

ENGINEERING OUTREACH ANNUAL REPORT

20 22

 **OntarioTech**
Engineering
& Applied Science



Our Goal

To provide accessible, inclusive and transformational learning opportunities that inspire youth to pursue Engineering careers.

Our Core Values

- 1. Inclusivity: We strive to create an inclusive and welcoming environment where everyone feels respected and valued.*
- 2. Innovation: We embrace new ideas, technologies, and methodologies to deliver impactful outreach programs.*
- 3. Collaboration: We work together with partners, stakeholders, and volunteers to create positive change in our communities.*
- 4. Accessibility: We believe that everyone should have access to engineering and technology education, regardless of their background or circumstances.*
- 5. Excellence: We are committed to delivering high-quality programs that meet the needs of our communities.*

Look Inside

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We are on a mission.

The Faculty of Engineering and Applied Science at Ontario Tech University is committed to providing Science, Technology, Engineering, and Math (STEM) learning opportunities to youth through its Engineering Outreach initiatives.

The Engineering Outreach team is committed to inspiring today's youth to solve the problems of tomorrow by sparking curiosity and preparing them to pursue Engineering careers. To support our vision, in 2022 Engineering Outreach hired 79 high school and undergraduate students as Engineering Outreach instructors to develop content and facilitate workshops, and have engaged with more than 28,000 youth in grades 1 - 12 and over 740 teachers through our hybrid delivery model.

Our mission is to engage with the community, spark curiosity and prepare K-12 students to build critical skills and confidence by making STEM learning opportunities accessible and inclusive to all youth including those from underrepresented communities in the Durham Region and beyond. We aim to foster and build a community that understands the importance of STEM education by developing impactful partnerships with community organizations. We aspire to increase digital literacy and skill development of youth through the delivery of hands-on STEM education in schools and community hubs. We strive to empower and support teachers and school leaders in their delivery of STEM education.

Engineering Outreach programs and activities are made possible by contributions from our partners, including Actua, Canada Summer Jobs, eCampusOntario, GM, Hydro One, and ONWiE. Many thanks to our partners for their generous support!

We invite you to explore our Engineering Outreach programs and activities and learn about the ways we can work together, to provide all youth with transformational learning opportunities.

Hossam Kishawy, Ph.D, P.Eng.

Dean - Faculty of Engineering & Applied Science

Qusay H. Mahmoud, Ph.D, P.Eng.

Associate Dean - Experiential Learning & Engineering Outreach



It's about teamwork.

Engineering Outreach is built off the passion within its instructors, and we would like to give a huge thank you to our team for their commitment to inspiring youth and supporting teachers. Our staff all come from an engineering or science background with an interest in teaching youth STEM concepts.



Ellen James

Engineering Outreach and
Women in Engineering Supervisor



Madeline Sialtsis

Engineering Outreach
Coordinator



Alex Piliounis

Engineering Outreach
Coordinator



Sydney Smith

Engineering Outreach
Coordinator



Charlie Kivi

Engineering Outreach
Coordinator



Mithulan Panchalingam

Engineering Outreach
Coordinator



It's about making an impact.

Mahum's Story

Working at Engineering Outreach as a high school program instructor was one of **my highlights of high school**. I was given a space to grow and mature despite the pandemic, both personally and professionally. The best part was of course, working with children and seeing their faces light up as they learned something new and created their projects. Additionally, I had the opportunity to work with people from diverse backgrounds in engineering and STEM. I learned about the unique contributions of each engineering branch. I also learned about the lack of representation of women in engineering and of BIPOC communities in academia, which made Engineering Outreach a pivotal hub of support for the community. Knowing this made me **feel more purpose in the role that I was doing**. Additionally, this opportunity allowed me to take responsibility and have ownership of my tasks as I developed workshops, presented content and led the class. I learned more about science and teaching and how to culminate them to create exceptional learning experiences for K-12 youth. The pillars of the overall supportive environment were the senior staff and supervisors who were role models I looked up to when I was faced with a challenging problem. Most importantly, this opportunity was super fun and I developed transferable skills I still use today.

Ali's Story

In 2021, I started volunteering with Engineering Outreach, I finally discovered a **warm welcoming community**, where I could build upon my skills. I would learn more about my passions, which include engineering. It gave me great insight about the university and the engineering program I am currently enrolled in.

In the summer of 2022, I was hired as a high school instructor, it would be a year of growth. I developed my technical and soft skills throughout this year. I learned how to network and how to work in a professional environment. Meanwhile, I developed a better understanding of STEM, by using tech including Arduinos, Micro:bits, etc.

Overall, I am glad that I have discovered Engineering Outreach as it has helped me get **closer to my passion** and gain numerous skills while also helping me discover who I am as a person. I would definitely recommend Engineering Outreach to any high school student interested in STEM.



Anthonia's Story

Hi I'm Anthonia and during the summer I had the opportunity to be a participant for the c_wonder: Black Youth STEM Club [Grades 9/12]. Throughout the summer I would attend the weekly sessions and **I always felt a sense of pride** being in an environment filled with people like me, unlike some of my school classes where I felt isolated due to having few black classmates. The sessions made me excited to learn, and I felt more confident academically since I did not have to worry about grades or saying the wrong thing. Despite being in summer school during that time, I would make sure that I attended the sessions because of how fun they were, especially the icebreakers. The instructors went above and beyond with their interactive sessions and even emailed me resources to help me find a co-op. After the summer sessions ended I applied to be an instructor myself, since I have volunteer experience working with children and I love STEM. Being an Instructor I am able to see the impact of programs like the c_wonder: Black Youth STEM Club when students show their excitement or when I see messages about how happy their parents are about their child participating and being exposed to new STEM topics. Moving forward this has changed my lens on education; before I saw learning as linear. Through Engineering Outreach, I saw how hands-on learning can be through all the activities we did with the students because of that I became a better learner at school. Most importantly, I feel like the work we do has the ability to change the world by instilling confidence in our students and providing them with a fair platform for them to continue learning. I love being in a work environment where we're all supporting each other and working for a good cause. In the future, I hope to continue working in an environment that impacts others.

Although I work for Engineering Outreach, I plan to pursue a career in healthcare as a nurse or doctor and continue community outreach. I know that the information I have learned like the Engineering Design Process will help me along that journey and help different communities.



79 High school & Undergraduate Students Hired

29,105 Participants Reached

91% of youth reported a better understanding of STEM

250 Programs Presented (workshops, clubs, camps)

140 Volunteers & Mentors

Our Programs

c_wonder: For Teachers

Our goal is to empower teachers to naturally make connections between STEM and the Ontario Ministry of Education curriculum for kindergarten to grade 12. We believe that the classroom should be a place where student interaction should include cross-curriculum content and focus on hands-on learning.

Engaged with over
740
Teachers

Teacher Workshops

Supporting teachers in our community is why we have developed weekly teacher workshops. Through this program, teachers are able to work with our team through virtual workshops. If the teacher is unable to attend, we have developed a bank of workshops online where the teachers can go to review and learn. This program focuses on:

- Developing the STEM skills of teachers
- Connecting their skills to ideas within the classroom
- Ensuring these ideas connect to the curriculum

"One of the biggest issues I have with technology is I often don't even know where to start. It's so helpful to have someone to help me understand how I can get started."

- DCDSB Teacher



Scan to view our online resources for teachers!



Tech We Teach

- Micro:bit
- TinkerCAD
- Scratch
- LEGO
- Minecraft
- Botley
- Ozobots
- Dash and Dot

Engineering Outreach Specialist (EOS) Program

The goal of the Engineering Outreach Specialist Program is to partner with teachers to infuse and integrate STEM areas naturally into teaching practice.

By promoting and encouraging creativity and innovation in both teachers and students, the program aims to create an atmosphere where teachers feel comfortable learning alongside their students and build confidence in delivering STEM programs within their classrooms for future students.

c_wonder: Community

Our c_wonder Community Programs are designed to support students from kindergarten to grade 8 outside of the classroom with STEM learning opportunities in a highly interactive manner. In 2022, we ran five diverse programs for over **23,800 K-8 youth**. These programs include:

- Community STEM and Coding Clubs
- Library Programs
- Indigenous Youth Programs
- Black Youth Programs
- All Girls Programs

Community STEM and Coding Clubs

These clubs enable youth to explore diverse facets of STEM in challenging and creative ways. Sessions have been designed to introduce youth to engineering design, scientific inquiry, and coding. This year, we ran clubs teaching youth about automotive engineering, UX, engineering technology, designing for sustainability, aerospace engineering, and more.



Library Programs

Library STEM and Coding Workshops

Our workshops for grades 1-8 students emphasize solving real-world problems using the Engineering Design Process. We had the opportunity to bring our tech to students, such as coding with Ozobots in space-themed exploration. We also covered engineering topics such as structural (designing earthquake-proof buildings), material science/mechanical (testing different materials to create the best parachute), and manufacturing engineering (3D printing using 3D pens).

Lending Library

This program reaches hundreds of students each year with hands-on coding activities. Our tech, which is kept at the libraries, and can be checked out by library patrons to try at home. This tech includes:



Arduino



Kano Computer



Makey Makey

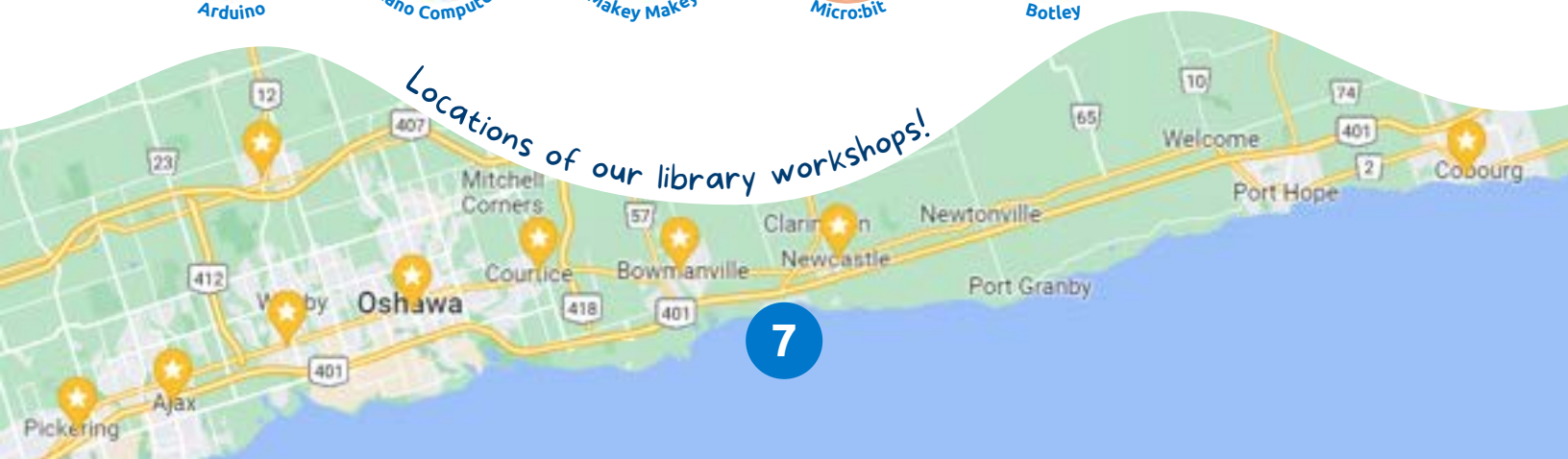


Micro:bit



Botley

Engaged
with over
1,650
youth at Library
Programs



Locations of our library workshops!

Engaged
with over
800
Indigenous
Youth

Indigenous Youth Programs

Our Indigenous Youth Programs focus on delivering STEM knowledge using the Ontario curriculum and traditional knowledge. These programs empower Indigenous youth to explore engineering in an inclusive space.

InSTEM@Home

Students in this program receive a free home kit containing materials and equipment to provide a hands-on method to learn about STEM. In a community-oriented and Indigenous-led environment, the InSTEM@Home program aims to provide support for Indigenous youth as we illustrate parallels between traditional ways of knowing and modern practices, highlight Indigenous STEM role models, and encourage Indigenous youth to pursue STEM education and careers.

Robotics for Indigenous Youth at Mādahòki Farm

In collaboration with IndigeSTEAM, our instructional team went to Mādahòki Farm in Ottawa, ON to present a workshop on robotics, connecting concepts on coding to the importance of cycles and patterns in nature.

Environmental Stewardship with Uxbridge Earth Kids

Our team taught **40 Grade 1-3 youth** on different ecosystems and how they pertain to all forms of life. Youth were able to create their own ecosystem in a box as we did an outdoor activity using the natural materials around them and at their disposal.



Actua Instructor Recognition Award

"The past two years working with Engineering Outreach has been such a rewarding experience. Receiving the 2022 Instructor Recognition Award means a lot to me as it exemplifies my dedication and commitment to STEM education, especially when it comes to Indigenous youth in STEM. I look forward to continuing the progress we've made to attract even more talent to Ontario Tech!"

**Hunter Johnson,
Indigenous STEM Instructor**



Black Youth Programs

We are committed to ensuring Black youth have a community-oriented and accessible learning environment to explore different facets of STEM, coding, and engineering design. We do this by ensuring Black representation in the classroom so youth can see themselves in multiple opportunities.

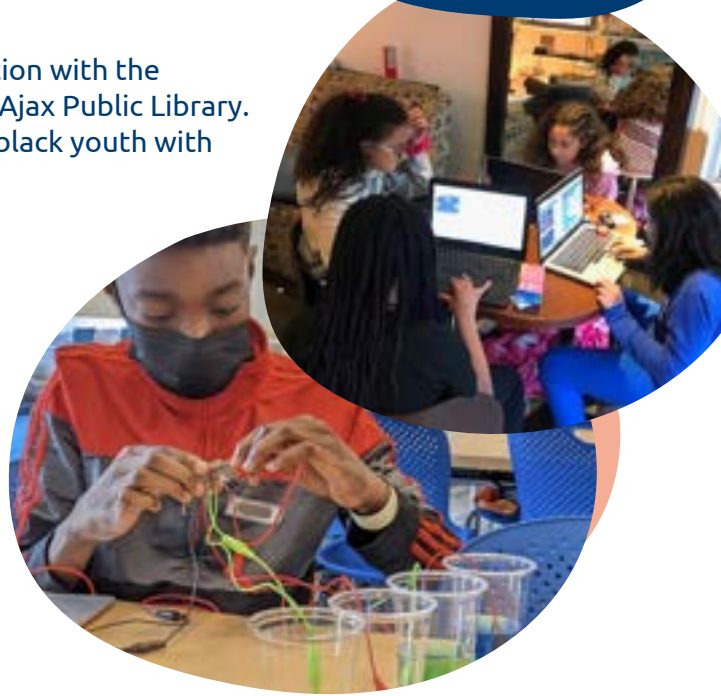
Black Girls Empowerment STEM Club

A virtual club for **80 grade 4-6 and 7-9 girls** in collaboration with the Congress of Black Women of Canada (Ajax Chapter) and Ajax Public Library. Our goal for this club was to provide female-identifying black youth with the confidence to grow their digital skills.

NSBE High School Conference

Our first virtual conference for **50 grade 9-12 youth** in collaboration with the National Society of Black Engineers (NSBE) Ontario Tech chapter. This conference focused on STEM, leadership, and academic excellence - empowering participants to collaborate, ask questions, and grow their interpersonal skills. We are so thankful for the continued support from Hydro One. Jablonsky Donna, Manager of Equipment Engineer and Special Projects at Hydro One, connected to the audience and shared her passion for STEM education.

Engaged
with over
2,500
Black Youth



Ontario Tech & Jamaican Canadian Association

During the school year, we collaborated with the JCA to run programs for Black Youth within their community. Through this collaboration, we highlighted how coding can tackle issues within the environment. 45 Micro:bits and climate action kits were sent out to each participating youth from Grades 1-12 with design challenges including designing a plant monitoring system, an automated tree planting machine, and a mechanism to combat deforestation.



“The feedback that I have for this program is fun, the people and staff are really kind. I enjoyed this because I forgot most of the coding stuff I learned in the past and they are reteaching me.”

- Black Youth STEM Club Participant

Girls Programs

In 2022, we continued to host girl-focused programs for grades 1-12. These programs continued to grow and inspire girls to explore STEM and build digital skills.



Girls Engineering Week

For grades 7-12 we have developed a week-long, free summer camp where we teach engineering concepts. At the camp, girls used mechanical and software engineering to build foil boats controlled with Bluetooth connection and hydraulic arms.

"I appreciate the time and effort the instructors put in the lessons and I do think it paid off because in my opinion, these sessions were awesome. I learned a lot and had a lot of fun. So thank you!"

- All Girls STEM Club Participant

Engaged
with over
3,000
Girls

Go ENG Girl and Go CODE Girl

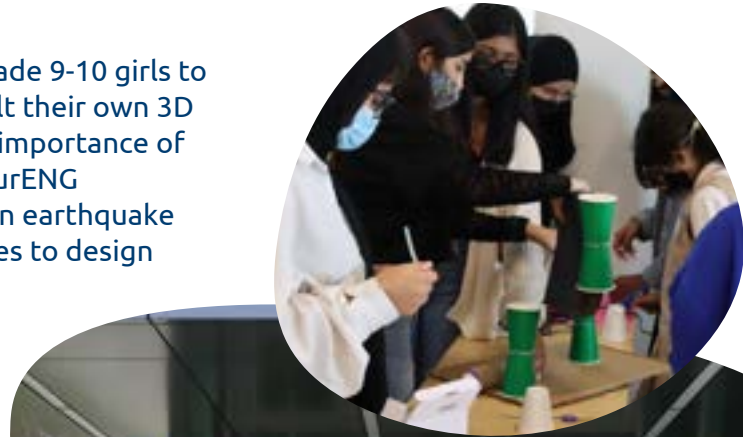
Each year we support grades 7-10 girls, introducing these students to female role models in engineering while challenging them to solve an engineering problem. At Go CODE Girl, participants used machine learning to code their own chatbot. At Go ENG Girl, our team partnered with Canada Post, where girls were prompted to design and build a working conveyor belt.

InspirENG and FuturENG

This year's virtual InspirENG conference introduced grade 9-10 girls to additive manufacturing. Participants designed and built their own 3D printed twist containers while also learning about the importance of material selection and bend theory. Our in-person FuturENG conference taught grade 11-12 girls how to program an earthquake detector using a Micro:bit and how to use strong shapes to design earthquake-proof buildings.

Discover Engineering

This program is open to girls in grade 12 who have taken interest in an engineering program at Ontario Tech University. This unique, 2-day event gives girls a first glance into student life at Ontario Tech by providing them with the opportunity to spend a night on campus, participate in engineering workshops, connect with Ontario Tech women engineering students, and tour campus grounds.



c_wonder: Academy

Our c_wonder: Academy programs are created to allow students in grades 9-12 to develop digital skills to support their transition into university. Our mentors are all STEM students who provide guidance and support for any questions related to post-secondary education. We offer a variety of enrichment in STEM programs, including:

- Academy STEM and Coding Clubs
- Engineering Robotics Competition
- Future Leaders in Training

Academy STEM and Coding Clubs

This year's STEM and Coding clubs introduced high school students to engineering design, the basics of programming Arduino, Python coding language, and virtual reality. Each session challenged students to think critically and solve problems.

I just wanted to say that the instructors are AMAZING! They even answered some of my questions about university engineering paths. I learned a lot with the slides, then examples, and then following the design process to complete the challenge. I had lots of fun!!!

- Engineering Design Club Participant

Engineering Robotics Competition

The Robotics Competition has provided an affordable option for elementary and high schools to compete in a fun and engaging autonomous robotic competition using a LEGO® MINDSTORMS® robot kit. Students apply STEM concepts to their creations as they face off against other teams from across the GTA.

Future Leaders in Training

In 2022, this program continued to grow and we had **15 students** participate. These high school students were mentored and taught both practical and technical skills that they can utilize to prepare them for post-secondary education in a STEM related field. Topics include, time management, organizational skills, how to tailor a cover letter and resume to careers in STEM, as well as an introduction to text-based programming and essential skills in engineering.



Engaged with over
4,200
High School Students

c_wonder: Mobile Design Lab

The c_wonder: Mobile Design Lab delivers curriculum focused hands-on and virtual learning activities to schools and brings design thinking to life in the classroom! Designed for students from Kindergarten to grade 12, our workshops are a fun, accessible, and engaging way to deepen a student's understanding of STEM topics.

These workshops include 3D Modelling and Digital Design, Physical Computing, and Micro:bit, Introduction to Text-Based Programming with Java, Introduction to Block-Based Programming with Scratch, Electronics and Circuit Design.



Engaged with over **4,800** through Mobile Design Lab

Touch a Truck Oshawa



Whitby Ribfest



STEM School Nights



Our Partners

Over the past five years, Ontario Tech U Engineering Outreach has collaborated with organizations big and small to offer hands-on STEM programming in our local community. From delivering free programming in local libraries to visiting communities with limited access to STEM programs, we are passionate about sharing our love of science, technology, engineering, and math.

Thank you to our trusted partners that make our vision possible through their generous funding. We would like to recognize Hydro One and ONWiE for supporting our Girls and Women in Engineering Programs. We are grateful to Actua and the Government of Canada for the support of our free digital skills activities for youth/teachers through the CanCode program. Actua has provided training, resources, and support to Engineering Outreach to deliver science, technology, engineering, and mathematics (STEM) education outreach programming. Each year, all of Actua's members engage over 350,000 youth in 500 communities nationwide. Please visit Actua at www.actua.ca. Thank you for the continued support of Canada Summer Jobs for providing funding for our summer staff. We would like to acknowledge the support of General Motors for supporting our c_wonder Mobile Design lab. This allows us to offer bursaries to families, so their children can attend our summer programs, and eCampusOntario for funding the development of a free AI course for high school students.



2022-23 Actua National Funders



Get in Touch

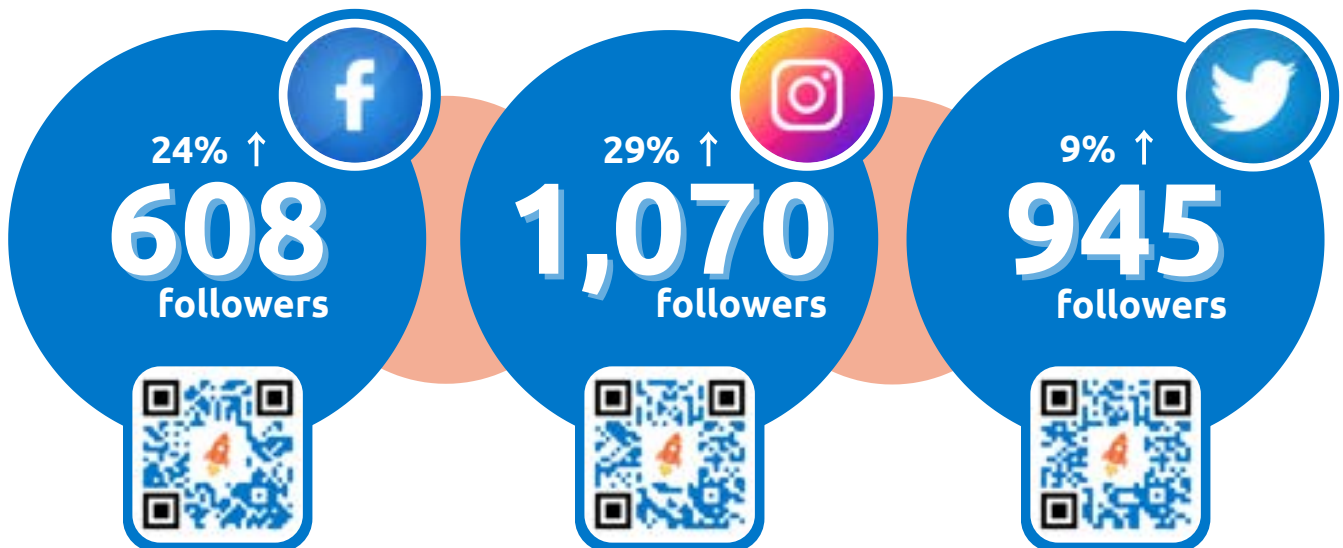
Social media is an important tool that helps us achieve our mission. We utilize these platforms to share registration for our programs, teach youth about niche topics and stories in STEM, and connect with sponsors and partners within our programs. In 2022, we added TikTok to our social media repertoire and continue to engage with youth, parents, and teachers across Canada.

In 2022, we reached
390,000
people across all platforms

In 2022, we had
725,000
impressions across all platforms

@ot_outreach

Scan the QR codes to visit our social media!



engineering.ontariotechu.ca/outreach

Photo Gallery



Testing parachutes at the Whitby Public Library



Meeting Spot the robot dog during summer camp



Girl Guide Badge Day engineering workshops



Bottle rockets at high school summer camp



Balloon water bottle car from STEM Club

Photo Gallery



Building a futuristic, earthquake-safe building at FutureENG



15th Annual Engineering Robotics Competition



Building conveyor belts at Go ENG Girl

Contact Us

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**Be the first to hear
about our programs!**