Portfolio

Atharva Kulkarni

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Education

University of Saskatchewan — Saskatoon, SK

Bachelor of Engineering - Department of Electrical and Computer Engineering, Co-Op — *Sept. 2020 – Present*

- **Relevant Coursework**: Analog and Digital Electronics, Engineering Design, Digital Signal Processing, Magnetic Fields and Circuits, Object Oriented Programming, VLSI Design, FPGA programming
- **Awards**: Dean's Honor List, University of Saskatchewan Entrance Scholarship

Work Experience

Mine Electrical Engineering Intern — May 2023 – Present

Nutrien — *Cory, SK*

- Designed, prototyped and developed Circuitry and PCBs for wireless communications in the Mine for creating a mesh of data, eliminating the need for humans to go in dangerous areas to collect data.
- Wrote Firmware and Software for node to node communications in the mesh and performed calculations of RF data transfer in the Mines.
- Performed cut over of PLCs from old to new Rockwell PLCs, including writting Ladder Logic for new logic operations.

Avionics Electrical Design Intern — January 2023 – April 2023

Reaction Dynamics — *Montreal, QC*

- Designed flight hardware for Canada's first attempt at a orbital rocket and the world's first attempt at an orbital rocket with a hybrid rocket motor.
- Designed and developed new iterations of multi-layered and mixed signal PCBs and circuitry for data acquisition, over voltage protection, engine control, and board interfacing to go on the rocket and ground support systems.
- Wrote embedded software, in C/C++, for implementing CRCs and testing flight electronics.

Satellite Firmware Developer — May 2022 – August 2022

University of Saskatchewan — *Saskatoon, SK*

- Wrote Embedded Software and designed Flight Hardware for Saskatchewan's first home-built satellite in space (RADSAT-SK), launched from the International Space Station (ISS) in 2023.
- Designed circuitry for overcharge/undercharge protection and remove before flight pin logic, and the PCB for a custom designed timer and inhibits board to prevent interference in the communications of the ISS.
- Implemented SPI communications on the OBC and reset functionality to the satellite's transceiver using C for better error management in case of component failure.

Engineering Projects

Rocket Electronics Stack — January 2023 – Present

U of S Space Design Team - Rocketry — *Saskatoon, SK*

- Designed the first iteration of the U of S rocket's GPS and Power Distribution Board. Both boards were microcontroller based using a CAN bus architecture.
- Designed circuitry for power delivery, bus voltage and current sensing, microcontroller programming and integrating the GPS transceiver with the MCU and to an antenna through a SMA connector.

Electrical Power System (EPS) — August 2022 – December 2022

Personal Project — *Saskatoon, SK*

- Designed an open-source EPS for satellite applications, procured manufacturing of PCBs and soldered SMD components.
- Designed the Battery Management System, Maximum Power Point Tracking Input from Solar Panels, Charging Circuitry and Voltage Buck Converters to meet requirements of various satellite missions.

Full Duplex Transceiver (RF Board) — September 2022 – December 2022

Personal Project — *Saskatoon, SK*

- Designed a full Duplex UHF/VHF uplink and downlink transceiver for satellite applications, making it open source due to the alternatives being expensive.
- Designed the balun, filter and impedance matching for the Si4460 RF IC.

Power and Electrical Team Lead December 2021 – December 2022

RADSAT-SK Cube-Satellite Project *Saskatoon, SK*

- Found mission-critical faults in the design of a custom timer and inhibits board PCB, Managed a team of 4 in redesigning the custom PCB within 3 weeks, while also communicating with partner companies to design mission-critical hardware.
- Led a team of 5 to conduct Circuit Simulations and verification testing on the custom designed Timer PCB, using LTSpice.

Attitude Determination and Control Systems Team Lead March 2021 – May 2022

RADSAT-SK Cube-Satellite Project *Saskatoon, SK*

- Led a team of 5 on conducting simulations and, using a MATLAB toolkit, for Attitude and altitude Determination of the CubeSat.
- Conducted tests on magnets and hysteresis rods of the satellite to check their serviceability by implementing Test Circuitry, using an Oscilloscope and Gauss meter.

Avionics Team Co-Lead Sept. 2021 – January 2022

U of S Space Design Team - Rocketry *Saskatoon, SK*

- Programmed the Barometer and IMU sensors to give readings of altitude, pressure and orientation using C/C++ and Arduino.
- Integrated the Barometer, IMU sensors and temperature sensors with the Teensy 4.1 microcontroller.

President and Founder Oct. 2020 – Oct. 2021

U of S Drone Team *Saskatoon, SK*

- Directly in charge of managing over 40 students of different disciplines.
- Using Python to program a drone's software to make the drone take multiple photos of previously selected areas on a field.

Publications

Radsat-SK Cube-Satellite Frame Design June 2021

CSME 2021 Symposium *Charlottetown, PE*

- B. Entz et al., "Radsat-SK Cube-Satellite Frame Design", Progress in Canadian Mechanical Engineering. Volume 4, Jun. 2021, https://doi.org/10.32393/csme.2021.239

Technical Skills

Languages: Python, C/C++, Embedded C, MATLAB, Verilog, HTML/CSS
Embedded Systems and Robotics: Debugging, FreeRTOS, various sensors, microcontrollers, FPGAs, Kalman Filters
Hardware Testing and Design: PCB Design using KiCad and Altium Designer, Circuit Simulations using LTSpice, expericene with soldering and reflowing, EMC Knowledge, power electronics design
Libraries: pandas, NumPy, Matplotlib, DroneKit, ArduPilot, openCV, mediapipe and Orbital Simulations in MATLAB, SystemC

References available upon request