

Ontario Tech Engineering Outreach
2021 Annual Report



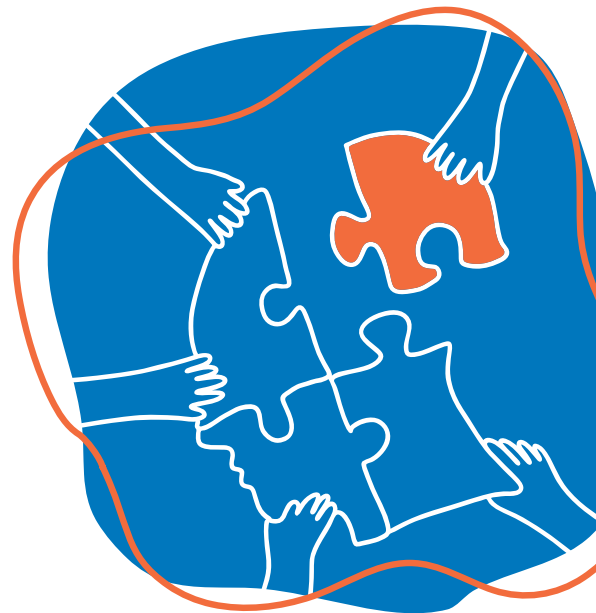


We have a vision.

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

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We're on a mission.

Engineering 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 STEM careers. To support our vision, in 2021 Engineering Outreach hired 39 high school and undergraduate students as Engineering Outreach instructors to develop content and facilitate workshops, and have engaged with more than 20,000 youth in grades 1 - 12 through our virtual-delivery model.

Our mission is to engage with the community, spark curiosity and prepare K-12 students 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 Hydro One, GM, Actua, NSERC Promo Science. Thank you for your generous support!

I 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.

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. Our staff all come from a science or engineering background with an interest in teaching youth STEM concepts.



Ellen James

Engineering Outreach
Supervisor



Mickole Mulano

Engineering Outreach
Program Coordinator

Undergraduate Instructors

David Akinyemi	Kirti Godbole
Aayush Bajaj	Farhan Habib
Clarissa Branje	Mamun Hossain
Amar Brocke	Mashaal Jawad
Nana Kwesi Amartei Brocke	Hunter Johnson
Christian Brown	Fiona Kirby
Izzy Cossarin,	Rachel Lynds
Keegan Dillon	George Mikhaiel
Aaron Emmanuel	Israel Ogunmola
	Nora O'Miller

Highschool Instructors

David Cadigan	Gabriel Joson
Todd Childerhose	Mahum Khawaja
Anthonia Chukwuyem	Yara Mahmoud
Elias Dawodi	Shelby Turcotte
Melanie Foltak	Ashlee Watson
Ruby Halter	

It's about making an impact.



Ruby Halters' Story

In Grade 10 I decided to attend the FUTURE ENG conference hosted by Ontario Tech University's Engineering Outreach program. At the time I wasn't too knowledgeable on what engineering was all about and I honestly wasn't too interested either... but this quickly changed after attending the FUTURE ENG conference. The event explored different fields of engineering through fun activities like STEM workshops and speed networking with inspirational women engineering professionals. Ultimately, the event showed me how broad of a field engineering is and how endless the related career opportunities are. This led me to volunteering for the Engineering Outreach program where I had the chance to support an all girls STEM club and create content for a micro:bit and sustainability program!

Soon I started working for Engineering Outreach as a Highschool instructor where I was introduced to other cool programs. This included the All Girls Coding Clubs where I was able to use my computer programming knowledge to introduce young girls to the world of code in different programming languages such as Blockcode, Python and Java! At this point I knew I wanted to enter the engineering field.

Now I continue to enjoy working for Engineering Outreach. I am learning so many new skills like communication and teamwork. Most of all I get the chance to contribute to an amazing learning environment that inspires youth to explore and enter the Engineering field, just like I was in Grade 10. I am beyond grateful for my experience in Engineering Outreach so far and I am super excited to pursue an undergraduate degree in Engineering next year!



Gabriel Joson's Story

When I was in grade four, I would attend one of the camps offered from Engineering Outreach at Ontario Tech University. My favorite part of the camp was getting my hands on an Arduino and learning how to make a thermometer. It was a blast learning about electrical components and coding. I have been going to these camps ever since!

In grade nine I became a volunteer for a STEM Camp for grades 1-8. It was such a joy to share my knowledge in STEM with the kids and watch them apply it to their activities. I volunteered again in grade ten and eleven because it was a great opportunity to gain leadership experience.

During my senior year of high school, I became an official instructor where I would create content to teach grades one to four STEM.

I was a little nervous given such a large task. However, my supervisors who I met over the years gave terrific advice as to how to be a good instructor and develop STEM content that kids will enjoy. Not only did I deliver amazing STEM activities that kids enjoyed, but I gained helpful mentors and life-long friends.

My experience at Engineering Outreach at Ontario Tech University was life changing. I would never have developed leadership skills and creative thinking if it wasn't for the opportunity to volunteer with Engineering Outreach. The time I spent working for Engineering Outreach would also be the place where I would decide to study mechanical engineering. I also got to meet amazing upper-year engineering students and faculty during high school who would eventually be my greatest friends to help me transition to be a first-year engineering student at Ontario Tech University.

Recent Highlights

While Engineering Outreach runs many programs throughout the schoolyear and summer months, here are some of the highlights.

Future City Experience

Run in partnership with Engineers Canada and Engineers of Tomorrow, this event saw over 500 students from schoolboards across Canada to research, design, and build cities of the future on the moon. The event uses the engineering design process as a framework to guide students through the creation of their cities. Within this framework, students apply specific project management methods to keep their projects on track. The structure gives students a real-world learning experience they can apply to future challenges in school, work and life.

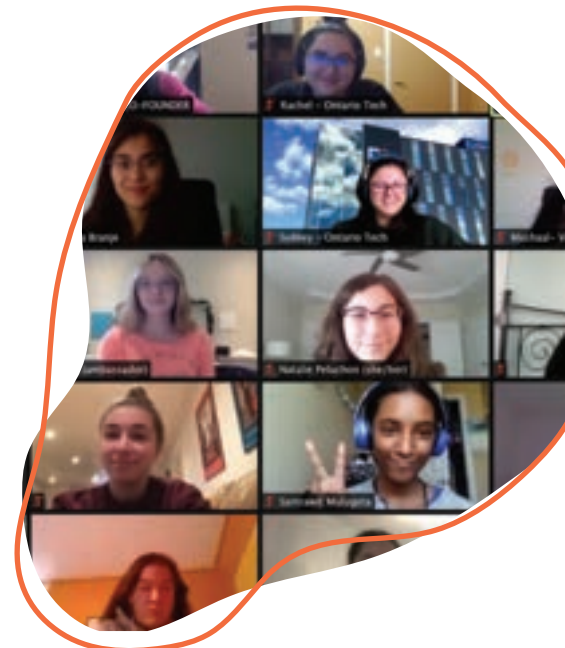


Go CODE Girl Parent Engagement

Along with educating youth, Engineering Outreach tries to educate parents on who they can better support their childrens STEM education. New this year at Go CODE Girl, we ran a session for parents discussed topics such as: how to get your child involved in coding and why coding is important for the future. We also provided them with resources they could use to learn more about coding themselves .

Grow STEM Conference

Engineering Outreach was contacted by an Ancaster High School to help support and attend a virtual STEM conference they were running, Grow STEM, to encourage and support STEM learning in girls in grades 9-12. We ran a full day of workshops and provided women undergraduate engineering students to speak on a student panel. The event saw over 50 girls who were very engaged.



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 by providing teachers with consistent, content-focused hands-on learning from the engineering perspective, teachers will have a better understanding of how STEM concepts can be integrated into their classroom with the ideas and strategies that they learn through these programs. We currently run two c_wonder: For Teachers programs, and Engineering Outreach Specialist Program, and Professional Development Workshops.

Engineering Outreach Specialist Program

In this program we directly partner with teachers in their classrooms and create an atmosphere where teachers feel comfortable learning alongside their students and build confidence in delivering STEM programs within their classrooms for future students.

Facilitated remotely in 2021, we partnered with two elementary schools in the Durham District School Board and engaged over 1600 youth through the delivery of 62 lesson plans in collaboration with over 50 educators.

Professional Development Workshops

With innovative changes to the Ontario curriculum, including the addition of coding, our workshops are designed to provide job embedded professional learning opportunities for K-8 educators and school leaders in the areas of Engineering, STEM, and Computational Thinking Education.

Throughout this year, we have reached over 450 educators over the delivery of nine professional development workshops focused on integrating Engineering Design and Coding within the delivery of Ontario curriculum.



In 2021 we engaged over 500 educators, teachers, and school leaders!



c_wonder: Community

Our c_wonder Community Programs are designed to support students from Kindergarten to grade eight outside of the classroom with STEM learning opportunities in a highly interactive manner. In 2021, we ran six different diverse programs which included two new programs we launched this year! These programs include:

- Black Youth Programs
- Girls programs
- Indigenous Youth Programs
- Library Programs
- STEM Clubs
- Summer Community Programs

STEM Clubs

Our STEM Clubs enable youth to explore diverse facets of STEM challenging and creative ways. Sessions have been designed to introduce youth to STEM concepts including engineering design, scientific inquiry and coding.

We developed and ran 14 STEM Clubs and engaged over 2,200 youth across 67 sessions.



Library Programs

To support STEM learning in the Durham region, we partner with several local public library systems including Oshawa, Ajax, Clarington and new this year Whitby. As part of this partnership we run Library Workshops which introduce youth to engineering design and basic coding principles through challenging hands-on activities while highlighting library resources to nurture their learning. To extend community engagement, we also run a Lending Library program which provides youth with access to free STEM technology learning resources which are in circulation in our partner libraries.

New this year, in collaboration with the Congress of Black Women of Canada (Ajax Chapter) and Ajax Public Library, we ran a four-week coding program for black youth in Grades 1 to 4. Our goal for these workshops was to provide female-identifying black youth with the confidence to grow their digital skills.

We hosted 86 unique library workshops and engaged over 2,400 youth within the communities of our library partners.

Summer Community Programs

In partnership with the Department of Continuous Learning and the Faculty of Education at Ontario Tech University, we developed and supported the delivery of 14 courses in various areas of STEM that were aimed at youth in grades 1-8 delivered during the summer months. From Artificial Intelligence, An Introduction to Engineering, and Programming Fundamentals, the program successfully introduced students to coding and how to incorporate science, math, technology and the engineering design process to solve everyday problems.

The eight-week program saw over 1,875 campers during July and August.

Indigenous Youth Programs

New in 2021, this program focused on engaging Indigenous youth in grades 4 to 8 and their communities both in the Durham region and Northern Ontario. Facilitated by Ontario Tech Indigenous students, the program is grounded in Indigenous land-based learning, demonstrating the intersections between Indigenous knowledge, STEM, and the engineering design process. We aim to renew students' pride in their Indigenous identity and empower them in the pursuit of STEM careers and education.

This program was developed in collaboration with the Ontario Tech Indigenous Education and Cultural Services advisory circle, Indigenous Education Department at Durham District School Board, and leaders of Actua's Indigenous Youth in STEM national program in order to ensure the curriculum prepared is grounded in Indigenous land-based learning.

This year we engaged over 600 Indigenous youth in 33 sessions.



STEM Support Program

Launched in 2021 in collaboration with the Durham District School Board (DDSB), Engineering Outreach hosted a series of STEM and coding workshops for students in grades 1-8 who have recently immigrated to Canada and are learning English as a Second Language (ESL). Our goal is to make connections between empathy and engineering through the different project-based activities while highlighting the societal effects of engineering as well as supporting their ESL learning. Qualitative surveys indicated a positive influence program towards digital literacy among the engaged participants.

Through this program we engaged over 500 youth over 20 workshops.

Live Learning

In 2021, through our Engineering Outreach Youtube Channel, we hosted Live Learning sessions in response to the COVID-19 pandemic, to create programs for youth that they could do at home with minimal supplies. These live-streamed sessions allowed youth in grades 1 to 12 to explore different topics and examined how engineering can be applied to solve the world's diverse problems. Topics included: Engineering and the Environment, Engineering and Sports and Engineering and Entertainment

We hosted 16 live sessions and engaged over 400 youth synchronously, with 50 additional asynchronous viewers.



Black Youth Programs

To help address the equity and diversity problem seen across STEM disciplines, in 2021 we launched our Black Youth Programs, which consisted of STEM clubs to engage black youth in Grades 1 to 12. The course content was designed by black STEM students, and provides black youth with a community-oriented and accessible learning environment to explore different facets of STEM, coding, and engineering design. With an intent for students to develop skills critical for the future, the program highlights black role models, promotes academic pursuits, and encourages growth in STEM literacy.

Our Black Youth program saw 1,780 youth in grades 1 to 12 engaged through the delivery of 52 sessions.



"I had such a good experience, and I would definitely recommend this program to other black students my age. I am going to miss the program, and I wish school was like this"

"It was very inspiring to watch the girls raise their hands without hesitation to offer definitions of STEM terms. The discussions about esteemed black scientists and mathematicians were a fitting start to the session"



Community Girls Programs

We believe that role models and mentorship is key to inspiring girls to pursue an interest in STEM. Our programs target girls in Grades 1 to 8 and offer programs in a variety of formats from workshops to clubs, and conferences, but all with the goal of building confidence and digital skills and teaching them about the opportunities available to them through STEM education. To make our programs more accessible and interactive, we provide technology and consumable kits to students who participate in certain programs. We want to thank all of our TD mentors who provided guidance within our STEM Clubs for girls in grades 1-6.

This year we engaged over 900 girls through our Girls Programs.

"Thanks for the amazing STEM classes you guys are providing. All the instructors are really doing a great job. My daughter loves them"



c_wonder: Academy

Our c_wonder: Academy programs were created to allow students in grades 9-12 to develop digital their digital skills, educate and inspire them on their transition to post-secondary education, and providing hem with STEM mentors to support them during this transition. We offer a variety of clubs, summer programs, in-class workshops, conferences and other volunteer opportunities.

Summer Academy Programs

This summer we interacted with over 200 students through our virtual week long camps. Students explored numerous STEM topics including connected calculus, physics, All About Engineering and Python 101. We had many mentors join us each week to discuss their path's and how these STEM subjects are used in industry.

This year we saw over 150 students participate in our Summer Academy Programs.

Academy Girls Programs

Our Academy Girls Programs continued to be successfull this year as we see a growing need for girls based STEM programing in the region. We ran targeted programs during the summer months for girls in grades grades 7 to 8 and 9 to 12, which aimed to inspire girls to learn more about the field of engineering with a focus put on sustainability and ways we can engineer a sustainable future. We continued with our FUTURENG conference for girls in grades 11 and 12 which was very well attended and saw girls come together from around the world to learn about similar themes. We also developed a new conference, INSPIRENG, targeting girls in grades 9 & 10, based off feedback from FUTURENG, which was that they wished they had these types of programs available to them sooner.

"It's so great to have this mentorship opportunity for my daughter, and I even noticed that some of my past Ontario Tech Students have been involved in delivering the program, which makes it even more meaningful to our family."



In-School Workshops

Through this program, we visit highschools across the Durham Region and deliver free in-class workshops on topics centered around future technologies, including micro-grids and artificial intelligence. In 2021 we ran two workshops virtually, Pitch Black which targets grade 9 science classes and teaches them about electrical circuits, and Powering Up, which targets grade 12 physics classes which teaches them about renewable energy, micro-grids and circuits.

In 2021 we visited 64 schools and engaged over 1,500 youth within the durham region.

Future Leaders in Training

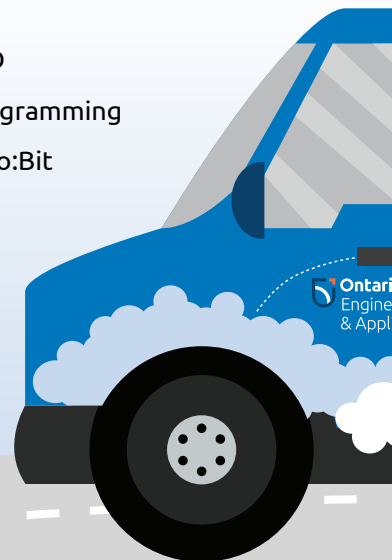
In 2021 this program continued to grow and we had 15 students participate. These highschool students were mentored and taught practical skills that they can utilize to prepare them for post-secondary education in a STEM related field. Topics include, time management, organizational skills, how to tailor a cover letter and resume to careers in STEM. These students were also invited to complete their community involvement hours, a requirement to graduate from an Ontario High School with Engineering Outreach throughout our Fall programs.

c_wonder: Mobile Design Lab

In September 2021, we adapted our our c_wonder: Mobile Design Lab to a virtual program model in response to the restrictions imposed due to the COVID-19 pandemic, and have been able to continue to offer workshops in classrooms across the Durham Region. These workshops introduce and increase digital literacy among youth and encourages them to make connections between coding and its applications to different STEM fields. We engaged with over 21 schools across four district school boards: Durham District School Board, Durham Catholic District School Board, Toronto District School Board and the Halton District School Board. Some of the workshops we delivered included:

- Artificial Intelligence and the World
- Scratch: Introduction to Block Programming
- Bloxels and Video Game Design
- Digital Design and TinkerCAD
- Java 101: Introduction to Programming
- Physical Computing and Micro:Bit

We delivered over 60 workshops reaching over 1500 students from Kindergarten to Grade 12.



Our Partners

Over the past five years, Ontario Tech 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 TD Canada Trust for supporting our Girls and Women in Engineering Outreach Programs. Actua for enabling us to run our no-cost programs and hire our amazing staff. Canada Summer Jobs for providing funding for our summer staff including 13 undergraduate and 7 high school students. NSERC Promo Science for supporting our c_wonder mobile Design lab and allowing us to offer bursaries to families so their children can attend our summer programs, and ecampus Ontario for funding the development of a new free AI course for highschool students to be launched in 2022.



Community partners we work with:

- ▶ Ajax Public Library
- ▶ Clarington Public Library
- ▶ Durham Catholic District School Board
- ▶ Durham District School Board
- ▶ Girl Guides of Canada
- ▶ Oshawa Public Library
- ▶ Pickering Public Library
- ▶ Toronto District School Board
- ▶ Whitby Public Library
- ▶ York Region School Board

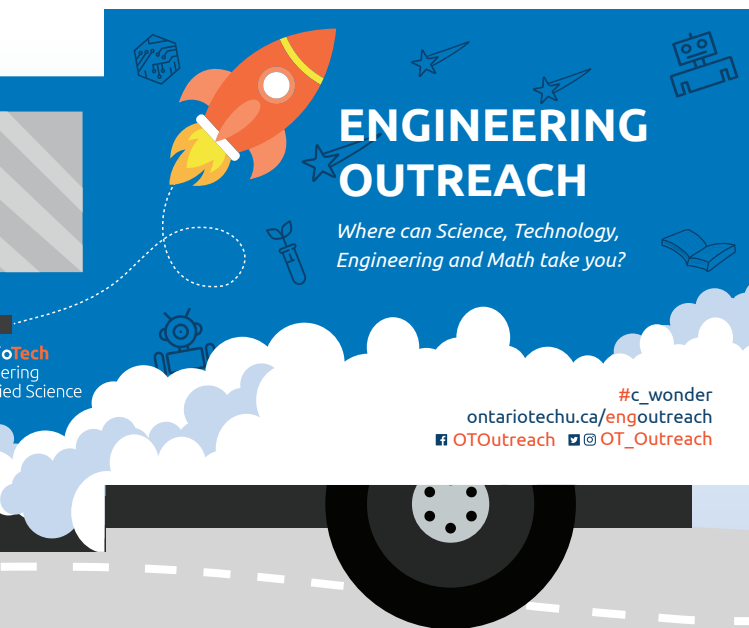
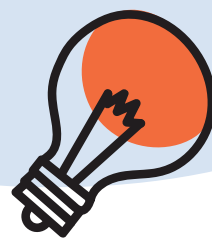


Photo Gallery







Contact Us

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