Vedant Sheel

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TECHNICAL SKILLS

Languages / Technologies: Python, Java, C++, JavaScript, TypeScript, HTML/CSS, MATLAB, Arduino, Bash, React, React Native, Node.Js, Flask, MongoDB, Databricks, Cohere Vector Database, Snowflake

Developer Tools: Git, GitHub, Visual Studio Code, Android Studio, Jupyter Notebook, Anaconda, Cursor, Copilot, Google Teachable Machine, RoboFlow, MATLAB

AI & Libraries: Neural Networks (CNNs, RNNs, LSTMs), Self-Attention, Computer Vision, Object Detection, Image Segmentation, Time Series Forecasting, Model Deployment, Classification & Regression, Vectorization, Vector Databases, PyTorch, TensorFlow, Keras, OpenCV, YOLOv8, MediaPipe, NumPy, Pandas, Matplotlib, FastAPI, Scikit-learn

EDUCATION

Waterdown District High School - Hamilton, ON **(***Expected Graduation Date: June, 2026)*
- Current GPA (grade 11): 98% | *Specialist High Skills Major in Business*
- President of the Robotics Club, Coding Club, Math Club, and HSA; Active member of DECA, Chess club
- Developed a school-wide student portal application to streamline access to academic resources, event information, and club activities, improving communication and engagement among 1300+ active student users

EXPERIENCE

McMaster University **Hamilton, ON**
Research Intern *March 2025 - Present*
- Engineered a state-of-the-art multi machine learning model for conducting prognosis prediction of pulmonary fibrosis with improved error rate of ± 47mL (human lung holds an approximate 6000mL)
- Implemented novel techniques for lung volume quantification, including watershed algorithms from CT scans.
- Developed a Self-attention CNN model to classify fibrotic tissue patterns and improve prognosis accuracy.
- Conducting research and testing on in-clinic data under Prof. Dr. Martin Kolb and Prof. Sarah Svenningson

Clearcable Networks™ **Hamilton, ON**
Software Engineer Intern *June 2024 - August 2024*
- Enhanced the company's internal chatbot system, improving response accuracy and user engagement by 35%, resulting in faster client communication and support resolution times.
- Developed automation scripts to streamline manual workflows, including emergency ticket information retrieval from clients, reducing response time by 43%.
- Improved team productivity by over 20% through optimizing communication tools and internal systems

University of Waterloo **Waterloo, ON**
Research Intern *March 2023 - June 2023*
- Mentored by Prof. Otman Basir and PhD student Daniel Zadeh on Machine Learning and neural network design
- Gained hands-on experience in model development, optimization and deployment for real-time computer vision
- Engineered a real-time ASL-to-text-to-voice translator with 98.4% accuracy using Machine Learning

Kumon Institute of Education Co. Ltd. **Port Elgin, ON**
Volunteer Assistant *June 2022 - July 2023*
- Dedicated over 200 hours tutoring and supporting students in developing core math and reading skills
- Assisted instructors with grading, marking, and maintaining accurate student progress records

PROJECTS

Immediate Pulmonary Fibrosis Prognosis Model |*SA-CNN, Linear Regression, Tensorflow, OpenCV* ***May 2024–Present***
- Developed a first of its kind multi-model system combining a Self-Attention Convolutional Neural Networks (SA-CNNs) and linear regression to predict pulmonary fibrosis progression with an error margin of ±47 mL on lung capacity decline
- Integrated a novel approach of watershed segmentation algorithm in lung volume estimation and enhanced CT image preprocessing using Hounsfield Unit normalization, which proved more effective than traditional methods
- Validated the model with K-Fold Cross-Validation, Root Mean Square Error, Modified Log Laplace Likelihood scoring, achieving a 21% better correlation than GAP index methods
- Currently working with the Firestone Institute for Respiratory Health to validate the model on clinical data and working towards peer-reviewed publication to contribute in the field of pulmonary disease prognosis.

ECOSCAN - *Environmental Conservation and Observation System for Coordinated Outdoor Unmanned Tracking* ***May 2025***
- Developed an autonomous rover capable of detecting and classifying wildlife, fires, waste, and plant life with 94% detection accuracy with YOLOv8 object detection model

- Integrated GPS modules providing less than 3-meter location precision for environment mapping
- Reduced manual forest monitoring time by 70% compared to traditional field surveys, utilizing MongoDB for structured storage of images, GPS data, timestamps, and classification metadata for research use

Waste-Wise|*MongoDB, CNN, TensorFlow Lite, OpenCV, Flask API, React Native*   *Nov 2024*
- Built a mobile and desktop waste classification platform using a TensorFlow Lite-optimized CNN, achieving 97% accuracy and <250 ms real-time prediction speed for Recyclable, Garbage, and Compost categories.
- Developed a Flask API backend and integrated a MongoDB database to store user profiles, classification history, and image metadata for future model improvements and analytics
- Trained on 50,000+ labeled images, improving waste sorting behavior by 28% in user testing

Lost and Found| *Cohere Vector Database, Vector Embeddings, Semantic Search, React, NodeJS*   *Sept 2024*
- Built an AI-powered platform using semantic search and vector embeddings to match lost items based on user descriptions, achieving 91% top-3 match accuracy
- Integrated the Cohere Vector Database for fast, scalable search across 15,000+ item descriptions, delivering search results in <500 ms

American Sign Language Real-time Translator | *CNN, Mediapipe, Tensorflow, Text-To-Speech*   *Nov 2022–March 2023*
- Developed a real-time ASL translator using CNNs trained on a custom dataset of 180+ images per letter, reaching 98.4% classification accuracy across 100+ ASL gestures with an average latency of under 100 ms
- Designed a two-stage classification system combining CNN-based class prediction with landmark distance calculations for accurate hand shape distinction, improving recognition efficiency while reducing memory size for mobile deployment
- Implemented a live GUI using Tkinter to display real-time camera input, skeleton hand landmarks, predicted text, and integrated text-to-speech (TTS) output for instant voice translation

Smart Solar Tracker | Arduino Uno, PID control   *Nov 2021–February 2022*
- Designed and build a self-orienting solar panel system using dual LDR sensors and servo motors to maximize solar energy capture by automatically tracking sunlight throughout the day
- Developed a real-time PID control system to ensure precise, stable panel positioning in varying light conditions
- Acheived an 18.7% improvement in energy output compared to a static panel in real-world testing, with live performance data monitored manually via voltmeter

Smart Traffic Light System | Arduino uno, Ultrasonic Sensors, C++   *March 2019*
- Built a model traffic light system using Arduino and ultrasonic sensors to detect vehicles and dynamically adjust light changes based on real-time traffic distance
- Programmed C++ logic to control green, yellow, and red cycles, reducing unnecessary stops and starts by over 30% compared to traditional fixed-timer lights in model tests

AWARDS & ACCOMPLISHMENTS
- **Two-time Canada-Wide Science Fair Silver medalist** *(Canada's largest science competition/fair)*   **(2022, 2023)**
- **DECA International Career Development Conference Competitor** *Top 30th Competitor*   **(2025)**
- **RISE Global** - *International Finalist*
- BRSTF Best of Fair Award
- Bay Area Science and Engineering Fair Gold Medalist
- Firestone Institute Respiratory Health Award
- Western University Scholarship
- University of Alberta Scholarship
- SHAD Canada Scholarship
- Canadian Nuclear Society Canada-Wide Award
- Richard Brown Persistence in Innovation Award
- Gowling WLG Innovation Award
- Bruce Power Science and Technology Award
- Renewable Energy Reward
- NPX Innovation Award
- Hillfield Strathallan College Awards of Excellence – Scientific Process Award
- John Lennon Award for Physical Sciences