# Sakthivel Ponnampalayam Sivakumar

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**Availability for Co-op: January to August 2026**

## EDUCATION

**Northeastern University** – **Boston, USA** Dec 2026
*Master of Science in Electrical and Computer Engineering* **GPA: 3.5**
Coursework: Computer Architecture, Operating Systems, Hardware and System Security, Computer Networks

**Anna University - Chennai, India** May 2024
*Bachelor of Engineering in Electronics and Communication Engineering* **GPA: 3.6**
Coursework: Digital Design, Embedded Systems, Digital Signal Processing, Internet of Things

## TECHNICAL SKILLS

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|---|---|---|
| **Languages** | : | C, C++, Python, Assembly, Verilog, Shell/Bash Scripting |
| **Tools** | : | Git, CMake, Docker, Wireshark, Xilinx Vivado, KiCAD, LTSpice |
| **Boards & OS** | : | STM32, Arduino, ESP32, RPi, Zynq FPGA \| Linux, Windows, FreeRTOS |
| **Protocols** | : | SPI, I2C, CAN, HTTPS, TCP/IP, SSH |
| **Security** | : | AES, RSA, PQC (Crystal Kyber), DPA, OpenSSL |

## EXPERIENCE

**Teaching Assistant** – **Northeastern University** (Boston, MA) **May 2025 – Present**
- Guiding 35+ students in learning the OSI fundamentals with conceptual and Wireshark based laboratory assignments
- Assisted students by conducting office hours on a weekly basis on socket programming in python, routing protocols (TCP/IP) and access networks

**Firmware Engineer (Member)** – **Northeastern Electric Racing** (Boston, MA) **May 2025 – Present**
- Programmed STM32 GPIO pins to read button I/P and control LED O/P, simulating car acceleration and braking functions
- Implemented and tested embedded C code using HAL libraries, enabling real-time button state monitoring and LED control via serial console.

**Embedded and IoT Engineer Intern – Emertxe** (Bangalore, India) **Jan – Jun 2023**
- Designed a Bash-based system monitoring tool in a Linux environment to automate the collection of CPU, memory, and disk usage metrics every 2 hours, improving visibility into resource utilization and system health
- Developed a low-cost ($15) Real-Time Health monitoring system using ESP32, MAX30102, & OLED to measure SpO2, BPM, body temperature, and saving it on ThingSpeak to maintain a cloud-based patient record and easy future access

## PROJECTS

**Comparative Analysis of AES, RSA, and Kyber Algorithms for Secure Communication** (C, OpenSSL, SSH) **Sep – Oct 2025**
- Profiled AES-128, RSA-3072, and Kyber512 with 1 M samples via OpenSSL/PQClean, highlighting 326× and 620× slower performance for RSA and Kyber
- Compared AES-128 ECB and CBC modes to expose ECB pattern leaks and CBC superior randomization (stronger security)
- Built C socket clients using RSA-AES and Kyber-AES to establish quantum-secure communication with a remote server

**Various Architecture Benchmarking** (C, ARM_v8, x86_64, Linux) **Sep - Oct 2025**
- Benchmarked Dhrystone across ARMv8 and x86_64, profiled with GPROF and validated hotspots with assembly snippets
- Optimized LINPACK on x86-64 using GCC by experimenting with compiler switches, BLAS/math libraries, and FP extensions
- Produced a comparative ISA analysis by compiling a Dhrystone basic block for ARMv8 vs x86 and explaining each instruction

**Development of OS Primitives** (C, Linux, SSH) **Feb – Mar 2025**
- Built a bare-metal OS in C with syscall wrappers, ELF loader, and mmap-based memory management for dynamic execution
- Implemented multi-threaded context switching with 4 KB custom stacks and yield functions for seamless process scheduling

**Reliable Data Transfer Protocol** (C++, Ubuntu, WSL, SSH) **Oct - Dec 2024**
- Implemented Alternating Bit and Go-Back-N protocol in C++, achieving 95%+ packet delivery rates under various loss and corruption scenarios while maintaining protocol correctness through comprehensive checksum validation and timeout management
- Conducted comprehensive performance analysis comparing two transport protocols across 1000+ message transmissions, under 6+ different network conditions and window sizes as test case

## LEADERSHIP

**Senator – Graduate Student Government of Northeastern** **July 2025 - Present**
**Global Student Mentor** – **Northeastern University** **Jan 2025 - Present**

**HOBBIES:** Trekking, Pickleball, Dancing, DIY Projects, Reading, Yoga