

# Ryan Verbrugge

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## Professional Summary

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Robotics engineering graduate with a focus on perception, mapping, and simulation in autonomous systems. Experienced in developing research-grade software using C++, Python, and PyTorch, and applying both classical methods and deep learning to sensor fusion, localization, and spatial understanding. Demonstrated ability to contribute to interdisciplinary research teams and support experimental validation through simulation tools and real-world testing.

## Education

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**Michigan Technological University**

*BS in Robotics Engineering*

*Aug 2021 – Aug 2025*

## Research Experience

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**Research Assistant**

*Michigan Technological University*

*Houghton, MI*

*Aug 2022 – Present*

- Conducted research in various topics spreading from legged robotic control to perception and path planning systems in autonomous vehicles
- Assisted graduate student peers in additional research topics

**Research Areas**

- 6/2023 - Present: Automated bat counting system for White Nose Disease population study with DNR (See [Fat Bat Project](#))
- 5/2025 - 8/2025: Research under the Army Corps of Engineers for vehicle terrain passability assessment through ground deformation analysis
- 1/2025 - 8/2025: LiDAR benchmarking and data collection in adverse winter weather
- 8/2024 - 12/2024: Winter Snow dataset for LiDAR systems and neural network training for vehicle detection in heavy snow environments
- 6/2023 - 9/2024: ARPA-E NextCar II, road surface analyzation and data collection
- 1/2023 - 5/2023: (main researcher) Bipedal locomotion and gate correction on low mu surfaces
- 8/2022 - 8/2023: (main researcher) Calculating fractional order calculus through the usage of symmetric neural networks

## Teaching Experience

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**Undergraduate Class Grader - Neuromorphics**

*Michigan Technological University*

*Houghton, MI*

*March 2025 – April 2025*

- Rewrote labs to provide proper content information and proper formatting
- Assisted students in asynchronous learning labs
- Graded students on given tasks

**Undergraduate Lab Assistant - ROS**

*Michigan Technological University*

*Houghton, MI*

*Sept 2023 – Dec 2023*

- Transferred labs from ROS Melodic to Noetic
- Re-wrote labs to provide better flow and ease of knowledge acquisition for students
- Assisted students in learning and understanding beginning topics for ROS
- Started creation of new lab curriculum for students in up-coming years

## Engineering Experience

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**Software Engineer**

*Steelhead*

*Calumet, MI*

*September 2025 – present*

- Implemented improved UI design for web-based applications
- Improved admin/user communication and interaction through back-end SQL data

**Autonomous Simulations Intern**

*Hexagon - Manufacturing Intelligence Division*

*Novi, MI*

*June 2024 – Aug 2024*

- Developed interfaces between simulation software and major autonomous vehicle software
- Developed automotive simulations for autonomous vehicle testing and development
- Produced documentation for customer support
- Supported and assisted in customer usage of simulation software

## Skills

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### Programming Languages

- C/C++, Python, Bash, TypeScript, SQL

### Robotics and Programming

- Robot Operating System (ROS/ROS2), Linux, PyTorch, Virtual Test Drive, Carla, Unreal, Linux, Matlab, Driving Scenario Designer, RoadRunner, Simulink

## Professional Affiliations

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- Society of Automotive Engineers (SAE)

## Additional Projects

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### AutoDrive Challenge II

[autodrivechallenge.com](https://autodrivechallenge.com) 

The AutoDrive II Challenge is a GM and SAE sponsored event in which universities receive a stock Chevy EUV Bolt and make it autonomous over 5 years. This challenge began in 2021 and ends in June 2026. Scored challenges progressively get harder as each year passes with topics including base-level object detection, and spanning to non-gps-based localization in an area. Teams then meet in June of each year to compete at the University of Michigan's test track, M-City.

**Roles:** Michigan Tech AutoDrive Team Captain, Robotics Systems Enterprise Director, Enterprise Assistant Director, Outreach Coordinator, Lab manager, Team Lead

### Personal Contributions:

- Computer vision through usage of a neural network and a camera
- Object detection and tracking through a lidar sensor
- Autonomous Vehicle simulation through for subsystem testing
- Implementation of feature level sensor fusion
- Creation of vehicle behavior management system
- Creation of mapping and path planning system using a standard planning algorithm
- Built LiDAR based localization system from scratch

### Major AutoDrive Contributions:

#### LiDAR Object Detection

- In my first year on the team, and in my first year working with this system, I worked on basic Euclidean Clustering and plane-ground filtering. Both of these implementations were done through use of PCL Libraries.

#### Vehicle Navigation, Path Planning, and Behavioral Subsystems

- In Year 3 of the AutoDrive II Challenge, I implemented a D\* Lite path planner for basic vehicle navigation through GPS-defined map infrastructure.

#### LiDAR Based Localization System

[github.com](https://github.com) 

- In year 4 of the AutoDrive II Challenge, teams were put to the task of navigating through an environment with intermittent GPS signal drops. With this challenge in mind, I was assigned the task of building the new localization system from scratch for our team. To do this, I worked on making an adaptation of [KISS-ICP](#) , which is a simple ICP based localization system, as a way to solve this challenge. The aim was to make a lightweight localization system so that we can successfully detect where we are within our environment and navigate to our end-goal location safely.

## Technologies

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**Languages:** C++, C, Python, Bash, Matlab

**Software:** ROS, Linux, PyTorch, Virtual Test Drive, Carla, Unreal, Matlab DSD and RoadRunner, Simulink, Inventor, NX

**Topics of Interest:** Perception, Mapping and Planning, SLAM, Simulation, Autonomous Vehicles, LiDAR, Camera Vision, Artificial Intelligence