Meg **Sindelar**

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Education

Northwestern University — *Evanston, IL*

M.S. IN ROBOTICS — *Fall 2022 - (Expected) Aug 2023*

- **Relevant Courses:** Embedded Systems in Robotics (ROS2), Machine Learning, Robotic Manipulation, Sensing, Navigation, and Machine Learning for Robotics (SLAM, C++), Introduction to Mechatronics, Wireless Protocols for IoT
- **Future Courses:** Active Learning, BME Machine Learning, Introduction to AI

University of Wisconsin-Madison — *Madison, WI*

M.S. IN MECHANICAL ENGINEERING — *Spring 2022 - Summer 2022*

- **Transferred to Northwestern after 1 semester**
- **Relevant Courses:** Feedback Control on Autonomous Systems

University of Wisconsin-Madison — *Madison, WI*

B.S. IN MECHANICAL ENGINEERING — *Fall 2017 - Dec 2021*

- **Relevant Courses:** Mechatronics, Introduction to Robotics

Experience

Research Assistant — *Madison, WI*

DEPARTMENT OF MECHANICAL/MATERIALS SCIENCE ENGINEERING, UNIVERSITY OF WISCONSIN-MADISON — *Jan 2022 - June 2022*

- Developed a signature-based feedback control system for a DED LENS multi-metal additive manufacturing machine by integrating C, C#, and Lua programs
- Created an external C program for the control architecture to interface with the main Lua printer system through an external Lua program
- Implemented a C# program to process Keyence IL-065 interferometer-based laser distance sensor data to measure the part layer height error

Controls and Software Researcher — *Madison, WI*

DEPARTMENT OF MECHANICAL/MATERIALS SCIENCE ENGINEERING, UNIVERSITY OF WISCONSIN-MADISON — *May 2021 - Aug 2021*

- Designed a control system architecture for a novel multi-material 3D-printer for 3D-printed electric motors, using C programming and ladder logic
- Configured the CPU, stepper motor modules, and limit switches of the printer
- Created an HMI user interface for simple operation of the printer on the B&R PLC platform

Data Analysis Research Assistant — *Madison, WI*

DEPARTMENT OF MECHANICAL ENGINEERING, UNIVERSITY OF WISCONSIN-MADISON — *June 2021 - Aug 2021*

- Digitized Raman Spectra data for fuel compound analysis to optimize the ratio of components in fuel
- Reconfigured a spectrometer to read laser wavelength data by redesigning its serial communication interface through the RS-232 port using SecureCRT

Undergraduate Student Assistant - Introduction to Mechanical Engineering — *Madison, WI*

DEPARTMENT OF MECHANICAL ENGINEERING, UNIVERSITY OF WISCONSIN-MADISON — *Sept 2021 - Dec 2021*

- Guided students in designing autonomous trolley carts, using SolidWorks, Arduino, oscilloscopes, and EES to implement course material on gear box design

Lab Technician — *Madison, WI*

TEAM LAB, UNIVERSITY OF WISCONSIN-MADISON — *Sept 2018 - May 2021*

- Assisted students with mills, lathes, woodworking, and welding while collaborating with staff to troubleshoot student questions

Engineering Intern — *Pleasant Prairie, WI*

REHRIG PACIFIC COMPANY — *May 2020 - Aug 2020*

- Configured a 6-axis UR5 collaborative robotic arm to grab product from a conveyor and place them into precise stacks
- Designed and manufactured iPad stands to be robust for water and oil damage, using welding, milling, plasma cutting, torching, and other hand tools

Projects

Autonomous Drifting Vehicle

- Created an autonomous drifting car that powerslides into a parallel parking spot using a multi-threaded C++ feedforward PI controller
- Replaced all of the hardware and created new circuit designs for the car
- Currently creating a real-time ML controller based on the Koopman operator to implement on the car

7 DoF Arm Manipulation and Path Planning

- Designed a Python interface within ROS2 using a custom API for a 7 DoF Franka Emika Panda arm to use a lightsaber using OpenCV
- Implemented a decision tree process to decide which of three types of path motions to complete based on obstacles in the environment

EKF Kalman Filter SLAM

- Created an EKF SLAM algorithm from scratch in C++ and implemented in simulation using ROS2

Transformed Mechatronics Course

- Converted a Mechatronics course at UW-Madison from a PLC B&R automation platform to an ATMega2560 microcontroller-based platform
- Reprogrammed all labs in C and developed new device drivers for new hardware.
- Developed in C to implement DC motor control, valve control, serial communication (SPI, I2C), and PWM driven motor amplifiers and encoder feedback.

6 DoF Arm OpenCV Greeting Robot

- Created a Python program within ROS1 for a SainSmart 6-DoF Desktop arm through Raspberry Pi on Linux to detect between greetings using OpenCV
- Deciphered the difference between a handshake, a fist bump, and a high five based on ArUco Tags and reciprocated the action.

Skills

Software: Python, C++, C, Git, Linux, Bash, Lua, Unit testing, Integration testing
Robotics: ROS2/ROS, MoveIt, Gazebo, OpenCV, CoppeliaSim, Control Theory (PID), Machine Learning
Mechatronics: AVR / Arduino / TI Microcontrollers, DC Motor Control, B&R Automation Studio, Microchip Studio, CodeVisionAVR, Soldering
Mechanical: SolidWorks, MIG / TIG / Stick Welding, CNC Mill, Lathe, Plasma Cutting, Drilling, Woodworking