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# Jay Lang

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## Education

### Massachusetts Institute of Technology (MIT)

- Candidate for M.S. in Computer Science and Engineering
- Thesis Proposal: Reinventing MIT's Digital Systems Lab to Embrace Modern FPGA Use Cases

*Class of 2023*  
Cambridge, MA

### Massachusetts Institute of Technology (MIT)

- Bachelor of Science (S.B.) in Computer Science and Engineering
- Relevant coursework: Computer Architecture, Seminar in OS Engineering, Distributed Systems, Performance Engineering

*Class of 2022*  
Cambridge, MA

## Research and Work Experience

### Apple Inc.

*Streaming Media, Software Engineering Intern*

- Designed a high-granularity, low-runtime power consumption analysis methodology applicable across Apple platforms
- Automated the identification of power regressions in streaming media down to the granularity of individual call stacks
- Enabled developers to locate such regressions and test resolutions >90% faster than existing methodologies

*Cupertino, CA*  
May 22 - Aug 22

### Computer Science and Artificial Intelligence Laboratory (CSAIL @ MIT)

*Undergraduate Researcher*

- Co-developed PACMAN, a novel attack which leaks ARM Pointer Authentication (PA) codes via speculative execution
- Reverse-engineered the Apple M1 TLB hierarchy via a dedicated, custom-built, bare-metal execution environment
- Performed the first-ever micro-architectural side channel attack against M1, irreparably breaking PA on these platforms

*Cambridge, MA*  
Sept 21 - May 22

### Massachusetts Institute of Technology (MIT)

*Administrative Teaching Assistant, 6.033 [Introduction to Computer Systems]*

- Designed material for and orchestrated 16 recitation sections to reinforce course material; taught two such sections
- Co-authored a semester-long design project, exams, and readings; deployed new hands-on simulations to >300 students

*Cambridge, MA*  
Jan 22 - June 22

### Apple Inc.

*Streaming Media, Software Engineering Intern*

- Developed and applied novel memory performance analysis against AVFoundation's HTTP Live Streaming framework
- Extended this technology to operate system-wide using minimally invasive semantic analysis; adopted in mainline
- Presented project to senior executives, including Craig Federighi; worked with 4 teams to integrate into future builds

*Cupertino, CA*  
June 21 - Aug 21

### General Motors

*Advanced Driver Assistance Systems, Software Engineer Intern*

- Developed and integrated a purely visual-based adaptive cruise control subsystem into next-generation AV firmware
- Validated this work through in-vehicle testing on public and private roads, achieving feature parity with production ACC

*Detroit, MI*  
June 20 - Aug 20

## Personal Projects

### advantaged:

- Implemented a mesh network which restores internet connectivity in densely populated areas after severe power outages
- Won HackMIT sustainability first prize and IBM Call for Code Climate Change Challenge after scaling to 1,000+ devices

**asys:** Small, proof-of-concept, open-source OS for RV64GC systems. Single-user, multitasking, preemptive kernel.

**Linux Kernel:** Wrote an x86/64-specific patchset highlighting vulnerable memory leaks in fork(2). Accepted upstream.

**PFS:** Specification for distributed, content-addressed filesystem for low-bandwidth environments. Presented to NASA staff.

**Pong 9000:** Self-hosting, JIT ANSI C compiler. Compact footprint; compiles itself and bare-metal programs on ESP8266 SoCs.

## Athletics

### MIT NCAA Swimming and Diving Team

*National-Level Diver on 1m and 3m; National and Intercollegiate Record Holder*

- NCAA Division III 3 meter national champion, 5 time national champion for Legacy Diving junior national team

*Cambridge, MA*  
Sept 18 - November 21

## Skills Summary

**Computer Systems** – Proficient in freestanding C, Linux/BSD/Plan 9 kernel work, Python, Verilog, Perl, Go, among others

**Music** – 17-year background in piano, pursuing independent study to master jazz and improvisation

**Scholarships** - National Merit Scholar and TD Ameritrade scholarship recipient