JACK LEIGHTCAP

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Experience

Independent research

May 2024 – present · NYC

- Designed *Transistor to Linux*, a computer kit using transistor-transistor logic gates to binary bootstrap build and execute the source code of the Linux kernel
- Developed presentation and collaborative, creative programming skills at the *Recurse Center*
- Mentored a group of engineers for *Summer of Nix*, collaboratively packaging open-source cryptographic libraries, firmware, and the software supply chain of a PowerPC processor design

Trail of Bits — *Research Engineer*

May 2022 – May 2024 · Brooklyn, NY

- Engineered and presented zero-knowledge proofs for amd64 machine code in DARPA's *SIEVE* program. Developed Haskell on top a Verilog emulator, verifying technology by tape-out of a tiny ASIC design
- Developed build system crytpographic security libraries
- Developed Ghidra reverse engineering plugin GUI
- Worked on short-term audits of customer repositories

Lutron Electronics — *Embedded Firmware Intern*

July 2021 – December 2021 · Boston, MA

- Designed, wrote, and integrated into FreeRTOS low-level drivers for an ARM microcontroller's analog peripherals, combined for voltage bus diagnostic logging
- Reported processor bug, now reflected in errata and HAL
- Wrote software constrained by power, scheduling, interrupt latency, and flash memory wear protection

Skills

Ethic

I work towards engineering, documenting, and presenting solutions to problems crossing computer hardware-software or theory-practice boundaries.

Technologies

- Systems software
- Firmware
- Digital logic design
- Functional programming
- Compilers/Interpreters/PLT
- Software supply chains
- Computer-assisted proofs
- EDA, PCB design

Programming

Python, C, Rust, Shellscript

C++, (System)Verilog, Haskell

Nix, NixOS, Linux, VMs, BSDs

ad-hoc Lua, Forth, Prolog, etc.

build systems, vizualization

Relevant coursework

- Microprocessor-based design
- Hardware and systems security
- Compiler design
- Systems programming
- Noise and stochastics

Education

Northeastern University – *BS Electrical and Computer Engineering*, 3.7 — May 2022

President, NU Wireless Club · Workshops, IEEE · NU Computer Architecture Research Lab

Cambridge University — Summer 2019

Young Global Leaders Scholarship · Northeastern GEO Grant