

# Karl Hallsby

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## EDUCATION

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### M.S. Computer Engineering

Graduated: DEC 2022

SPECIALIZATION IN COMPUTER SYSTEMS SOFTWARE

*Illinois Institute of Technology* GPA: 4.0/4.0

### B.S. Computer Engineering, Summa Cum Laude

Graduated: DEC 2022

*Illinois Institute of Technology* GPA: 3.957/4.0

*Lunds Tekniska Högskola* Lund, Sweden. (Study Abroad) GPA: 4.2/5.0

AUG 2019 – JUN 2020

### Course Work

Digital System Design	Virtual Machines	CMOS VLSI Design
Thermo-Fluid Dynamics	Digital Signal Processing	Computer Organization & Architecture
Secure System Design	Network Architecture	Concepts of Programming Languages
Systems Programming	Functional Programming	Object-Oriented Programming
Compilers	Operating Systems	Data Structures and Algorithms

## SKILLS

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### Programming Languages

- C
- Rust
- MC68k Assembly
- MIPS
- RISC-V
- Java
- Python 3
- Haskell

### Software

- Git
- L<sup>A</sup>T<sub>E</sub>X
- LINUX
- NIX

### Hardware Description Languages

- Verilog
- VHDL
- Chisel

### Hardware

- Oscilloscope
- Analog/Digital Function Generator
- Digital Logic Analyzer
- Xilinx Vivado
- Intel Quartus

### Human Languages

- English, Native
- Spanish, Fluent
- Swedish, Beginner

## PROFESSIONAL EXPERIENCE

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### Northwestern University, Evanston, IL

JUN 2022 – AUG 2022

ADVISOR(S): DR. PETER DINDA & DR. NIKOS HARDAVELLAS

*Student Researcher — Prescience Lab*

- Helped implement back-end VCODE code generation for an LLVM-based compiler
- Identified RISC-V V-extension as good candidate for VCODE acceleration
- Designed VCODE accelerator as RoCC coprocessor in Chisel and integrated with Chipyard
- Implemented both unit tests and baremetal full-program tests for coprocessor

### Illinois Institute of Technology, Chicago, IL

JUN 2021 – AUG 2021

ADVISOR(S): DR. KYLE HALE

*Student Researcher — Mystic*

- Created FPGA design to accelerate virtual machine clean-up, branching off of work another Ph. D student completed
- Developed LINUX PCIe kernel module to initialize and communicate with flashed hardware design
- Exposed FPGA capabilities as character device for programmer interaction
- Wrote QEMU device to emulate physical device's behavior and validate kernel module functionality

### Mazarine Ventures, Chicago, IL

JUN 2020 – AUG 2020

*Intern*

MAY 2019 – AUG 2019

- Automated and refined deal flow database with partners in VC firm
- Redesigned and optimized website
- Unified digital presence through common media collection and sharing tool
- Organized and documented networking configuration of firm's online resources

**Nalco Water, an Ecolab Company**, Naperville, IL

MAY 2018 – AUG 2018

*Intern*

DEC 2017 – JAN 2018

- Reviewed, revised, edited, and drafted technical manuals for water treatment equipment
- Revised training materials for new employees and helped develop training curriculum
- Created automated templates and formatting macros for others to use in developing new manuals adhering to department standards
- Developed code in VBA for automated pricing tools, integrating MS Word and MS Excel, and developed training materials for sales team
- Leveraging Adobe RoboHelp, converted manuals to a cloud-based HTML5 version, allowing access to manuals from mobile phones, tablets, and laptop computers

**Starbucks**, Geneva, IL

MAY 2015 – AUG 2017

*Barista*

- Prepared handcrafted beverages
- Cleaned facilities to exceed health inspections
- Trained new employees on drink creation and standards

## OTHER ACTIVITIES

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### **Triangle Fraternity, Armour Chapter**

RESIDENT ADVISOR

- Connect current students with alumni for mentorship
- Guide Junior Actives on project management, to complete upgrades to chapter House
- Serve on Chapter's Alumni Board, determining the Chapter's objectives and goals

HOUSE MANAGER, CHAPTER EXECUTIVE BOARD

- Responsible for keeping house operating and in compliance with local and school rules
- Organized regular House duties and bi-annual pre-semester "work week" for scheduled maintenance and upkeep
- Investigated and determined COVID-19 policies for chapter House, preventing any infections within the House

FILESERVER/WEBSITE ADMINISTRATOR

- Maintain chapter website
- Replaced outdated Linux server with new FreeBSD-based system
- Determined requirements and budget, obtained funds from National organization, and replaced hardware

### **nixpkgs Contributor**

Redesigned the GNU Octave definition to allow for declarative installation and management of add-on libraries

### **home-manager Contributor**

Refactored `mbsync` configuration module to allow for more granular control over how email is fetched.  
Added configuration module for the `mu` email indexing and searching program

### **Eta Kappa Nu, HKN**

Member of IEEE honor society

### **Tau Beta Pi, TBPI**

Member of Engineering Honor Society

### **Martial Arts Club**

Vice President (2018)  
3<sup>rd</sup> Degree Black Belt  
Tang Soo Do Instructor

## HONORS

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Armour Chapter of Triangle Fraternity — 2022 Active of the Year	Awarded: APR 2023
Armour Chapter of Triangle Fraternity — 2022 Fall Mr. Triangle	Awarded: NOV 2022
Armour Chapter of Triangle Fraternity — 2021 Active of the Year	Awarded: APR 2022
Illinois Institute of Technology — Dean's List	2017 – 2022
Illinois Institute of Technology — Camras Scholarship	2017 – 2022
Batavia High School — Highest Honor Roll (> 4.375 GPA)	2013 – 2017