

Canada-Wide Science Fair **Ottawa**

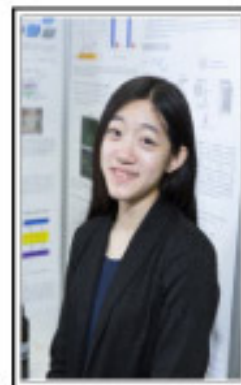


Advait Maybhate, Senior, Innovation

Identifying the binding sites of ligands, which bind to proteins, is a crucial task. Understanding the shape and size of such binding sites allows for the creation of drugs that bind to these sites, preventing other ligands, potentially stopping the spread of diseases such as HIV. This project proposes a new geometry-based algorithm to tackle the challenge of identifying ligand binding sites with proteins. **Awards:** Excellence - Silver Medal; Entrance Scholarships: Carleton \$2000, Dalhousie \$2500, UBC Science \$2000, U of Ottawa \$2000, Western \$2000

Connie Cheng, Senior, Innovation

A novel biologically inspired device that cleans waste products from the blood for people with kidney failure was created. Current hemodialysis devices are very expensive and too large to be portable. The new device is over 63 times more efficient at filtration, costs less than a dollar to make and fits in the palm of the hand. This innovation has the potential to revolutionize hemodialysis treatment. **Awards:** Excellence - Silver; S.M. Blair Family Foundation \$1000, Entrance Scholarships: Carleton \$2000, Dalhousie \$2500, UBC Science \$2000, U of Ottawa \$2000, Western \$2000

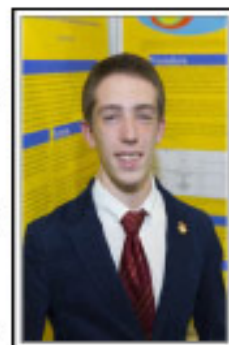


Adam Martinez, Intermediate, Environment

Silver and copper ions are commonly used as antimicrobials in the cleaning and medical industries. However, there are medical and environmental concerns regarding their use, making detecting and quantifying these metals important. Two genetically-engineered bacterial biosensors which are able to detect and quantify a variety of silver and copper ions were developed and then assessed. **Awards:** Excellence - Gold Medal; Challenge - Gold Medal; Entrance Scholarship - Western \$4000

Zachary Trefler, Senior, Information

Voice-recognition systems powered by machine learning are widely used to secure critical data, e.g. on smartphones and in banking systems. But can they be fooled? This project revealed a critical vulnerability: adversarial machine learning techniques can generate convincing audio prints. I then introduced a novel method for voice recognition systems to flag fake data, thus reducing the risk. **Awards:** Excellence - Bronze Medal; Challenge Award - Senior, Information; Canadian Acoustical Society Award - Senior \$1000; Entrance Scholarships - Carleton \$1000, U of Ottawa \$1000, Western \$1000



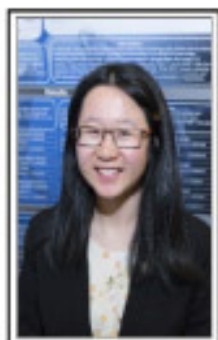


Holden Ford, Junior, Energy

In 2016 Canada burned more than 16 billion liters of diesel, just one of many non-renewable fossil fuels. Because of the environmental implications associated with burning fossil fuels, it's important that an alternative fuel source be found. This project explored the viability of biodiesel as an alternative fuel source. It considered fuel efficiency and economy, and observed emissions from a variety of biodiesel fuel blends. **Awards:** Excellence - Bronze; Entrance Scholarship - Western \$1000

Ashok Pandey, Intermediate, Health

Cardiovascular events are the leading cause of death worldwide. Exercise can improve heart health. This project looked at the efficacy of yoga incorporated into an exercise program on global cardiovascular risk. It found that yoga intervention was significantly more effective than the standard exercise program. If these results are validated, yoga may represent an opportunity to enhance the efficiency of standard cardiovascular rehabilitation/prevention programs. **Awards:** Excellence - Silver; Entrance Scholarship -Western \$2000



Angela Zhang, Senior, Environment

Anthropogenic (human-caused) noise is a major problem in oceans, affecting the behaviour of marine life by masking sounds used for communication and causing stress levels to increase. This has been shown to lead to mass strandings in some whales. This project involved predicting the presence of whales in a certain location at a certain time given past records of whale ID tagging, for re-routing ships. **Awards:** Excellence - Bronze Medal; Entrance Scholarships Carleton \$1000, U of Ottawa \$1000, Western \$1000

Hadi Almalki, Intermediate, Innovation

Developing a method of recognizing the species of bird calls and song using a computer algorithm allows for remote tracking bird migration in a scalable and timely manner. In comparison to traditional (visual) methods of tracking birds, this approach allows for more accurate study of bird species behaviour and more effective identification of changes in environmental factors such as climate by analyzing shifts in migration patterns. **Awards:** Excellence - Bronze Medal; Entrance Scholarship - Western \$1000



Sasha Seufert, Intermediate, Innovation

Jellyfish possess millions of micro-needle-like stinging cells embedded in their tentacles, often used to inject venom into their prey. The goal of the project was to determine whether or not these stinging cells can be used to deliver DNA into water bears, a micro-organism of great interest to the scientific community. This fast and low-cost injection method would help scientists study the unique genomic makeup of water bears. **Awards:** Excellence - Bronze Medal; Entrance Scholarship Western \$1000