Anthony Arnold

(502) 530-2791 | ajar231@uky.edu | anthonyarnold.xyz | anthony-arnold | 1stub
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
  - 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 at *PLDI 2026*.

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

- **Nomination for CRA Outstanding Undergraduate Researcher Award** *October 2025*
  Computing Research Association
  - University-nominated candidate for the premier national award for undergraduate CS researchers
- **Graduate Research Incentive Program (GRIP) Scholarship** *September 2025*
  University of Kentucky
  - Received recognition as a promising researcher being granted 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)