Rea Ahuja

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Driven and analytical Computer Engineering student with a strong passion for machine learning, embedded systems, and software development.

Education

University of Toronto — Toronto, Ontario
BASc, Computer Engineering + PEY Co-Op — *Sep. 2022 – May 2027*

Experience

Undergraduate Researcher and Software Developer — May 2023 – Present
University of Toronto — *Toronto, Ontario*

- `Led` the development of a Visual Studio Code extension named "Falcon", utilizing OpenAI's API to assist students in debugging syntax, logical, Valgrind, and cppcheck errors.
- `Conceptualized and implemented` tools to enhance student debugging skills, driving the extension's full development and integration.

Backend Software Co-Lead — September 2024 – Present
University of Toronto Creative Computing Association (UTCCA) — *Toronto, Ontario*

- `Leading` a team of developers in creating machine learning projects focused on computer vision, classification models, and generative AI for interactive displays and creative artworks.
- `Coordinating` the integration of cloud technologies to support scalable machine learning pipelines and deployment for these interactive projects.

3DOD Developer — September 2024 – Present
University of Toronto's Auto-drive Team (aUToronto) — *Toronto, Ontario*

- `Research`, design, and develop deep learning architectures for object detection, leveraging data from camera, LiDAR, and Radar sensors.
- `Maintain and enhance` the 3D object detection pipeline, ensuring continuous improvements in system performance.

Projects

DermAI: Skin Cancer Detection | *Python, TensorFlow* — July 2024

- `Architected and developed` a machine learning model for skin cancer classification, achieving an **accuracy improvement of 15%** by leveraging transfer learning with ResNet18.
- `Designed` and implemented a custom CNN incorporating advanced techniques such as Convolutional Block Attention Modules (CBAM) and batch normalization, which enhanced feature extraction and boosted model performance.
- `Trained and fine-tuned` the model, optimizing it for real-world application and integration into diagnostic workflows.

Discrete FFT Visualizer | *C++, DE1-SoC Board* — April 2024

- `Developed` a **C program for the DE1-SoC board** to analyze and visually render the frequency spectrum of audio inputs or generated waveforms, improving auditory and visual analysis
- `Designed` a graph drawing algorithm and integrated multiple peripherals, including microphone, speaker, VGA display and more, enhancing user interaction and system capabilities.

HerWay Map — April 2024

- `Developed` a mapping application leveraging C++, EZGL, and Glade, incorporating **Dijkstra's algorithm** to generate optimal routes for safe night-time commutes, minimizing exposure to high-risk areas and maximizing security.
- `Engaged` with York Region Municipality government and local police to incorporate the application as a public service, aiming to improve community safety and security.

Technical Skills

Languages: C/C++, Python, Javascript/Typescript, Verilog, Assembly, MATLAB, HTML/CSS
Developer Tools: Git, Google Cloud Platform, Visual Studio Code, Quartus, ModelSim, ROS, Docker
Hardware Platforms: Nios II Processor, DE1-SoC Board, Arduino, Raspberry Pi