Sahaj Singh

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TECHNICAL SKILLS

Programming Languages: C, C++, Python, MATLAB, Bash, Java, Assembly, HTML5/CSS3, Javascript, Flutter
Tools, Frameworks & Technologies: Git, Jira, React, Visual Studio Code, PyCharm, macOS, Linux, Windows, Android

WORK EXPERIENCE

MATLAB — SFU Student Ambassador   **Oct 2022 — Present**
MathWorks   Burnaby, BC
- Organizing and hosting numerous programming and simulation based events revolving around **MATLAB and Simulink.**
- Helping in the process of creating meaningful relationships between MATLAB and professors/students at SFU. Providing support for students with questions related to MATLAB and Simulink.

Software/Firmware Developer   **Jan — April 2022**
picoTera Electronics Inc.   Richmond, BC
- Developed advanced firmware in C/C++ for **PSoC6 and ARM Cortex-M4, M0 platforms** and ported the project from PSoC creator to ModusToolbox 2.4 for better compatibility.
- Implemented modifications to a Recurrent Neural Network **(RNN) model written in Python** and **ported in C** for Cortex-M4 devices, reducing noise in audio denoising applications approximately from **90+ decibels down to 60 decibels.** Additionally, created a custom audio dataset to train the RNN model, increasing the variety of noise profiles for training by a factor of 3.
- Replaced dynamic gain with static gain, optimizing post-processing audio quality, and **boosting denoising performance by 25%.**
- Authored custom **cmake scripts for CMSIS libraries**, reducing memory usage and storage in complex operations and enabled Bluetooth Low Energy **(BLE) integration** between PSoC6 and an Android app, facilitating real-time data transmission.

PROJECTS

🔗 **Multi-threaded Memory Allocator:**   **Spring 2023**
- Developed a multi-threaded memory allocator in C, supporting **First Fit, Best Fit, and Worst Fit allocation algorithms.**
- Implemented features such as allocator initialization, allocation/deallocation interfaces, metadata management, compaction support, statistics reporting, multi-threading support, and uninitialization in C.
- Designed test cases and provided usage instructions to ensure the proper functionality and efficiency. Wrote custom Makefile for easy compilation and execution.

🔗 **FPGA UART Protocol Implementation:**   **Spring 2023**
- Developed a **UART protocol** for the **Altera DE2 FPGA**, featuring baud rate generation, data framing, error detection and correction, and handshaking subsystems.
- Implemented in **VHDL** with comprehensive testbenches in **Modelsim** to verify the functionality of both the transmitter and receiver modules.
- Enabled synchronous data transmission between UART devices and allowed for seamless operation via onboard switches and keys for data input, baud rate selection, and module reset.

🔗 **Drone Controller and System:**   **Fall 2022**
- Designed a wireless drone system using a BeagleBone Green and Arduino Nano 33 IOT drone.
- Developed multiple control modes, integrated LCD display, and implemented an ultrasonic sensor for gesture-based height control.
- Wrote a custom driver for a **UART-BLE module in C** for efficient BLE communication between the controller and drone.
- Incorporated watchdog and systemd scripts for automated restarts to handle any unexpected system crashes.

🔗 **FASTrack - Reaction Time Game:**   **Summer 2022**
- Developed a reaction time-based game called FASTrack for the Xilinx ZedBoard, utilizing the **ARM7 assembly instruction set.**
- Implemented various game features such as multiple speed modes and user controls through switches. Utilized OLED display and LEDs for visual feedback.
- Demonstrated key concepts including timer interrupts, masking, OLED display usage, and Finite State Machines (FSMs).

EDUCATION

B.A.Sc. Computer Engineering — Honours   **Sep 2020 — Sep 2025**
Simon Fraser University   Burnaby, BC

AWARDS

Innovation Award / ESSS Award   **Spring 2022**
Simon Fraser University   Burnaby, BC
Recognized for outstanding creativity, originality, and impact via my projects driving advancements in technology.
Honored for contributions to the student society.