Swaraj Hota

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EDUCATION

IIIT Bhubaneswar 2017 – 2021
B.Tech in Information Technology, CGPA: 8.38 Bhubaneswar, Odisha

EXPERIENCE

Apertus Association Dec. 2020 – May 2021
Research/Gateware Development Intern Vienna, Austria (Remote)

- Developed gateware and scripts for a novel resource-friendly approach to FPGA register sets using Partial Dynamic Reconfiguration to access/modify registers, by in-depth analysis of bitstream format and CLB structure, for a Xilinx Zynq device used in AXIOM Beta Open Source Camera
- Tools: Python, VHDL, Tcl, Xilinx Vivado, Project X-Ray, Embedded Linux, MicroZed Development Board

Google Summer of Code 2020 with Apertus Association May 2020 – Aug. 2020
Student Developer - Linux Kernel Driver Remote

- Developed a Linux Kernel Driver to program/debug Lattice MachXO2 FPGAs through a specific I2C-JTAG bridge in AXIOM Beta Open Source Camera, allowing more flexible and easy debugging
- Built and exposed a User API from the driver to interface any JTAG controller software (like OpenOCD)
- Produced a patch for OpenOCD to work with the driver, making SVF replays possible
- Tools: C, Linux Kernel, Device-tree, Embedded Linux, OpenOCD, Lattice Diamond Tools, PIC MCU Programming

Google Summer of Code 2019 with FFmpeg May 2019 – Aug. 2019
Student Developer - HEIF Support Remote

- Studied the High Efficiency Image Format (HEIF) specification and added its support in FFmpeg's *libavformat* library
- Utilized fuzz testing, memory leak detection, and HEIF conformance tests
- Patched 2 Video Formats (IFV & KUX) in FFmpeg as qualification tasks, by reverse engineering binary media files
- Tools: C, Git, zzuf fuzzer, Valgrind, Unix Command-line Tools, Hex Editors

PROJECTS

TermOS

- Developed a simple educational x86 based Operating System from scratch with custom bare-metal bootloader, inode based file system, minimal C library, necessary drivers (Keyboard, Display, ATA), FIFO task scheduler, and a shell
- Tools: C, x86 Assembly (nasm), Cross-compiler and debugger (GCC and GDB), QEMU

Intel 8080 Emulator

- Designed a full Intel 8080 emulator, along with the arcade machine hardware, to emulate the game *Space Invaders*
- Tools: C, Intel 8080 Assembly, SDL library

Chat App using E2E encryption

- Built a command-line chat application based on Client-Server model using bare network sockets and End-to-End encrypted messages (RSA) with key exchange, key storage, and (serialized) message storage functionalities
- Tools: Java, Wireshark, DigitalOcean VPS

Polygon Wars

- Developed a 2D point-and-shoot game using ECS (Entities, Components, Systems) Game Engine design
- Tools: Modern C++, CMake, SFML Library

SKILLS

C, C++, Python, Java, Assembly, Linux, Linux Driver Development, Embedded Software, FPGA, VHDL, Git, LaTeX