Kalvik Jakkala

kjakkala@uncc.edu https://itskalvik.github.io/
https://github.com/itskalvik https://linkedin.com/in/itskalvik
316-226-4000 Charlotte, North Carolina

Research Interests

I am interested in Bayesian learning, deep learning, and algorithmic robotics. Specifically, I am studying sparse Gaussian processes to address crucial problems in robotics, such as generating explainable DNN predictions, sensor placement, multi-robot informative path planning, and learning robot dynamics.

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

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 DNNs.

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. "Bayesian Sensor Placement for Multi-source Localization of Viruses in Wastewater Networks". Manuscript submitted for publication. 2023. URL: https://itskalvik.github.io/publications/wastewater.

[2] **Kalvik Jakkala** and Srinivas Akella. "Efficient Sensor Placement from Regression with Sparse Gaussian Processes in Continuous and Discrete Spaces". Manuscript submitted for publication. 2023. URL: https://itskalvik.github.io/publications/SGP-SP.

[3] **Kalvik Jakkala** and Srinivas Akella. "Multi-Robot Informative Path Planning from Regression with Sparse Gaussian Processes". Manuscript submitted for publication. 2023.

[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 2023*. IEEE, 2023. URL: https://itskalvik.github.io/publications/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* (2022). URL: https://itskalvik.github.io/publications/gas-leak-estimation.

[6] **Kalvik Jakkala**. "Deep Gaussian Processes: A Survey". In: *CoRR* abs/2106.12135 (2021). URL: https://itskalvik.github.io/publications/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 2019*. IEEE, 2019. URL: https://itskalvik.github.io/publications/STAR.

[8] **Kalvik Jakkala**, Arupjyoti Bhuyan, Zhi Sun, Pu Wang, and Zhuo Cheng. "Deep CSI Learning for Gait Biometric Sensing and Recognition". In: *CoRR* abs/1902.02300 (2019). URL: https://itskalvik.github.io/publications/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 2018*. IEEE, 2018. URL: https://itskalvik.github.io/publications/Neuralwave.

SKILLS

Research Methods: Gaussian Processes, State-Space Models, Probabilistic Models, Variational Inference, Graph Neural Networks (GNNs), Convolutional Neural Networks (CNNs), Generative Adversarial Networks (GANs), Transformers, Generative Flow Networks (GFlowNets-RL), Energy-Based Models, Flow-Based Models, Diffusion Models, Contrastive Representation Learning, Metric Learning
Libraries: Tensorflow, PyTorch, OpenCV, Robot Operating System (ROS), SciPy, Pandas, Pyro, GPFlow, Numpy
Languages: Python, C/C++, Matlab, Bash Scripting, SQL
Platforms: Linux, Unix, OpenStack, Amazon Web Services (AWS), Microsoft Azure, Google Cloud Platform (GCP), Slurm

TEACHING EXPERIENCE

Teaching Assistant (University of North Carolina at Charlotte) **Jan 2021—**
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—Dec 2023**
- 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—**
- Reviewer for ICRA and IROS conferences

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 Deans office

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

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