# 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 slewing rings based on customer requirements such as life and stiffness.
- Created new designs and managed CAD drawings, models, and assemblies using PTC Creo and Windchill.
- Improved manufacturing lead times by reviewing design deviations requested by the factory with customer engineering teams.

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

**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. testing, and warranty support.

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

**Teaching an RC Car to Drive Fast with Machine Learning (in progress)** — **January 2024 – Present**
- Using SLAM with an autonomous RC car to map and plan an optimal path around a previously unknown racetrack.
- Optimizing throttle, braking, and cornering behavior using reinforcement learning, optimizing for lap time.

**Making Coffee With 7DOF Robot Arm: Botrista** — **November – December 2023**
- Controlled a Franka Emika robot arm to brew a cup of pour over coffee using ROS 2 and MoveIt2 as part of a team of five.
- Used a RealSense camera and OpenCV to detect the handles of objects before picking them up.
- The robot would pick up objects and perform actions such as dumping grounds in the filter and pouring hot coffee.

**Improving Robot Localization Using a Particle Filter** — **October 2023**
- Implemented a particle filter and measurement data to improve the dead-reckoning position estimate of a robot test dataset.
- Improved the robot's position error to <0.25 meters by implementing the particle filter. With no filter, the position estimate was unusable due to position error >2 meters.

**Design of Back-drivable Cycloidal Actuator for Quadruped** — **2021 – 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 – 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 material selection.
- 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, OpenCV, Machine Learning, Kalman and Particle Filters, Embedded Systems, SLAM, Computer Vision, MoveIt, Single Board Computers/SBCs
- **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