

ALEXIA SAVAGE

Professional Portfolio

B.Eng. Aerospace Engineering, Co-op | Carleton University
Third Year | Seeking 12 to 16 Month Co-op

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Alexia Savage

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PROFESSIONAL SUMMARY

Third-year Aerospace Engineering co-op student at Carleton University with a competition-validated research record spanning computational materials science, renewable energy systems, and structural analysis. Built and tested a solar-powered hydrogen electrolysis system recognized at Genius Olympiad International; conducted SOFC electrolyte optimization research that reduced lattice strain from 27.82% to 3.76%, earning a Gold Medal at the Africa Science Buskers Festival. Proficient in CATIA, SolidWorks, AutoCAD, Python, and FDM 3D printing. Co-founded Carleton University's NSBE chapter. Dual citizen (Canada/USA) seeking a 12 to 16 month co-op placement.

CORE COMPETENCIES

CAD & Design: CATIA • SolidWorks • Fusion 360 • AutoCAD • Autodesk Inventor • Tinkercad • 3D Modeling & Assembly Design

Programming & Electronics: Python • VEX Microcontroller Programming • Raspberry Pi • Sensor Integration • Autonomous Control Logic • Circuit Design Fundamentals

Fabrication & Manufacturing: FDM 3D Printing (custom functional components) • Manual Mill & Lathe Operation • Iterative Prototyping & Testing • Electrolysis Chamber Fabrication

Analysis & Modeling: Computational Materials Science • Structural Stress & Strain Analysis • Truss Analysis • Mathematical Modeling • Data Analysis (Python, Excel)

WORK EXPERIENCE

Mathematics Instructor & Tutor — Mathnasium

2025 – Present

Nepean, ON

- Deliver individualized and small-group mathematics instruction to students across multiple grade levels, adapting explanations to each student's current understanding
- Developed targeted instructional strategies that improve student confidence and concept retention in subjects including algebra, geometry, and pre-calculus

Lifeguard — Brighton Town / Mark IV Enterprises / RIT Inn

2022 – 2025

Rochester, NY

- Maintained swimmer safety through active surveillance, emergency response, and facility management across multiple aquatic environments over **3 consecutive seasons**
- CPR/AED, First Aid, and Emergency Oxygen certified; trained and applied crisis decision-making protocols under high-pressure conditions
- Developed situational awareness and rapid risk assessment skills through daily responsibility for patron safety

EDUCATION

Bachelor of Engineering, Aerospace Engineering, Co-op Program (Stream D)

Carleton University, Ottawa, ON

Expected May 2029

Third Year Standing | Seeking a 12 to 16 Month Co-op Placement

Advanced Regents Diploma, Project Lead the Way Engineering Track

Rush Henrietta Senior High School, Rochester, NY

June 2024

LEADERSHIP & EXTRACURRICULARS

Co-Founder & Media and Communications Executive

Sep 2025 – Present

Carleton University NSBE Chapter (National Society of Black Engineers)

- Co-founded Carleton University's NSBE chapter from the ground up; manages communications, social media, and outreach to grow membership and build industry partnerships

Recovery Sub Team Member

Sep 2025 – Present

CU InSpace Rocket Engineering Design Team, Carleton University

- Contributes to rocket recovery systems design and testing as part of Carleton's competitive university rocketry team

Student Government: Treasurer (2023–2024), Secretary (2022–2023)

- Oversaw budget records and event coordination; developed large-scale planning and task management skills in high-accountability elected roles

CERTIFICATIONS

- CPR/AED Certified | First Aid Certified | Emergency Oxygen Certified

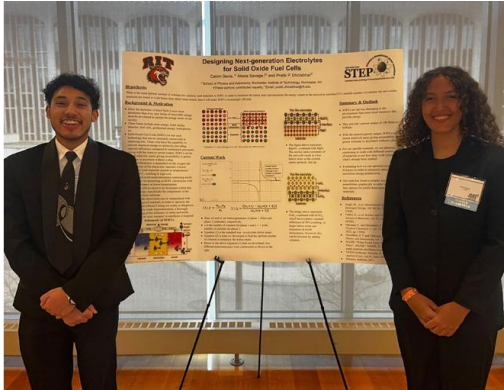
AWARDS & RECOGNITION

- Africa Science Buskers Festival: Gold Medal Certificate, Zimbabwe Science Fair (2024)
- Junior Science and Humanities Symposium (JSHS): Regional Winner, Environmental Poster Category (2024)
- NYS STEP Regionals: 1st Place, SOFC Research (2024)
- Genius Olympiad International: Bronze Medal (2023)
- Terra Science Fair: Highest Honors, US Stockholm Junior Water Prize, U.S. Air Force Certificate for Outstanding Engineering (2023)
- Terra Science Fair: U.S. Navy & Marine Corps ONR Award, Scientific/Engineering Excellence (2022)
- Terra Science Fair: Women in Technology Innovation Award (2021)
- RIT STEP: Excellence in Research Award & RIT Scholar Award (2018–2024)

Portfolio Highlights

The following projects demonstrate engineering design capability, computational research, and hands-on fabrication skills developed across independent research, coursework, and international competition. Additional projects and details are available at alexiasavage.com.

Designing Next-Generation Electrolytes for Solid Oxide Fuel Cells



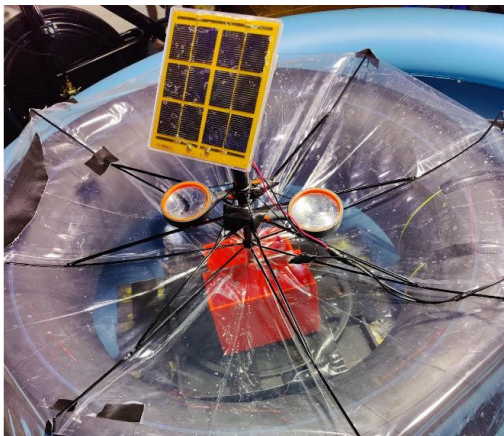
Computational Materials Science | RIT / Terra Science Fair | 2023–2024

Conducted computational research to optimize atomic structures in SOFC electrolyte materials, targeting lower operating temperatures to make solid oxide fuel cells a viable renewable energy source. Guided by Prof. Dholabhai (RIT); collaborated with one peer researcher.

- Derived a mathematical model identifying optimal atomic configurations that minimize misfit dislocations in layered electrolyte materials
- Achieved lattice strain reduction from **27.82% to 3.76%** for a critical material pairing, enabling more efficient energy generation below the typical $\sim 800^{\circ}\text{C}$ operating threshold
- Earned **Gold Medal** at Africa Science Buskers Festival (Zimbabwe Science Fair, 2024) and 1st Place at NYS STEP Regionals (2024)

Tools & Methods: *Mathematical modeling, computational materials science, oxide combination analysis, scientific presentation*

Solar Desalination & Hydrogen Electrolysis System



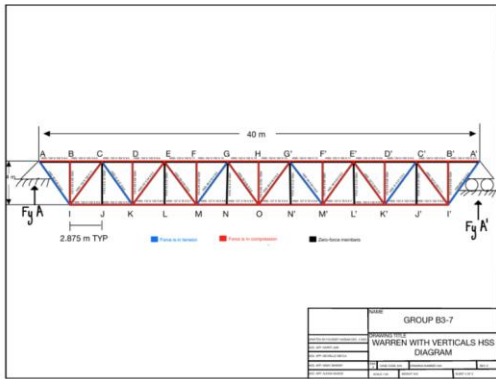
Renewable Energy Systems | Independent Research / Genius Olympiad | 2022–2023

Designed, built, and tested a low-cost floating device that uses solar power for dual-purpose water desalination and hydrogen fuel production via electrolysis. Full design ownership from concept through fabrication and testing, targeting water scarcity and clean energy access in developing regions.

- 3D modeled and 3D printed a custom electrolysis chamber; conducted iterative fabrication and testing cycles until the prototype produced **measurable hydrogen output**
- Integrated solar panel array for off-grid power; extended the system design to incorporate a desalination stage for fresh water production
- Earned **Bronze Medal at Genius Olympiad International** (2023); featured in Rochester Engineer Magazine (2021 Young Engineer Profile)

Tools & Methods: *SolidWorks/Fusion 360 CAD, FDM 3D printing, electrolysis system design, solar integration, iterative prototyping*

Hockey Arena Roof Truss Design & Analysis



Structural Engineering | Carleton University | 2025

Performed a full structural analysis for a 40-meter hockey arena roof using a Warren with Verticals HSS truss configuration. Determined stresses and strains across all truss members and calculated appropriate cross-sectional areas to meet engineering specifications.

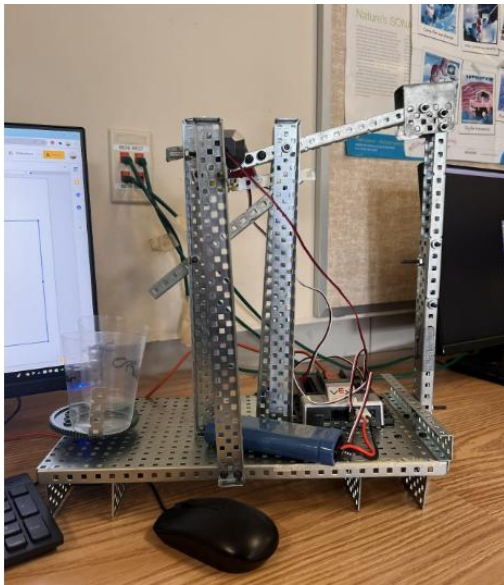
- Applied method of joints and method of sections to resolve forces in all tension and compression members across the truss
- Selected and verified **HSS cross-sections** for each member type

based on calculated stress demands and standard structural design criteria

- Produced a full engineering diagram with labeled member forces, support reactions, and cross-sectional area specifications

Tools & Methods: Structural analysis (method of joints, method of sections), hand calculations, engineering design methodology, AutoCAD

Automated Marble Sorting System



Mechatronics / PLTW Principles of Engineering | 2022

Designed and built an automated sorting system using the VEX robotics platform. The device detects marble transparency differences using a light sensor and physically diverts each marble into a separate collection cup via a motor-driven rotating mechanism.

- Programmed autonomous sorting logic on VEX microcontroller: sensor reading, threshold classification, and motor actuation for each detection event
- Designed and **3D printed a custom sorting mechanism** with motor-driven cup rotation to reliably divert marbles into separate bins
- Integrated mechanical design, electronics, and programming into a single functional prototype demonstrating full mechatronics

design cycle

Tools & Methods: VEX microcontroller programming, sensor integration, 3D printing (FDM), mechanical design, iterative testing