# Kabeer Cheema

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**Portfolio:** https://kabeercheema.github.io/

## Skills

**Languages:** *C, C++, Python, Bash, VHDL*
**Tools & Utilities:** *Linux, Git, Jira, MATLAB/Simulink, Altium, LTspice, SolidWorks, Ladder Logic*
**Libraries:** *NumPy, Pandas, Scikit-Learn, OpenCV, Multithreading*

## Education

**University of Waterloo**                                                                                          *Sept 2023 - Present*
    *BASc.  Mechatronics Engineering  – GPA: 4.0, Dean's Honour List*

## Experience

**Connected & Automated Vehicles Lead** | UWaterloo  EcoCAR Team                          *May 2025 - Present*
- Deployed a **Raspberry Pi 4 CAN** gateway on **Linux** to Cadillac Lyriq ECUs and built **Bash** automation and **Python multithreading** to drive status lights and switches with low-latency, **real-time** messaging, verified with **HIL** testing
- Built a 2D **LiDAR** object-detection pipeline with **Python**, using **C++** for sensor I/O via **UART** and **TCP**; applied **scikit-learn** and **NumPy** for preprocessing, clustering, and classification with **OpenCV** for visuals
- Designed radar + camera **sensor fusion** in **Simulink**  with **RTMaps** and **Python**, improving object-tracking accuracy by 85% for **perception** in **ADAS** features
- Coordinated across teams and delivered EcoCAR milestones via **Jira** sprints, backlog grooming, and standups

**Software QA Engineer** | i4i                                                                                      *Jan 2024 - Dec 2024*
- Developed an internal **automation software tool** using **Python** and **XSLT** to convert metadata in Excel to Word documents. Tool increased productivity of the document conversion team by over **90%**
- **Led testing** of company software and directed several quality control members to conduct **functional**, **regression**, and **performance** testing for multiple customers
- Utilized Microsoft **Office** to create release notes for the automation tool and created other documentation for test scripts while adhering to guidelines of the FDA and Health Canada

## Projects & Extracurriculars

**LiDAR Object Detection**
- Built  a 2D **LiDAR** supervisory object-detection module that validates stock sensor outputs, strengthening the Cadillac Lyriq **ADAS perception** stack for UWaterloo's UWAFT EcoCAR team
- Leveraged **C++** to interface with the LiDAR over **UART** and **TCP**; processed data in **RTMaps** + **Python** with **scikit-learn** and **NumPy** to detect objects and estimate orientation/width, integrating the module with stock vehicle sensors
- Delivered a deployable perception module that was tested with HIL and VIL  that met real-time latency budgets, improved detections of perception stack by **70%**

**Electrical & Powertrain Member** | University of Waterloo Baja SAE                        *Aug 2024 - May 2025*
- Designed  buck-converter **PCBs** and **schematics** in **Altium,** ran simulations in **LTspice**, optimized for efficiency/EMI, and led assembly and bench testing to validate  circuit boards
- Improved CVT performance through analysis and tuning, and created **SolidWorks** assemblies to verify packaging/clearances and guide thermal management updates

**RC Formula 1 Car**
- 1/10-scale RC F1 car with a 3D-printed chassis, brushless motor + rear differential, and a clean, modular electronics bay for the radio receiver and controller
- Wrote embedded **C++** on an Arduino to read RC receiver inputs and generate precise **PWM** for the ESC and steering **servo**; added normalization, deadbands, calibration, and command smoothing
- Implemented a non-blocking control loop with timer interrupts and a **state machine**, plus loss-of-signal safeguards and LED/serial diagnostics for responsive, reliable control