

Canada-Wide Science Fair

Fredericton, NB...



John Fish, Waterloo. Intermediate, Innovation

GPS Footprint; A Modern Approach to Emissions

Carbon dioxide is the most radiative forcing greenhouse gas, and is commonly released through transportation. To measure these transportation carbon dioxide emissions, a phone application was created that combines GPS data with the fuel economy of multiple methods of transportation. Accurate data presented in a meaningful manner should act as an incentive to lower a person's carbon dioxide emissions.

Ashna Jain, Guelph. Junior, Innovation

The 3rd Wheel Challenge

The 3rd Wheel bicycle enables children in developing countries to attend school by reducing their time spent transporting water by eight times. A cost-effective, sustainable solution was designed by considering the type of bicycle, the container size, shape and material, and the attachment location of the container to the bicycle. Using the principles of physics, including forces and work, an optimal design was determined.



Sajeev Kohli, Waterloo, Junior, Innovation

R.E.D.M.A. - Residential Emergency Detecting Multifunctional Apparatus

R.E.D.M.A is an innovative system that allows homeowners to monitor the environmental conditions of their property in real-time via a Smartphone from any remote location. The system also transmits e-mail alerts in the event of a fire or basement flood. The prototype implementation of the system has a demonstrated accuracy in excess of 99%.

Awards: Junior Silver Medal, Canadian Artificial Intelligence Association Award \$500, The Dr. Lisa Su Award - Junior \$500 Excellence Award, Western University Entrance Scholarship Silver Medallist - \$2000

Arjun Pandey, Waterloo. Intermediate, Discovery

Determinants of the Accuracy of Blood Pressure Measurement: A Novel Strategy

This project aims to develop a more effective strategy for blood pressure (BP) measurement to reduce the risk of erroneous readings and conditions like White Coat Hypertension. Specifically, I tested the impact of the type of individual measuring BP, their attire, and the location of BP measurement on the accuracy of readings and the incidence of Isolated Clinic and White Coat Hypertension in 106 volunteers.





Nikhil Patil, Waterloo, Intermediate, Health

Beta Cells' Ability to Secrete Insulin under Glucotoxic Conditions

Despite obesity being correlated with diabetes, there is yet to be conclusive evidence regarding what links the two together. Beta cells' ability to secrete insulin was diminished after exposure to hyperglycemic conditions. Glucotoxic states are likely to be induced in obese patients who are developing type 2 diabetes. It was found that glucose toxicity could be a significant factor connecting obesity with type 2 diabetes.

Kimia Raahemifar, Rishika Geda, Waterloo. Intermediate, Discovery

Binaural Beats: Bio-feedback via Brainwave Entrainment

This project explored immediate influences of binaural beat stimulation on brain bioelectrical signals and mood. Thirty participants were exposed to beta frequencies with a difference of $f=30$ Hz. EEG data showed that the entrainment increased the participants' awareness rates immediately after exposure to binaural beats, an effect that persisted even after the stimulus had been removed, opening numerous pathways for innovation based on this research.

Awards: Intermediate Silver Medal , Western University Entrance Scholarship Silver Medallist - \$2000



Devanshi Shukla, Guelph. Senior, Innovation

Evaluating antimicrobial plant-derived compounds

Observing the inhibition of bacterial communication in *V. fischeri*, seen as decreased luminescence, provides a new method to screen for effective antimicrobial plant-derived compounds. Various compounds in Holy Basil were isolated using HPLC, and screened for their effectiveness. The same was done for its essential oils, but without contact. Interestingly, the volatile compounds are more effective antimicrobials than the compounds which were isolated.

Awards: Senior Bronze Medal, University of Ottawa Entrance Scholarship Senior Bronze Medallist - \$1000, Western University Scholarship Bronze Medallist - \$1000

George Utsin, Waterloo. Senior, Innovation

ThermIS: Automation of Viral System Detection

ThermIS is an automated system to detect symptoms of viral infections. ThermIS passively and non-intrusively detects whether or not an individual is a possible carrier during an influenza outbreak, given that fever is a common symptom of many viruses and infections. This system can be useful in optimizing airport security, with potential applications in medicine as well.

Awards: Senior Silver Medal, Dalhousie University Faculty of Science Entrance Scholarship \$2500, UBC Science Entrance Award \$2000, Uof O Entrance Scholarship \$2000, Western University Scholarship \$2000, University of New Brunswick Entrance Scholarship \$2500

