IAN Q. MATTSON

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PROFESSIONAL SUMMARY

Current Ph.D. student working in robotics, autonomous vehicles, and sensing and processing with a passion for engineering education.

EDUCATION

Ph.D. in Electrical Engineering, January 2024 – Present
Michigan Technological University

- **Dissertation Topic**: Perception sensor benchmarking in adverse winter weather

Bachelor of Science in Electrical Engineering, August 2020 – December 2023
Michigan Technological University

- **Capstone:** Autonomous vehicle sensing and electrical distribution system

RESEARCH EXPERIENCE

Graduate Research Assistant, January 2025 – Present
Robust Autonomous Systems Lab (RASL) at Michigan Tech

National Institute of Standards and Technology (NIST) Autonomous Vehicle Sensor Winter Weather Benchmarking (PI: Dr.Vinh Nguyen, co-PIs: **Dr. Jeremy Bos**, Dr. Nathir Rawashdeh, Dr. Evan Lucas)

- Designing and validating a repeatable experiment to assess the degradation of commercial, automotive LiDAR sensors in various weather conditions, including rain, fog, and extreme snow
- Fabricated 30 1/2m – 1m calibrated LiDAR target stands for a 200m wide test field
- Conducted a Gage Repeatability and Reproducibility test to determine experiment feasibility

Undergraduate Research Assistant, April 2021 – December 2024
Robust Autonomous Systems Lab (RASL) at Michigan Tech

CERL Trafficability Assessment via Automated Dynamic Cone Penetrometer (PI: Ryan Williams, co-PIs: **Dr. Jeremy Bos,** Dr. Thomas Oommen, funded by US Army Corps of Engineers)

- Compared two inexpensive automotive ADAs sensors to determine effectiveness and uncertainty at estimating wheel tracks left by a mid-size automated robot
- Engineering a ROS package to control and execute tests on a custom designed automated dynamic cone penetrometer (ADCP) to be used for field soil strength assessment

NEXTCAR II Automated Lane Level Positioning (PI: Dr. Jeff Naber, co-PIs: **Dr. Jeremy Bos**, Dr. Bo Chen, Dr. Darrell Robinette, funded by Department of Energy, ARPA-E)

- Analyzed collected LiDAR data of vehicle convoy behavior and compared three vehicle backplane estimation techniques to determine 1) estimation effectiveness and 2) energy efficiency
- Delivered a conference presentation as a second-year undergraduate at SPIE DCS

TEACHING EXPERIENCE

Graduate Teaching Assistant, January 2024 – December 2024
Department of Electrical and Computer Engineering at Michigan Tech

EE 3280: Robot Operating Systems, Fall 2024 (instructor: Dr. Shane Oberloier)
- Lab Instructor for two sections of ~15 students
- Redesigned lab curriculum from the ground up to focus on student robotic projects via a ROS robot platform
- Updated lab curriculum to support ROS2 Jazzy and implemented portable Linux USB drives
- Recognized as an instructor with course ratings in the top 10% of the university
- Student evaluation of 4.71/5

EE 2112: Circuits II, Spring + Fall 2024 (instructors: Prof. Trever Hassell and Dr. Flavio Bezerra Costa)
- Lead Lab Instructor in Fall 2024 coordinating six lab sections across multiple TAs
- Lab Instructor for one section in Spring 2024, two sections in Fall 2024
- Student evaluation of 4.66/5

EE 2180: Introduction to Robotics, Spring 2024 (instructor: Dr. Shane Oberloier)
- Lab instructor for three sections introducing students to fundamental robotic principles through designing and fabricating an open source 2D arm robot
- Student evaluation of 4.71/5

ENGINEERING EXPERIENCE

Electronics + Controls Intern, May – August 2023
Pratt Miller, New Hudson, Michigan
- Developed autonomous robot simulation environment to validate autonomous software stacks

AutoDrive Challenge II, August 2021 – June 2026
Michigan Tech Team Prometheus Borealis, Houghton, Michigan
- Primary electrical engineer and systems designer that translated user requirements and competition mandates into a full hardware stack including power distribution, sensing, computing, and CAN communication nodes in the development of an autonomous vehicle from scratch.
- Mentored undergraduates in a Human Machine Interface (HMI) sub team into developing, testing, and refining a touchscreen interface for vehicle occupants.

SKILLS

- **Robotics/Programming**: Robot Operating System (ROS/ROS2), Linux, Git, LaTeX, Python, Unreal Engine, C/C++, MATLAB, Point Cloud Library, Arduino
- **Hardware**: KiCAD, Eagle, Inventor, NX, SMT + through-hole soldering

PUBLICATIONS

[C1] **I.Q. Mattson**, L. Schexnaydre, and J.P. Bos, "Red vs. Infrared: comparing 900nm and 1550nm Lidar performance in arctic winter conditions," *Laser Communication and Propagation through the Atmosphere and Oceans XIV*, p. 1, Sep. 2025. doi:10.1117/12.3064732

[C2] **I. Q. Mattson**, Z. D. Jeffries, C. D. Majhor, and J. P. Bos, "Rut depth detection for automated trafficability assessment," *Autonomous Systems: Sensors, Processing and Security for Ground, Air, Sea, and Space Vehicles and Infrastructure 2023*, p. 26, Jun. 2023. doi:10.1117/12.2664429

[C3] **I. Q. Mattson** *et al.*, "Reducing ego vehicle energy-use by LIDAR-based Lane-level positioning," *Autonomous Systems: Sensors, Processing and Security for Ground, Air, Sea and Space Vehicles and Infrastructure 2022*, p. 2, Jun. 2022. doi:10.1117/12.2619430

AWARDS and GRANTS

- **2nd Place Graduate Research Colloquium Oral Presentation**, March 2025
- **Outstanding Graduate Student Teaching Award**, Fall 2024
- **SPIE Defense + Commercial Sensing Conference Travel Grant**, May 2023
- **ECE Department Scholar**, April 2023

PROFESSIONAL AFFILIATIONS

- Society of Photo-Optical Instrumentation Engineers (SPIE), 3+ years
- Institute of Electrical and Electronics Engineers (IEEE)
    - Robotics & Automation Society
- Society of Automotive Engineers (SAE)