

# Zachary Hoffman

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## Education

**Liberty University: B.S. Computer Science, Mathematics Minor**

Lynchburg, VA

**GPA: 4.0**

Aug. 2022-May 2026

*Relevant classes:* Data Structures and Algorithms, Advanced C++, Discrete Math, Calculus III, Matrix and Linear Algebra, Database Design and Management

## Projects

**Chess Robot (Ongoing)**

Nov. 2024-Present

Repo: [chessRobot](#)

- Designed and 3D-printed a 20-inch articulated robotic arm using **Autodesk Fusion 360**, optimized for precise chess piece manipulation
- Developed a real-time **computer vision** system on a Raspberry Pi 4B with a Pi AI Camera, implementing **OpenCV** for board detection and **PyTorch**-based neural network for piece classification
- Implementing motion control through PCA9685 PWM driver interfacing with high-torque 270° metal gear servos (40KG-60KG), utilizing inverse kinematics for accurate piece movement and placement

**Machine Learning Racing Simulation**

Oct. 2024

Repo: [Machine Learning Racing Simulation](#)

- Developed a **machine learning** model using NEAT (NeuroEvolution of Augmenting Topologies) to optimize vehicle behavior, achieving 96% of the fastest lap time in under 25 generations
- Built a robust **custom physics engine** that models 10 key vehicle dynamics (e.g., wheelbase, traction, downforce) to accurately simulate real-world driving conditions and improve race performance
- Created an interactive simulation using Pygame and Tkinter, enabling real-time track creation, vehicle adjustments, and live **AI performance visualization** to showcase dynamic optimization results

**Personal Portfolio Website**

Sept. 2024

Repo: [zthoffman.com](#)

- Architected a dynamic portfolio website using vanilla JavaScript and CSS animations, featuring custom particle systems, 3D card effects, and theme management
- Implemented features like PDF rendering, interactive music player, and dynamic theme switching using local storage and DOM manipulation

## Experience

**Liberty University**

Lynchburg, VA

*Competitive Programming Club*

Aug. 2022- Present

- Placed **2nd** in the **2023 ACM ICPC Div. II Mid-Atlantic Region**, utilizing algorithms such as dynamic programming, greedy algorithms, and graph traversal (DFS/BFS)
- Collaborated in a team environment to solve advanced algorithmic challenges under timed conditions

**French Creek Golf Club**

Elverson, PA

*Bagroom Attendant*

Aug. 2020- Aug. 2024

- Led a team of **5** employees, utilizing **communication** and **leadership** skills to maintain smooth daily operations, delivering high-quality **customer service** to 100+ golfers daily, ensuring prompt assistance and issue resolution

**Languages:** Python, C++, Java, SQL, JavaScript, CSS, HTML, Assembly

**Frameworks/Tools:** OpenCV, PyTorch, Git, Docker, MongoDB, Azure, Arduino

**Software:** Linux, SQL Server Management Studio, Mathematica, Autodesk Fusion, ER Assistant