

FIRST Impact Award - Team 4039

2025 - Team 4039
Team Number
4039
Team Nickname
MakeShift Robotics
Team Location
Hamilton, ON - Canada
Describe the impact of the <i>FIRST</i> program on team participants within the last 3 years. Think about percentages of those graduating high school, attending college, in STEM careers, leadership skills, and serving as mentors/sponsors in <i>FIRST</i> programs.
MakeShift changes student lives. 100% of our graduates pursue post-secondary education, 52/56 in STEAM. 10 students had a robotics co-op. 3 graduates offered FIRST engineering, 1 the Women in STEM scholarships & 12 received St. Mary Robotics awards. 5 alumni mentor MakeShift. 15 alumni or current members volunteer in official FIRST roles. Students develop leadership skills from 14 team leadership roles. 1 student was the logistics lead for HammerHacks & 4 students have served on student council.
Describe your community along with its unique opportunities and circumstances. Think about your geographic region, diversity of town/school, language barriers, socioeconomic barriers, and cultural expectations.
MakeShift lifts up their community. Hamilton is a diverse steel city transitioning to tech & medicine. As the first FRC team in our school board, we advocated for our school board to fund any FIRST team, inspiring 20+ teams in the area. We proposed a collective sponsorship model for our school board (AMD) & FIRST Canada (MDA) due to the limited local sponsorship availability. Our team attracts students to the school & welcomes mentorship & resources from nearby McMaster University.
Describe the team's methods, with emphasis on the past 3 years, for spreading the <i>FIRST</i> Mission in ways that are effective, scalable, sustainable, and creative.
MakeShift accelerates FIRST growth. In 2023 we hosted a T-bot build workshop for our school board's gifted program with excellent feedback. To make it scalable, in 2024 we worked with FIRST Canada to teach the teachers so they could integrate it in their classrooms. This developed skills & interest in robotics. Competing in our T-bot challenge at DCMP showed them the excitement of an event. Our Instants of Inspiration is a simple pop-up robot demo to reach non-STEM audiences stirring interest.
Describe your team's goals and the progress you have made towards them to fulfill <i>FIRST's</i> Vision.
MakeShift prioritizes the goal of bringing FIRST to underrepresented groups. Our Girls R Brilliant & Women in STEM Socials spotlight female role models creating a more inclusive community. We

mentored a FIRST global team in Lesotho Africa & are returning to the Dominican Republic. Our IMPACT presentation at FIRST CANADA's Skilled for the Future Education conference showed sponsors, school boards & the Minister of Education the holistic benefits of FIRST to students & communities.

What impact has your team seen from your efforts described in the above question? How does your team measure impact?

MakeShift breaks down barriers in STEM. The number of female team members grew to 32%, a 50% increase from last year. We also have a 32% increase in female mentors. Due to our presence in Lesotho, a team in Uganda reached out to us to come to STEMley. We advocated with our embassy for them to attend an Ontario event. Although unable to come, they held their own FLL event & remained in touch with us. Our previous experience in the Dominican inspired a project in the Philippines.

Please provide specific examples of how your team and team members act as role models within the *FIRST* community with emphasis on the past 3 years. How do you share these best practices with other teams?

MakeShift's mentoring shares best practices & includes a concrete demonstration of core values. STEMley provides rookies with an opportunity to use our robot to learn about all aspects of FRC & they also glimpse the supportive community. At events, our build-a-bumper squad helps teams get on the field to see some success. We educated other teams about Neurodivergent of FIRST promoting acceptance. MakeShift is a member of the Compass & FIRST Alliances making our resources open to other teams.

Describe your team's initiatives to Assist, Mentor, and/or Start other *FIRST* teams with emphasis on activities within the past 3 years.

MakeShift lifts up new teams via funding advocacy for all board teams. Outside of our board in 2023, a 4039 parent inspired by their experience started FRC 9098. For FRC, yearly we teach and mentor a pre-rookie team at STEMley - FRC 9098 (2022), 9621(2023) & 10015 (2024). Our Practice Field has assisted many teams across Ontario & our Boost Award gives a percentage of revenues to another team annually. We mentored FLL teams 41337, 61723, 65476, 63478, & 55748 (2024).

What other initiatives have you created, grown, sustained, or participated in (*FIRST* or otherwise) to help inspire young people to be science and technology leaders and innovators? What outcomes have you seen from your efforts in the past 3 years?

MakeShift's outreach, like Sidewalk Science, inspires children. A science topic is written on the sidewalk to ask a question. A few days later the answer appears resulting in 38867 social media impressions. In 2023, we hosted 4H Club STEM workshops: Onshape & 3D printing for 7 children. We supported FIRST Canada's STEMATHON for 480 girls building confidence & innovation. Student-led projects solving real problems i.e ENABLE we designed 3-D printed prosthetics for people unable to access them.

Describe the partnerships and relationships that you've created with other organizations (teams, sponsors, educational institutions, government, philanthropic entities, etc.) and what you have accomplished together, with emphasis on the past 3 years.

MakeShift fosters corporate relationships. Over 2 years, we partnered with FIRST Canada to have our initiative of students coming to provincials as a field trip for 764 students. We work with other FRC teams & our school board to offer the STEMley Cup, the FLL Qualifier & our practice field supporting teams from Kingston to Niagara. We are sponsored by ArcelorMittal & we support their Canada Day celebrations with robot demonstrations. We were also profiled in their sustainability series.

Describe your team's efforts in the past 3 years to promote equity, diversity, and inclusion within your team, *FIRST*, and your communities.

MakeShift emphasizes ED&I. We are the first Canadian team to be a member of Neurodivergent in FIRST which ensures accommodation for people with different abilities. We created an Inclusivity training session based on our rainbow theme "Every color brings something to the team." Our team allows students outside of our school to participate. The team budgets for the compassionate needs of team members who cannot pay team fees so this is not a barrier to participation.

Explain how you ensure your team and the initiatives you have created will be sustainable.

MakeShift knows relationships are key to achieving our goals. Our strong support in our school board ensures FIRST teams retain funding & also encourages teacher advisor participation. Our proximity to McMaster has allowed us to maintain technical mentors. Collaborating with teams & FIRST Canada strengthens our events & initiatives like elementary school tours to ensure ongoing volunteers continue. Our motto of doing the best with what we have ensures we have the finances for difficult times.

Highlight one area in which your team needs to improve and describe the steps actively being taken to make those improvements.

MakeShift seeks to improve student experiences. It was determined that student leadership on pre-season projects would help with team innovation and student confidence. Students took the lead on projects such as building a button machine for events, designing a new robot cart, and creating customized buttons with student and mentor names. 100% of all students this year responded that they strongly agreed to a survey question that they felt there had been a good balance of student leadership.

Briefly describe other matters of interest to the *FIRST* Judges, including items that may not fit into the above topics. The judges are interested in learning about aspects of your team that may be unique, particularly noteworthy, or had a large impact.

MakeShift shifts the perception of science & technology. Our rainbow branding is the transformation when exposed to FIRST going from black & white to full rainbow. Our shirts are mentor-sewn. Our team inspired a segment on the Rick Mercer Report about FIRST with over 1,082,000 viewers. Our Robot was featured in Lifetime Movie - "The Price of Fitting In" with 203,000 views in 2021. Above all, we are a well-rounded team, winning awards in robot performance & team attributes. We are a family.

Judge Feedback

We try to bring FIRST to underrepresented groups but since our school is upper/middle class, we need to reach outside our school to achieve this ie starting teams at Six Nations Indigenous School & Mexico. How we can efficiently do more in this area?

An area the team has an opportunity to improve.

Something that really impressed the judges.

Essay

It's the set of your sails and not the gales that determines where you go. From their inception, FRC team 4039, MakeShift Robotics ensured our sails were trimmed to steer us where we could spread the vision

of FIRST. Much like this year's theme, MakeShift's efforts & collaborations are like restoring coral reefs. Our techniques have grown FIRST in our hometown including teams in all programs, practice fields for both FRC and FTC, an FLL & FRC official qualifier, and an off-season FRC event. We are successful due to our engagement strategies, FIRST team support, inclusion efforts & use of our skills to change lives.

COMMUNITY ENGAGEMENT: Like coral farming where healthy coral is implanted on failing reefs, MakeShift knows introducing FIRST and STEM skills creates interest. To bring FIRST to our community this year our robot delighted the public at the Autism Speaks Walk, the Santa Claus Parade and the CNE. One team member coordinated the Hammer Hacks event supporting coding challenges for high school students this year.

Last year, at our Provincial Championships, our team was there not just competing. We were actively promoting FIRST. 4039 recognized the potential of having the 2023 FRC Provincial Championships in our hometown. We arranged to bus elementary school children to First Ontario Centre. We continued the tours in 2024 sharing the experience with other teams. Over two years we provided 764 students with tours of the pits engaging them with a bingo card or scavenger hunt tying the robot to class curriculum.

At the same event, our impact team presented at the FIRST Canada Skilled for the Future - Education conference to 150+ attendees who were potential sponsors, board representatives & the Provincial Minister of Education. 4039 was selected among exceptional teams to share our impact presentation demonstrating that FIRST is more than just robots and was the highlight of the event. In addition, our team members explained the gameplay to the FLL team from Ron Joyce Treatment Center.

FIRST TEAM SUPPORT: Marine protected areas give coral the chance to thrive. MakeShift has a long history of supporting other teams to allow them to flourish. We mentor FLL teams annually to develop early skills & interest. After the pandemic, our students mentored 2 FLL teams each year in 2021/22. In 2023, our team members stretched to support 6 FLL teams. This year our team members supported 3 board FLL teams & 2 FLL teams from Ron Joyce. MakeShift has been supporting FTC since it started in 2019 mentoring new teams and hosting events. Last year, we provided an FTC build training session for teachers in our school board. This year, we provided parts & mentorship to a rookie team 27990. We are also setting up an FTC game field at our practice field to be available for teams in the area.

MakeShift has a long history of assisting & mentoring other FRC teams. Over the years, we shared our build space & mentors with teams 6342, 7623 & 7509. In 2023 we started and mentored 9098 with weekly touchpoints. In 2024 our mentoring focused on team 9621 which started like many of our mentees with their attendance to the STEMley Cup, our off-season event.

The STEMley Cup is a vehicle to mentor new teams. We specifically invite pre-rookie teams to attend this pre-season event. Pre-rookie teams compete for free. We invite them to our practice field before the event & they learn how to drive our robot. We mentor them to all aspects of FIRST on the day of the event while they compete with our robot including strategy and scouting. We also role model the core values of FIRST through this mentorship. This creates a connection to support them going forward. In turn, our team members learn how to mentor. We have supported 9 pre-rookie teams over 7 years.

This year, we mentored 10015 at STEMley, through pre-season. Supporting rookies creates ongoing team collaborations. Their words reflect the impact of our practice. "Participating in the STEMley Cup was not only exciting as our first competition but also an unforgettable experience... Your support

throughout the event was very much needed as we tackled many new and confusing challenges. You are truly a huge role model to use and we felt greatly welcomed into your space and community because of you.”

We also support new teams annually with a BOOST award. We provide young teams with potential with a small award of 1% of our annual revenue. We have provided this award to 10 teams over the years.

EQUITY, DIVERSITY and INCLUSION: Coral reefs are essential to promoting biodiversity in the ocean providing a habitat for 33% of saltwater fish species. Inclusion is key in MakeShift's mission bringing STEM to under-represented people. Diversity brings more ideas to the team.

Our students wanted to encourage girls to pursue STEM careers. Hearing the stories of strong female role models is the premise of Girls R Brilliant. Since 2017, our students researched & created YouTube videos about 78 women in STEM. Annually our team members support STEMATHON, a FIRST initiative engaging girls in STEM by organizing & mentoring several teams. At STEMley we host a Women in STEM session annually.

Team members felt strongly about ensuring accessible robotics programs. We collaborated with the Ron Joyce Children's Treatment Centre to deliver 2 remote robotics series for children with different cognitive or physical abilities in 2020/21. We assisted FIRST Canada to deliver an in-person program in 2022. They fielded their first FLL team last year & this year they supported two teams with a 4039 team member directly mentoring them through a successful season.

Again inspired by a team member's passion, MakeShift became the first Canadian team to partner with Neurodivergent of FIRST (NDoF). NDoF represents neurodivergent individuals promoting education & acceptance. We educated teams at STEMley about the Association. In 2024 we created a mobile quiet room receiving excellent feedback from event participants. We have shared this design with others and FIRST.

MAKESHIFT FOR GOOD Reefs grow on their foundations. Like a reef, participating in FIRST builds skills that can be used to stimulate growth. Our mission to encourage youth to pursue stem careers doesn't stop there. We hope our team members use their passion to make a difference in the world and their team projects help students enjoy the feeling of using their skills for good.

Internationally, in 2021, 4039 mentored a FIRST Global Innovation Challenge team in Lesotho Africa supporting their project to enhance ventilators in their small country. Over 8 years, 10 team members went to the Dominican Republic with our school's DREAMS project providing Lego, NXTs, laptops & training to a school there. Over the years, team members add initiatives like GRB themed teddy bears to distribute to girls. This year a team member is returning with DREAMS to continue to inspire.

One of the teams' initiatives to the Dominican was Make A Spark. Students wired LED lights to go with DREAMS. At the time, their research found more than 80% of the island was plagued with black outs. The LED lights helped but the Spanish instructions of how to make their own that helped even more by allowing them to sustain the project. This inspired a current team member with ties to the Philippines to bring a revised product there.

Remote areas of the Philippines are struggling with high electricity bills & planned blackouts due to

outdated infrastructure & climate change. This Make A Spark focuses on reusing readily available pop bottles and converting them with a 3 D printer adaptor to become a light. The lights are to be delivered with a medical mission team in February 2025.

The environmental emergency is a team priority. Even though cans can be recycled, too many end up in landfill. Recycling an aluminum can uses less than 5 percent of the energy used to make the original product. In 2023, 4039 collaborated with the world's largest aluminum can supplier Novelis to create CRUSH, our can-crushing, recycling-promoting robot. Our team smelted our cans to make the STEMley Cup awards this year. At STEMley we also support other FRC teams to create their own can crushing robots including FRC team 2708.

Makers Making Change connects volunteer makers to people with disabilities who need assistive devices. Makeshift has provided several devices to a child with Cerebral Palsy to independently use a nerf gun and communication tool as well as a device to support writing for a person with arthritis.

OUTCOMES: Over 12 years, we have conservatively reached 10,478,314 people with our outreach. But how does introducing FIRST create impact?

Our Ron Joyce workshops resulted in them fielding their own FLL teams. They have been noticed by FIRST Canada and are sharing their experiences to increase participation of students with cognitive and physical challenges. Our elementary school tours resulted in increased team participation on our team. McMaster University was inspired by our advocacy to offer FIRST scholarships up to \$90,000.

To date, 9885 people have been impacted by initiatives to Make the Shift reaching underrepresented populations. Our team currently has 39% female team members which is a 50% increase from last year. Our initiatives have reached the Dominican Republic, Finland, Mexico, Lesotho, Uganda & now the Philippines.

Over our existence, 7935 students were impacted by FIRST team participation in Hamilton alone due to 4039's work to start teams. As for team members, 100% of team graduates pursue post-secondary education - 93% in STEM. 4039 graduates mentor teams, volunteer at and/or organize FIRST events. It's not the gales but the set of your sails that determine where you go. Based on our outcomes, MakeShift has their sails set to continue to have significant impact. ;

