

# Gabriel Melendez

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## Education

### Carleton University

Bachelor of Engineering, Mechanical Engineering | CGPA: 11.40/12.00

Ottawa, ON

Expected May 2028

## Experience

### Teaching Assistant – ECOR 1034 (Engineering Dynamics) & MATH 1004 (Calculus I)

September 2025 - December 2025

Carleton University

Ottawa, ON

- Designed and implemented AI tutoring models for ECOR 1034, utilizing **sentiment analysis** and **student performance data** to assess engagement, identify gaps, and drive **continuous, data-informed improvements**.
- Delivered **weekly tutorials** and office hours to support first-year calculus students, providing clear explanations of complex concepts and grading tests.
- Organized and led a final exam review session by coordinating upper-year volunteers, supporting approximately **300 students** and contributing to a **measurable increase in course pass rates**.

### Robotics Instructor & Director of Marketing

April 2025 - September 2025

Zebra Robotics

Burlington, ON

- Instructed students (ages 6–17) in robotics using LEGO Spike and VEX; prepared teams for **national and international WRO/ STRIPE competitions**.
- Pitched our programs at school events and led community workshops to promote enrollment, engagement, and brand awareness.
- Led marketing initiatives including Meta ad campaigns, cold calls, and event outreach. Secured **partnerships with local schools**, generating over **\$18,000 in projected future revenue**, further expanding location presence.

### Planetary Robotics Mechanical Designer

December 2024 - Present

CPRT - Carleton University

Ottawa, ON

- Mechanical designer on a planetary Mars rover team, **manufacturing drawings** for key chassis components, incorporating **basic tolerances, fits, and alignment requirements** to ensure reliable assembly, integration, and terrain performance.
- Designed a shoulder bolt in **SolidWorks** and an **assembly drawing** to resolve a **7° rover tilting issue** by lengthening the attachment between the transfer bar and ball joint end bearing, enhancing stability through force redistribution.
- Contributed to the design of a dodecagon 4-wheel-drive system, **reducing** individual wheel **weight from 2.1 kg to 710 g**, resulting in a **9.8 kg overall weight reduction**.
- Currently leading the design and fabrication of a carbon-fiber **UAV** for the University Rover Challenge, applying composite **material analysis, FEA**, and design principles to **ensure stiffness, strength, and reliability** during field deployment.

## Projects

### Temperature Control System

November 2024 - February 2025

- Developed a Temperature Control System using an **Arduino**, improving sleep quality by **13%**, as measured by an analytical sleep app. Utilized a **DHT sensor** for accurate temperature measurements and optimized system performance.
- Conducted tests with a **dual-range force sensor**, performing **graphical analysis** and moment calculations to ensure servo motor used delivered adequate torque. **3D-printed a custom attachment** with a stand for mounting and securing the motor.

### Roof Truss Design for Hockey Arena

January 2025 - April 2025

- Modeled a custom steel truss in SolidWorks and performed FEA to evaluate **load paths, tensile and compressive member behavior**, and structural response under dead, live, and snow loads, iterating designs to satisfy strength, stiffness, and **manufacturability requirements**.
- Analyzed **axial stress, strain, deformation, and buckling risk** in steel truss members using **material properties** and mechanics-based calculations to confirm structural **safety**, documented results and selected HSS sizes in Excel.

## Skills

Certifications: Solidworks CSWA, Pilot Certificate - Basic Operations, Basic Machine Shop Certification

Software: SolidWorks, MATLAB, AutoCAD, Arduino IDE, Raspberry Pi (Thonny IDE), Python, C++, Microsoft Office

Laboratory: FED Health and Safety Training, Drill Press, CNC machine, WHIMIS 2015