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 (Remote)**
- Performed raceway and bolting analysis to validate bearing design and recommend changes to Kaydon slewing rings based on customer requirements such as life and stiffness.
- Used PTC Creo and Windchill to create new designs and manage CAD drawings, models, and assemblies.
- Assisted manufacturing engineering at the factory by approving deviations and to provide preliminary bills of materials for manufacturing cost estimates of new designs.

Application Engineer for Industrial Market — **June 2018 – July 2022; Elgin, IL and Lansdale, PA**
- Completed bearing damage analysis and application design reviews to reduce failures and improve bearing performance in customer applications such as pumps, gearboxes, and other rotating machinery.
- Supported industrial market customers with all aspects of bearing system design, including bearing and seal selection, life calculations, shaft and housing tolerances, and lubrication.
- Worked with defense and robotics customers to specify design features of specialty slewing and thin section bearings.

Tenneco Automotive

Mechanical Engineering Co-Op – 5 sessions — **May 2014 – August 2017; Grass Lake, MI**
- Worked with four teams: Mechatronics, Cold End Development, Durability Testing, and Technical Support Engineering.
- Designed and performed a variety of different test procedures, including fatigue testing and various fluid flow tests.
- Worked with all stages of the product lifecycle, including initial design, prototyping and testing, and warranty support.

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

Teaching an RC Car to Drive Fast with Reinforcement Learning (in progress) — **Jan. 2024 - Present**
- Using SLAM on an autonomous RC car to map and plan an optimal path around a previously unknown racetrack.
- Reinforcement learning over several laps is used to optimize braking and cornering behavior, optimizing for lap time.

Making Coffee With 7DOF Robot Arm: Botrista — **Nov. – Dec. 2023**
- Used ROS 2 and the MoveIt package to control a Franka Emika robot arm to brew a cup of pour over coffee.
- The robot would pick up objects and perform actions such as dumping grounds in the filter and pouring hot coffee.
- The handles of the various objects were detected using a RealSense camera and OpenCV before being picked up.

Design and Implementation of a Particle Filter — **Oct. 2023**
- Used a particle filter and measurement data to improve the dead-reckoning position estimate of a robot test dataset.
- With the filter implemented, the robot's position error was improved to >0.25 meters throughout the run. With no filter, the position estimate was unusable due to the rapid accumulation of error.

Design of Back-drivable Cycloidal Actuator for Quadruped — **Jan. 2022 – Dec. 2022**
- Designed 3D printed cycloidal actuator powered by a brushless motor and capable of outputting over 10 Nm of torque.
- Built prototype leg for quadruped robot using two actuators and performed basic robot leg motions on a test stand.

Purdue FSAE Electric - Vehicle Dynamics Team Lead — **Jan. 2016 - June 2018 (Member since Jan. 2016)**
- 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 material selection.
- Redesigned suspension geometry to improve driver feel and simplifying tuning at the track.

RELEVANT SKILLS

- **Programming/Software**: Python, C++, C, Git, Linux, Visual Studio, MATLAB,
- **Robotics**: ROS/ROS 2, OpenCV, Machine Learning, Kaman and Particle Filters, Embedded Systems, SLAM, Computer Vision, MoveIt, Single Board Computers
- **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, Breadboarding