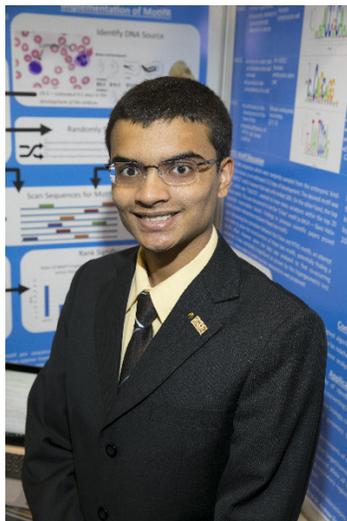


CWSF 2017 - Regina, Saskatchewan



Advait Maybhate

A New Approach to Motif Discovery

Challenge: Innovation

Category: Senior

Region: Waterloo-Wellington

City: Waterloo, ON

School: Sir John A. Macdonald S.S.

Abstract: Discovering the relationship between genetic sequences and their biological function is crucial to the understanding of life. Samples of genetic sequences can be computationally analyzed to identify significant patterns, termed motifs. Such motifs can be linked to specific functions e.g. PITX1 motif has been linked to limb development. This project proposes a new approach to motif discovery, increasing its speed without compromising accuracy.

Biography

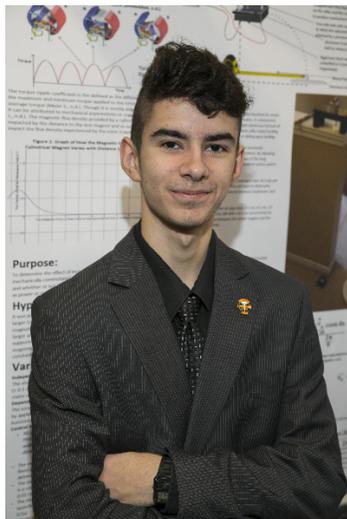
My name is Advait Maybhate. I am a grade 11 student and a SHAD Fellow from Waterloo, Ontario. I am passionate about computer science, the natural sciences and mathematics. In the past, I have worked as a software intern at Christie Digital where I improved their camera calibration tools for projection mapping. My latest love is to compete in hackathons, recently winning the first place prize at WearHacks for my creation of an automated teleprompter for the Pebble smartwatch. I am the school champion of the Pascal, Cayley and Galois math contests, run by the University of Waterloo. Additionally, I love to compete in long distance sports, specifically cross country running and nordic skiing, in which I was the 2016 regional champion. Currently, I am the president of science club and leader of computer science club at my school. I am also a leader of electric car club where we design and manufacture 24V electric cars. I wanted to create a project in which I could integrate my love for computer science with biology. I managed to accomplish this objective by working in the field of bioinformatics, specifically by identifying motifs in genetic sequences in a new way.

Awards

Value

Statistical Society of Canada Award - Senior Sponsor: Statistical Society of Canada	\$1 000
Excellence Award - Senior - Silver Medal Sponsor: Youth Science Canada	
Dalhousie University Faculty of Science Entrance Scholarship Senior Silver Medallist - \$2500 Entrance Scholarship Sponsor: Dalhousie University, Faculty of Science	\$2 500
UBC Science (Vancouver) Entrance Award Senior Silver Medallist - \$2000 Entrance Scholarship Sponsor: The University of British Columbia (Vancouver)	\$2 000
University of Ottawa Entrance Scholarship Senior Silver Medallist - \$2000 Entrance Scholarship Sponsor: University of Ottawa	\$2 000
Western University Scholarship Silver Medallist - \$2000 Entrance Scholarship Sponsor: Western University	\$2 000
Total	\$9 500

CWSF 2017 - Regina, Saskatchewan



Sergiu Pocol

Air Gap Thickness and Torque Ripple Induced by Asymmetries

Challenge: Discovery

Category: Senior

Region: Waterloo-Wellington

City: Kitchener, ON

School: Cameron Heights C.I.

Abstract: In haptic devices, direct drive actuators perform optimally with low torque ripple, the variance in the output torque of a motor. The effect of the thickness of the air gap on torque ripple was determined in a mechanically commutated DC motor, wherein the rotor's mass is asymmetrically distributed. A loose positive correlation between the two was noted, while power showed a negative correlation.

Biography

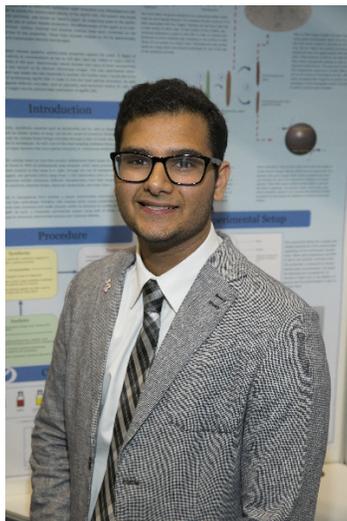
My name is Sergiu Pocol and I am a grade 11 student in Kitchener, Ontario. Being a physics enthusiast, my experiment involves the determination of torque related parameters in asymmetric motors and how the thickness of the air gap might affect them. Many direct drive actuators require low torque ripple, which is a negative quality in motors. As such, I wanted to develop an easy and accessible method for investigating torque ripple, relying on physics and calculus. In spare time, I enjoy volunteering at summer camps and cycling. Also, I am a member of a local choir and orchestra and enjoy both playing and listening to music. Furthermore, I am an avid science lover and have participated in related programs like Gene Researcher for a Week. As I am an ardent reader, I have won first prizes at the Waterloo County English Awards.

Awards

Value

Excellence Award - Senior - Silver Medal Sponsor: Youth Science Canada	
Dalhousie University Faculty of Science Entrance Scholarship Senior Silver Medallist - \$2500 Entrance Scholarship Sponsor: Dalhousie University, Faculty of Science	\$2 500
UBC Science (Vancouver) Entrance Award Senior Silver Medallist - \$2000 Entrance Scholarship Sponsor: The University of British Columbia (Vancouver)	\$2 000
University of Ottawa Entrance Scholarship Senior Silver Medallist - \$2000 Entrance Scholarship Sponsor: University of Ottawa	\$2 000
Western University Scholarship Silver Medallist - \$2000 Entrance Scholarship Sponsor: Western University	\$2 000
Total	\$8 500

CWSF 2017 - Regina, Saskatchewan



Danish Baig

Bio-friendly Antimicrobial Replacement to 2017 FDA Banned Drugs: Silver NP/CNC

Challenge: Innovation

Category: Senior

Region: Waterloo-Wellington

City: Waterloo, ON

School: Waterloo Collegiate Institute

Abstract: The goal of this project was to develop a stable antimicrobial system offering an advantage over current commercial systems in the form of silver nanoparticles on cellulose nanocrystals (CNC). The FDA recently, just in 2017, banned 19 drugs found in antibacterial soaps for environmental concerns. I concluded that my synthesized system offers stability and the same antimicrobial performance, allowing it to be a replacement chemical.

Biography

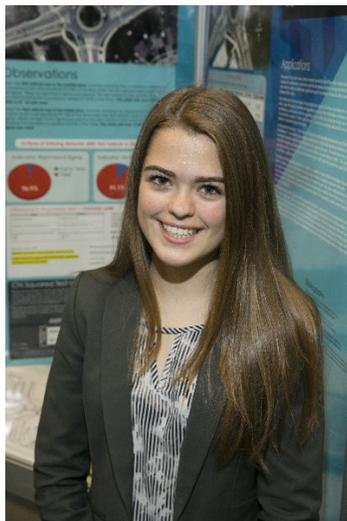
My name is Danish Baig and I live in Waterloo, Ontario. I attend Waterloo Collegiate Institute, a school that in our region is known for excellent math and science programs. Apart from working hard in classes, I enjoy playing football on the city and school team as well as rocking out with my cello in the school orchestra. My inspiration for this project came from discussions I had with my mentors, Fatima Awan and Dr. Michael Tam. I learned that the best way to develop an idea is to consider some criteria you want to meet first. I had to ask myself, can it be commercialized? Am I doing something new? Is it "cool"? And finally, am I interested in what I'm doing? As for advice I would give students considering a project: it doesn't matter if you fail because you've simply found a way that doesn't work. Trial and error are the bread and butter of scientists so do not be afraid to mess up. However, you should understand that time is against you and you need to make the most of it by practicing thorough organization along with planning.

Awards

Value

Excellence Award - Senior - Gold Medal Sponsor: Youth Science Canada	\$250
Dalhousie University Faculty of Science Entrance Scholarship Senior Gold Medallist - \$5000 Entrance Scholarship Sponsor: Dalhousie University, Faculty of Science	\$5 000
UBC Science (Vancouver) Entrance Award Senior Gold Medallist - \$4000 Entrance Scholarship Sponsor: The University of British Columbia (Vancouver)	\$4 000
University of Manitoba Entrance Scholarship Senior Gold Medallist - \$5000 Entrance Scholarship Sponsor: University of Manitoba	\$5 000
University of Ottawa Entrance Scholarship Senior Gold Medallist - \$4,000 Entrance Scholarship Sponsor: University of Ottawa	\$4 000
Western University Scholarship Gold Medallist - \$4000 Entrance Scholarship Sponsor: Western University	\$4 000
Total	\$22 250

CWSF 2017 - Regina, Saskatchewan



Ruth Meyer

Concede to Me! The Effect of Exit ? Signalling on Yield Rates in Roundabouts

Challenge: Discovery

Category: Intermediate

Region: Waterloo-Wellington

City: Waterloo, ON

School: Kitchener-Waterloo C. & V.S.

Abstract: One only needs to drive a short distance within Waterloo Region to notice many inconsistencies with the signalling behaviour of drivers in roundabouts. Through observation, this project examined the effect of exit-signalling on the yield rates of drivers entering roundabouts. Data collected clearly supports that exit-signalling significantly increases the likelihood that entering drivers will yield the right of way.

Biography

I am a grade 9 student at Kitchener Collegiate Institute in the French Immersion Program. I love participating in many activities at school beyond the classroom including Curling Club, Junior Leadership, Concert Band and Me to We. Outside of school, I belong to a synchronized skating team and also compete in singles figure skating. Although I'm not a licensed driver yet, I have become quite fascinated in studying roundabouts and in particular, the signalling behaviour of drivers. My favourite subjects in school are math and science and I would eventually like to pursue post-secondary studies in Civil Engineering. This is my second science fair project in the area of transportation engineering. I've continued to study roundabouts because I've been so interested in them and because how to properly drive through them is a "hot topic" where I live in Waterloo Region. There is a lot of confusion by many motorists about how to safely navigate through a roundabout and I'm hopeful that my research will help lead to improved safety of all drivers. My advice to other students contemplating doing a science fair project... find your passion!

Awards

Value

Excellence Award - Intermediate - Bronze Medal Sponsor: Youth Science Canada	
Western University Scholarship Bronze Medallist - \$1000 Entrance Scholarship Sponsor: Western University	\$1 000
Total	\$1 000

CWSF 2017 - Regina, Saskatchewan



Ethan White

CPU Load Covert Channels Exploiting Interrupt Latency

Challenge: Innovation

Category: Intermediate

Region: Waterloo-Wellington

City: Waterloo, ON

School: Waterloo Collegiate Institute

Abstract: A covert channel security vulnerability was discovered that allows a remote adversary to perform easy deanonymization of anonymous Internet users. This attack exploits the fact that latency to reply to network requests decreases when load on the computer being attacked is increased. It is suggested to mitigate this attack by maintaining a running process that will always cause full load on one processor core.

Biography

I've been working with computers as long as I remember. At age four, I had a project to find the IP address of every computer on the network at my house. At age five, my parents showed me how to use HTML. To their surprise, they came home the next day to find I had created an entirely new webpage. At age six, I began with software development, with the Visual Basic programming language. At age thirteen, I participated in the Hack The North programming competition, receiving an honorable mention for the sponsor prize from Pebble. The summer between grades seven and eight, I took an interest in computer security, consuming large amounts of online talks and Wikipedia articles, even designing some of my own protocols. Later on during eighth grade, I designed a number of cryptographic primitives, including a block cipher, mode of operation, and hash function. In my spare time, I write software, devour old electronics for spare parts, and play grand strategy video games, Minecraft, and Kerbal Space Program.

Awards

Value

Excellence Award - Intermediate - Bronze Medal Sponsor: Youth Science Canada	
Western University Scholarship Bronze Medallist - \$1000 Entrance Scholarship Sponsor: Western University	\$1 000
Total	\$1 000

CWSF 2017 - Regina, Saskatchewan



Sadia Khan

Firm 'n' Cute

Challenge: Health

Category: Intermediate

Region: Waterloo-Wellington

City: Kitchener, ON

School: Cameron Heights C.I.

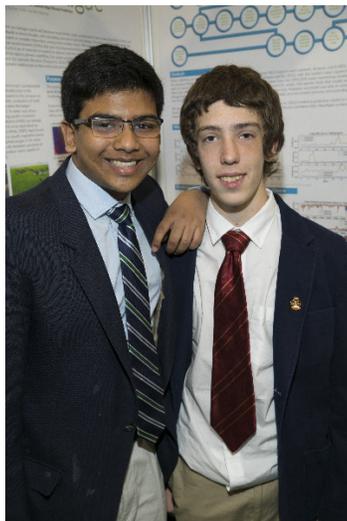
Abstract: Sucralose changes the composition of intestinal bacteria by unnaturally increasing the population of Firmicutes and elevating the risk of obesity. This in-vitro experiment tested whether antibacterial herbs could prevent the sucralose induced population increase in *Lactobacillus rhamnosus* GG ATCC 53103, a Firmicute and probiotic bacteria. Contrary to predictions, sucralose decreased population growth instead of increasing it, and the effectiveness of the herbs varied greatly.

Biography

Sadia Khan is a grade 10 Pre-IB student at Cameron Heights Collegiate Institute in Kitchener. Sadia's passion for science has led her to participate in Waterloo-Wellington Science and Engineering Fair since grade 7. This year's project was not only an extension of her past project, but also a more creative approach to find whether antibacterial herbs could control the growth of a Firmicute and probiotic bacteria. In the future, she plans to investigate whether probiotics have a role in preventing negative side-effects of certain antibiotics. Sadia enjoys participating in University of Waterloo Brain Bee competition, different Math contests and Perimeter Institute Lectures. She has been involved in school clubs and activities such as helping school office and library, making morning announcements, fundraise for charities as member of Cougar PAWS, assisting students with special needs, attending 'Safe, Caring and Inclusive Schools' conference as student representative, and volunteering in school events. Sadia volunteered with City of Kitchener neighbourhood camps for two summers through Building Youth Leadership Development program, Kitchener Public Library through Summer Teen Volunteering program, YMCA through Lego Computer Camp, and Our Place Family Resource Centre through...

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416-341-0040

CWSF 2017 - Regina, Saskatchewan



Zachary Trefler, Atif Mahmud

NeurAlgae: A Novel Approach to Harmful Algal Bloom Prediction

Challenge: Information

Category: Senior

Region: Waterloo-Wellington

City: Waterloo, ON, Kitchener, ON

School: Waterloo Collegiate Institute

Abstract: Harmful algal blooms (HABs), sudden, rapid growths of algae in water bodies, pose an increasing threat in modern society. The effects on surrounding ecosystems due to oxygen depletion and toxin generation create large ecological and socioeconomic problems. Predicting HABs is useful, but modern methods can be lacking. We propose an Artificial Neural Network to predict HABs which improves upon prior methods in generalization and accuracy.

Biographies

Zachary - Hi, my name is Zachary Trefler. I am 16 years old, in grade 11 at Waterloo C.I. in southern Ontario. I am mainly interested in physics and computer science, but all sciences fascinate me (University will mean tough decisions). Besides science, I am reading books constantly, as well as running, wood-carving and kite-flying. I also talk to people sometimes. My project, NeurAlgae, was a collaboration between my own ideas regarding artificial neural networks and my friend Atif Mahmud's experiences with an algal boom in BC. Using a neural network, we can predict algal blooms, with a model accurate yet general enough for public use. We are continui...

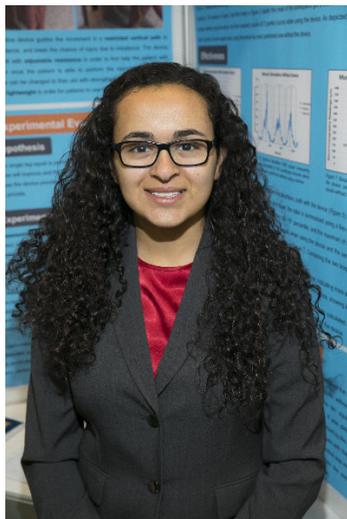
Atif - The one thing that I'm most passionate about is the power of questions, and not only the use of them to empower myself, but the use of questions to empower those around me. I am an ambitious high school student raised in Waterloo, Ontario and I have been fortunate enough to watch tech startups rise and fall around me. From these experiences I've developed an understanding of the reality of the business world and the value of asking the right questions. From a young age I've always been fond of using travel as a tool to expand your horizons by looking at the lessons of the past. Anthropology and culture has been something that has always intri...

Awards

Value

Excellence Award - Senior - Silver Medal Sponsor: Youth Science Canada	
Dalhousie University Faculty of Science Entrance Scholarship Senior Silver Medallist - \$2500 Entrance Scholarship Sponsor: Dalhousie University, Faculty of Science	\$2 500
UBC Science (Vancouver) Entrance Award Senior Silver Medallist - \$2000 Entrance Scholarship Sponsor: The University of British Columbia (Vancouver)	\$2 000
University of Ottawa Entrance Scholarship Senior Silver Medallist - \$2000 Entrance Scholarship Sponsor: University of Ottawa	\$2 000
Western University Scholarship Silver Medallist - \$2000 Entrance Scholarship Sponsor: Western University	\$2 000
Total	\$8 500

CWSF 2017 - Regina, Saskatchewan



Marina Ilyas

Phixing Physio

Challenge: Innovation

Category: Junior

Region: Waterloo-Wellington

City: Waterloo, ON

School: Centennial P.S.

Abstract: In my project, I created an assistive device to improve the form in the single leg squat, (a difficult exercise in physiotherapy). A MyoWare, which is a device that detects muscle stimulation through electromyography, was used to ensure that the intended muscle usage was not compromised when using the device. The impact of explaining the general benefits of the exercise on regularity was also evaluated.

Biography

My name is Marina Ilyas, I am a grade 8 student, and I am a part of the Waterloo-Wellington delegation. I am very excited to be part of CWSF for the first time. Because of the many injuries I got playing sports, and the number of times I needed physiotherapy, my project aims at overcoming incorrectness and irregularity in the single leg squat. I created an assistive device to improve the form in this exercise and measured muscle stimulation to ensure the device did not compromise muscle usage. Besides my love for science and Math, I play piano, violin, cello and bass clarinet. I also play soccer and squash, and I will be representing my city in the International Children's Games in Lithuania this summer playing table tennis. I enjoy travelling and learning new languages. I have always loved engineering and building things, and I hope that I will become a mechatronic engineer.

Awards

Value

Excellence Award - Junior - Bronze Medal Sponsor: Youth Science Canada	
Western University Scholarship Bronze Medallist - \$1000 Entrance Scholarship Sponsor: Western University	\$1 000
Total	\$1 000