

Khushal BRAHMBHATT

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EXPERIENCE

ROBOTICS ENGINEER

Apr 2024 - Present

WHEEL.ME

- Developing motion planning and navigation algorithms for autonomous robots.

GRADUATE RESEARCH ASSISTANT

Jun 2021 - Apr 2024

OREGON STATE UNIVERSITY

- Developed a distributed motion planning and trajectory optimization algorithm for safety critical autonomous systems using Temporal Logic and Mixed Integer Programming on an **HPC** cluster in **Gurobi/MATLAB**.
- Demonstrated SLAM, pure-pursuit, and planning algorithms for autonomous racing on Nvidia Jetson TX2 using **ROS/C++**.
- Conducted a literature review on resilient control architectures for autonomous UAV systems to advise the FAA on UAV safety.

AUTONOMOUS VEHICLE SAFETY INTERN

Jun 2022 - Sep 2022

UL SOLUTIONS

- Developed a pipeline to streamline data visualization and error analysis of object detection models under different ODD using Waymo Perception dataset in **PyTorch/Python** to advise functional safety of autonomous vehicles.
- Composed training material on ADAS standards: ISO 26262, ISO 24029, ISO 4804, UL4600.

RESEARCH CONSULTANT

Aug 2019 - Aug 2020

AI4D-AFRICA INNOVATION GRANT

- Collected the first driving dataset from Africa of over 20hrs using vehicle CAN, and trained an end-to-end deep learning model for automated driving on dirtroads using **TensorFlow/Python**.

AUTONOMOUS SYSTEMS ENGINEER

Feb 2018 - May 2019

VIAMAAN

- Early employee in the development of a UTM urban air mobility solution (Air Taxi).
- Trained deep learning models for trajectory prediction, behavior planning and aerial scene understanding from LiDAR data using **PyTorch/Python** and WandB.
- Led the effort on hardware/software system integration to build the first prototype with Agile and CI/CD principles using **C++/Redis**.
- Demonstrated MVP using HIL and SIL flight simulations using **Gazebo** and Ardupilot/Dronekit to sign on the first customers.

ROBOTICS ENGINEER

Oct 2017 - Feb 2018

ISPAGRO ROBOTICS

- Developed and tested drones for agriculture, including computer vision algorithms for collision avoidance and autonomous landing using **OpenCV/Python** in dense forested environments.

EDUCATION

OREGON STATE UNIVERSITY

Sep 2020 - Jun 2023

M.S. IN ARTIFICIAL INTELLIGENCE, M.S. IN ROBOTICS

MANIPAL UNIVERSITY

Jul 2013 - Jul 2017

B.TECH IN MECHATRONICS

PUBLICATIONS

GARI: A DRIVING DATASET FROM KENYAN HIGHWAYS AND NATIONAL PARKS

Jan 2021

Khushal Brahmbhatt, Ronald Ojino. [\[DATASET\]](#)

END-TO-END LEARNING FOR AUTONOMOUS DRIVING ON UNPAVED ROADS – A STUDY TOWARDS AUTOMATED WILDLIFE PATROL

Apr 2020

Khushal Brahmbhatt. "AfricaNLP Workshop." ICLR, 2020.

NEURAL NETWORK APPROACH FOR VISION-BASED TRACK NAVIGATION USING LOW-POWERED COMPUTERS ON MAVS

Sep 2017

Khushal Brahmbhatt, Akshatha Rakesh Pai, and Sanjay Singh. IEEE ICACCI, 2017.

SKILLS

PROGRAMMING LANGUAGES C++ | Python | MATLAB | Bash

SOFTWARE DEVELOPMENT Linux | Git | Docker | AWS | HPC | Azure DevOps

FRAMEWORKS & LIBRARIES **Robotics & UAV Systems:** ROS | Gazebo | Gurobi | Python-CAN | ArduPilot | MAVLink
Deep Learning & Computer Vision: PyTorch | TensorFlow | WandB | OpenCV
Data Science: Redis | Numpy | Pandas | Scikit-learn

AWARDS

ARTIFICIAL INTELLIGENCE FOR DEVELOPMENT IN AFRICA (AI4D-AFRICA) INNOVATION GRANT

Aug 2019

PROJECTS

DISTRIBUTED FAIRFLY

Oct 2021 - Jun 2023

- Developed a distributed planning algorithm for a multi-UAV system with inherent safety guarantees using Temporal Logic. Focused on fairness optimization as a Mixed Integer Problem solved with Gurobi in MATLAB. [\[THESIS\]](#)

PRIORITY-BASED MULTIAGENT PATH DECONFLICTION

Oct 2021 - Dec 2021

- Used Neural Tree Expansion, a machine learning algorithm that combines Monte Carlo Tree Search and Reinforcement Learning, to formulate a novel reward function for path deconflition based on task priorities when planning in a multiagent system. [\[PROJECT\]](#)

DARPA SUBTERRANEAN CHALLENGE

Jun 2021 - Sep 2021

- Improved artifact and survivor detection on the DARPA SubT challenge by training a deep learning model with a ResNet50 backbone for object detection on thermal images using TensorFlow/Azure/Docker.
- Collaborated with a large team of over 100 researchers from Oregon State University and Carnegie Mellon University to build a system of autonomous vehicles to map, navigate and detect artifacts in underground caves and tunnels.

MOTION PLANNING FOR URBAN AUTONOMOUS DRIVING USING CONFORMAL LATTICE PLANNER

Jan 2021 - Mar 2021

- Implemented both conformal lattice planner and deep neural network (ResNet50) data-driven approaches for a comparative analysis of short-horizon motion planning using the Lyft dataset. [\[PROJECT\]](#)

MOBILE SENSOR COORDINATION FOR OPTIMAL COVERAGE OF WEATHER DATA SOURCES

Oct 2020 - Dec 2020

- Used a neuro-evolutionary algorithm to achieve optimal coverage of weather data in an environment by intelligently coordinating mobile sensor agents in a multiagent system. [\[PROJECT\]](#)

MOTION PREDICTION FOR AUTONOMOUS VEHICLES

Aug 2020 - Nov 2020

- Built a motion prediction model using a CNN+LSTM architecture in PyTorch to predict trajectories of surrounding vehicles using the Lyft Prediction Dataset. [\[PROJECT\]](#)

END-TO-END LEARNING FOR AUTONOMOUS DRIVING ON UNPAVED ROADS

Jul 2019 - May 2020

- Used an end-to-end deep learning model in Keras/TensorFlow to learn to autonomously steer a vehicle on driving trails in national parks in Kenya using behavioral cloning. The results were used to perform a feasibility study on the deployment of Unmanned Ground Vehicles for automated wildlife patrol in Kenya. [\[PROJECT\]](#)

UAV NAVIGATION USING MACHINE LEARNING AND COMPUTER VISION

Jan 2017 - Jun 2017

- Developed a UAV to autonomously navigate a track using real-time inference from a neural network trained only on monocular images.