Ryan Verbrugge

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Professional Summary

Current masters student in Electrical and Computer Engineering working on robotics and autonomous vehicles in structured and unstructured environments. Main focus is on perception and mapping systems.

Education

Michigan Technological University *Aug 2021 – Aug 2025*
BS in Robotics Engineering
Michigan Technological University *Aug 2025 – May 2027*
MS in Electrical and Computer Engineering

Research Experience

Research Assistant *Houghton, MI*
Michigan Technological University *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

- 8/2024 - Present: Winter Snow dataset for LiDAR systems and neural network training for vehicle detection in heavy snow environments
- 6/2023 - Present: Automated bat counting system for White Nose Disease population study with DNR (See Fat Bat Project)
- 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

Undergraduate Class Grader - Neuromorphics *Houghton, MI*
Michigan Technological University *March 2025 – April 2025*

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

Undergraduate Lab Assistant - ROS *Houghton, MI*
Michigan Technological University *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

Autonomous Simulations Intern *Novi, MI*
Hexagon - Manufacturing Intelligence Division *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

IT Operations Student - Tier 1 *Houghton, MI*
Michigan Technological University IT *Oct 2021 – Dec 2022*

Skills

Programming Languages

- C/C++, Python, Bash

Robotics and Programming

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

Professional Affiliations

- Society of Automotive Engineers (SAE)

Additional Projects

AutoDrive Challenge II *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 Based Localization System *github.com*

In year 4 of the AutoDrive II Challenge, teams were put up 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 adaption 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 mapping system so that we can successfully detect where we are within our environment and navigate to our end-goal location.

Technologies

Languages: C++, C, Python, Matlab

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

Topics of Interest: Simulation, Perception, Mapping and Planning, Autonomous Vehicles, LiDAR, Camera vision