Developed a low size, weight, and power (SWaP)-optimized Bayesian approach to explain black-box pre-trained DNN predictions

Pose Estimation and Action Recognition with mmWave Radar Devices May 2019—May 2020

Analyzed and developed deep learning algorithms for pose estimation and action recognition from mmWave radar data

User Recognition with WiFi Routers and mmWave Radar Devices May 2019—May 2020

Pioneered deep learning algorithms for gait-based user recognition with WiFi routers and mmWave radars

Real-time Depth Estimation from Monocular Images Jan 2017—Dec 2017

Studied, implemented, and deployed deep learning methods for real-time depth estimation from monocular images in autonomous underwater and aerial drones

Autonomous Indoor Environment Mapping Drone (Team) Aug 2015—May 2016

Developed path planning and object avoidance algorithms for an indoor environment mapping aerial drone

PUBLICATIONS

- [1] **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/>.
- [2] **Kalvik Jakkala** and Srinivas Akella. “Bayesian Sensor Placement for Multi-source Localization of Viruses in Wastewater Networks”. Preprint. 2023. URL: <https://www.itskalvik.com/publication/wastewater/>.
- [3] **Kalvik Jakkala** and Srinivas Akella. “Efficient Sensor Placement from Regression with Sparse Gaussian Processes in Continuous and Discrete Spaces”. Preprint. 2023. URL: <https://www.itskalvik.com/publication/sgp-sp/>.
- [4] 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/>.
- [5] **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/>.
- [6] **Kalvik Jakkala**. “Deep Gaussian Processes: A Survey”. In: *CoRR* abs/2106.12135 (2021). URL: <https://www.itskalvik.com/publication/dgp/>.
- [7] 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/>.
- [8] **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/>.
- [9] 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/>.

SKILLS

Libraries: Tensorflow, PyTorch, OpenCV, Robot Operating System (ROS), Pyro, GPFlow, Numpy, Jax

Languages: Python, C/C++, Matlab, Bash Scripting

Platforms: Linux, Docker, OpenStack, Amazon Web Services (AWS), Microsoft Azure, Google Cloud Platform (GCP), Slurm

TEACHING EXPERIENCE

- Teaching Assistant** (University of North Carolina at Charlotte) **Jan 2021—May 2024**
Taught and mentored graduate students in the following courses
- Machine Learning (ITCS8156)
 - Algorithms & Data Structures (ITCS8114)
 - Optimization for Machine Learning and Data Science (ITCS8010)
- B.S. Teaching Fellow** (Wichita State University) **Aug 2016—May 2018**
Co-instructed, graded, and tutored undergraduate students in the following programming classes
- Object-oriented programming (CS311)
 - Data structures (CS300)
 - Introductory C++ programming (CS211)

EDUCATION

- University of North Carolina at Charlotte (PhD)** **Aug 2018—May 2024**
- Computer Science, Machine Learning
- University of North Carolina at Charlotte (MSc)** **Aug 2018—May 2021**
- Computer Science, concentration in AI, Robotics, and Gaming
- Cumulative GPA: 4.00
- Wichita State University (BSc)** **Aug 2014—May 2018**
- Computer Science, minor in Mathematics
- Cumulative GPA: 3.45

ACTIVITIES/AWARDS

- Reviewer** **Jan 2022—**
- IEEE International Conference on Robotics and Automation (ICRA)
- IEEE International Conference on Intelligent Robots and Systems (IROS)
- IFAC Conference on Control Applications in Marine Systems, Robotics and Vehicles (CAMS)
- 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