Abhishek Raghuwanshi

(+1)236-234-1213 | abhi112r@gmail.com | linkedin.com/in/a112r | a112r.github.io

Objective: To contribute as a Hardware Design and Verification Engineer in the semiconductor industry, leveraging expertise in both digital and analog systems to develop robust, high-performance silicon solutions.

Education

University of British Columbia *Vancouver, BC*

Bachelor of Applied Science in Electrical Engineering ***Sep. 2022 – May 2027***

Awards: EUS Community Contribution Award 2025, Martin Sikes Memorial Award in ECE UBC 2024, Outstanding Student Award 2022

- Authored and presented a paper on **Atomic Layer Deposition (ALD)** for **Semiconductor device optimization**.
- Founding member @Hackerfab UBC, developing open source hardware for DIY semiconductor fabrication.

Skills

Hardware: **System Verilog** - RTL, UVM, Testbench+simulation, Circuit design and debugging, **PCB** design(Altium, KiCAD), SPICE, **Serial protocols** (UART, I2C, SPI), **microcontroller** systems(STM32, ESP, Nrf5280, SAMD21)

Languages: C, C++, Python, HTML+CSS, JavaScript, Assembly(ARM and 8051), Pascal, LaTeX, makefiles

Tools: Quartus + Modelsim, Matlab + Simulink, Oscilloscopes, Logic Analyzers, Git, Powershell, WSL, VS Code, IntelliJ, STMCube/Arduino IDE, Raspberry Pi, Solidworks, Onshape, 3D Printing, Microsoft Office, Google Suite

Technical Experience

Electronics Team Lead **Sep. 2023 – Present**

@ UBC Subbots - Autonomous Underwater Vehicle Robot team *Vancouver, BC*

- **Leading a team of 18 students** to design the electronics and relevant firmware for an Autonomous Underwater Vehicle (AUV) competing in the International RoboSub Competition.
- Developed a **custom Electronic Speed Controller PCB**, converting PWM signals to 3-phase motor outputs with closed-loop **IMU feedback** using **C++ and Simulink**.
- Designed power distribution PCB in **Altium**, **improving efficiency by 25%** while also integrating BMS and an emergency safety kill switch.
- Delivered a **modular** and **debug-friendly** electronics system using **I2C** communication, helping the team reach RoboSub semifinals for the first time.
- Currently developing a custom **PoE-based Ethernet interface** board to communicate and power an Nvidia Jetson TX2 over tether without needing battery for testing.

Projects

FPGA Music Player | *SystemVerilog, Assembly(PicoBlaze), DE1-SoC, Quartus+ModelSim* **May 2025**

- Designed an **FPGA-based MP3 player** by interfacing Flash memory, PS/2 keyboard, and DAC on a DE1-SoC board, using FSMs to control 22KHz/44KHz audio playback from 16-bit samples.
- Implemented **asynchronous clocking** with domain-crossing synchronizers from 27MHz and 50MHz clocks.
- Developed **keyboard controls** for play, pause, reset, seek, and adjustable playback speed via on-board keys.
- Added an **LED volume intensity meter** using a PicoBlaze soft processor with interrupt-driven averaging logic written in Assembly to display amplitude in real time.

Web controlled balancing BLE robot | *Nrf52840, C++, HTML+CSS, Py(Flask+BLEak), Node.js* **Jan 2025**

- Designed a **custom motor driver PCB** to optimize motor efficiency and reduce power consumption by 20% in a two-wheel self-balancing robot using an **NRF microcontroller**. Enabled **BLE-based control** with <100 ms latency and a stable 10-meter wireless range.

- Developed a **local web server hosted on laptop(with js and Python)** and **responsive website interface** for real-time robot control, **supporting up to 5 users** simultaneously with joystick UI for intuitive movement.
- Implemented **PID control** for the self-balancing using an on board IMU, enhancing stability and movement accuracy for smooth operation.

Metal detecting RC robot | *PIC32, ATmega, STM32, C, Python, Putty, makefiles* **Mar 2024**

- Developed **two-way UART** communication via **JDY40 Bluetooth** (100m range) with <5% data loss and programmed PIC32 microcontroller for magnetic flux detection (1.40mH) with 98% accuracy.
- Built a **software control interface** using **Python for UI and STM32(in C)**, enabling robot control via keyboard (WASD), and feedback including position tracking + data plot for verifying accuracy.
- Created analog meter for inductance display using timer interrupts on **PIC32** to indicate metal present in range.

Reflow Oven Controller | *Nuvoton microcontroller system, 8051 assembly, Python* **Feb 2024**

- **Designed hardware controls** for selecting reflow profile parameters (soak temperature/time, reflow temperature/time) and oven settings using **N76E003 microcontroller** in pure **8051 assembly**.
- Developed **Python script** for logging temperature data and displaying animations to improve user awareness.
- **Implemented dual timers in assembly** to track state durations, display time information, and generate PWM for controlling oven power via SSR box.

RISC Machine | *System Verilog (RTL+Testbench), ARM assembly, Altera FPGA* **Nov 2023**

- Made a fully-functioning **32 bit CPU and Datapath** using **System Verilog** that decodes **ARM instructions** and executes them completely on a **DE1-SOC FPGA**.
- Executed extensive coding in System Verilog synthesized in **Quartus** and created extensive **test benches** to verify the functioning of every feature using **RTL simulation waveforms** using **Modelsim**.

Extracurricular Activities and Interests

• **Sports**: UBC Triathlon, Intramural Tier-1 Basketball Champion, ECE and EUS sports captain - Basketball & Soccer.
• Recreational electric guitar player, made a project to use an **FPGA board** as a **digital FX pedal.**

• ***UBC Electrical and Computer Engineering Student Society (ECESS)***:
- **VP Finance** (2025-26) - Responsible for operating and maintaining a budget of more than $50,000 for undergraduate ECE students at UBC
- **VP Student Life** (2024-25) - Responsible for organizing all social, sports and extracurricular events for all undergraduate ECE students
- Organized **NASA International Space Apps** hackathon successfully in Vancouver, with 130+ participants.
- **2nd year representative**(2023-2024) - Student Council member representing all 2nd year ECE students, conveying any student concerns and feedback to improve student experience

• ***UBC Engineering Undergraduate Society (EUS):***
- Facilities Director, Career Fair Company Relations Manager, WebMaster and Communications Manager
- Student tutor, ESC Technician, Red Sales rep, Eatery rep, Keeper of Cairn, Spirit Rep

• ***UBC AMS Calisthenics Club:***
- Treasurer of the AMS Calisthenics club, responsible for managing club funding and overall finances, occasional instructor for exercises.