Taheer Khan

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Education

Toronto Metropolitan University (Formerly Ryerson) 2022-2027
Bachelors of Engineering in Computer Engineering *Toronto, ON*

Relevant Courses: Operating Systems, Digital Systems, Electronic Circuits, Signal and Systems, Control Systems, Data Structures & Algorithms, Object Oriented Programming

Experience

Toronto Met. Baja Racing Sept 2024 – Current
Electrical Division *Toronto, ON*

- Designed and calibrated a 100 PSI pressure transducer system integrated with an **ESP32 microcontroller** to monitor hydraulic brake system pressure differences
- Applied communication between the **ESP32** and **Raspberry Pi** to seamlessly send pressure readings to the main GUI on the vehicle's gauge cluster.

Projects

Personal Portfolio Website | *JavaScript, HTML, CSS* khantaheer.com

- Created a personal portfolio website to showcase projects, skills, and hobbies by developing personal branding through a simple & minimalist design.

Realtime Posture Correction | *Python, MediaPipe, OpenCV*

- Developed a real-time posture recognition system using **Python**, **OpenCV**, and **MediaPipe** to track and alert users of sitting posture, enhancing ergonomic health and user awareness.
- Implemented a calibration algorithm leveraging multi-threading and landmark detection to adapt for diverse user profiles, ensuring precise feedback.

16-Bit CPU Design | *VHDL, Quartus II, FPGA*

- Developed three custom CPUs using **VHDL** and **FPGA**, integrating logic units such as **decoders**, **FSMs**, and **flip-flops**, to enhance processing for operations such as arithmetic, logic functions, parity checking, and bit rotation.
- Improved processing accuracy by implementing **ALU cores** that modify inputs and execute Boolean functions, displayed via **seven-segment display**.
- Constructed a **Mealy FSM** and a **4:16 decoder** to control ALU operations, increasing the CPUs' flexibility to handle multiple operations, such as input comparisons and arithmetic checks.

Realtime Motion Detector | *C++, ESP32, Firebase, KiCAD*

- Used an **ESP32** to detect motion via **HC-SR04** ultrasonic sensor with a **custom PCB**.
- Applied event-driven architecture for efficient real-time data synchronization to **Firebase** for **IoT communication**.

Oscilloscope | *C, Python, Microchip Studio, KiCad, MatPlotlib, ATM328*

- Developed a low-cost oscilloscope using the **ATmega328 microcontroller** and Python's **Matplotlib library**.
- Integrated **UART communication** and **ADC conversion** on the ATmega328 microcontroller, enabling precise data acquisition for real-time signal visualization.
- Designed a **PCB** using **KiCad** to house the ATmega328 and essential components for the oscilloscope project while maintaining a compact form-factor.

Cascaded BJT Amplifier | *NI Multisim, Oscilloscope, Multimeter*

- Designed an amplifier by cascading a Common-Emitter and Common-Collector BJT amplifier using **MultiSim**.
- Conducted performance analysis by measuring gain, bandwidth, and distortion while also verifying stability through frequency response ensuring amplifier met design specifications.

Technical Skills

Languages: C/C++, VHDL/Verilog, Java, Python, Matlab, JavaScript, HTML/CSS
Technologies/Tools: Quartus, Microchip Studio, KiCad, LTSpice, MultiSim, Git, Matplotlib, Firebase, JavaFX
Hardware: ESP32, FPGA, Raspberry Pi, atMega328, STM32, OPAMP, MOSFET, HC-SRO4, Oscilliscope, Soldering