

FIRST Impact Award - Team 1502

2025 - Team 1502
Team Number
1502
Team Nickname
Technical Difficulties
Team Location
Chelsea, MI - USA
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.
Technical Difficulties prepares students for life after school with soft and hard skills. On 1502, we use a kanban board to organize tasks, giving students leadership roles that translate to the professional world. Within the last 3 years, 100% of 1502 students have graduated and pursued post-secondary education. 96% of our alumni joined a STEM field after graduating with many securing internships with team sponsors. 13 Chelsea Robotics program mentors are current or former 1502 students.
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.
Traditionally agricultural, Chelsea does not have a strong base of local manufacturing for Technical Difficulties to draw mentors and sponsors from. Despite this, Chelsea has a robust web of support built into our city, a testament to the community we have created. To foster this community, every year, Chelsea Robotics invites local residents and government into our Chelsea Robotics Center, working to spread STEM into the city and countryside at 30+ events in the past 3 years.
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.
Robotics is well known in Chelsea and is the largest K-12 extracurricular in our district. Program growth allowed our district to hire two paid employees for our K-12 program. To expand Chelsea Robotics and spread FIRST's message, we instituted Career Technical Education programs in our school and neighboring districts. 1502 students created and implemented 4 new CTE programs designed around FIRST's core values. Since their creation, 600+ students from 7 schools have taken these classes.
Describe your team's goals and the progress you have made towards them to fulfill <i>FIRST</i>'s Vision.
In order to fulfill FIRST's Vision, we knew we needed to address key sustainability issues with the FIRST season. In 2021, 1502 started the Michigan South Central Robotics League (MSCRL) to increase competition opportunities for middle schoolers. The league allows for more low-stake matches over a

longer season. This inspires more students by building their STEM confidence at a crucial age. We bring the same advantages of the MSCRL to the FRC season by inviting local teams to work in our space.

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

Since 2021, 139 FTC teams have registered for the MSCRL. FiM is now modeling their FTC season around our league structure. This year, 5 FTC leagues for 117 teams are running in MI. For FRC teams, working with us allows them to improve and test their mechanisms before competitions. For many teams in our area, the only field they play on before competition is in our facility. By inviting these teams, we have not only increased their awards at competition, but brought recognition to their programs.

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?

Since 2022, the FiM community has lost 96 teams, robbing thousands of students of their FIRST experience. To foster community, 1502 invites teams from SE MI into our space. This community of teams allows for a network of support, facilitated by our Discord server with 68 members from teams across the world. By supporting others, we are ensuring that recent turnover trends do not have to be the end of the story for FRC teams.

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

Every year, we open our facility to FRC teams in SE MI. In the past 3 years we have hosted 13 teams for over 800 hours. Last year, we presented our kanban model for team organization at the 2024 World Championship. We shared this presentation on Chief Delphi so more teams could benefit from this resource. On the FTC level, we started the MSCRL which hosts league events for 30 FTC teams throughout SE MI. This model has been so successful that FiM is starting leagues based on ours across MI.

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?

Providing STEM opportunities to young people in our community is one of our goals. This summer, we started a new program called Cross-Connections where we partnered with a local daycare to offer a week-long summer camp using FLLC chassis to teach the basics of coding. We hosted a similar event with our local Girl Scout troops where scouts built chassis and attachments. By learning to code missions from the previous year's FLLC game, scouts earned 3 badges each for designing, coding, and sharing.

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.

For several years, Bosch has served as Chelsea Robotics' biggest sponsor. As part of this partnership, Bosch invites our FTC teams to participate in their Take Your Kids to Work Day and Girls in Engineering Summer Camp. Annually, 1502 students tour the Bosch facility in Farmington Hills and engage with engineering professionals. 1502 alums have benefitted from the many internship opportunities available. In 2024, we partnered with Bosch to expand FIRST to Budapest, Hungary to start FRC10609.

Describe your team's efforts in the past 3 years to promote equity, diversity, and inclusion within your team, <i>FIRST</i>, and your communities.	
We believe everyone has a place in robotics. In the past 4 years, we have worked with Lyla, a C2 quadriplegic wheelchair user, and FIRST HQ to add Lyla's wheelchair-inclusive controllers to the game manual. In 2016, we started a scholarship program called Jared's Fund. Since then, we have raised over \$15k to ensure no student is prevented from joining robotics due to financial barriers. By putting these systems in place, we have shown that "robots are for everyone" and opened the doors for all.	
Explain how you ensure your team and the initiatives you have created will be sustainable.	
To ensure the sustainability of the Chelsea Robotics Pipeline, 1502 mentors the youngest students in our program. Since 2016, our FLL and FTC teams have been mentored and coached by 1502, building a strong pipeline of expertise. This year, 150 families are active in K-12 robotics, with 1 in every 20 Chelsea students involved in our program. By growing our program and mentoring from the ground up, we have built a strong and sustainable robotics community that spans across our entire district.	
Highlight one area in which your team needs to improve and describe the steps actively being taken to make those improvements.	
For years, student retention between our FTC and FRC programs has been an issue on 1502. To combat this, last year, we started our 8th grade Kitbot Team. Students in this program work with 1502 to build a kitbot and compete in an off-season event. 100% of last year's 8th graders returned to 1502 this year, the highest retention rate of any class. To further engage our upperclassmen, this year, we developed criteria for earning a varsity letter for participation, contribution, and community.	
Briefly describe other matters of interest to the <i>FIRST</i> 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.	
In 2024 we reached out to a Budapest-based non profit, Robotics Infinity, with a mission to bring FRC to Hungary. We utilized our connection with Bosch to secure space at the Bosch, Budapest facility, registering FRC10609 for the 2025 season. During the offseason, we worked with 10609 to design and build a swerve chassis to use as the base for their robot. During the build season, we resolve Hungary's roadblocks at weekly meetings and over our shared Discord channels.	
Judge Feedback	
	In your time as judges, what have you noticed is the biggest need for Michigan FRC teams? We want to continue to expand the help we offer to our FIRST community, and we would appreciate any insight into how best to do so. An area the team has an opportunity to improve. Something that really impressed the judges.
Essay	
Diving In: The state of Michigan has 1,310 high schools, 498 football teams, and 533 FRC teams. This abundance of robotics is the catalyst that propels MI teams forward. However, we have noticed that having so many teams has created sustainability issues.	

With this in mind, the mission of FRC team 1502, Technical Difficulties is to create and advance lasting, sustainable FIRST and STEM programs in Chelsea, Washtenaw County, Michigan, and internationally. We do this by starting the first FTC league in MI, collaborating with our school district to implement the leading career technical education robotics program in our county, opening our facility as the hub for FRC teams in SE MI, and partnering with Bosch to start and support the very first FRC team in Hungary. In our eyes, robots are for everyone.

Riding the Robotics Wave from K-12: Advancing FIRST programs starts within our own school via the Chelsea Robotics pipeline. Over the years, we have corrected the barriers that inhibit student retention and engagement at every level of our program, making Robotics a strong and integral part of our district.

To combat a low retention rate of our FTC 8th graders, last year, we started the 8th grade Kitbot Team. The students in this program work with 1502 during the FRC season to build, code, and later modify the year's kitbot to compete in an off-season event. 100% of last year's 8th graders returned to 1502 this year, the highest retention rate of any class since starting our FTC programs in 2016. We are continuing the program this year with over 90% of our 8th grade class joining us for the 2025 FRC season.

In addition to retention on our own teams, we identified issues with the FTC competition season at large. Traditional FTC events give each team only 5 qualification matches before eliminations, meaning small mistakes and bad luck can easily derail an entire season, lowering STEM confidence at a young and critical age for MI students. After witnessing this phenomena with our own students, we tried something new. In 2021, we designed the world's first open invitation FTC league, the Michigan South Central Robotics League. The MSCRL reworked FTC competitions, giving students a small-scale meet every week. In this model, teams compete in an average of 20 qualification matches before a large league tournament. Our students flourish under this model, and our FTC student registration is at an all-time high this year. Since its inception, 139 FTC teams have registered with the MSCRL. Due to the MSCRL's success, the league style of competition was adopted by FIRST in Michigan and is the model for new FTC programs across the state. This year, 5 FTC leagues supporting 117 teams are operating in MI.

By combating barriers in our pipeline, we have increased student retention between our own programs and improved the FTC season structure for our entire state. With 1/20 of all students in our district registered for robotics, Chelsea Robotics is the largest K-12 organization in the Chelsea School District.

Anchoring STEM Education Across Schools: With just over 5,000 residents, Chelsea is a small and close-knit city in Washtenaw County, the most academically competitive county for public schools in MI. In order to compete with the larger schools around us, 1502 partners with our district to improve STEM education and resources, furthering the mission of FIRST in the classroom.

In 2019, 1502 worked with our district to pass an \$81,000,000 bond to revamp our school's STEM program. Since their creation, 600+ students from 7 schools have registered for our school's STEM-centered Career Technical Education classes.

Chelsea Robotics is lucky enough to work out of a world-class facility that other teams and schools look to replicate. Since 2022, our students have met with over 35 administrators from surrounding schools to workshop new curriculum and discuss our bond process and expenditures. We are working with 3 school districts, Adrian Public School District (home of FRC6150), Dexter Community Schools (home of

FRC3656), and Manchester Community Schools (home of FRC6081) to write bond initiatives that secure enhanced working space for their robotics teams. During these meetings, administrators tour our facility and speak to our students about the needs of FRC teams. Both Adrian and Dexter are in the early stages of writing their bonds, but hope to add funding for their STEM programs on future ballots. In 2023, the Manchester Community Schools successfully passed a \$64,820,000 bond that will build and furnish a STEAM wing at their school. Cumulatively, 1502 helped secure \$145,820,000 for STEM programs for MI schools, furthering FIRST's mission.

Within the Great Lakes: Southeast Michigan is the one of most concentrated hubs of FIRST teams in the world, including the 44 active FRC teams located within 25 miles of our facility. Although FiM has done a wonderful job starting new FRC teams in MI, team sustainability is a major issue across the state. In the last 3 years, FiM has added 153 new FRC teams, but lost 96, depriving an estimated 2,000 students of the FIRST experience. With such high turnover, 1502 knew we could help; so in 2022, we opened our doors to the FRC community. Since then, 14 teams across Livingston, Washtenaw, and Wayne county have worked in the Chelsea Robotics Center. 7 of these teams come from schools that qualify for title 1 funding. Collectively, visiting teams have spent over 800 hours in the CRC.

At our facility, teams can use our shop to create custom parts, program on a full-sized field, practice driving, compete in scrimmage matches, and network with surrounding teams. This year, we are hosting an unofficial week 0 scrimmage competition at our facility for teams, complete with inspection, queueing, and qualification matches. By building a strong network, we have ensured that the teams around us have every opportunity to succeed. Our model propels visiting teams toward their most successful years. On average, the EPA of the teams that visit our facility increases by 85.6 points, a 12.1% increase normal to baseline. We know FIRST is not only about winning. However, on-field success helps teams stay afloat year after year by attracting more students, mentors, and sponsors. Furthermore, the additional funding teams obtain through state grants for higher levels of play at the state and world championships help teams thrive year after year.

Casting a Global Net: 1502 has dedicated the last 3 years to fulfilling our mission of program sustainability within a 25 mile radius. This year, we expanded our reach to Europe, where instead of 44 teams in 25 miles, there are only 18 teams in 44 countries.

In an effort to pursue new, sustainable, areas, we identified Europe as an untapped market of FIRST potential. We began by identifying pre-existing programs with a similar mission to ours. In Hungary, we found our new partners, Robotics Infinity, who were already working on the goal to bring FRC to Europe. Starting an FRC team requires a lot of support, something we in the states take for granted. Unfortunately, with so few FRC teams in Europe, there are almost no available resources or funding available for starting new teams. So, we knew we needed to step in.

Martin, our beloved parent and mentor, is also the Global Director of Engineering at Bosch. In early 2024, Martin and other 1502 representatives had our first call with Bosch and Robotics Infinity. From that call, a three year road map was developed with the end goal of a Regional competition in Budapest in 2028. This included developing a budget and a contract between Bosch and RI that secured €50,000, build space, and a challenge to include students from outside of Budapest. The president of Bosch in Hungary grew up outside of the city, where there were very few STEM opportunities. Upon forming 10609, he asked that Team Hungary be open to students from across the region.

Starting a team an ocean away is a massive challenge. So we worked with FIRST HQ as well as representatives from FIRST in Türkiye, the closest, established FIRST district to Hungary, to better understand the next steps and learn what resources were available in the region. We identified that sustainability would depend on established FIRST infrastructure, something that is limited with so few teams. Since the nearest team is 401 km away, and in another country, there is no simple way to obtain materials. On kickoff day, 10609 mentors had to drive to Turkey, across several borders, to acquire their Kit of Parts. With the lack of infrastructure in mind, Bosch decided to challenge other auto manufacturers in Central Europe to also start FRC teams in Hungary.

Team Hungary is made of 19 students who travel up to 2 hours one way by train to Bosch Budapest to work inside the facility. They even have their own badge access. The final piece Hungary needed to compete this year was experienced guidance from 1502. Weekly alignment meetings were set up, and several meetings occurred in June and later in October. Since 10609 had never built a FRC robot, we felt it would be easiest for them to build their first chassis in parallel with us.

As we dove into the build season, we found that there were many other difficulties 10609 had to face. Because FIRST is based in the US, all measurements are imperial, with few metric conversions available. This is a huge problem for Hungary, because they are unable to purchase PVC coral substitutes and deal with longer, more expensive shipping. To help 10609 we bought and shipped imperial tools, Coral, and Algae to Budapest.

SEA Ya: In 2016, one of our mentors coined the phrase “robots for everyone.” Now, almost 10 years later, robots for everyone is the motto of all that we do. From our school, our state, and even our friends in Hungary, 1502 is not only shaping the future of STEM and FIRST, but making sure established teams can stay afloat. ;

