Ahmed M. Omran

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EDUCATION

Bachelor of Applied Science in Mechanical Engineering + PEY Co-op　　**Sep 2023 - Apr 2028 (expected)**
University of Toronto　　*Toronto, ON, Canada*

- **Concentrations:** Mechatronics and Bioengineering
- **Intended Minors:** Engineering Business, and Robotics
- **GPA:** 3.72/4.00, *Dean's List*
- **Related Coursework:** Mechanical Design, Mechanics of Solids, Engineering Analysis, Computer Fundamentals (C), Applied Fundamentals of Deep Learning, Corporate Accounting and Finance.

Secondary School Diploma - High Honors　　**Graduated May 2023**
King's Academy　　*Madaba, Jordan*

SKILLS

Programming: MATLAB, C, Python, JavaScript
Tools: Microsoft Office, Solidworks, VS Code, AnyLogic, Finite Element Analysis
Machining: Drill press, Lathe, Mill
Professional: Leadership, collaboration, problem-solving, adaptability

PROJECTS

EMG-controlled Robotic Bionic Hand, Personal Project　　**Jun 2025 - Jul 2025**
Local workshop and home tools　　*Eastern, Saudi Arabia*

- Designed and prototyped a 5-finger bionic hand; each finger used a 3-joint tendon-like mechanism, resin 3D printed at 40 μm resolution; iteratively improved design by reducing joint friction, tuning elastic cords, and adjusting tolerances for smoother actuation and stability.
- Implemented embedded control on an ESP32-S3 with PSRAM, driving 5 SG90 micro servos via PCA9685.
- Developed two control methods: computer-vision teleoperation using MediaPipe for early validation, and surface EMG with AI for gesture inference. Trained a TensorFlow Lite CNN on 10k+ EMG samples (100 Hz, 500 ms sliding windows), achieving 83% accuracy across 4 gestures (rest, open hand, fist, pinch).
- Overcame deployment limits by redesigning a GRU into a CNN, enabling real-time inference on the ESP32-S3 (<200 ms latency), and iteratively refined mechanics by reducing joint friction, tuning elastic cords, and adjusting tolerances for smoother actuation.

Skin Cancer Lesion Classifier, Group Member　　**Jan 2025 - April 2025**
App. Fund. of Deep Learning Course, University of Toronto　　*Toronto, ON, Canada*

- Developed a deep learning model trained on 25,000 images from the ISIC 2019 dataset to classify 8 types of skin cancer lesions, achieving 76% test accuracy.
- Built a baseline model with 3 CNNs and 3 fully connected layers, totaling 13 million trainable parameters, to establish performance benchmarks.
- Implemented transfer learning with PyTorch's ResNet-50 as a feature extractor, enhancing model efficiency.
- Conducted qualitative performance analysis using confusion matrices and Grad-CAM, improving model interpretability.
- Led team coordination by managing work distribution, setting internal deadlines, facilitating meetings, and ensuring timely project completion.

Pressure Vessel Testing, Group Member　　**Jan 2025 - April 2025**
Mechanics of Solids Course, University of Toronto　　*Toronto, ON, Canada*

- Created a pressure vessel model, using ANSYS Workbench to conduct finite element analysis with linear triangular discretization, simulating uniaxial loading, and generating heatmaps of stresses and deformation, to locate stress concentration points.
- Performed photoelastic analysis on a pressure vessel model, using polarized light while imposing varying loading conditions, to observe critical points.
- Measured and recorded fringe orders by observing isochromatic and isoclinic patterns to calculate the principal stress magnitude, using the stress-optic law, at three points of interest.
- Conducted non-destructive strain analysis on a cross-sectional model, using rosette and uniaxial strain gauges, to calculate uniaxial and Von-Mises stresses; the resulting maximum stress values occurred at the vessel's corners.

CNC Router, Team Leader　　**Sep 2024 - Dec 2024**
Mechanical Engineering Design Course, University of Toronto　　*Toronto, ON, Canada*

- Researched 22 commercial CNC models and market gaps through online forums and manufacturers' data to define engineering specifications for beginner and hobbyist users.
- Led a team of four engineering students through the engineering design process, facilitating weekly meetings, managing

work distribution, and ensuring alignment with the project timeline.

- Developed CAD models of candidate and final designs using SolidWorks, creating a 44-component assembly with standardized parts for manufacturability.
- Achieved a 95% grade on the final course deliverable by producing a well-documented, optimized design that met functional and engineering requirements.

Walkable Cities, Team Leader   **Jan 2024 - Apr 2024**
Engineering Strategies & Practices II Course, University of Toronto   *Toronto, ON, Canada*

- Led a team of five engineering students through the engineering design process by facilitating weekly team meetings and discussions and resolving team member conflicts, resulting in a successful submission of the conceptual design specifications report.
- Analyzed the Galbraith-Bahen crosswalk on St. George St through visual observations, sampling pedestrian and vehicle traffic, dimensions, and noise measurements to identify the lack of accessibility and safety features.
- Researched crosswalk standards through the City of Toronto, the Ontario Ministry of Transportation, and ISO Standards to define a list of design objectives and evaluation metrics.
- Simulated proposed adjustments in traffic-light timing using AnyLogic simulation software, resulting in a projected 37% decrease in the number of pedestrians per traffic cycle.
- Developed CAD models of candidate and final solutions using SolidWorks, presented to course instructors and the client, and used for design implementation advocacy.

Reversi Board Game, Individual Project   **Feb 2024 - Mar 2024**
Computer Fundamentals Course, University of Toronto   *Toronto, ON, Canada*

- Developed a player versus player reversi board game through C programming language using 2D arrays for the game board and various functions to check move legality, game interactions, and win conditions.
- Created player versus environment mode using a minimax algorithm with Alpha Beta pruning to maximize player score seven moves in advance, with a computation time limit of less than one second.
- Submitted algorithm to compete in course-wide tournaments and placed 18th out of 300+ students.

EXTRACURRICULAR EXPERIENCE

Team Member   **Oct 2023 - present**
University of Toronto Supermileage Team   *Toronto, ON, Canada*
Urban Concept Car Mechanical Division

- Developed SolidWorks CAD skills through team tutorials and workshops, enabling the design and modification of vehicle components.
- Installed the braking system onto the car frame by shaping brake-fluid delivery pipes and mounting friction pads onto the wheel hub using hand tools.
- Redesigned the kingpin steering mechanism in SolidWorks, reducing scrub radius and steering effort, while introducing a self-adjusting geometry for improved handling.
- Machined a front axle with precision chamfers, reduced diameters, and threaded sections using a lathe, ensuring compatibility with the final vehicle assembly.

CERTIFICATIONS

Certified SolidWorks Associate (CSWA)   **December 2024**
Online Exam, University of Toronto   *Toronto, ON, Canada*

- Created new parts using reference geometry, extrusion, and sweep features, based on engineering drawings
- Created assemblies of given parts with various mating features to measure critical distances at specified positions.
- Adjusted material properties and density to complete mass measurements.

Python Specialization   **May 2024 - Jun 2024**
University of Michigan / Coursera   *Virtual*

Topics covered: syntax, data structures, web data, databases, and data visualizations.

- Developed various Python scripts to read and analyze text files and mail headings
- Developed a web scraper and utilized *beautifulsoup4* to parse HTML and XML files
- Utilized SQLite software and libraries to create and edit databases.

Machining Course   **Jan - Feb 2024**
George Brown College   *Toronto, ON, Canada*

- Machined piston and cylinder mechanism using aluminum rods.
- Operated the lathe machine to create piston ridges and shafts.
- Used drill press to create screw holes and hollow cylinders
- Used a 3-axis milling machine to reduce the thickness of the desired components.
- Assembled the piston and cylinder to a flywheel, creating a crankshaft mechanism.