Zachary Yoder

R&D Engineer | Portfolio
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San Francisco, CA / Stuttgart, Germany

Professional Experience

Research Scientist | *Max Planck Institute for Intelligent Systems, Stuttgart, Germany* 2021 - present

- **Led cross-functional hardware development cycles on emergent, electrostatic soft transducers** for high-voltage wearable devices and robotic systems.
- **Assembled, tested, and iterated on electromechanical hardware,** using collected data and models to inform design.
- **Developed MATLAB interfaces for test control and data acquisition**, characterizing force-stroke, lifetime, electrical properties, and dynamics of flexible actuators and sensors; adopted by 40+ team members across 10+ projects.
- **Strategically positioned research findings to field experts**, leading to five publications in top journals.
- **Presented to diverse audiences and created visual media expressing research impact,** earning seven awards, over 90,000 YouTube views, and invitations for talks and panel moderation.
- **Translated user requirements into functional specifications** for high-voltage amplifiers, achieving a cost reduction of 65%.

Key Projects

Designed high-speed modules for reconfigurable robots
Science Robotics
- Used first-principles modeling to guide design.
- Learned Eagle to design untethered high-voltage electronics.

Created soft, electrohydraulic haptic devices with diverse feedback
Advanced Science
- Designed a robust high-voltage safety approach with IRB approval.
- Developed a full-stack user interface for a psychophysical study.

Developed versatile soft grippers with object size detection
Advanced Functional Materials
- Utilized impedance spectroscopy for high-voltage capacitance sensing.
- Developed algorithms for pick detection and size estimation.

Graduate Research Assistant | *University of Colorado, Boulder, CO* 2019 - 2021

- **Designed, fabricated, and evaluated high-speed prosthetic fingers** driven by electrostatic artificial muscles, modeling the kinematic linkage system to optimize geometric parameters.

New Product Development Engineering Co-op | *MSA Safety, Cranberry, PA* 2017 - 2018

- **Designed components and conducted validation testing** for highly-regulated supplied air respirators, identifying and escalating persistent hardware failure modes to engineering and design teams.
- **Applied finite element analysis** to identify stress concentrations in plastic hose clips, informing component and mold design.

Leadership Experience

Advisor for Bachelor's Thesis | *University of Esslingen, Esslingen, Germany* Fall 2023

- **Mentored a bachelor's thesis** on proprioceptive soft grippers using impedance spectroscopy and machine learning, training the student in scientific writing and presentation; the thesis won an award.

Teaching assistant I *University of Colorado, Boulder, CO* Fall 2019

- **Manufacturing Processes and Systems lab instructor**, training students in design for manufacturing, GD&T, engineering drawing, and life cycle analysis; taught labs, held office hours, and graded assignments.

President, Pitt Club Triathlon | *University of Pittsburgh, Pittsburgh, PA* 2017 - 2018

- Grew membership 140%, increased budget 333% and tripled the number of club races.

Awards

Best demo (EuroEAP 2024) | **Best poster** (Multi-modal robots workshop, IEEE Robosoft 2024) | **Second most 'kudos cards'** (Colleague appreciation program, 2023) | **Best poster** (Soft grippers workshop, IEEE Robosoft 2023) | **Best presentation** (5th workshop on perception, IROS 2022) | **Best presentation** (CU graduate research symposium 2020) | **Second-best product pitch** (Randall Family innovation and product pitching competition 2016, $15,000 award)

Education

PhD in Engineering Science | *University of Stuttgart, Stuttgart, Germany* 2021 - present
Research carried out at Max Planck Institute for Intelligent Systems under Christoph Keplinger and Katherine Kuchenbecker.
MS in Mechanical Engineering | *University of Colorado, Boulder, CO* 2019 - 2021
BS in Mechanical Engineering | *University of Pittsburgh, Pittsburgh, PA* | Summa cum laude 2015 - 2019
Minor in Computer Science | *University of Pittsburgh, Pittsburgh, PA* 2016 - 2019

Skills

Software: SolidWorks, OnShape, Adobe Premiere Pro, Affinity Designer, National Instruments, Microsoft Office
Programming languages: MATLAB, Python, Java
Prototyping: 3D printing, laser-cutting, high-voltage electronics, fixture design, screen and flexography printing, hand tools
Test equipment: DAQs, load cells, torque sensors, laser-displacement sensors, tensile testers, muscle levers, multimeters, oscilloscopes, waveform generators, LCR meters, high-voltage amplifiers, high-speed cameras
Actuator characterization: force-stroke behavior, specific energy and power, dynamics, power consumption, capacitive sensing
Materials characterization: electrochemical impedance spectroscopy, dielectric breakdown, tensile testing, clean room
Communication: presentations, demonstrations, product pitches, visual media