Stephen Welch

Gainesville, VA

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Education

M.S. in Computer Engineering: Software & Machine Intelligence — *Virginia Polytechnic Institute*
Graduating May 2025 — *Aug. 2023 - May 2025*

B.S. in Computer Engineering: Controls, Robotics & Autonomy — *Virginia Polytechnic Institute*
Minor in Computer Science | GPA: 3.28 — *Aug. 2019 - May 2023*
Relevant Courses: Software Design & Data Structures (CS 3114), Linux Kernel Programming (CS 4424), Machine Learning (CS 4824)

Skills

Tools	Git, Gradle, Jetbrains IDEs, Visual Studio, GNUPlot, LaTeX
Frontend	JavaFX, Swing, Qt, ASP.NET
Languages	Python, Java 8, C++, C#, Javaswcript, SQL

Work Experience

Robotics Researcher — *Blacksburg, VA*
Terrestrial Robotics Engineering and Controls Lab — *Jan. 2020 - Present*

- Developed custom communications and controls code for the PANDORA humanoid robot using the **Java**-based humanoid robotics stack developed by the Institute for Human & Machine Cognition (IHMC)
- Enabled torque control of 32 DOF 6-foot-tall humanoid robot by deriving and implementing performant (12,000 calls/s) force-torque mapping in **Java**. Validated approach using custom visualizations & simulations written in **Python**.
- Applied reinforcement learning to create novel feedback controller for linear series-elastic actuators using **Python**, **RLLib**, and **Java**

AI Intern — *Alexandria, VA*
Shield AI — *Dec. 2020-May 2023*

- Built air-to-air combat simulation framework for large-scale (4v4+) dogfights in **Python** for use across multiple government contracts
- Developed swarming vehicle autonomy for defeating simulated air defenses using reinforcement learning and expert systems. Fielded system against industry competitors under the USAF Golden Horde program
- Reduced sim-to-sim transfer time by 90% using model-based reinforcement learning with **PyTorch** and **MBRL-Lib**
- Improved debrief experience for F-22, F-35, F-16 fighter pilots evaluating AI agents by building visualization tool using **Javascript** and **Lua**

Enterprise Applications Intern — *Herndon, VA*
Serco North America — *Mar. 2020 - Aug. 2020*

- Eliminated time-consuming manual labor for Contracts department using **PowerShell** scripts to automatically update macro-enabled spreadsheets
- Created utilities to verify website integrity using **Java**, **JavaFX**, **Swing**, and **Selenium** with interactive graph visualizations
- Performed bugfixes and quality-of-life changes on widely used TA/NDA request web application built using **C#**, **ASP.NET** and a **SQL** database

Software Team Lead — *Haymarket, VA*
FIRST Robotics Team 1885 — *Jun. 2017 - Jun. 2019*

- Designed and taught courses on **Java** programming, **Git**, cybersecurity
- Led development of **Java** software for feedback controls, state machines, logging mechanisms, and graphical interfaces for competition robots with team of 6-8 students
- 3-time District competition winner, District Championship winner, 2-time World Championship division quarterfinalist
- Taught STEM summer camps of 20 elementary and middle school students

Accomplishments

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