

Zachary Yoder

Hardware Engineer | [Portfolio](#)
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San Francisco, CA

Professional Experience

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

- Executed cross-functional hardware development cycles on high-voltage actuators and sensors for wearable devices and robotic systems; owned every aspect, from conception to delivery.
- Assembled, tested, and iterated on electromechanical hardware, using collected data and models to inform design.
- Developed a suite of test execution and data acquisition programs in MATLAB to characterize mechanical and electrical behavior of actuators; adopted by 40+ team members.
- Created functional specifications, acceptance criteria, and a test plan for modular high-voltage amplifiers, achieving a cost reduction of 65%.
- Clearly communicated scientific findings to diverse audiences, earning seven awards, five publications, over 140,000 YouTube views, and invitations for talks and panel moderation.

Key projects:

Designed high-speed modules for reconfigurable robots

[Science Robotics](#)

- Used energy-minimization modeling approach to guide design.
- Created snap-on, untethered, high-voltage driving electronics.

Created high-voltage, wearable haptic devices with diverse touch feedback

[Advanced Science](#)

- Learned Eagle to design high-voltage safety electronics for IRB approval.
- Developed a full-stack user interface for a psychophysical study.

Developed versatile, soft end-effectors with sensory feedback

[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

- Modeled, fabricated, and optimized geometric design of prosthetic fingers driven by electrostatic artificial muscles.
- Evaluated actuation speed, force production, and energy consumption of the system.

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

- Conducted validation testing to ensure NFPA and NIOSH regulatory approval for safety-critical supplied air respirators, identifying and escalating persistent hardware failure modes to engineering and design teams.
- Executed environmental and stress tests including accelerated aging, extreme temperature, and cyclical test conditions.

Leadership Experience

Graduate Research Advisor | *Max Planck Institute for Intelligent Systems, Stuttgart, 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 | *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.

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: NI 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