Nischay Joshi

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TECHNICAL SKILLS

Hardware: Microcontrollers, Oscilloscope, Signal Generator, Soldering (THT/SMT), Power Supplies, Schematic Capture, PCB Design, Digital Logic Design, Robotics, FPGAs
Programing Languages: C++, C, Python, Assembly, System Verilog, Verilog
Technologies: Git, SVN, MATLAB, Altium Designer, Xilinx Vivado, Vitis, Petalinux, Embedded Systems Development

EDUCATION

UNIVERSITY OF BRITISH COLUMBIA **Vancouver, BC**
Bachelor of Applied Science – Electrical Engineering *Expected May 2025*
Relevant Coursework:
Data Structures and Algorithm, Digital Systems Design, Embedded C/C++ Projects, Robotics

WORK EXPERIENCE

Tesla Motors Inc. **Palo Alto, CA**
Vehicle Software Intern *Jan 2024 – July 2024*

- Developed and maintained Tesla's Processor In Loop (PIL) simulation system using Xilinx FPGAs and Embedded Linux, creating and managing over 10+ custom Linux distribution configurations deployed across 5+ engineering teams
- Designed and integrated 8+ Verilog IPs for FPGA applications, including SPI-based DACs, AXI peripherals, and a custom data recording system, achieving 50MB/sec data transfer rates with Xilinx's AXI DMA block and custom C drivers
- Executed and optimized motor models on FPGA, running at 20MHz using Simulink and HDL Coder, and tweaked the model to completely eliminate logic glitches, ensuring accurate simulation and reliable FPGA implementation with smaller footprint
- Automated Vivado project generation and version control with TCL and Python scripts, accelerating project setup by over 80%, and successfully ported an embedded debugging environment to Arm Based Linux OS for a Cortex R5F microcontroller

TRIUMF **Vancouver, BC**
Firmware Development Co-op *May 2023 – Dec 2023*

- Developed and implemented a testing procedure for external cards controlling DACs, comparators, and high-speed LEDs. Reduced the testing and verification time by 65%
- Wrote firmware for a Xilinx Mercury X1 SoC board with Zynq Ultra scale FPGA and assisted in the deployment of Petalinux as the operating system
- Enhanced a custom UART IP module in Vivado to increase its FIFO size from 16 to 1024 characters and developed user space C++ drivers for it to operate on Petalinux. This work, aimed at improving data handling and transmission speed, is used in significant international physics experiments at CERN (HyperK and NuPRISM)

UBC ECE (Molecular Mechatronics Lab) **Vancouver, BC**
Undergraduate Research Intern *September 2022 – April 2023*

- Assisted in testing and characterizing over 20 soft and flexible touch sensors spanning over 5 different topologies, improved the sensor's performance by 20% after analysing the data
- Designed an external hardware debugging system for the main computing unit using Altium Designer
- Developed and maintained firmware for different sensor configuration which integrated functionalities such as OTA, BLE, UART and SPI

TECHNICAL PROJECTS

6 DOF Robot Arm Controller | *Robotics, C++, Python, MATLAB Simulation* **April 2023 – July 2023**

- Developed a controller for a 6 Degree of Freedom robot arm kit using servo motors to control the joint angles
- Utilized Python to enable manual control of the robot using a USB Gamepad and transmitted the joint angles to the robot via serial communication
- Implemented custom inverse kinematics solvers based on Gradient Descent and Pseudo Inverse Jacobian approaches and compared their performance in MATLAB, simulating the robot using the Robotics System toolbox
- Integrated visual feedback for the robot using an ESP-Cam, providing information about the robot's environment
- Created a custom animation engine in C++ to animate eyes for the robot to enhance its personality. Deployed the system on an ESP32 with a 128x160px ST7735 LCD display. Added numerous animation effects such as wake up, sleep, looking around and moods such as happy, sad, scared, and angry

ESP32 Spectrum Analyser | *C++, Amplifier Design, Signal Processing* **August 2022 – September 2022**

- Designed a Signal Spectrum analyser running on ESP 32. The device displays real-time spectral content of the signal with a refresh rate of 30 Hz
- Optimized the firmware to utilize the hardware capabilities of the ESP32 such as DMA, I2S, Dual Cores
- Designed a custom PCB for the device using Altium Designer including a microphone Class A amplifier to add the functionality to view the waveform and spectrum of human voice

Windows Streamer | *ESP32,* C++, *WebSockets, Python* **August 2022 – August 2023**

- Developed a screen mirroring embedded system running on an ESP32 and combined with a 168x120 LCD color display. The system mirrors your computer screen in real-time by transmitting visual data from the host to the client via WebSockets
- Improved the video frame rate from by 300% by adding JPEG compression and multi-threaded transmission approach. Minimized latency by switching to C++ libraries for faster processing speeds

ENGINEERING STUDENT TEAMS

UBC UNCREWED AIRCRAFTS SYSTEMS **Vancouver, BC**

Payload Team Co-Lead *January 2022 - Present*

- Led a team of 20+ students from various engineering disciplines, coordinating complex tasks and ensuring seamless communication, resulting in the successful development of an advanced GPS-guided parachute system
- Developed PCB for the flight controller, optimizing power efficiency and space constraints, while also facilitating easy integration of future updates and multiple failsafe options to rely on
- Implemented and optimized a 6-axis Kalman filter, overcoming challenges related to sensor noise and computational efficiency, and validated the system through extensive MATLAB simulations and real-world testing
- Directed thorough testing and validation processes, including field tests and iterative improvements, to ensure the system's reliability and precision under various conditions such as temperature, altitude, wind and precipitation
- Managed project timelines and mentored team members, fostering a collaborative environment that encouraged creativity and technical growth, leading to a well-coordinated and successful project completion

AWARDS/ACADEMIC ACHIEVEMENTS

- Faculty of Applied Science International Student Scholarship 2022
- Trek Scholarship (International) 2022, 2021
- Dean's Honor List 2022, 2021

INTERESTS AND ACTIVITIES

- Lawn Tennis
- Classical Piano
- Photography and Digital Art
- YouTube channel for showcasing electronic projects (https://bit.ly/3y1fLe3)