



ENGINEERING OUTREACH

Annual Report 2023

 **OntarioTech**
Engineering
& Applied Science

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Welcome

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 2023, Engineering Outreach hired 61 high school and undergraduate students as Engineering Outreach instructors to develop content and facilitate workshops. We have engaged with more than 34,000 youth in grades 1-12 and over 1,200 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 by delivering 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, NSERC, Canada Summer Jobs, OVIN, 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 how we can work together to provide all youth with transformational learning opportunities.

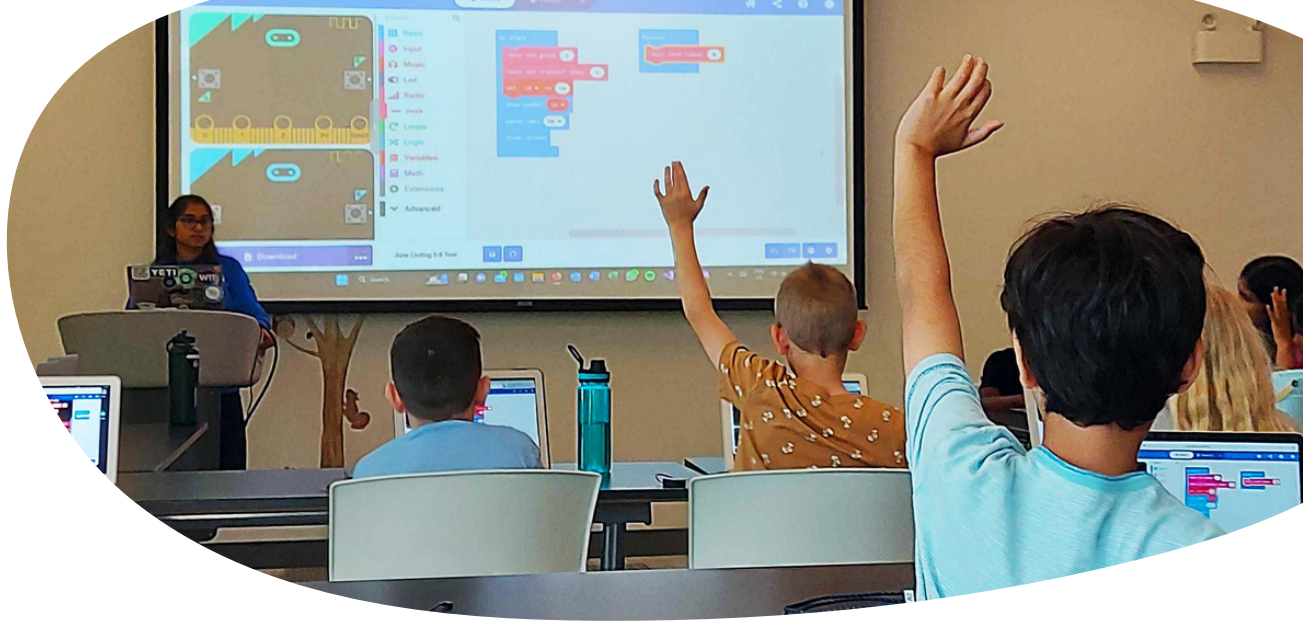
Hossam Kishawy, Ph.D, P.Eng.

Dean - Faculty of Engineering & Applied Science

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

Associate Dean - Experiential Learning & Engineering Outreach





Our Goal

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

Our Core Values

Inclusivity

We strive to create an inclusive and welcoming environment where everyone feels respected and valued.

Innovation

We embrace new ideas, technologies, and methodologies to deliver impactful outreach programs.

Collaboration

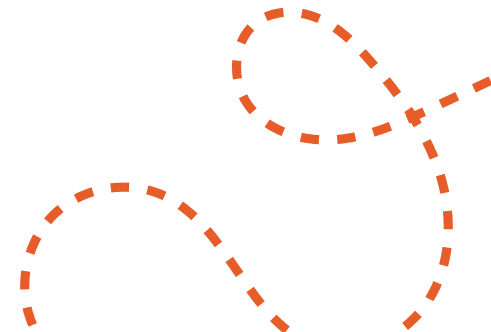
We work with partners, stakeholders, and volunteers to create positive change in our communities.

Accessibility

We believe that everyone should have access to engineering and technology education, regardless of their background or circumstances.

Excellence

We are committed to delivering high-quality programs that meet the needs of our communities.



It's about teamwork.

Engineering Outreach is built off the passion of its instructors, and we would like to give a huge thank you to our team for their commitment to inspiring youth and supporting teachers. All of our staff come from engineering or science backgrounds and are interested in teaching youth STEM concepts.



Ellen James
Engineering Outreach
Manager



Kimberly Davis
Engineering Outreach
Coordinator



Hunter Johnson
Engineering Outreach
Coordinator



Alex Piliounis
Engineering Outreach
Coordinator



Avdon Racki
Engineering Outreach
Coordinator



Madeline Sialtsis
Engineering Outreach
Coordinator



It's about making a difference.



In the summer of 2021, I joined Engineering Outreach for my first "real" job. It was a unique opportunity to share my love for science and engineering with peers my age. Despite being the youngest on the team, the positive work environment erased any age differences. Seeing students' passion for STEM grow filled me with pride, knowing our outreach efforts shape future engineers and scientists.

This experience taught me teamwork, responsibility, and the importance of making learning fun and inclusive. Engineering Outreach has been transformative, equipping me with valuable skills and experiences that extend beyond my professional life. It's given me a head start and valuable insights into facing life's challenges.

Michael, Engineering Outreach Instructor

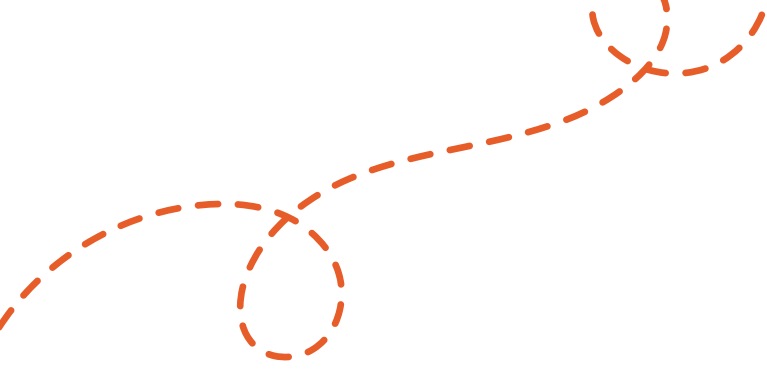


Since joining the Girls STEM Club in September 2023, our daughter eagerly anticipates each session. Her hands-on problem-solving experiences, like building bridges, have ignited her passion for STEM. Collaborating with like-minded girls and female student mentors has boosted her confidence and taught her that multiple solutions can be refined through feedback and experimentation in STEM.

She's gained invaluable skills like critical thinking, creativity, collaboration, and communication. As parents, we're grateful for this opportunity, as it's opened doors to new interests and passions, making her more aware of STEM's role in society and her potential contributions.

Girls STEM Club Parent





Our impact in 2023:

1,200+

educators served

350

programs were delivered, including workshops, clubs and camps

34,000+

student interactions

144

mentors and volunteers worked with Engineering Outreach this year

61

high school and undergraduate students employed by Engineering Outreach

84%

of youth served reported a better understanding of STEM concepts

Teacher Programs

Our Teacher programs continue to empower educators by facilitating connections between STEM concepts and the Ontario Ministry of Education's kindergarten to grade 12 curriculum. Within this framework, we prioritize creating a dynamic classroom environment, fostering cross-curricular learning experiences, and strongly emphasizing practical, hands-on education.

Professional Development Workshops

Our professional development workshops have maintained their success, with 31 sessions conducted and over 400 teachers participating. These workshops remain pivotal in providing focused small-group instruction for skill development utilizing common technology. These workshops hold immense value for educators as they not only offer a cost-free opportunity for skill development but also provide lasting benefits through the accessibility of recorded sessions, allowing educators to revisit and reinforce their learning at their convenience.

New! TechUcation

This year marked a significant milestone as we successfully launched our inaugural teacher conference, 'TechUcation.' This free event brought together over 50 educators to explore emerging technologies and enhance their proficiency with familiar ones, offering them a full day of valuable resources and educational opportunities.



1,200

educators participated
in our programs



9

school boards
were served



75+

1:1 coaching sessions
were run with educators

TECH WE TEACH

Botley
Dash and Dot
Lego
micro:BIT
Minecraft
Ozobots
Scratch
TinkerCAD
New! Zumi Robot

Mobile Design Lab

In the past year, our Mobile Design Lab remained dedicated to our mission of providing curriculum-focused, hands-on learning experiences to schools while actively engaging with the community.

Tailored for students from kindergarten to grade 12, our workshops have continued to serve as an enjoyable, accessible, and immersive means for students to deepen their understanding of STEM topics. This year, the Mobile Design Lab visited 142 elementary and 30 high schools, covering various subjects, from 3D modeling and block-based programming to electronics and circuit design.

Furthermore, the Mobile Design Lab extensively travelled throughout the Durham Region, actively participating in community events. Here, it engaged with youth and ignited enthusiasm for STEM education, contributing significantly to the heightened brand recognition of The Faculty of Engineering and Applied Science and Engineering Outreach within the community.



8,000+

youth served through all events



172

total school visits



Touch a Truck Oshawa



Whitby Ribfest



STEM School Nights



Elementary Programs

In 2023, our Elementary Programs continued to play a pivotal role in extending STEM learning opportunities to students from kindergarten to grade 8 beyond the traditional classroom setting. This year, we conducted five diverse programs, including:

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

Community STEM and Coding Programs

Our STEM and coding programs continue to empower youth to explore the multifaceted world of STEM through stimulating and creative avenues. Our sessions are thoughtfully designed to introduce young participants to engineering design, scientific inquiry, and coding.

In 2023, we ran 27 clubs, offering experiences that cover a broad spectrum of topics from all the fields of engineering to how to safely navigate the internet and how to code a robot.

Furthermore, we conducted 8 workshops as part of the Science Odyssey Program, funded by NSERC. These sessions were crafted to provide assistance to underrepresented youth in STEM education, with our instructors delivering them both virtually and in person.



26,000+

total youth served through Community programs



2,300

youth served through clubs



1,650

youth served through Library programs



Library STEM and Coding Workshops

Our library workshops for grade 1 to 8 students continue to emphasize real-world problem-solving through the engineering design process.

Throughout the year, we introduced students to technology, such as coding with Dash in an engaging activity focusing on environmental sustainability. Our workshops also covered diverse engineering topics, including structural engineering, material science, mechanical engineering and software engineering.

In 2023, we conducted 55 workshops, reaching 1,650 students, underscoring the significance of libraries as essential centres for STEM learning within their communities.

Lending Library

Our lending library initiative continues to thrive, engaging 497 users this year. Notably, we enhanced our offerings by introducing Micro:Bit and Botley to our tech resources. We are happy to now offer:

- Arduino
- Kano Computer
- Makey Makey
- **New!** Micro:Bit
- **New!** Botley

Check out our library locations!



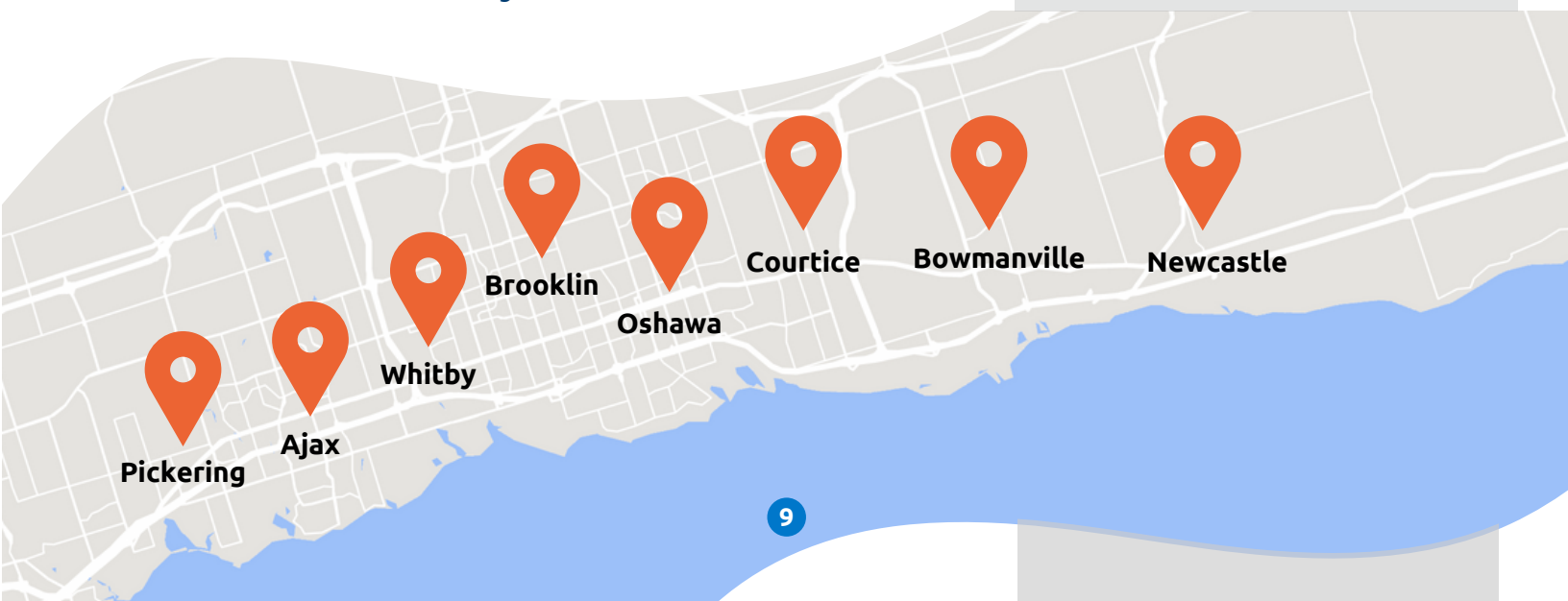
Our partner libraries include:



Whitby Public Library



Clarington Public Library
Experience Community



High school Programs

Our high school programs continued to serve as a vital resource for students in grades 9 to 12, equipping them with essential digital skills to facilitate a seamless transition into post-secondary education. Our dedicated team of mentors, all of whom are STEM students, played a crucial role in offering guidance and support for any inquiries about post-secondary education. This year, we proudly provided a wide array of enriching STEM programs, including:

- ▶ Academy STEM and Coding Clubs
- ▶ Black Youth Conference
- ▶ All Girls Programs
- ▶ InSTEM Youth Land Camp
- ▶ High school Competitions

Academy STEM and Coding Clubs

This year, our STEM and Coding clubs played a pivotal role in introducing 150 high school students to the Engineering Design Process. We ran six clubs focused on skill development and digital proficiency, encompassing topics such as the Internet of Things and virtual reality. Each session was meticulously designed to challenge students, fostering critical thinking and problem-solving skills.

New! STEM Hacks

New this year, we collaborated with Mathstronauts to run a STEM Hacks competition. We hosted 135 high school students at Ontario Tech University, engaging them in a challenge that centered around utilizing machine learning and Python to conquer an autonomous vehicle task.



8,400

high school students were served through our programs this year



64

high schools across the durham region were served



The Virtual Reality Club was an excellent program and I highly recommend it. Making our own environments in Unity was very exciting and was a very fun experience!



Virtual Reality Club Participant



New! Zumi-Maze Competition

New this year, we hosted the "ZumiMaze: Autonomous Delivery Design Competition," bringing together more than 50 high school students from the Durham region to Ontario Tech University's Faculty of Engineering and Applied Science. Made possible by the Ontario Vehicle Innovation Network (OVIN), the event challenged students to utilize small programmable autonomous Zumi Robots to simulate a food delivery system similar to Uber Eats, necessitating creative thinking and problem-solving skills.

Engineering Robotics Competition

This year's Robotics Competition drew participation from 40 teams, involving over 250 youth from various communities across the Greater Toronto Area. The competition presented an exhilarating challenge by tasking students with guiding robots through a complex maze. It offered an engaging platform for students to apply and showcase their STEM concepts. In the two months leading up to the competition, teams diligently coded their robotic creations, fostering an innovative atmosphere during the event.

“*The Robotics Competition was a new and fun experience. I really enjoyed the addition of the booths to take part in between competing. I hope to see that again next year!*”

-Robotics Competition Participant



Creating programs with diversity, equity, and inclusion in mind.

At Engineering Outreach, our unwavering commitment to diversity, equity, and inclusion is at the heart of everything we do. We are dedicated to fostering an inclusive and welcoming environment where everyone feels respected and valued. Through our various programs, we actively engage with

youth from communities that are often underrepresented in STEM, including Black youth, Indigenous youth, and girls. We hope to inspire, empower and contribute to a more diverse and inclusive future in the STEM fields, where everyone has an equal opportunity to thrive and succeed.

InSTEM Indigenous Youth Programs

In 2023, our InSTEM programs continued to make a positive impact on Indigenous communities across Canada. This year, our team connected with more than seven Indigenous communities, spanning from Ontario to Nunavut, to deliver STEM learning opportunities for Indigenous youth.

Delivered both in person and online, these initiatives are thoughtfully designed to provide Indigenous youth with valuable opportunities to engage with STEM education while respecting and incorporating traditional knowledge. Through these programs, we strive to empower and inspire Indigenous youth, fostering a sense of belonging and achievement within the STEM fields.

Developed in collaboration with multiple Indigenous community members, such as Ontario Tech STEM students, alumni, and professionals within the industry, our approach is deeply rooted in the circle of courage model, emphasizing positive youth development through four universal growth needs: belonging, mastery, independence, and generosity.



2,200

Indigenous youth were served this year

29

InSTEM programs were run

InSTEM@Home

This year, our InSTEM@Home program has remained committed to empowering Indigenous youth through STEM education. We provided 20 students with no-cost home kits, fostering hands-on STEM learning experiences. Throughout eight sessions, our program has emphasized skill development and digital proficiency, exploring the synergy between traditional knowledge and modern STEM practices. Each session has challenged students, promoting critical thinking and problem-solving skills.

Dnaagdawenmag Binnoojiiyag Child & Family Services Camps

In collaboration with Dnaagdawenmag Binnoojiiyag Child and Family Services, our team delivered six STEM workshops to 120 Indigenous youth in various communities, covering topics such as robotics, Anishinaabeg perspectives to fractals, and the importance of cyber security.

New! Land-based Education Camp

This year, we were pleased to have offered our inaugural Land-Based Education Camp, guided by Indigenous STEM students, elders, knowledge keepers, and community members. This two-day overnight camp saw 18 Indigenous youth from grades 9 to 12 participate in land-based learning experiences. This innovative initiative showcased the intersections between Indigenous knowledge, STEM disciplines, and engineering design while recognizing the rich STEM knowledge within Indigenous traditions encompassing biology, chemistry, mathematics, and engineering concepts.

“

I very much enjoyed the presentation comparing fractals and sacred geometry to Indigenous art and concepts. This is a great way to get youth to shift their preconceived notions of STEM and incorporate two-eyed seeing where they may not have considered it before.

Rama First Nation
Community Facilitator

”

“

It was fun and I found new friends. I learned a lot and I was happy that I came here. I learned about my culture and how to survive in the wilderness”

Land Camp
Participant

”



Black Youth Programs

Through our Black Youth Programs, we continue to empower students in grades 1 to 12 to explore the diverse facets of STEM, coding, and engineering design. These initiatives focus on our commitment to ensuring Black representation within the classroom, enabling young individuals to envision themselves pursuing multiple opportunities within these fields.

Clubs and Workshops

Through our Black Youth STEM & Coding Clubs, we have continued introducing students in grades 1 to 8 to digital skills. This year, we have engaged more than 690 students through 20 clubs, and 300 students through 25 workshops. These programs allow students to visit the Ontario Tech University campus, where they participate in hands-on learning experiences within a university classroom setting, fostering their STEM and coding abilities and paving the way for future educational and professional success.

NSBE High School Conference

Now in its second year, our NSBE High School Conference transitioned from a virtual event to in-person. Organized with the National Society of Black Engineers (NSBE) and backed by Hydro One, the event united 50 students from grades 9 to 12. We empowered Black youth to pursue academic excellence, leadership, and community engagement through group challenges and immersive, hands-on STEM workshops. This year, we were honoured to have Marci Ien, Ontario Minister for Women and Gender Equality and Youth, deliver an impactful message to our participants.



2,800

Black youth were served this year



87%

of youth who participated in our programs reported a better understanding of STEM concepts



Girl Programs

This year, we remained steadfast in prioritizing and expanding programs tailored specifically for girls in grades 1 to 12. These initiatives have experienced consistent growth and have been instrumental in fostering equality in STEM fields, inspiring girls to explore STEM and develop essential digital skills.

This year, we are pleased to announce that our dedication and impact were recognized on a national level as Rushda, an Engineering Outreach All Girl program instructor, received the 2023 Instructor Recognition Award from Actua, Canada's largest outreach network delivering educational STEM programs to young people, for her commitment to teaching girls about STEM.

Additionally, we were selected as one of the two program winners of the 2023 Actua Experience Award - National Girls Program, recognizing our strong community and institutional partnerships, the intentionality of our growth and offerings, and our commitment to engaging All-Girls at every stage of their STEM journey.

These accolades underscore our enduring commitment to empowering girls in STEM and our continuous efforts to expand their growth and opportunities for success.



3,800

girls were served through our programs this year



45

All Girl programs were run



Congratulations Rushda!

Rushda is a 2nd year Software Engineering student, and is passionate about teaching girls STEM.

InspirENG and FuturENG

In 2023, our annual InspirENG conference engaged 32 girls in grades 9 to 10 by challenging them to build functional wind turbines in group competitions, with the support of our sponsor, Hydro One. Our FuturENG Conference for girls in grades 11 to 12, initially scheduled for 2023, has been postponed to January 2024. We look forward to the conference's success in the coming year.

Go ENG Girl and Go CODE Girl

We continued our partnership with the Ontario Network of Women in Engineering this year and held our annual Go ENG Girl and Go CODE Girl Conferences. These events are integral to our mission of advancing STEM education among girls in grades 7 to 10, and they witnessed the participation of 169 students and 55 parents combined.

Rural WEMADEIT

WEMADEIT is a Canadian collaborative partnership between the engineering faculties of four Universities, including Ontario Tech. With generous support from Hydro One, we develop coordinated strategies to enhance enrollment and career opportunities for women and young girls in engineering. Our programs are thoughtfully designed to align with girls' STEM interests, emphasizing how STEM practices can benefit society.

Now in its second year, "Rural **WEMADEIT**" brings engaging STEM workshops directly to kindergarten to grade 12 classes in schools in rural communities. These workshops cover various topics, from the fundamentals of force to practical software applications in agriculture. Additionally, we are delighted to announce a new partnership with the Kawartha Pine Ridge District School Board.

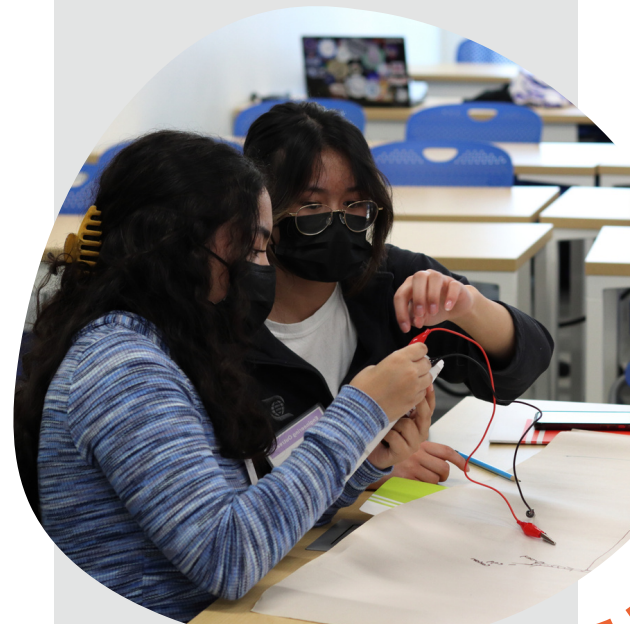
"Rural **WEMADEIT**" was tremendously impactful this year, reaching over 1,000 students across 13 schools.

“

I liked how the leaders talked about their experiences going through STEM programs. Helps me know what I may want to do in the future, and what I can expect

”

InspirENG Conference Participant



Communicating our message.

Throughout 2023, social media remained invaluable in promoting Engineering Outreach. These platforms were dynamic tools to generate awareness, showcase our upcoming programs, boost registrations, and foster connections with our partners.

The year's central focus was cultivating meaningful, high-quality interactions with our audience. This encompassed the creation of shareable content that resonated with our followers and prioritizing swift, informative responses to incoming messages.

Alongside social media, email communications remained a key channel for reaching our audience. Over the year, we sent over 77,800 emails, providing essential program information and registration details. Our mailing list witnessed significant growth, now boasting 2,811 users, a testament to our expanding reach and engagement efforts.



12,880

social media engagements across all platforms



600

inbound messages received and responded to across all platforms



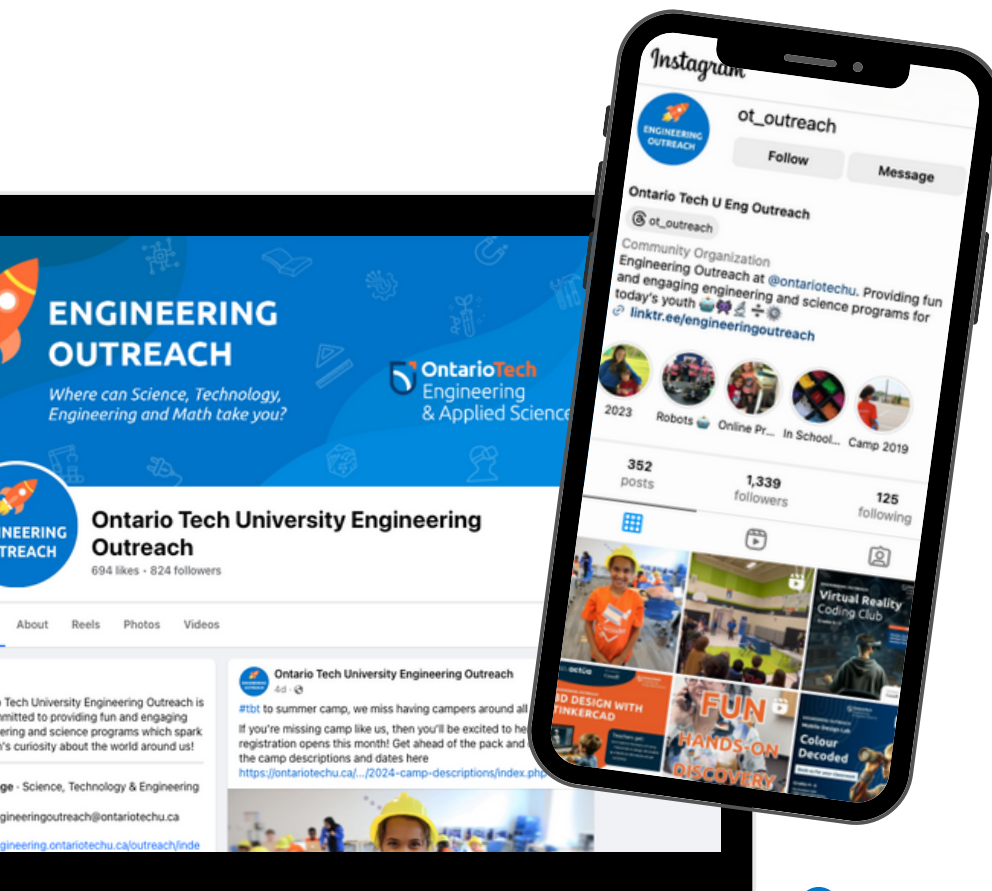
3.1K

followers across all accounts, an 18% increase from last year



6.9%

average post engagement rate, a 19% increase from last year, compared to a 1.5% industry average



Our Partners

Our partners are the cornerstone of our success and the driving force behind our impactful initiatives. With the unwavering support of both large and small organizations, we've brought hands-on STEM programming to our local community. Our deep passion for sharing the wonders of science, technology, engineering, and math is made possible through generous funding from our valued partners.

Since 2018, Actua has been a vital collaborator, offering training, resources, and steadfast support to Engineering Outreach in delivering our STEM education programs.

With Actua's funding, along with the invaluable support of the Canadian government's CanCode program, we have expanded our reach by offering free digital skills activities for youth and educators.



A network member of **actua**

Actua provides training, resources and support to its national network of members located at universities and colleges across Canada in the delivery of science, technology, engineering and mathematics (STEM) education outreach programming. Each year, these members engage over 350,000 youth in 500 communities nationwide. Please visit Actua at www.actua.ca

2023-24 Actua National Funders



In 2023, Ontario Tech Engineering Outreach celebrated two new significant partnerships.

We received a generous PromoScience grant of \$600,000 over three years from the Natural Sciences and Engineering Research Council of Canada (NSERC). This grant expands our reach, providing hands-on STEM education opportunities to Indigenous and Black youth. It also equips teachers with essential training for the evolving technology landscape. In addition, through our NSERC funding, we ran 8 workshops through the Science Odyssey platform.

Additionally, Engineering Outreach along with the Faculty of Engineering and Applied

Science, formed a new partnership with the Ontario Vehicle Innovation Network (OVIN), a leader in autonomous vehicle technology. This partnership aims to educate youth about the future of transportation. OVIN's expertise complements our commitment to youth development, empowering high school students to explore STEM fields, especially in autonomous vehicles.

We would also like to acknowledge the vital support of Hydro One and the Ontario Network of Women in Engineering (ONWiE) for our Girls and Women in Engineering Programs, General Motors for their support of our Mobile Design Lab and Canada Summer Jobs for support hiring staff within the summer.

Thank you to our partners!



Natural Sciences and Engineering
Research Council of Canada

Conseil de recherches en sciences
naturelles et en génie du Canada

Canada

We acknowledge the support of the Natural Sciences and Engineering Research Council of Canada (NSERC).
Nous remercions le Conseil de recherches en sciences naturelles et en génie du Canada (CRSNG) de son soutien.



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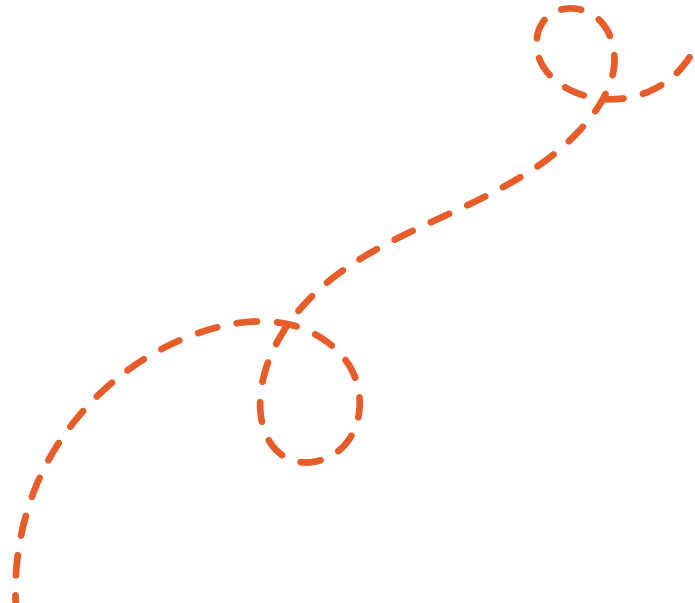
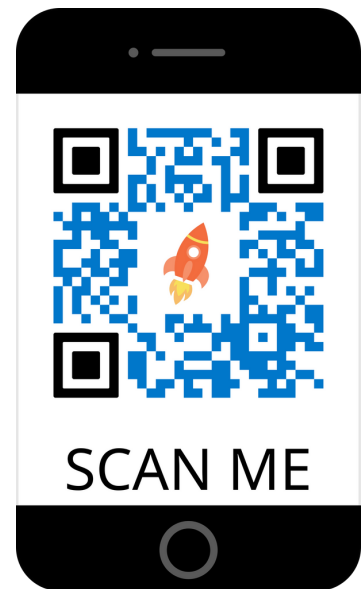
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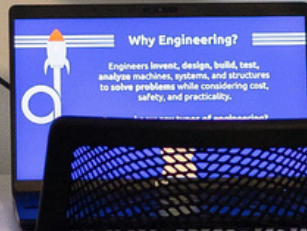
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Why Engineering?

Engineers invent, design, build, test, analyze machines, systems, and structures to solve problems while considering cost, safety, and practicality.

Do you know any types of engine



ENGINEERING OUTREACH

