Ebrahim Hussain

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Availability: 4 month term, January 2023 → April 2023

SKILLS

Software	Python, MATLAB, Java, C, Verilog, CAD, Quantum Computing with Qiskit
Hardware	Arduino, RPi, FPGA, Digital and Analog Logic
Circuitry	Soldering, Oscilloscope and Network Analyzer Usage, PCB Design (Altium)

EDUCATION

UBC Engineering Physics **2021 - (Present)**

2nd Year BASc at the University of British Columbia

[1] ENPH 259 - Experimental Techniques

Practicing advanced testing, hardware troubleshooting, and data collection with oscilloscopes, network and logic analyzers, multimeters, and frequency generators.

PROJECT EXPERIENCE

UBC Thunderbots Electrical Sub-team Member **2022 - Present**

Collaborating with electrical and mechanical team members to rapidly prototype and fabricate soccer-playing robot components.

- Improved motor driver board design on Altium by streamlining motor chip communications and adding individiual indicators for motor failure.
- Tested the robot dribbler's responses by analyzing motor currents under stress to find possible faults.

DC-DC Power Supply and MC34700 Application **2022**

A series of tests with switching power supplies, and further applications with dedicated SMP to create a dual 12 → 1.8V (1.0A max) and 12 → 3.3V (1.5A max) power supply.

- Created a 2V → 7V switching DC-DC power supply from scratch with inductors, capacitors, N-MOSFETs and diodes.
- Analyzed power circuit behaviour with a four-channel oscilloscope across several cases, such as increasing switching duty cycle and reducing ripple through an LC filter.
- Further utilized power circuit analysis to implement a 12V to 1.8/3.3V supply on a MC34700 switching mode chip using its datasheet.
- Outlined schematic, power efficiency, component selection justification, and PCB layout considerations for the MC34700 buck converter.

Wireless Energy Transfer **2021**

Applied relevant course theory into practice to create an efficient and low-power wireless energy transmitter using commonly available components.

- Invented a self-recharging oscillator by deriving and MATLAB testing a system of differential equations.
- Broke down a complex wireless energy transfer system into modules, and systematically derived, designed, and implemented them together.
- Created a low power DC to AC inverter without specialized components such as comparators, transformers, or excess transistors.
- Conducted circuit analysis with an oscilloscope, function generator, and network analyzer to model and optimize circuit behaviour in relation to E&M theory.

Other Projects

Other personal projects, some of which are listed on ebrahimactivities.github.io

- 8-Bit CPU with conditional program execution.
- Basys-3 FPGA frequency generator (50 MHz max) and CPU module interfacer and tester.