



Anthony Arnold

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Lexington, Kentucky - 40508, USA

I am currently an undergraduate researcher with Dr. Mark Marron at the University of Kentucky. My research is largely focused on the development of programming languages and surrounding tools. I am deeply involved with the Bosque programming language project where I am creating a new, stable, and predictable runtime.

EXPERIENCE

- **University of Kentucky**  December 2024 - Present
Undergraduate Researcher Lexington, Kentucky - USA
 - Designed and implemented Catalpa, a novel garbage collector featuring bounded pause times, fixed-constant memory overhead, and no barriers or synchronization with the application code
 - Engineered an experimental Bosque-to-C++ compiler to integrate the GC with the runtime system, enabling low-level memory management operations and performance optimizations
 - Extended the Bosque standard library with Rope data structures, persistent red-black tree deletion operations, and Unicode/ASCII character support for enhanced string processing capabilities
- **Humana**  May 2024 - December 2024
Software Engineering Intern Remote
 - Developed a dashboard using Power BI, PowerShell, ServiceNow, and Azure DevOps to visualize software delivery metrics across teams, enhancing data-driven decision-making
 - Resolved bugs and inefficiencies in Azure DevOps projects in collaboration with Tech Enablement, reducing technical debt and improving project performance

EDUCATION



- **University of Kentucky** August 2022 - May 2026
Bachelors in Computer Science, Minor in Mathematics Lexington, Kentucky - USA
 - GPA: 3.80/4.00

PUBLICATIONS

C=CONFERENCE, J=JOURNAL, S=IN SUBMISSION, T=THESIS

- [S.1] Anthony Arnold and Mark Marron (2025). **Catalpa: GC for a Low-Variance Software Stack**. Manuscript submitted for publication in CGO.

SOFTWARE

- **Gameboy Emulator** December 2024 - May 2025
C, SDL2, Nuklear 
 - Machine cycle-accurate Z80 CPU emulator passing 90% of Blargg's test ROMs, including interrupts, DMA, and hardware timing quirks
 - Implemented memory banking to allow support for games that exceed the GameBoy's restrictive 32kb ROM, supporting roughly 80% of commercial games
 - Built an optimized debugging runtime using Nuklear supporting breakpoints, instruction stepping, and real-time CPU state visualization
- **VoxelCraft** July 2024 - October 2024
C++, OpenGL 
 - Developed a 3D voxel world, simulating a Minecraft-like environment with advanced terrain generation
 - Implemented various graphics programming techniques, including advanced shaders, dynamic lighting, and texture mapping, to enhance realism and immersion
 - Enabled procedural generation of infinite worlds using chunk-based systems and optimized rendering through efficient mesh management techniques

HONORS AND AWARDS

- **Graduate Research Incentive Program (GRIP) Scholarship** September 2025
University of Kentucky
 - Received recognition as a promising researcher being granted full funding for final year of undergraduate studies
- **Undergraduate Research Fellowship Award** April 2025
University of Kentucky
 - Competitive award supporting full-time programming languages research
 - Recognized for potential in programming languages and runtime systems research

SKILLS

Software design & development: C, C++, Bosque, Typescript, OpenGL

Languages: English (Native), Japanese (Basic)