# William Andrews

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## EDUCATION

**The College of William & Mary - Computer Science GPA: 3.92**          Williamsburg, VA
*B.S. in Computer Science and Mathematics*          *Sept. 2023 – Expected May 2027*

## RESEARCH & PROJECTS

**Undergraduate Honors Thesis: Compiler & Performance Optimization for DNNs**   Feb. 2026 – Present
*Advisor: Prof. Bin Ren @ W&M*          *Williamsburg, VA*
- Initiated a year-long undergraduate honors thesis on **compiler-based performance optimization** for **deep neural network** execution on resource-constrained hardware (robotics).
- Currently surveying research literature and in **ML system design** and high-performance compiler optimization to refine research direction and methodology.
- Will apply compiler analyses and transformations introduced in **CS642: Compiler Optimization**, including **control/data-flow analysis**, **locality optimization**, **vectorization**, and **hardware-aware transformations**.
- Project will culminate in a formal proposal, technical report, and oral presentation.

**Directed Study in High Performance Computing - C/C++, CUDA**          Aug. 2025 – Dec. 2025
*Advisor: Prof. Robert Michael Lewis @ W&M*          *Williamsburg, VA*
- Researched and implemented high-performance CPU/GPU algorithms with **C/C++**, **OpenMP**, and **MPI**, focused on numerical kernels, memory/cache efficiency, and multi-threading.
- Implemented **SIMD** vectorized matrix operations in C using **AVX-512**; benchmarked against auto-vectorization; improving code for CPU data pipelining to increase cache and bandwidth performance.
- **Final Project:** Developed a high-performance 2D Jacobi and Gauss–Seidel solver in C++ for **Laplace PDEs**, implemented iterative stencils and parallelization to efficiently compute steady-state solutions on large grids.

**Graph Theoretic Transit Routing Engine - C++, Docker**          Aug. 2025
*Personal Project*          *Alexandria, VA*
- Created a Waze-inspired **routing engine** to explore open source shortest path computation methods.
- Implemented multiple shortest path algorithms and compared performance.
- Invented a multi-threaded, bidirectional A*-based algorithm, reducing long distance computation times.
- Visualized graphs using GraphViz, deployed in a **Docker** containerized server using Flask.

**Matroid Algorithm Optimization - C++**          May 2025 – Aug. 2025
*Personal Project*          *Alexandria, VA*
- Designed a **C++ framework** to solve matroids in **combinatorial optimization**.
- Implemented matroid greedy algorithms to find minimum spanning trees in regular and bipartite graphs, find the minimum basis for matrices, and solve abstract set systems.
- Generalized an algorithm to solve multiple unrelated and cross-disciplinary algebraic problems.

## WORK EXPERIENCE

**Research Assistant & Software Developer**          Feb. 2026 – Present
*geoLab @ W&M*          *Williamsburg, VA*
- Helping conduct applied research in geospatial analytics, developing software tools to process, analyze, and visualize spatial datasets for our explorations.
- Will work with ML models to extract data and summarize articles to assist the geoParsing team with their research.

**Software Engineer Intern**          Sept. 2024 – Dec. 2025
*DisinfoLab W&M*          *Williamsburg, VA*
- Developed **Python** software tools using **Hugging Face transformer** models for sentiment analysis.
- Created backend components and data-processing pipelines using Python.
- Co-authored a research report analyzing public sentiment trends, **published** in *The Diplomatic Courier*.

## RELEVANT COURSEWORK — GRADUATE CLASSES IN **Bold**

- Operating Systems – **Compiler Optimization for High Perf. Computing** – **Advanced Computer Architecture**
- **Systems Programming** – Directed Study in High Performance Computing – Differential Equations
- Honors Real Analysis – Graph Theory – Intermediate Linear Algebra – Abstract Algebra – Probability

## SKILLS & TOOLS

**Languages:** C, C++, Go, Python, x86-64 Assembly (AT&T syntax; System V ABI; Linux).
**Topics:** High Perf. Computing, Operating Systems, Computer Architecture, Linear Algebra, Graph Theory, Real Analysis.