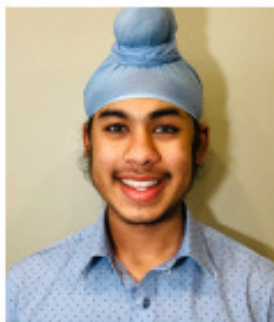


Virtual Canada-Wide Science Fair



Hardit Singh

Specular: A Comprehensive Teleophthalmology Platform for People Centred Eyecare

Best Project Award, Innovation; Excellence Award – Gold; Youth Can Innovate (Intermediate); Challenge Award, Disease and Illness (Intermediate); York U STEM Entrepreneur Bootcamp; European Union Contest for Young Scientists; Centre for Canadian Nuclear Sustainability Award; 1 entrance scholarship offer

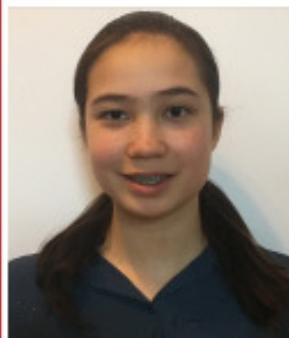
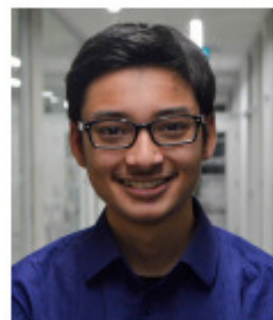
I developed Specular, combining low-cost portable retinal imagers using smartphones with artificial intelligence to screen diseases. Specular builds a low-cost teleophthalmology platform serving marginalized communities. A new transfer learning method was invented and tested for the classification of glaucoma achieving the best results reported in literature. Imagers have been tested in a clinic and pick up all clinically relevant features needed for accurate diagnosis for glaucoma.

Neil Mitra

A Graphene Oxide Paper Microfluidic Device for Heart Attacks

Excellence Award - Gold; Youth Can Innovate (Senior) plus \$8000 bonus; Challenge Award, Disease and Illness (Senior); 5 entrance scholarship offers

Certain cardiac indicators in blood increase during the progression of a heart attack. A test strip for early detection is developed using commonly available paper that works with a small quantity of simulated blood. The indicators are separated from the whole blood sample using a patent-pending graphene oxide filter membrane. Machine learning provides predictive capability of the device to monitor heart conditions. The process from sample collection to detection and prediction of results takes less than two minutes with a final cost of around \$1.



Jasmine Schneider

A Protist Against Fertilizer Runoff

Excellence Award – Silver; 1 entrance scholarship offer

The project studied the link between synthetic fertilizer and organic fertilizer usage on algal growth. Runoff from store-bought organic and synthetic fertilizers as well as compost manure was added to separate algal samples in order to compare their growth rates and overall growth. Both the synthetic and organic fertilizers produced similar results, whereas the compost manure consistently showed less algal growth. The study shows that compost manure may be best for preventing catastrophic algal blooms.



Cindy Cheng

A Modular Multi-Functional Wound Dressing

Excellence Award – Gold; Challenge Award, Disease and Illness (Junior); S.M. Blair Family Foundation Award; 1 entrance scholarship offer

Patients suffering from multiple illnesses and elderly patients are susceptible to developing non-healing wounds caused by infection, making the wounds more dangerous. Traditional wound dressings cannot fight the infection. I developed a “smart” wound dressing capable of both treating infection and displaying infection in a colourimetric fashion. My wound dressing can adapt to a wide variety of wound types, promote quick recovery, and reduce cost and labour.

Julian Hall

Meow!! Analysis of the Benefits of the Feline Laser Toy

Excellence Award – Gold; Challenge Award, Curiosity and Ingenuity (Junior); 1 entrance scholarship offer

I wanted to see if the cats would get more exercise from playing with the laser toy and whether it would cause them mental stress. I compared the laser toy to a feather wand toy. This was an important experiment because the majority of pet cats are overweight and don't get enough exercise. The results of my experiment showed that the laser toy provided cats with a good way to get exercise in a way that was safe and that did not cause an increase in mental stress.



Connor Jantzi

Detecting Disaster - Preventing Devastation

Excellence Award – Bronze; 1 entrance scholarship offer

If a tree falls in the forest, I WILL KNOW! One impact of climate change is forest fires which destroy nature, animals, and many homes. My device can decrease deforestation by monitoring and limiting the destruction of woodlands. Using AI and deep learning, my device will accurately detect extreme heat from fires, listen for unnatural noises including chainsaws, gunshots, machinery, and unauthorized human activity.

Alka Devi Ukrani

Prevention of Agrobacterium Tumor Invasion in Plants and VIR Gene Expression - Mathematical Models

Excellence Award – Silver; 5 entrance scholarship offers

Plant diseases reduce agricultural yields. Crown gall disease, caused by *Agrobacterium tumefaciens*, triggers tumor formation that affects hundreds of plant species, including tomatoes and apples. During infection environmental signals activate bacterial-specific virulence genes that direct *Agrobacterium* to induce tumor formation. My project built five mathematical Hill function-based models to estimate parameters that influence virulence gene expression.

