Stephen Ferro

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EDUCATION

Northwestern University, Evanston, IL   Expected Graduation **Fall 2024**
Master of Science in Robotics

Purdue University, West Lafayette, IN   Graduated **May 2018**
Bachelor of Science in Mechanical Engineering
- Minor in Economics and Certificate in Entrepreneurship and Innovation.

WORK EXPERIENCE

SKF USA
Product Engineer for Slewing Rings   **July 2022 – August 2023; Chicago, IL**
- Designed custom slewing bearings with PTC Creo for demanding applications in the wind-energy and rail industries.
- Ensured designs met customer requirements such as stiffness and load capacity by performing raceway and bolting analysis.
- Reduced delivery times by reviewing and updating old bearing designs to simplify manufacturing at a new factory.

Application Engineer for Industrial Market   **June 2018 – July 2022; Elgin, IL and Lansdale, PA**
- Directly supported industrial market customers in all aspects of bearing system design, including bearing and seal selection, life calculations, shaft and housing tolerances, and lubrication.
- Reduced failures and improved bearing performance in applications such as pumps, gearboxes, and other rotating machinery.
- Ensure smooth operation of specialty thin section bearings for the robotics industries by performing load and torque analysis.

Tenneco Automotive
Mechanical Engineering Co-Op – 5 sessions   **May 2014 – August 2017; Grass Lake, MI**
- Worked with four different teams at all stages of the product lifecycle: design, prototyping, testing, and warranty support.
- Designed and implemented several test procedures, including component fatigue testing, on-vehicle testing, and flowrate tests.

PROJECTS (photos and more at scferro.github.io)

RC Hot Lap Car Using SLAM and Machine Learning (in progress)   **January 2024 – Present**
- Creating a ROS 2 package using C++ and Python to map an unknown racetrack and plan a "racing line" for the robot to follow.
- Optimizing throttle, braking, and cornering behavior using reinforcement learning to minimize lap time.

Simultaneous Localization and Mapping (EKF SLAM) from Scratch (in progress)   **January 2024 – Present**
- Currently programming an EKF SLAM algorithm using C++ and ROS 2 for both a real and simulated Turtlebot3 robot.
- Incorporating differential drive control of the robot, odometry, and feature classification of 2D LiDAR data.

Making Coffee With 7DOF Robot Arm: Botrista   **November – December 2023**
- Used ROS 2, Python, and MoveIt2 to control a Franka Emika robot arm to brew a cup of coffee as part of a team of five.
- Used a RealSense camera and OpenCV to detect the handles of objects before picking them up.
- Successfully performed precise actions such as grasping the coffee ground scoop and pouring hot coffee into a cup.

Robot Navigation Using A* Algorithm   **October 2023**
- Developed a navigation model from scratch using Python and the A* algorithm to plan paths for a robot to a goal location.
- Created a motion model and PID controller to simulate the motion of the robot following the planned paths.
- Optimized performance of the algorithm using different cell sizes, different obstacles, and different start and goal locations.

Design of Back-drivable Cycloidal Actuator for Quadruped   **2021 – 2022**
- Designed and manufactured a 3D printed robot actuator powered by a brushless motor that outputs over 10 Nm of torque.
- Built prototype leg for quadruped robot using two actuators and performed robot leg motions using an Arduino on a test stand.

Purdue FSAE Electric – Member and 2018 Vehicle Dynamics Team Lead   **January 2016 - June 2018**
- 2018 Results: 1st in Skidpad and 2nd in AutoX at Formula North and FSAE Lincoln, the team's best results to that point.
- Reduced weight of suspension system by 15% by optimizing suspension component design and implementing carbon fiber links.
- Improved driver feel and simplified tuning at the track by redesigning suspension geometry.

RELEVANT SKILLS

- **Programming/Software**: Python, C++, C, Git, Linux, Visual Studio, MATLAB
- **Robotics**: ROS/ROS 2 (Robot Operating System), OpenCV, Machine Learning, Kalman and Particle Filters, Embedded Systems, SLAM, Computer Vision, MoveIt, Single Board Computers/SBCs, Intel RealSense Cameras
- **Design**: CAD (SolidWorks/Creo/ProE/Fusion360/Inventor), CAM (Fusion360), FEA (SolidWorks, Creo), PCB Design (KiCAD)
- **Manufacturing**: Manual and CNC Machining, Injection Molding, Waterjet, Laser Cutting, 3D Printing (FDM, SLA), Soldering