# Gabrielle G. Conard

PhD Student in Robotics Engineering

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## SUMMARY

Robotics Engineering PhD student passionate about designing robots from top to bottom with experience in mechatronics and PCB design, classical and modern control theory, dynamics modeling, and bridging the gap between simulations and physical robots. Particular interests include the mechanical and control system designs of mobile robots for space applications.

## SKILLS

**Software:** MATLAB, Python, ROS, Arduino, Git, LaTeX, Webots, SolidWorks, Inventor, Fusion 360, Creo, Microsoft Word, Excel, PowerPoint, Teams

**Manufacturing:** 3D Printing, Soldering, and basic proficiency with manual and CNC mills, lathes, and other shop equipment

## EDUCATION

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|---|---|---|
| 8/2023 - Present | **Doctor of Philosophy in Robotics Engineering**<br>Soft Robotics Lab, Advised by Dr. Cagdas Onal | **Worcester Polytechnic Institute** |
| 8/2021 - 5/2023 | **Master of Science in Robotics Engineering**<br>Soft Robotics Lab, Advised by Dr. Cagdas Onal, GPA: 4.00/4.00 | **Worcester Polytechnic Institute** |
| 8/2017 - 6/2021 | **Bachelor of Science in Mechanical Engineering, Minor in Physics**<br>Summa Cum Laude (GPA: 3.96/4.00), Honors in Mechanical Engineering | **Lafayette College** |

## RESEARCH EXPERIENCE

**8/2022 - Present**    **Lizard-Inspired Continuum Mobile Robot**    **WPI Soft Robotics Lab**
- Collaborating with a team of graduate students to investigate methods of enabling a soft lizard-inspired robot to traverse uneven terrain, including mechanical design updates and motion planning development

**8/2021 - Present**    **Continuum-Spine Quadruped Robot**    **WPI Soft Robotics Lab**
- Collaborating with another graduate student to develop a quadruped robot with a soft, flexible spine
- Responsible for developing Webots simulation environment and providing mechanical design assistance
- Investigating dynamic models for the continuum spine in order to accurately predict and control the robot's behavior

**1/2020 - 6/2021**    **Honors Thesis: Investigating Dynamic Stability in a Low-Cost Quadruped Robot**    **Lafayette College**
- Designed and constructed a low-cost ($165) quadruped robot, including custom printed circuit boards, 3D-printed parts, and force sensors in each foot
- Developed Python and Arduino software to implement walking gaits, active compliance in leg joints, and basic autonomous navigation (table-edge avoidance)
- Implemented novel control methods for dynamic balancing and disturbance recovery both in simulation (Webots) and on the physical robot, overcoming the sim2real gap
- Wrote honors thesis report and defended my work through a presentation to my committee and a public audience

**6/2019 - 8/2019**    **Lafayette OpenDog Quadruped Robot**    **Lafayette College**
- Selected as a Clare Boothe Luce Research Scholar for the summer of 2019
- Collaborated with another student and professor to develop a quadruped robot based on the open-source project openDog by James Bruton
- Wrote Python scripts using ROS to develop walking mechanisms that laid the groundwork for the 2019-2020 Lafayette OpenDog Senior Design Team
- Modified and designed various components of the hip and leg systems

## PROFESSIONAL EXPERIENCE

**NASA Langley Research Center | LANDO Robotics Research and Development Intern (NIF/OSTEM)**
Worked with the LANDO team for two consecutive summers on the Lightweight Surface Manipulation System (LSMS), a robotic crane for surface operations on the Moon or Mars.

| 6/2023 - 8/2023 | **Payload Dynamics and Control** | **NASA Langley Research Center** |

6/2023 - 8/2023     **Payload Dynamics and Control**     **NASA Langley Research Center**
- Developed dynamic model of and began controller design for an underactuated double pendulum mounted at the end of a robot arm as an analogy for controlling a payload's oscillations at the end of the LSMS
- Designed, manufactured, and assembled the double pendulum system to be mounted on a UR3 robot

6/2022 - 8/2022     **Serial Manipulator Kinematics and Dynamics**     **NASA Langley Research Center**
- Drafted a literature review comparing the LSMS to existing robotic cranes and investigating empirical dynamic modeling and system identification techniques to support simulation and controller design
- Developed Python/MATLAB scripts for deriving serial arm dynamic and energy equations
- Supported hardware development

## TEACHING AND ADVISING

8/2022 - 5/2023
8/2021 - 5/2022     **Co-Advisor for Major Qualifying Project (MQP) Teams**     **WPI Soft Robotics Lab**
- Mentored two teams of undergraduate students (one team each year) working on a continuum mobile robot for pipe inspection for their senior capstone projects
- Guided students by helping them define the scope of their projects, meeting with them weekly to ensure they were on schedule, answering questions, and aiding with documentation

1/2018 - 5/2021     **CRLA Level I Certified Physics/Engineering Peer Tutor**     **Lafayette College Academic Resource Hub**
- Provided one-on-one tutoring for students in PHYS 111: General Physics – Mechanics and Thermodynamics, PHYS 131: Physics I – Mechanics, PHYS 133: Physics II – Electricity, Magnetism, and Waves, ES 226: Statics, and ME 240: Dynamics
- Completed CRLA Level 1 Tutor Certification by participating in regular training sessions

1/2020 - 5/2020     **Supplemental Instructor for PHYS 131: Physics I – Mechanics**     **Lafayette College Academic Resource Hub**
- Led and prepared material for group sessions to reinforce concepts and applications of course content, including review worksheets in preparation for exams
- Held drop-in sessions to work individually with students
- Successfully transitioned from in-person to online sessions in compliance with Lafayette's shift to remote learning in March 2020 due to the pandemic

## HONORS AND AWARDS

8/2021 - 8/2024     **2021 National Science Foundation Graduate Research Fellowship Program (NSF GRFP)**
I received this fellowship as an undergraduate senior to pursue graduate studies at Worcester Polytechnic Institute. The NSF GRFP supports graduate students in NSF-supported STEM disciplines who are pursuing research-based master's and doctoral degrees at accredited US institutions.

5/2021     **Karl J. Ammerman Prize**     **Lafayette College**
Awarded annually to the "most deserving student" in the Department of Mechanical Engineering, selected by the faculty of the department.

11/2019     **Tau Beta Pi Engineering Honors Society**     **Lafayette College**
Admitted into Lafayette College's chapter of Tau Beta Pi, Pennsylvania Epsilon, as a junior.

4/2019     **William G. McLean Tau Beta Pi Prize**     **Lafayette College**
Awarded annually to 1-3 sophomore engineering students based on academic performance, campus citizenship, and professional orientation.

8/2017 - 6/2021     **Dean's List**     **Lafayette College**
Placed on the Dean's List every semester, which recognizes students achieving a cumulative semester GPA of 3.60 or higher.

8/2017 - 6/2021     **Marquis Scholarship**     **Lafayette College**
As Lafayette's second highest academic scholarship, this grant is awarded to incoming students who demonstrate global citizenship, scholarly pursuits, leadership, and concern for others.

5/2015     **Laramore Service Award**     **George School**
This award recognizes two George School students who are "quiet givers." Recipients have assisted others on a one-to-one basis, quietly demonstrating leadership through acts of kindness, generosity of spirit, and service to the community. Each recipient receives a cash award that they may spend on projects that will directly benefit the school, or up to half on their own personal service projects or enrichment experiences.