FOR RELEASE

Young Innovators from Ottawa, London, Mississauga, and Thornhill collect cash and medals at 56th annual Canada-Wide Science Fair

REGINA, SK (Friday May 19, 2017) – Seven projects from four Ontario Regional Science Fairs earned more than $11,750 in national cash prizes, as well as medals, for their year-long efforts to investigate societal problems and develop innovative solutions through Science, Technology Engineering, and Mathematics (STEM) in the 56th Canada-Wide Science Fair, held this year on the University of Regina campus. They are inaugural winners of the *Youth Can Innovate* Awards, sponsored by The Gwyn Morgan & Patricia Trottier Foundation.

"One of the key goals of our Foundation is to encourage and support Canadian students in STEM," said Gwyn Morgan in announcing the 2017 winners. "We want to champion Canada's young innovators and shine a light on their work by encouraging them and providing financial support. They're Canada's future," said Patricia Trottier. More than 440 STEM students from schools across Canada presented 390 projects.

The seven successful Ontario projects winning *Youth Can Innovate* awards include three from Ottawa, two from London, and one each from Thornhill and Mississauga.

Mississauga
Gold Medallists Saharsh Hariharan, 17, a grade 11 student at Mississauga's Woodlands School, and Rushi Gandhi, a grade 11 student at Chinguacousy Secondary School's science and technology program, earned one of four prestigious $8,000 awards, in the senior category, for creating a navigation system to help guide visually impaired individuals. The system consists of an Android application and a headband, and applies vibrations, known as Haptic Feedback, to inform the user when to turn and in which direction. The device uses several Google's GPS APIs to help the user navigate a path with 100% accuracy. In fact, the device enabled the user to reach their destination 23% faster than with human assisted navigation. The device makes sure that visually impaired individuals can continue to live independent lives even with their disability, which has a huge positive impact on their quality of life.

In the future, they plan to "incorporate an ultrasonic sensor in front of the headband to detect and notify the user of any obstacles in his or her way." Another improvement they plan to incorporate into the Android application is to detect pedestrian signals and notify the user when it is safe to cross the road.

Saharsh and Rushi are no strangers to science fairs: Saharsh has already competed at three CWSF's, while Rushi has competed in two. Rushi has an extensive background in science and technology and was invited to Google Canada where he learned from many of the engineers there. He says that his project sparked his continued interested in computer science. Saharsh is also well versed in many business and robotics competitions. He is athletically inclined and hopes to pursue Mechatronic Engineering at University of Waterloo.

-more-

Ottawa (3)

Bowen Xue, a Grade 12 student from Bell High School utilized aptamers, which are short, synthetic compounds known for their high specificity to bind to small molecules and proteins, to enable safer and more effective medical-imaging diagnostics in MRI and CT scans. One in three MRI and CT scans, equivalent to 60 million annually, rely on contrasting agents (CA) to generate greater contrast in the images, which also improves the diagnostic value of the images. However, the use of CAs in these diagnostic techniques, and the benefits they provide, are limited due to the potential adverse reactions in patients. In fact, gadolinium, a CA used in MRI scans is known to cause allergic reactions in one per 1,000 patients, including anaphylaxis. Rare kidney diseases such as Nephrogenic Systemic Fibrosis and Contrast Induced Neuropathy are also potential side effects of using these dyes. Xue recognized that, to obtain the full benefits of CAs, large doses are needed which continue to circulate through the blood. However, targeted CAs (using aptamers) would require significantly lower doses, effectively minimizing side effects while optimizing image quality. Xue developed aptamers that can target fibrinogen, a protein found in the formation of platelet-fibrin thrombus, which can lead to stroke and intracranial aneurysms. By binding these aptamers to CAs such as gold nanoparticles and DOTA-gadolinium chelate, Xue could develop targeted imaging probes for CT and MRI scans for diagnosis of these two diseases.

Xue's efforts earned him the *Youth Can Innovate* $1,000 Senior category cash prize and a Gold Medal for Excellence. Xue developed this project at Carleton University. Outside of research, Xue is the co-president of his Executive Student Council and the Co-Chair of the Ottawa-Carleton District School Board President's Council. He hopes to continue his work and to pursue engineering in university.

Bhavya Mohan, 14, a Grade 8 student at Earl of March Secondary School in Kanata, won a $500 junior category *Youth Can Innovate* award, and a Gold Medal, for an innovative PCR-based Lab-on-a-Chip microfluidic device designed to measure DNA concentration for use in diagnosing diseases such as leukemia and HIV. Genetic diagnosis, which is currently expensive, utilizes the unique genetic sequences found in particular diseases which can be detected and amplified to create several copies of the sequence using polymerase chain reaction (PCR). Typically, measuring the concentration of amplified biomarkers requires the use of diagnostic tools such as the Nanodrop, which can cost upwards of $10,000. Mohan developed an inexpensive $1 chip, which could be used to replace conventional DNA diagnostic tools making genetic diagnostics more accessible in clinical settings and developing countries. Interestingly, Mohan described that increasing amounts of DNA can cause a greater amount of resistance to an electric current. His chip uses this unique property of DNA to measure its concentration by simply passing electricity through a PCR amplified sample and measuring the current. Through this, he was able to show that the chip can accurately identify leukemia based on a genetic biomarker that is uniquely expressed in leukemia cells.

Mohan's work was motivated by the fact that cancer still remains a problem which affects millions of lives and so he began doing cancer research two years ago at Carleton University. He has taught himself bioinformatics by learning the program "R Studio". Outside of science, he is part of his school's Student Council and enjoys playing music. For young scientists, Mohan recommends to "look at your interests, find a problem and then just research".

Naomie Azzi, Grade 8 is enrolled in the Défi (Challenge) program at Franco-Cité High School. She has been awarded one of the *Youth Can Innovate* $500 Junior category prizes for the development of a hands-free crutch that uses the knee as the point of pressure to help people who break their feet. Recognizing the challenge many people face when they are not able to support their injured leg due to the inconvenience of crutches, Azzi set out to create her novel design. This is especially meant to help people who do not have the strength to use normal crutches such as elderly people, those with damaged shoulders and those who live alone and cannot receive help. Aside from her research, Azzi is involved in the improvisation team at her school and is also an avid athlete, especially a fencer, having won medals at international fencing tournaments.

London (2)

The Thames Regional Science Fair in London produced two winners of *Youth Can Innovate* Awards, along with Gold Medals, for their health-related research work.

Grade 10 student Amal Aziz is enrolled in the enrichment program at Sir Wilfrid Laurier Secondary School in London. She has earned an Intermediate category $750 cash prize for the development of Trojan horse-conjugated antibodies which could be used to diagnose Alzheimer's disease in the earlier stages. Aziz observed the fact that almost 99% of clinical trials from 2002 to 2012 aimed at reversing or preventing Alzheimer's Disease failed. This was mostly due to blood-brain barrier (BBB) penetration issues. The fact that some antibodies and shuttle peptides exist that can be manipulated as a BBB molecular "Trojan Horse" to ferry a neurovascular medicine across the BBB (using a receptor mediated transport system) paved the way to the original idea of Amal Aziz's project.

This novel concept could also potentially be used for minimally-invasive diagnosis and treatment of other neurodegenerative disorders such as Huntington's disease, Parkinson's disease, lysosomal storage disease, and stroke. Aside from her astounding research work, Aziz has delved into the realm of graphic design and plays the piano.

Danish Mahmood, a Grade 8 student from Ryerson Public School, received a platinum award as best overall junior project as well as a $500 Junior category *Youth Can Innovate* award and a Gold Medal for his work in developing a wireless interconnected non-invasive triage system that includes a novel biomedical finger sensor, hoping to improve triage in mass casualty incidents. His device, a biomedical sensor dubbed the W.I.N.I.T Band, can non-invasively and continuously measure the cuffless blood pressure, heart rate, blood oxygen concentration, and body temperature of a patient. "In mass casualty incidents, paramedics and hospitals will be able to receive real-time updating of vital signs on an online dashboard and device with an organic LED screen, thus eliminating the need for patient reassessments," explained Mahmood. His device is cost effective, the estimated cost of development being about $25. It can improve pre-hospital triage protocols with accessible Wi-Fi communication and real-time updating of vitals for hospitals, first responders and paramedics. Once patients are in hospitals, devices can remain on the patients to allow for fast and efficient treatments, without having to reassess the patients for vital signs. Mahmood is no stranger to science fairs, having competed in his regional fair since Grade 4. Passionate about solving challenging problems, Mahmood aspires to continue working in the field of science, specifically medicine. He is also involved in multiple sports and enjoys reading books.

Thornhill

Harry Parmar, a Grade 8 student at Bakersfield Public School in Thornhill, earned his $500 Junior *Youth Can Innovate* recognition for his pursuit of an inexpensive way to produce the anti-cancer and antioxidant agent violacein. Using the power of synthetic biology, genetic material from one organism was extracted and inserted into a new non-pathogenic strain, producing pure violacein at a low price without impacting the functionality of the plasmid. His research demonstrated that the virtually cost-prohibitive product could be made cheaper by transferring genetic material from its primary producer, to a non-pathogenic strain of *E.coli*. Furthermore, fungus was treated with different concentrations of violacein, and it was shown that higher concentrations of violacein showed a higher zone of inhibition and very little fungal growth. In fact, violacein and the known antifungal amphotericin b both showed similar zones of inhibition at higher concentrations of the substances. He was first introduced to synthetic biology by a Ph.D. student at Ryerson University, and now understands how it can impact our world if used properly. Aside from his work in synthetic biology, Harry is a basketball player for a team in Richmond Hill and plays the piano.

Youth Can Innovate awards, with a total cash value of $41,000, are offered to students competing at Canada's annual national science fair. This year, 242 finalists at the junior, intermediate and senior levels nominated their projects for evaluation. The 2017 recipients were selected by Canada-Wide Science Fair judges. More information about *Youth Can Innovate* and profiles of 2017 recipients, can be found at Facebook/YouthCanInnovate, Twitter: @youthcaninnovate, and www.youthcaninnovate.ca.

- ends -

For media information, photos, and to interview winners: Rosemarie Enslin (403) 630-8421, enslin@enslinpr.com
@RosemariePRyycT

About The Gwyn Morgan & Patricia Trottier Foundation: The Gwyn Morgan & Patricia Trottier Foundation is a family foundation based in Calgary, Alberta. Established in 2005, it focuses on education, wellness initiatives and leadership development. In education, the Foundation gives priority to initiatives that encourage and support students pursuing STEM (Science, Technology, Engineering, and Mathematics) careers. The Foundation's STEM support currently includes 20 recently established *Youth Can Innovate* awards, which are given annually to 16 innovative projects at the Canada-Wide Science Fair; Camosun College's Empowering Women In Trades Program; the Gwyn Morgan **Be An Engineer** bursaries awarded annually at 15 Canadian universities and the Gwyn Morgan Centennial Bursary.