

Stephen Welch

Gainesville, VA

✉ stephenwelch@vt.edu | 📧 StephenWelch | 📄 stephenwelchva

Education

M.S. in Computer Engineering: Software & Machine Intelligence

Graduating May 2025 | GPA: 3.80

Relevant Courses: Learning Theory for Dynamics & Control | Nonlinear Systems Theory | Machine Learning

Virginia Polytechnic Institute

Aug. 2023 - May 2025

B.S. in Computer Engineering: Controls, Robotics & Autonomy

Minor in Computer Science | GPA: 3.27

Virginia Polytechnic Institute

Aug. 2019 - May 2023

Skills

Tools Git, Gradle, JetBrains IDEs, Visual Studio, GNUPlot, \LaTeX
Frontend JavaFX, Swing, Qt, ASP.NET
Languages Python, Java, C++, C#, Javascript, SQL

Work Experience

Software Intern - Robotics

Apptronik

- Deploying reinforcement learning on humanoid robots using **Python** and **C++**

Austin, TX

Jun. 2024 - Present

Robotics Researcher

Terrestrial Robotics Engineering and Controls Lab

- Researching applications of convex optimization and reinforcement learning to robotics tasks
- Designed **Java** software enabling whole-body control of a 32 DoF bipedal robot for balancing tasks

Blacksburg, VA

Jan. 2020 - Present

Research Engineer

Occupational Ergonomics & Biomechanics Lab

- Lead development of UI & robot controls for collaborative manufacturing studies with **C++**, **Qt**, and **ROS**
- Created camera-based user interface allowing remote point-and-click operation of 7-DoF robot arm with sub-cm precision

Blacksburg, VA

Jan. 2024 - Present

Machine Learning Intern

Shield AI

- Built air-to-air combat simulation framework for large-scale (4v4+) dogfights in **Python** used across multiple contracts
- Developed optimization-based approaches to airborne combat autonomy
- Applied model predictive control with learned dynamics models to autonomous jets, enabling a 90% reduction in compute usage

Alexandria, VA

Dec. 2020-May 2023

Projects

AUV Fault Detection

Center for Marine Autonomy and Robotics

- Integrates with IMU-based **state estimator** to detect actuator & sensor faults on the 690-type submersible robot, increasing reliability during long-term surveys of the oceanbed
- Implemented & validated in **C++ ROS**-based simulation

2023

Miniature Bipedal Walker

Personal Project

- Designing and building torque-controlled 3 degree-of-freedom robot leg as a <\$1000 learning platform for motion planning & control
- Implemented end-effector force tracking on microcontroller using **C++**

In Progress

Accomplishments

- Jul. 2024 **PANDORA: The Structurally Elastic Humanoid Robot**, Humanoids 2024
- Jun. 2023 **Real-World Deep Reinforcement Learning for Position Tracking of a Pendulum Driven by a SEA**, IMECE 2023
- Apr. 2023 **Real-Time Model-Free Deep Reinforcement Learning for Force Control of a Series Elastic Actuator**, IROS 2023
- Apr. 2022 **A Mapping Approach to Achieve Torque Control for Parallel-Actuated Robotic Systems**, IMECE 2022
- Apr. 2018 **Effective Student Leadership in the FIRST Robotics Competition**, FRC World Championship