

Aleeza Zar.

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Education

McMaster University; **Integrated Biomedical Engineering and Health Sciences** Honours Bachelor of Health Sciences; Health, Engineering Science, and Entrepreneurship

2023 – 2027

Relevant Coursework: Biomedical Signals & Systems, Genetic Engineering, Programming for Mechatronics, Computational Mechanics, Innovating Care: Navigating Canada's Healthcare System, Entrepreneurship in Biomedical Innovation, Statistics & Epidemiology

Skills

- Literature review, experimental planning, data interpretation, technical documentation, and cross-disciplinary collaboration.
- Python, C++, MATLAB, Node.js, Visual Studio and Excel for data analysis, numerical modeling, and control logic development.
- COMSOL (Multiphysics) and MATLAB/Simulink for system modeling, validation, and iterative refinement of laboratory protocols.
- PCR, gel electrophoresis, molecular cloning, plasmid design, mammalian cell culture, microscopy, and aseptic technique.
- SolidWorks, Autodesk Inventor, and Fusion 360 for parametric CAD and prototyping of laboratory or manufacturing components.

Experience

Human Factors and Ergonomics Design - McMaster Formula SAE

September 2023 – present

- Analyzed 20+ driver positions to design inclusive seat geometry for 5th percentile female to 95th percentile male, using mesh modeling and pressure-mat analysis to reduce strain and improve cockpit ergonomics.
- Evaluated material and composite options (foam, carbon fiber, hybrid layups) and assessed load transfer into the chassis to meet safety and competition regulations.
- Created onboarding materials and led training sessions on SolidWorks, ergonomics workflow, and safety protocols, improving team consistency and reducing onboarding time.

Clinical AI Decision Support Tester & Research Volunteer - WELL Health AI

October 2025 – present

- Supported clinical testing of an AI co-pilot decision support platform for rare and complex chronic diseases using EMR data.
- Worked alongside family physicians and clinic staff to assess algorithm outputs, usability, and integration into clinical workflows.
- Evaluated decision-support recommendations for clarity, contextual relevance, and alignment with physician decision-making, providing actionable feedback for platform refinement.
- Assisted in exploring applications of the technology for Continuing Medical Education (CME) and clinical case review.

Medical Assistant Volunteer / Health Resources Creator - Dr. Curnew's Cardiology Clinic

April 2025 – present

- Educated patients on evidence-based cardiovascular practices, improving self-management and long-term health outcomes.
- Created informational webinars and videos to teach community members practical strategies for managing cardiovascular health and led live Q&A sessions to reinforce learning.
- Assisted physician by taking detailed patient histories, summarizing test findings, and addressing patient questions to ensure understanding, while maintaining confidentiality and patient safety, ensuring adherence to healthcare protocols.

Crisis Line Responder - Kids Help Line

April 2025 – present

- Provided empathetic and clear communication to support individuals in crisis, using techniques such as rapport-building, risk assessment, and structured problem-solving to effectively address emotional distress.
- Managed sensitive, high-pressure situations by assessing risks, coordinating immediate responses, and guiding individuals towards appropriate resources.
- Participated in team discussions during training, sharing reflections and offering peer feedback to improve response strategies.

Research Assistant - Hosseinidoust Lab, McMaster University

May 2025 – August 2025

- Conducted literature reviews to support experimental design and contributed summarized findings to internal documentation.
- Performed molecular biology techniques including plasmid DNA isolation, PCR, gel electrophoresis, and mammalian cell culture while consistently maintaining aseptic conditions.
- Fabricated phage-coated nanobots and developed a 6-ring Helmholtz coil system in COMSOL, validating magnetic manipulation through physical prototyping and experimental testing.

Firmware and Controls - McMaster Formula SAE

September 2024 – August 2025

- Redesigned the vehicle control system in C++, based on Simulink Stateflow logic, improving firmware-controls compatibility.
- Improved Torque Vectoring, Traction Control, Regenerative Braking, and ABS, contributing to an estimated ~15% increase in vehicle stability and performance.
- Developed and validated plant models for multiple subsystems, including vehicle dynamics and shutdown logic.
- Collaborated with a team of four to model vehicle behavior using CarSim and Simulink Unreal Engine, enabling more realistic simulation environments and stronger design validation.

- Mentored incoming engineering students on academic expectations, course navigation, and faculty resources to ease their transition to university.
- Coordinated logistics for large-scale faculty events, managing group dynamics and troubleshooting issues for 500+ participants in a fast-paced environment.
- Collaborated with a peer leadership team to execute inclusive programming, ensuring events were accessible and engaging for a diverse student body.

Post Office Clerk / Cashier - Shoppers Drug Mart

August 2022 - June 2023

- Optimized service workflows to maintain an average customer wait time of under 5 minutes in a high-volume retail environment.
- Managed complex documentation, tracking, and routing for incoming and outgoing parcels with high attention to detail.
- Assisted customers with various technical forms and service requirements, ensuring clear communication of standard operating procedures.
- Conducted daily financial reporting and balanced cash drawers with a high degree of precision and accountability.

Design Lead - APEGA Science Olympics

September 2022 – March 2023

- Led the design and fabrication of a transmission tower prototype engineered to withstand 1000+ N of multi-directional loading.
- Applied structural design principles and iterative testing to develop an earthquake-resistant structure that successfully passed simulation-based evaluations.
- Managed a team of five through concept development, material selection, and fabrication, culminating in an award-winning competition prototype.

Pharmaceutical Volunteer - Poundmaker Treatment Centre

February 2022 - June 2022

- Supported patients in addiction recovery and mental health treatment by engaging in daily conversations, offering reassurance, and addressing concerns with empathy and discretion.
- Administered daily doses of medication to 20+ patients, fostering trust through consistency, attentiveness, and clear communication about their treatment plans.
- Assembled individualized blister packs to prepare weekly medicinal doses, helping patients adhere to personalized treatment regimens.

Projects

Probiotic-Based Solution for PMS and Mental Health

January 2025 – April 2025

- Designed genetic circuits using estrogen-responsive promoters and transcriptional regulators to dynamically modulate serotonin biosynthesis in engineered probiotics.
- Synthesized findings from 10+ iGEM projects and peer-reviewed papers to guide system design and support white-paper development.
- Analyzed gut-brain axis mechanisms and mapped relevant biological pathways to evaluate feasibility, safety considerations, and potential use-cases for a probiotic-based therapeutic system.

Gamified Physiotherapy device for Multiple Sclerosis Patients

February 2024 – April 2024

- Conducted needs-finding and preliminary market analysis through patient consultations to guide design and evaluate feasibility.
- Planned and tracked project milestones using Gantt charts, coordinating timelines, task ownership, and deliverables across the team to ensure on-time completion.
- Programmed a physiotherapy experience on Raspberry Pi, integrating sensors and LEDs to enhance patient engagement, while ensuring safety through controlled stimulus output and secure device housing.
- Designed the device in Autodesk Inventor, modeling complex organic shapes and integrated tracks to facilitate and optimize patient movement patterns.

“Cube” - McMaster Design League Competition Winner

January 2024

- Engineered a modular system using Autodesk Inventor, optimizing for spatial efficiency and structural stability.
- Executed 10+ design iterations, utilizing a Pugh Matrix to quantitatively evaluate configurations against predefined performance and usability metrics.
- Conducted demographic and user-requirement analysis to identify core workflow friction points, ensuring the final system architecture addressed specific end-user needs.
- Delivered a validated technical prototype that secured first place by demonstrating problem-solving logic and attention to detail during a high-pressure competition.

Hypoallergenic Hip Implant Design

Oct 2023 – Dec 2023

- Engineered a custom hip replacement system tailored for pediatric patients with metal hypersensitivity, prioritizing biocompatibility and long-term joint mobility.
- Modeled complex anatomical geometries using Autodesk Inventor, incorporating features to enhance implant fixation and comfort.
- Conducted a comparative material analysis of 20+ candidates, selecting high-performance, lightweight, and hypoallergenic alternatives to standard surgical alloys.
- Presented technical specifications and prototypes at a Design Expo, defended design choices to a panel of evaluators, and integrated feedback into the final concept.