Muhammad Choudhary

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Education

- **University of Toronto** — Toronto, CA
  Bachelor of Applied Science, Computer Engineering + PEY — *Sep. 2022 – Apr. 2027*
  - **Relevant Courses**: Object Oriented Programming (C++), Data Structures and Algorithms (C/C++), Deep Learning & Neural Networks (PyTorch), Communication and Design, Computer Fundamentals, Digital Systems
  - **Awards**: 1st Place in MakeUofT (North America's largest makeathon), 2nd Place in EWB CEDR Hackathon, 2nd Place in NSBE Hacks, Top three in UofTHacks

Experience

- **University of Toronto Formula Racing Team** — Toronto, ON
  Autonomous F1 Perceptions Team + Firmware Team — *Oct 2023 - May 2024*
  - Integrated the YOLO-NAS object detection architecture into the perception system of an autonomous Formula 1 racing car to accurately detect and classify track obstacles in real-time.
  - Improved object detection accuracy and reliability by fine-tuning hyperparameters and employing techniques such as data augmentation and model ensembling.
  - Achieved significant reductions in model training time (4 times quicker) by leveraging GPU acceleration and distributed computing, optimizing resource usage and improving the team's development cycle.
  - Siumultaneously worked on the Firmware sub-team to program embedded software that runs the microcontrollers on the car, developing firmware for ECUs, implementing sensor integration and testing and validating firmware to ensure it meets safety and performance requirements

- **University of Toronto Aerospace Team** — Toronto, ON
  AEAC (Aerial Evolution Association of Canada) Software Team — *Sep 2022 - May 2023*
  - Developed and integrated the Robot Operating System (ROS) for an autonomous drone, focusing on navigation and control, as part of the AEAC Software team.
  - Designed and implemented airspace visualization and path planning algorithms using Python, including RRT (Rapidly-exploring Random Tree) and D Lite*, to optimize flight paths and enable dynamic re-planning in real-time.
  - Won **2nd** place in Phase 1 Design Paper for the UAS (Unmanned Aerial System) Competition

Projects

- **Communication device for the deaf and blind**: Developed a communication device for the deaf and blind using Qualcomm's HDK-8450 Dev Kit, programmed in Kotlin and C++. Integrated Google's text-to-speech and speech-to-text APIs for Morse Code and speech conversions. Utilized an Arduino to convert Morse Code into vibrations for output. Won **1st** place at Make UofT.
- **Intellectify (Automated Note Taker)**: Programmed an automated note taker for live or recorded lectures. Used AWS Bedrock and SageMaker for speech-to-text and note compilation. Implemented web scraping for study resources using JavaScript (Puppeteer) and AWS Lambda to automate processes and generate PDFs.
- **ReLive: VR Photo Album**: Created a web app that converts nostalgic photos into immersive 360° VR experiences using Panolens.js and Google Cardboard. Enabled photo uploads, interactive panoramas, and VR navigation via the Cardboard action button. Utilized HTML, CSS, JavaScript, and Firebase for frontend development and image storage.
- **ASL Classifier**: Created an ASL classifier that converts hand gestures to text and speech using a camera. Utilized TensorFlow via Google's Teachable Machine for ASL conversion, Python for image processing, and P5JS/HTML for the front end. Won **2nd** place at NSBE Hacks.

Programming Skills

- **Languages**: C/ C++, Python, Javascript, HTML, CSS, Swift, Kotlin, Unix Shell Scripting
- **Technologies**: AWS, React, Git, Docker, XCode, Android Studio. Firebase
- **Skilled Areas**: OOP, Software Development, Data Structures, Algorithms, Databases, Team Work