Nicholas Mankowski

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LinkedIn / GitHub

EDUCATION

University of Cincinnati, Cincinnati, OH — August 2025–Present
Ph.D. Student in Mathematics

Ohio Wesleyan University, Delaware, OH — August 2021 - May 2025
B.A. in Mathematics/Computer Science — Dean's List, GPA: 3.98 / 4.00

RESEARCH & TEACHING EXPERIENCE

OWU Sagan ARC, Delaware, OH — January 2025 – May 2025
Math/German Tutor

- Offering personalized tutoring sessions for Math and German students by appointment, focusing on conceptual understanding, problem-solving, and language proficiency.
- Assisting students with coursework and content reinforcement in Calculus, Differential Equations, Linear Algebra, Statistics, and German.
- Collaborate with faculty from both departments to ensure effective student support and resource alignment.

OWU Summer Science Research Program, Delaware, OH — May 2024 – January 2025
Student Researcher — GitHub Repository

- Conducted computational and analytical research on the stability and dynamics of traffic systems using mathematical modeling techniques.
- Developed a microscopic numerical model leveraging delay differential equations to simulate single- and multi-lane traffic scenarios, enabling detailed analysis of individual driver impacts on overall traffic flow.
- Co-authored and submitted a manuscript to *Transportation Research Part B*, presenting findings on traffic system stability and modeling insights.

OWU Department of World Languages, Delaware, OH — August 2022 - December 2022
German Tutor

- Held scheduled open tutoring hours to assist students in German courses with language skills, including grammar, vocabulary, and conversation.
- Collaborated with faculty in the German department to provide additional academic support resources.

MANUSCRIPTS

- **Mankowski, N.**, Mushtaq, H., & Guo, H. (2024). *A Car-Following Framework for Traffic Instability and Lane Changes.* Submitted to Transportation Research Part B. *Preprint available on arXiv.*

PRESENTATIONS

- **Joint Mathematics Meeting PME Session**, Seattle, WA — January 2025
  A Microscopic Computational Model for Traffic Jams
- **Patricia Belt Conrades Research Symposium**, Delaware, OH — September 2024
  Understanding Traffic Jams and Lane Changing
- **Choose Ohio First Scholar Showcase**, Columbus, OH — February 2024
  Implementing Custom Phrase Mapping for Chemical Dossiers in 3E Notify
- **Patricia Belt Conrades Research Symposium**, Delaware, OH — September 2023
  Bridging Software for Accurate Chemical Compliance
- **Choose Ohio First Scholar Showcase**, Columbus, OH — April 2023
  Building Data Validation in 3E Notify

PROJECTS

Log Dawg — June 2025
Independent Project — GitHub Repository

- Developed a Python-based tool for automated log analysis using large language models, supporting both structured (JSON) and unstructured log formats.
- Incorporated git repository context and recent commit history to enhance the interpretability and relevance of diagnostic results.
- Designed a modular log parsing and reporting pipeline, generating markdown reports with confidence scores and actionable summaries.
- Provided a REST API and Docker-based deployment for reproducible, programmatic access and integration with research workflows.

Malloc-Craft — February 2025
Independent Project — GitHub Repository

- Developed a Minecraft-like voxel game in C using OpenGL, featuring infinite procedural chunk-based world generation and real-time 3D rendering.
- Optimized chunk-based rendering pipeline, reducing draw calls from 2,400+ to 8 per frame, enabling advanced lighting, transparent geometry, and dynamic world editing without impacting performance.

3D-SCII - Terminal-Based 3D Renderer — January 2025
Independent Project — GitHub Repository

- Designed and implemented a 3D rendering engine in C that displays models directly in the terminal using ANSI escape codes and ASCII characters, with no external dependencies beyond the C standard library.
- Developed a custom graphics pipeline including mesh loading (OBJ format), lighting (ambient and point lights), rasterization, and Z-buffer-based depth handling.
- Created an interactive terminal display with frame buffering for smooth animations and configurable rendering settings (e.g., resolution, scaling).

Exploring Alternative Rendering Techniques October 2023 – December 2024
Independent Project GitHub Repository

- Developing an advanced C++ project to optimize real time 3D software rendering using binary space partitioning, inspired by DOOM(1993).
- Utilized Java Swing API to build software for designing levels in a format accepted by previously mentioned rendering software.
- Advanced practical skills in algorithm design, project scalability, and cross-platform development.

Glimpse - Lightweight OpenGL Logging Library September 2024
Independent Project GitHub Repository

- Developed a lightweight and extensible logging utility, `GlimpseLogger`, for handling OpenGL error logging and general message logging, designed for flexibility with support for multiple output targets (console, file, etc.).
- Implemented functionality to log OpenGL error codes directly and handle fatal errors by terminating the application gracefully when necessary.

Predicting the Financial Success of Will Ferrell Movies December 2023
Introduction to Mathematical Modeling Course Project GitHub Repository

- Utilized data from IMDb and Rotten Tomatoes to incorporate variables like production costs, ratings, and actor age, building a comprehensive dataset for modeling.
- Developed and analyzed predictive models in MATLAB to estimate the box office success of Will Ferrell movies, applying mathematical techniques such as linear and quadratic regression.
- Performed analysis to determine viability of each model presented.

Using PageRank to Model Phone Tag December 2023
Introduction to Mathematical Modeling Course Project GitHub Repository

- Applied PageRank algorithm to analyze a social graph representing celebrities playing a game of phone tag, modeling contact relationships with a directed graph.
- Constructed an adjacency matrix and transition matrix to represent celebrity interactions, integrating a damping factor to simulate random contacts made by assistants.
- Created a Google matrix and employed power iteration to compute steady-state probabilities, predicting the likelihood of each celebrity being "it" in the long-term game.
- Demonstrated practical applications of linear algebra, Markov chains, and numerical methods to solve real-world, stochastic problems with PageRank convergence.

Modeling Rumour Spread December 2023
Introduction to Mathematical Modeling Course Project GitHub Repository

- Applied a SIR-based model to study the spread of a rumour on a university campus, using differential equations to simulate the interactions between individuals spreading, hearing, or ignoring the rumour.
- Discretized the system to iteratively solve it using MATLAB, modeling population dynamics over time and evaluating the impact of parameters such as the rate of rumour adoption and forgetfulness.
- Analyzed the effects of model parameters on the dynamics of rumour spread, using insights from parameter sensitivity analysis to interpret how altering rates of interaction impacts overall outcomes.

Heuristics for Intractable Problems August 2022 – December 2022
Independent Study Coursework

- Implemented heuristic algorithms in C++ to produce approximation solutions to NP-complete problems such as Knapsack, Graph Coloring, and Traveling Salesman.
- Applied approximation algorithms such as greedy algorithms and dynamic programming to efficiently generate solutions to NP-complete problems.
- Completed projects under strict deadlines, consistently achieving results that averaged 97% of the best-case solutions identified by the professor.
- Used Git / GitHub to manage source control within 5 different projects.

PyCast December 2021 - May 2022
Independent Project GitHub Repository

- Developed a raycasting engine in Python using the Pygame library, aimed at creating a performant 3D rendering system for a retro-style first-person shooter game.
- Implemented key features such as AI pathfinding, animated enemies, dynamic resolution scaling, and a fully integrated level editor with support for in-game modifications, making the engine flexible for game development.
- Designed an optimized rendering and collision detection system, improving performance and enabling features like textured floors and ceilings, interactive NPCs, and customizable weapons.
- Enhanced user experience through the addition of sound effects, doors with animations, a detailed minimap, and a menu system, while also integrating configuration files for asset management (textures, NPCs, weapons).

HONORS AND AWARDS

- **Phi Beta Kappa Member**, Ohio Wesleyan University 2025
- **Robert Wilson Outstanding Senior Prize**, Ohio Wesleyan University 2025
- **PME Student Speaker Award**, Joint Mathematics Meeting 2025
- **Career Connection Grant Award**(awarded $1,636), Ohio Wesleyan University 2025
- **David Staley Outstanding Junior Prize**, Ohio Wesleyan University 2024
- **Pi Mu Epsilon Member**, Ohio Wesleyan University 2023
- **Florence Leas Award**, Ohio Wesleyan University 2022, 2023
- **Schubert Scholar**(awarded full tuition), Ohio Wesleyan University 2021
- **Choose Ohio First Scholar**(awarded $5,500 per year), Ohio Wesleyan University 2021

LEADERSHIP AND CAMPUS INVOLVEMENT

OWU Mathematics and Computer Science Student Board September 2023 – Present
Member

- Assisted in conducting mandatory faculty evaluations.
- Participated in planning and hosting department events.

Choose Ohio First Program January 2024 - May 2024
First Year Student Mentor

- Served as a mentor to a first year Choose Ohio First student.

- Helped to navigate course selection and provide advice for being a successful student in the Choose Ohio First program.

Phi Delta Theta – Ohio Beta March 2023 – December 2023
Chapter President

- Led a 25-member fraternity, overseeing all chapter operations, large chapter meetings, and strategic planning.
- Collaborated with university administrators to ensure chapter compliance with university policies and fraternity standards.
- Organized philanthropic event that saw the largest amount of funds raised for charity in recent chapter history.
- Helped to promote the Iron Phi program at Ohio Wesleyan, leading to individual fraternity members raising $2000+ to help families living with ALS through Live Like Lou foundation.
- Organized community service events giving fraternity members the opportunity to support local families living with ALS by assisting with household work.
- Resolved internal conflicts and mediated disputes, ensuring a cohesive, respectful chapter environment.

PROFESSIONAL EXPERIENCE

3E, Canton, OH Jul 2022 – Present
Software Engineering Intern

- Maintaining high code quality through testing automation with unit and integration test coverage.
- Collaborating within an Agile SCRUM team to develop value-based enhancements for the Notify web application, improving usability and system reliability.
- Utilized .NET minimal API to implement 10+ RESTful API endpoints as part of a backend migration project, enhancing the scalability and maintainability of the platform's architecture.