

# Hersh Vakharia

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## EDUCATION

### University of Michigan

Master of Science in Robotics

- GPA: 4.00/4.00

Ann Arbor, MI

Aug. 2022 – May 2024

### University of Michigan

Bachelor of Science in Computer Engineering, Minor in Mathematics

- GPA: 3.67/4.00
- Coursework: Robotics, Embedded Systems, Computer Vision, Linear Algebra

Ann Arbor, MI

Aug. 2018 – May 2022

## PUBLICATIONS

H. Vakharia and X. Du, 'Efficient Multi-Resolution Fusion for Remote Sensing Data with Label Uncertainty', in *IGARSS 2023 - 2023 IEEE International Geoscience and Remote Sensing Symposium*, 2023.

## EXPERIENCE

### University of Michigan Robotics - Ford Center for Autonomous Vehicles

Graduate Research Assistant

- Research fuzzy-measure based multi-modal and multi-resolution sensor fusion with label uncertainty
- Formulate label uncertainty with Multiple Instance Learning
- Develop python fuzzy-measure optimization with evolutionary algorithms, quadratic programs, and quasi-newton methods
- Apply fusion to Multi-spectral, Sonar, LiDAR, and Depth sensing modalities
- Formulate experiments with pedestrian, building, and object detection

Ann Arbor, MI

Aug. 2022 – Present

### Microsoft - Surface Org

Software Engineer Intern (x3)

- Developed prototype website in Blazor/C# that communicates with windows service to image Surface Devices
- Developed and tested UEFI image based on open-source EDK2 platforms
- Developed and documented Surface Duo dual-screen android apps

Redmond, WA

Summer 2021, 2022, 2023

### Lucid Drone Technologies

Embedded Systems Engineering Intern

- Developed C++ ROS package to read MPU6050 IMU data via I2C
- Engineered a ROS camera-IMU synchronization sensor for Robust Visual Inertial Odometry Framework
- Calibrated IMU, camera (extrinsic and intrinsic), and Cam-IMU sync using Kalibr toolset

Charlotte, NC

May 2020 – Aug. 2020

### University of Michigan Autonomous Robotic Vehicle Team

President / Sensors Lead / Sensors Member

- Led 40 member team in development of autonomous robotic vehicle for the 2022 Intelligent Ground Vehicle Competition
- Developed Extended Kalman Filter based odometry in ROS/C++ from IMU and wheel encoder data
- Configured Simultaneous Localization and Mapping (SLAM) from odometry, LiDAR, and IMU
- Ran Robot Operating System workshops to train new members

Ann Arbor, MI

Sept. 2018 – June 2022

## PROJECTS

### SNACBot | Python, C++, ROS, MoveIt, Computer Vision, YOLOv5, Inverse Kinematics

- Designed custom 3D-printed 5-axis robot arm with Dynamixel servo motors
- Configured low-level control, inverse kinematics, and motion planning in ROS and MoveIt
- Developed YOLOv5 based food object detection using gripper-mounted Intel Realsense depth camera

### AdaIN Style Transfer | Python, PyTorch, Computer Vision

- Implemented Arbitrary Style Transfer in Real-time with Adaptive Instance Normalization by Huang et al. in PyTorch
- Trained convolutional neural network to apply style of one image to the content of another image

### Robot Laser Tag | Embedded C, STM32, UART, I2C

- Engineered STM32-based omni-directional tilt-controlled robots with motorized turrets for IR laser tag
- Developed embedded-c drivers for LCD, motor H-bridge, IMU, and IR emitters/receivers

### Visual Underwater SLAM | Python, GTSAM, ROS, SLAM, Docker

- Developed visual-inertial underwater pose-graph SLAM formulated in GTSAM with ORB feature detectors
- Enabled ROS compatibility and tested on real-world underwater data

## TECHNICAL SKILLS

**Languages:** Python, C, Embedded C, C++, C#, MATLAB

**Frameworks:** Robot Operating System (ROS, ROS2), MoveIt, Android SDK

**Libraries:** NumPy, Matplotlib, PyTorch, Python Multiprocessing, OpenCv, GTSAM, CUDA

**Other:** Linux, Docker, Arduino, Raspberry Pi, NVIDIA Jetson, LaTeX