Justin Ernest Mateo

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SKILLS

- **Programming Languages:** C, C++, Python, Java, MATLAB, VHDL, SQL, JavaScript.
- **Software Tools:** Linux (more Debian and Ubuntu), bash, make, git, Jira, TensorFlow, LabVIEW.
- **Hardware Tools:** Function generator, oscilloscope, multimeter, solder station, LTSpice, Altium.
- **Soft Skills**: Adaptable, Bilingual (English & Tagalog), Coordinated, Independent, Inquisitive, Leader, Team-oriented.

EDUCATION

B.A.Sc. in Computer Engineering with Distinction — **Sep. 2019 – Aug. 2024**
Simon Fraser University — *Burnaby, BC*

- **CGPA**: 3.59
- **Dean's Honour Roll**: Summer 2020, Fall 2020, Spring 2022, Summer 2022, Summer 2023, Summer 2024
- **Key Coursework:** Embedded/Real-time Systems; Software Engineering; Data Structures & Algorithms; AI & ML; Database Systems; Operating Systems; Advanced Digital Logic Design; Feedback Control Systems; Microelectronics; Electrical Circuits.
- **Extracurricular**: Controls team member, SFU Team Phantom; Electrical/controls team member, SFU Team Guardian; Various hackathons.

WORK EXPERIENCE

Project Manager Intern — **Sep. 2023 – Dec. 2023**
Arlo Technologies Canada — *Richmond, BC*

- Arlo specializes in home automation, and I worked with their Hub devices, multi-sensors and doorbell cameras.
- Significantly reduced false detections in Arlo's multi-sensor product by designing a more reliable algorithm for smoke & CO alarms.
- Collaborated with internal teams (local and international) and external contractors to ensure project status updates and to update Jira.
- Delivered comprehensive data analyses and proposed software and hardware revisions to the Project Management and SW/HW teams.

Electromechanical Engineer Intern — **Jan. 2021 – Dec. 2021**
Conetec Investigations Inc. — *Burnaby, BC*

- Led the end-to-end development and enhancement of Conetec's iBPT system, including designing & implementing a DAQ system.
- Created detailed documentation, test plans, and training materials using Confluence for knowledge transfer.
- Optimized sensor accuracy across key products (eCones, eResitivity and more) by refining data analysis algorithms with Python and MATLAB.
- Completed side projects utilizing CAN drivers and Ethernet to communicate with peripherals for data acquisition.

PROJECTS

FrisMe – Automatic Ultimate Frisbee Launcher — **Jan. 2024 – Jul. 2024**

- Led the end-to-end development of FrisMe, a shelf-ready product for accurate throws to players, and created a mobile app for control.
- Designed and integrated subsystems for propulsion, angle adjustment, aim control, and machine vision on *BeagleBone Green*'s Debian OS.
- Developed device drivers and validation tests in **C** for *BLE* modules and motor controllers, including expected outputs for specific inputs.
- Utilized **Python** and **C** for machine vision on an *NVIDIA Jetson*, leveraging *GPU* parallelization to enhance processing speed and efficiency.
- Employed *SPI, I2C, and UART* protocols to communicate with sensors and implemented *PWM* for precise motor control for multiple motors.

Spot-A-Bone – Embedded Smart System for Music Playback — **Oct. 2022 – Dec. 2022**

- Served as team leader of the group project, Spot-A-Bone, for an Embedded Systems / Real-time Systems course, achieving a grade of **100.6%.**
- Integrated an enclosed embedded system with BeagleBone Green, employing cross-compilation to optimize performance on Debian OS.
- Developed *NFC* communication for song selection, implemented *face recognition* for login, utilized *motion sensing* for playback control, and integrated the *Spotify API* using **C**, **C++**, and **Python**.

S-Talk – Terminal-Based Real-Time Chat Application — **Oct. 2022**

- Developed a chat application in **C**, facilitating real-time communication between users on the same network through terminal-based interaction.
- Leveraged *UNIX UDP IPC*, the client/server model and multi-threaded programming in C to ensure robust message sending and receiving

Graduate Admissions System — **Oct. 2020 – Nov. 2020**

- Designed and implemented a graduate admissions system in **C++** using *inheritance* and *linked lists* for optimized data management.
- Created a Student class with International and Domestic subclasses, and separate classes for ToeflScore and LinkedLists.

Piano Tiles on ZedBoard — **Jan. 2024 – May 2024**

- Engineered a video game on ZedBoard using AMD's Vivado Design Suite for hardware design and Vitis for software integration, emphasizing real-time interactions.

- Developed **C** software for *hardware interfacing*, *sprite rendering* via VGA, and *interrupt handling* for seamless hardware-software integration.
- Designed and implemented hardware subsystems including IP blocks such as *FFT*, *DMA*, and real-time tile generator in **VHDL**, synchronized with the Zynq-7000 SoC using audio data.

EmoTune – Emotion Detection w/ Audio Data **Jan. 2024 – May 2024**

- Curated a dataset of 200 songs, employing **Python** to extract vocal features, which contributed to *advanced emotion detection* analysis.
- Utilized *pandas, matplotlib & scikit-learn* to manipulate and visualize data analyses, training *TensorFlow machine learning models* to compare.
- Investigated emotion detection using only raw audio data, achieving *57%* accuracy using k-fold cross-validation with a CNN model.

Binary Neural Network on FPGA **Feb. 2023 – Apr. 2023**

- Created a *hardware binary neural network* on a DE2-115 FPGA, optimizing performance and earning a grade of **120%.**
- Trained a **Python**-based BNN to classify images into numerical digits, extracting optimal matrix weights for the hardware implementation.
- Designed **VHDL** hardware to read image data and matrix weights stored in on-board ROM, facilitating the BNN's layers and data pipeline.

Titanic Survival Predictor **Feb. 2022 – Apr. 2022**

- Utilized **Python** libraries for data manipulation and visualization, achieving **87%** accuracy in survival predictions with analysis and model tuning.
- Analyzed a dataset of 891 passengers, applying preprocessing and feature engineering to optimize model performance.
- Implemented various *scikit-learn ML models* including Random Forest, Logistic Regression, SVM and Perceptron using the preprocessed data.

Vending Machine Controller **May 2020 – Jun 2020**

- Designed a functional vending machine controller in **VHDL**, contributing to a 98% grade through effective teamwork and innovative design.
- Realized 6 different states for which each was defined with their own robust and effective finite state machine written in VHDL.

Rush Hour in Java **Feb. 2021 – Apr. 2021**

- Created and tested an efficient **Java** program that solves Rush Hour puzzles, implementing an *A* algorithm* to optimize gameplay strategies.
- Implemented an efficient A* algorithm utilizing the number of obstructing cars as a heuristic to determine optimal moves.
- Achieved a **100%** grade on the project due to well-structured code, efficient performance and effective teamwork.

INTERESTS

Outdoor activities (cycling, hiking, snowboarding); Basketball; Fitness; One Piece; Board games.