MAX RUCKER

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EDUCATION

University of Michigan - Ann Arbor **April 2021 - May 2024**
Bachelor's, Robotics *GPA: 3.88*

- Robot Design and Manufacturing, SLAM and Navigation, Autonomous Vehicles, Technical Communication for Robotics, Human-Robot Systems, Data Structures and Algorithms, Signals and Systems, Digital Logic Design, Differential Equations, Sensors and Signals

PROJECTS & OUTSIDE EXPERIENCE

SLAM Benchmarking for Autonomous Underwater Vehicles **Ann Arbor, MI, USA**
Undergraduate Researcher, Field Robotics Group *December 2023 - Present*

- Researched state-of-the-art SLAM algorithms such as ORBSLAM and SVIN2 that utilize camera data and inertial measurement units to evaluate their performance on underwater datasets.
- Worked with GitHub code and created extensive documentation on applying different underwater datasets from caves and under ice to different SLAM algorithms.
- Utilized ROS and Linux operating systems to efficiently test SLAM algorithms on varying datasets and evaluate their performances.

MBot Simultaneous Localization and Mapping **Ann Arbor, MI, USA**
Lead Developer *October 2023 - December 2023*

- Created a fully autonomous robot that would explore a closed map using lidar and create a 2D virtual map.
- Developed multiple algorithms that were integrated such as motor controllers, particle filters, sensor and action models, odometry, occupancy grids, frontiers, and A* path planning to create a program that would explore unknown territory until there are no more places to explore.
- Programmed a Jetson Nano using the ROS to connect different code written in Python and C++ to effectively transfer data.
- Worked in a group of three and learned how to effectively share code and collaboratively code by using GitHub.

Self Balancing Mobile Ball Robot **Ann Arbor, MI, USA**
Lead Engineer *September 2023 - November 2023*

- Designed and executed the construction of a Ball Balancing Robot entirely from the ground up, deriving multiple kinematic models to select the correct motors and components.
- Employed laser cutting and 3D printing to fabricate all components of the robot and prototype in the early stages of building.
- Leveraged Raspberry Pi for control, using the University of Michigan's Mbot code base, and implemented various closed loop PID controllers in Python for the balance and steering of the Ball-bot.

Underwater Autonomous Vehicle Control System **Ann Arbor, MI, USA**
Undergraduate Student *August 2023 - October 2023*

- Employed Matlab and Simulink to model the underwater kinematics of an Autonomous Underwater Vehicle (AUV) and derived a closed-loop PID controller to simulate the AUV moving to waypoints in an ocean map.
- Collaborated with graduate students in the development of a research paper that explored the kinematics and motion control of the AUV model, giving me experience at the graduate level of writing and collaborating on a research paper.
- Employed A* path planning and occupancy grid simulation to determine the accuracy and real-world implications that an AUV could serve, such as traversing sunken shipwrecks.
- Rigorously tested and validated the AUV simulation to ensure accuracy and reliability within the model and simulation.

LEADERSHIP EXPERIENCE

Triangle Fraternity **Ann Arbor, MI, USA**
President *December 2022 - December 2023*

- Managed the well-being of the fraternity, ensuring its overall health and success.
- Led an executive board of seven members, and ensured the goals of each chair were met.
- Managed a budget of over $62,000 in operational and functional expenses for the fraternity.
- Fostered ties with the university by maintaining communication and updating them on our chapter's progress.
- Raised an impressive $8,000 for charity within a single month, establishing a commitment to community impact and philanthropy within the chapter.

SKILLS

Languages: Python, C/C++, R, Java, Arduino, Julia, Simulink, MATLAB, Verilog
Software Frameworks: Robot Operating System (ROS), HTML/CSS, Pytorch, Tensorflow, OpenCV, Linux/Unix
Computer-Aided Design: AutoCAD, Solidworks, CREO, LTSpice, Tina
Version Control: Git, Github, Gitlab
Other: Machine Learning, Computer Vision, Teamwork, Project Management, Communication