Roman Yoder

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Professional Summary

Mechanical engineer with professional software engineering experience in robotics and automation. Skilled in control systems, path planning, and industrial/medical applications. Passionate about scalable solutions for complex interdisciplinary problems. Strong communicator and collaborator who thrives in multi-functional teams and fast-paced environments.

Education

M.S. Mechanical Engineering (Robotics)   Texas A&M University
GPA: 3.72   Aug 2021 – Dec 2023
B.S. Mechanical Engineering   Colorado State University
GPA: 3.65   Aug 2017 – May 2021

Experience

Medtronic – Software Controls Engineer, Surgical Robotics   Apr 2024 – Present

- Developed core control software for flexible tendon-driven catheter system used in robotic surgery.
- Transitioned research code into a robust production-ready implementation as part of the New Product Development (NPD) lifecycle.
- Filed multiple IP disclosures for novel methods including catheter auto-homing, redundant DOF usage for tool insertion, buckling detection/prevention, and continuum force sensing.
- Designed a delay pre-compensation algorithm to correct for kinematic latency/offsets in tendon transmission.
- Designed safety heuristics by comparing ideal vs. measured insertion lengths within a lung digital twin to assess risk and infer catheter shape.
- Designed a centralized, modular kinematic optimization pipeline using Jacobian decoupling for future scalability.

Medtronic – Research Engineer   Spring 2023

- Designed and tested algorithms to compute efficient paths through lung vascular models.
- Integrated path planning methods into an autonomous robotic catheter navigation prototype.

Research & Projects

Automated Welding Thesis

- Developed ROS-based welding automation pipeline using a 6-DOF Universal Robot and MIG welding tool.
- Created a custom Traveling Salesman Problem (TSP) solver using Mixed Integer Programming to optimize weld sequences.
- Enabled human-robot collaboration by integrating user-guided part localization and adaptive trajectory execution.
- Ran simulations to test weld paths before deployment; validated results with physical prototypes.

Capstone – Jet Impingement Server Cooling

- Designed and built a prototype system to evaluate novel CPU cooling via jet impingement.
- Modeled and analyzed pressure drop and thermal performance using experimental and analytical methods.

Course Projects (Selected)

- **Reinforcement Learning:** Implemented actor-critic model to simulate real-time missile interception control.
- **Non-Linear Controls:** Applied feedback linearization to stabilize high-speed missile trajectory.
- **Robotic Manipulator Mechanics:** Solved multi-path routing using Dubbin's curves and TSP solver for ground vehicle.

Skills & Coursework

- **Robotics:** Kinematics, dynamics, path planning, RL, MDPs
- Mechatronic System Modeling
- Control System Design
- Optimization (Linear/Nonlinear)
- Vehicle Dynamics
- Combustion & Turbo Machinery
- **Tools:** Python, ROS, C++/OOP, bash, Simulink, Matlab
- Git, Copilot