



Annual Report 2025

Developing Canada's capacity for high-quality research in science, technology and engineering since 1974

Another wonderful year for our community's young researchers!

Registration by secondary students was the most ever. Their projects were just astonishing, and they made our judges work very carefully. This year the secondary exhibitors were treated to a variety of lab visits at the University of Guelph, and later a researcher from the Perimeter Institute again to entice them with the cutting edge in theoretical physics.

Our elementary exhibitors also brought a wealth of clever projects. Their afternoon program continues our exploration of the UN Sustainable Development Goals. This year they were tasked with designing and making a sorting contraption as one might find at a recycling centre. We took them to the Waste Management Site in Waterloo. They were taken into the cells where all our garbage goes. It's awesome. One of the chaperones exclaimed that "Everyone should see this."

Once again we welcomed former exhibitors to help judge, and to present awards. All of the finalists we took to the Canada-Wide Science Fair in Fredericton received an award. It is rare for any region to be so successful, but not for us.

Also, **Gurnoor Kaur** was one of 8 members of Team Canada at the Regeneron International Science and Engineering Fair. Gurnoor's project was ***SynaptiQ: Detection and Prevention of Hospital Induced Delirium.*** This is a common and life-threatening phenomenon that Gurnoor's project could help alleviate. This was the 39th time one of our young researchers was selected for Team Canada.



Our 2025 Canad-Wide Science Fair team. Read on for details about their projects and achievement awards.

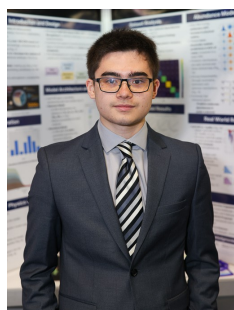
Canada-Wide Science Fair 2025- Fredericton



Ayesha Abubakr *Novel $\alpha\beta6$ -targeting Non-small Cell Lung Cancer Virotherapy*

Common treatments for lung cancer also target healthy cells leading to adverse effects. Ayesha's project developed a virotherapy to target a protein, integrin $\alpha\beta6$, often overexpressed on the surface of non-small cell lung cancer cells. Synthetic peptide A20FMDV2 was computationally optimized for attachment to bacteriophage T4's "head" protein and then inputted into molecular docking softwares for binding to $\alpha\beta6$. Upon binding, the peptide induced rapid internalization of $\alpha\beta6$, leading to cancer cell lysis.

Excellence Award Silver 2 University Entrance Scholarship Offers



Tristan Butcher *Detecting and Quantifying Molecules in Exoplanetary Atmospheres*

Current methods of understanding the atmospheres of exoplanets are slow and somewhat inaccurate. Tristan's project developed HyPCAR, an advanced machine learning framework to provide a better understanding. It can detect the presence and abundance of specific gases, such as water vapour, carbon dioxide and methane. The unique feature of HyPCAR is the incorporation of physics-based constraints. This yields faster predictions with clearer interpretability

**Excellence Award Gold Special Award Statistical Society of Canada Award \$750
2 University Entrance Scholarship Offers**



Felicity Banbury *SoilSense: A Machine Learning Approach to Soil Organic Carbon Estimation*

Soil stores three times more carbon than the atmosphere, retained after organic decomposition. Known as Soil Organic Carbon (SOC), it is highly influenced by agricultural practices. Estimating SOC by traditional methods is costly and logistically challenging. Felicity's project used the power of machine learning and data from a reflectometer to provide a lower-cost estimate enabling farmers to enhance carbon sequestration.

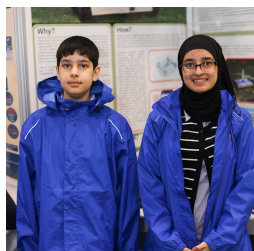
Challenge Award - Agriculture, Fisheries and Food Intermediate \$750



Brinn Wight *Scraper Snail: An Aquarium Cleaning Robot*

Aquarium owners need to remove algae from the glass. Some scrapers are guided by a strong magnet 'partner' on the outside of the tank. Brinn's project was an autonomous robot that drove on the outside, automatically guiding a scraper on the inside. She 3D printed the case to look like a snail, soldered the electronics and coded the Arduino. The Snail's accelerometer kept the angles precise, while the silicone wheels provided traction on the glass.

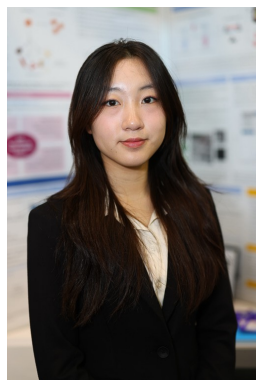
Excellence Award Bronze 1 University Entrance Scholarship Offer



Maryam and Ali Ahmad *Spraybot: An Automatic Robot Sprayer*

Many of the materials people spray are hazardous to inhale - pesticides, herbicides, fertilizers etc. Maryam and Ali developed the SprayBot prototype to spray de-icing solution on driveways and sidewalks. The system used a mobile application to operate wirelessly, sensor data and target coordinates in an onboard computer. It has 4WD transmission and can operate in any weather, and day or night.

Excellence Award Bronze 1 University Entrance Scholarship Offer



Cindy Cheng *3D Bioprinting Soft Microrobotic Niches for Stem Cell Delivery*

Stem cell therapy struggles for approval due to unsafe and inefficient delivery methods. The Soft MicroRobotic “niche” (SMORE) system employs soft microrobots to deliver stem cells while promoting their survival and integration. In Cindy’s project, microrobots were 3D-bioprinted from a synthesis of a biocompatible polymer, a light-reactive initiator, magnetic nanoparticles, stem cells, and niche components. The material and formulation process suitably supported live cells and the microrobots successfully navigated through a spinal model.

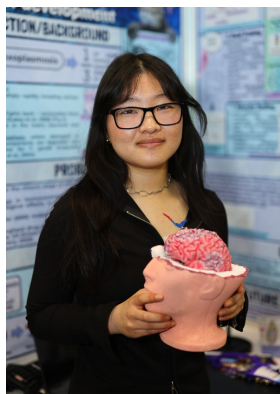
Excellence Awards Gold Special Award: Canadian Nuclear Laboratories Fusion Award \$1,000 Grand Awards Youth Can Innovate Award \$8000 6 University Entrance Scholarship Offers



Ashish Chettimada *MycoShield: A Next-Gen Biopesticide Utilizing RNAi for Fungal Pathway Disruption*

The overuse of chemical fungicides in agriculture has led to widespread off-target deposition, environmental contamination, and increased human exposure to carcinogenic compounds. Ashish’s project presented an RNA interference (RNAi)-based formulation as a safer, biodegradable alternative for fungal disease control. RNAi works by silencing specific fungal genes at the mRNA level, blocking the production of proteins essential for growth and infection.

Excellence Award – Silver Challenge Award - Agriculture, Fisheries and Food Senior \$1000 Grand Award: Youth Can Innovate Award \$1000 5 University Entrance Scholarship Offers



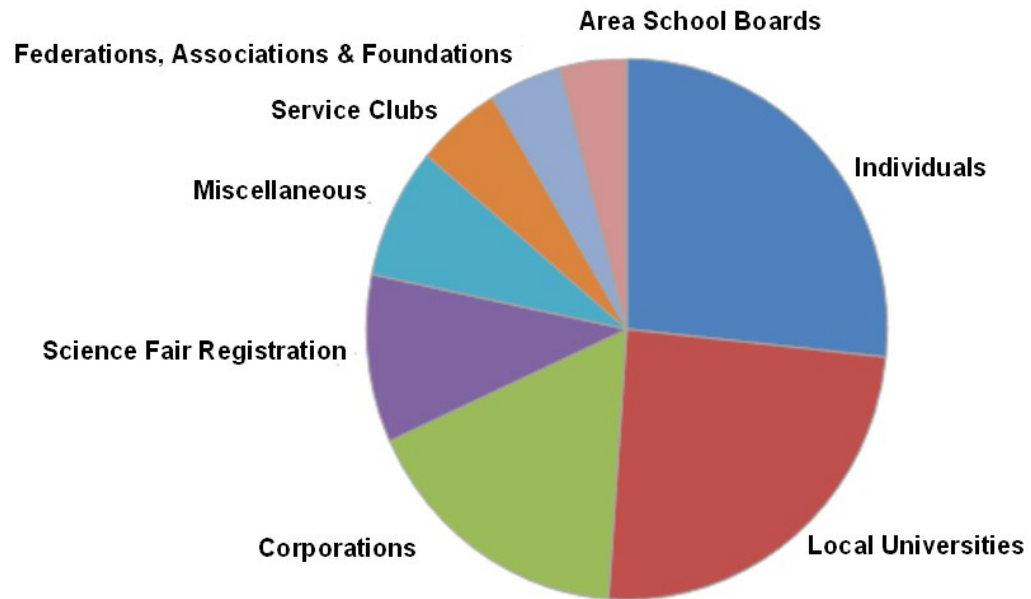
Emily Huang *QSAR-Based Virtual Screening For T. gondii Autophagy Inhibitors*

Toxoplasmosis is a common food-borne illness caused by the parasite Toxoplasma gondii, a parasite also often associated with cat excrement. Through autophagy, the parasite can persist in the host’s tissues for life. Emily developed an integrated virtual screening framework combining Quantitative Structure-Activity Relationship (QSAR) modelling and bioinformatics tools to identify promising drug candidates.

Excellence Award Gold Challenge Award Disease and Illness \$1,000 Grand Award Youth Can Innovate Award \$1000 6 University Entrance Scholarship Offers

2025 Financials

2025 REVENUE



2025 EXPENSES

