

# Sidharth Mehta

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## Education

**North Carolina State University**, Raleigh, NC

August 2019 - May 2021

Master of Science

**Major:** Computer Engineering

**CGPA:** 4.0

*Coursework:* Real Time Embedded System, Embedded System Optimization, Embedded Linux, Computer Architecture, ASIC & FPGA design, Operating Systems, Parallel Computer architecture, Object-Oriented Design, Compilers

**YMCA University**, Faridabad, Haryana, India

August 2014 - June 2018

Bachelor of Technology

**Major:** Electronic and Communication Engineering

**CGPA:** 8.83/10

## Work Experience

**EMTECH Foundation**, New Delhi, India

June 2017 – November 2017

Embedded Systems Intern

- Created schematic and PCB design for projects using Altium designer.
- Wrote firmware for projects based on PIC and STM32 microcontroller.
- Performed proof-reading and quality maintenance of technical documents.
- Assisted students undergoing embedded systems training at EMTECH Foundation.

## Skills

**Programming:** C, C++, Assembly, Python, Verilog, C#, RTOS (Keil RTX5), LLVM, Ruby on Rails, OpenMP, Pthreads

**Electronics:** Microcontroller (Cortex-M, AVR, PIC, Raspberry Pi), Logic analyzer, Circuit Design, Debugging

**Tools:** Linux, Git, Perf, Ghidra, Keil, OrCad PSpice, Altium Designer, XINU OS

**Other:** Profiling, Software Optimization (Performance, Memory, Responsiveness, Power), Protocols (I2C, SPI, USB, UART)

## Projects

- **Speed optimization of Linux based systems:** Speedup a Spherical Geometry calculation code by 4.95 times on a Cortex-A72 processor. Generated profiling info for code and applied optimizations to take benefit of ARM ISA.
- **Memory size optimization of Embedded Systems:** Reduced amount of memory needed for an RTOS-based application on Cortex-M processor. Reduction of RAM and ROM by 2348 bytes and 3000 bytes, respectively.
- **Speed optimization of Embedded System:** Achieved 4.3 times improvement in execution speed of a JPEG decode and display program for images fetched from SD card. Optimizations include operating SPI at higher baud rate, use of fast GPIOs, caching of data read from SD card and changes in control flow to reduce number of instructions.
- **USB Mouse and Touch Keyboard:** Implemented a USB Mouse and Keyboard using FRDM KL25Z development board. The device registers keystrokes from a touchscreen and uses the onboard accelerometer to register motion for mouse support. The code uses HID protocol of the USB stack to communicate with host device.
- **Motion detector:** Improved responsiveness of a motion detector program using non-preemptive scheduling. The program reads data from an accelerometer over I2C and blinks an RGB LED to indicate motion.
  - Broke tasks into finite state machines to remove busy waiting in program.
  - Created a shared data structure to enable handshaking between different tasks.
- **Touchscreen control of LED brightness:** Shared access of ADC using Preemptive scheduling to get touch input from touchscreen and current measurement from buck converter in a time critical manner. Project also involved displaying current plot on a display.
- **LLVM bit-code generator:** Implemented C-- a subset of C programming language using parser generators Flex & Bison to generate code in LLVM IR.
- **fork system call on XINU OS:** Implemented a fork system call similar to Unix's fork on XINU. The fork primitive creates a new process (the child) by almost duplicating the parent process.