Zachary Hoffman

zthoffman.com | (610) 507-7219 | zachhoffman@ymail.com | linkedin.com/in/zthoffman | github.com/zthoffman21

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 ⬏ | *Python, OpenCV, PyTorch*   *Nov. 2024-Present*
- 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 a **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 ⬏ | *Python, Neat-Python*   *Oct. 2024*
- 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 ⬏ | *Javascript, CSS, HTML*   *Sept. 2024*
- 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*