

# Kalvik Jakkala

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## RESEARCH INTERESTS

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I am interested in Bayesian learning and mathematical optimization. Specifically, methods that can reliably express uncertainty, make open-set predictions, and incorporate prior domain knowledge. I am currently researching sensor placement and source localization using sparse Gaussian processes.

## RESEARCH EXPERIENCE

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### Bayesian Sensor Placement and Source Localization

May 2020—May 2023

Researching Bayesian approaches for sensor placement and source localization in continuous and discrete (set and graph) domains. Wrote four papers on the topic, one of which has been published in the top robotics journal IEEE RA-L

### 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

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- [1] **Kalvik Jakkala** and Srinivas Akella. “Augmented Gaussian Processes for Data Reconstruction and Sensors Placement”. Manuscript submitted for publication. 2022.
- [2] **Kalvik Jakkala** and Srinivas Akella. “Bayesian Sensor Placement for Multi-source Localization of Viruses in Wastewater Networks”. Manuscript submitted for publication. 2022. URL: <https://kdkalvik.github.io/publications/wastewater>.
- [3] **Kalvik Jakkala** and Srinivas Akella. “Efficient Sensor Placement using Sparse Gaussian Processes in Continuous and Discrete Environments”. Manuscript submitted for publication. 2022.
- [4] **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://kdkalvik.github.io/publications/gas-leak-estimation>.
- [5] **Kalvik Jakkala**, Chen Chen, Minwoo Lee, Arupjyoti Bhuyan, Zhi Sun, and Pu Wang. “Spatio-Temporal Domain Adaptation for Gait Based User Recognition from Radar Data”. Manuscript submitted for publication. 2022. URL: <https://kdkalvik.github.io/publications/STDA>.
- [6] **Kalvik Jakkala**. “Deep Gaussian Processes: A Survey”. In: *CoRR* abs/2106.12135 (2021). URL: <https://kdkalvik.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://kdkalvik.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://kdkalvik.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://kdkalvik.github.io/publications/Neuralwave>.

## SKILLS

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**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, GFlow, 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

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<b>Teaching Assistant</b> (University of North Carolina at Charlotte) Taught and mentored graduate students in the following courses <ul style="list-style-type: none"><li>- Machine Learning (ITCS8156)</li><li>- Algorithms &amp; Data Structures (ITCS8114)</li></ul>	<b>Jan 2021—May 2022</b>
<b>B.S. Teaching Fellow</b> (Wichita State University) Co-instructed, graded and tutored undergraduate students in the following programming classes <ul style="list-style-type: none"><li>- Object-oriented programming (CS311)</li><li>- Data structures (CS300)</li><li>- Introductory C++ programming (CS211)</li></ul>	<b>Aug 2016—May 2018</b>

## EDUCATION

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<b>University of North Carolina at Charlotte (PhD)</b> <ul style="list-style-type: none"><li>- Computer Science, Machine Learning</li></ul>	<b>Aug 2018—Dec 2023</b>
<b>University of North Carolina at Charlotte (MSc)</b> <ul style="list-style-type: none"><li>- Computer Science, concentration in AI, Robotics, and Gaming</li><li>- Cumulative GPA: 4.00</li></ul>	<b>Aug 2018—May 2021</b>
<b>Wichita State University (BSc)</b> <ul style="list-style-type: none"><li>- Computer Science, minor in Mathematics</li><li>- Cumulative GPA: 3.45</li></ul>	<b>Aug 2014—May 2018</b>

## ACTIVITIES/AWARDS

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<b>Deans Honor Roll</b> <ul style="list-style-type: none"><li>- Recognized for outstanding academic performance by the Deans office</li></ul>	<b>May 2018, May 2017, Dec 2016, Dec 2014</b>
<b>Vice President, Association for Computing Machinery (ACM)</b> <ul style="list-style-type: none"><li>- Managed the local chapter of ACM and organized educational events on campus</li></ul>	<b>Aug 2015—Dec 2016</b>
<b>Vice President, Institute of Electrical and Electronics Engineering (IEEE)</b> <ul style="list-style-type: none"><li>- Managed the local chapter of IEEE and organized educational events on campus</li></ul>	<b>Aug 2015—Dec 2016</b>