Kai Karadi

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Education

University of Illinois Urbana-Champaign Expected May 2027
B.S. in Computer Engineering *GPA 4.00*
Honors: O. Thomas and Martha S. Purl Scholarship, Illinois Engineering Achievement Scholarship, James Scholar
Coursework: Computer Architecture, Advanced VLSI System Design, FPGA Laboratory, Intro to VLSI System Design, ECE Honors Lab, Analog Signal Processing, Data Structures (C++)

Experience

Software Engineering Intern Jan 2025 – Present
Synchrony Financial *Champaign, IL*
- Designed an automated AWS architecture for PGP key rotation, envisioned to enhance security by automating 100% of key lifecycle management and leveraging AWS Secrets Manager, AWS Lambda, Cloud HSM, and AWS S3
- Secured multiple 1st places (500 participants) at Synchrony's international hackathons, building agentic workflows
- Developed a compliance dashboard using Spring Boot, MySQL, Java, streamlining compliance for 500+ teams

Computer Architecture Course Assistant Aug 2024 – Present
University of Illinois Urbana-Champaign *Champaign IL*
- Mentored students in designing and verifying a pipeline RISC-V core, 4-way set-associative cache in SystemVerilog
- Expected to guide students in adding microarchitecture features (FIFOs, GShare, superscalar, ROB, reservation stations) for an out-of-order explicit register renaming processor to optimize IPC, power, and area
- Expected to support students verifying cache with transactional test bench, golden model, DUT driver, scoreboard

Research Intern Feb 2024 – May 2025
National Center for Supercomputing Applications *Urbana, IL*
- Engineered a secure personalized AI nutrition chatbot, to incorporate user meal histories with less than 1 second response times, by leveraging ChatGPT Assistants, RAG, few-shot prompting, AWS Lambda, GraphQL in Python
- Led the design of a food recommender engine (2.5 million foods), utilizing embeddings, health indices in Python

ECE Honors Lab Course Assistant Aug 2024 – Dec 2024
University of Illinois Urbana-Champaign *Champaign, IL*
- Mentored honors students in designing analog/digital circuits, such as an Audio Equalizer and Wireless Controller
- Taught students how to use the oscilloscope, waveform generator, and hardware debugging principles

Projects

Superscalar Out of Order RISC-V Core | *SystemVerilog, Synopsys DC, Verdi* Mar 2025 - May 2025
- Engineered an out-of-order RISC-V 32IM processor with ERR, GShare predictor, and a split Load-Store unit
- Secured 5th (50 teams) in design comp with a 1.13 IPC, $33mW$ pwr, 241135 μm^2 area on compression benchmark
- Designed a 2-way superscalar microarchitecture, improved IPC of all benchmarks by $\sim$50% by optimizing a multi-word fetch, enabling simultaneous dispatch, multi-commit ROB, pipelined banked icache, and age order issue

Real-time Xilinx FPGA 3D Renderer | *SystemVerilog, C, Vivado, Vitis* Nov 2024 - Dec 2024
- Designed a real-time 3D rendering hardware on an FPGA with user camera inputs in SystemVerilog, Vivado
- Integrated a MicroBlaze softcore, custom triangle rasterization FSM, double frame buffer and HDMI video output
- Developed C firmware in Vitis for user input from MAX3421E, allowing for translation/rotation matrix transforms
- Validated the design through comprehensive assert-based simulations and visual verification using bitmap outputs

Custom SAT Solving ASIC Tapeout | *SystemVerilog, Synopsys DC, Cadence Innovus* May 2025 - Present
- Proposed a SAT Solving ASIC based on mesh Network-on-Chip/Boolean Constraint Propagation in a team of 6
- Currently early stages: will eventually work on algorithm design, RTL and Physical Design: Plan to tape out

Pulse Weaver DIP Chip Gesture Audio | *Analog Circuit Design, Oscilloscope* Jan 2024 - May 2024
- Developed a gesture-based electronic instrument, using capacitive touch, bend sensors, VCA, VCO, and speaker

Skills

Languages: SystemVerilog, Verilog RTL, C, C++, Python, Java, JavaScript, SQL, Assembly, HTML/CSS
Dev Tools: Xilinx Vivado, Xilinx Vitis, Synopsys DC, Cadence Innovus, Cadence Virtuoso, Git, Docker, VCS, Verdi, Node.js, Bash, Linux, GDB, AWS Lambda, AWS S3