

FIRST Impact Award - Team 2220

2023 - Team 2220
Team Number
2220
Team Nickname
Blue Twilight
Team Location
Eagan, MN - USA
Describe the impact of the <i>FIRST</i> program on team participants within the last 3 years. This can include but is not limited to percentages of those graduating high school, attending college, in STEM careers, and in <i>FIRST</i> programs as mentors/sponsors.
We build leaders who enhance their community with our core values: respect, curiosity, integrity, teamwork, inclusiveness, and happiness. Students develop soft skills and industry level skills such as programming, CAD, 3D printing, CNC manufacturing and a passion for STEM. 100% of our members are prepared and choose to continue their education, versus our schools average of 82%, with >80% of members majoring in STEM. We have 5 alumni mentoring our team and more who volunteer for FIRST.
Describe your community along with how your team addresses its unique opportunities and circumstances.
Our suburban high school has many opportunities and is renowned for speech and debate. We are not part of a STEM school and we receive no school funding for FIRST teams or special equipment other than the space in our school's warehouse. Although most of our 28 members are from EHS, we accept students from any local public, private, or home school and promote STEM equity. We consider our team to be a "robotics family", where students of any background can be comfortable and find their passion.
Describe the team's methods, with emphasis on the past 3 years, for spreading the FIRST message in ways that are effective, scalable, sustainable, and creative. How does your team measure results?
We create new events every year to ensure our initiatives, EFR, WIRES, RWB and SIA, remain relevant. We promote STEM equity for all students to participate on FIRST teams and engage in hands-on STEM activities, especially girls and underrepresented students. We measure results by surveying class participants, tracking events and people reached. We hold 40+ events/year and reached 30,000+ people this year. We track hits on our website, facebook page, and followers on Twitter and Instagram.
Please provide specific examples of how your team members act as role models within the FIRST community with emphasis on the past 3 years.
Team 2220 students create and run free STEM classes including a new underwater robot class. We promote STEM equity in our community by starting and mentoring FLL and FTC teams including at our local homeless shelter. We hosted 20+ seminars ranging from robot build to outreach to CAD & 3D

Printing. We partnered with 4400, 1622 and 1816 to conduct Impact Award seminars to help teams improve their submissions. We annually host 4 FIRST competitions where we volunteer as judges, emcees and more.

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

We run a full progression of FIRST programs from FLL Explore to FRC to maintain a pipeline of students of all ages. In the past 3 years, we started 3 and mentored 11 FIRST teams. We started FLL and FLL Explore teams at our local homeless shelter, and an all girls FLL team at a middle school. We started the first FTC teams in our school and FLL teams in every elementary school. We advocate for FIRST funding with government officials and sponsors to ensure team sustainability.

Beyond starting teams, what initiatives have you done to help inspire young people to be science and technology leaders and innovators? What results have you seen from your efforts in the past 3 years?

We ran free STEM camps for diverse students including Learn to Solder and Robot Build & Programming and Underwater Robots. 72% of students were encouraged to pursue STEM, with several joining our team. We taught the Girl Scouts soldering and built Line Following and Underwater Robots. Two girls who attended these classes joined our team. We run robot demos at the MN State Fair, 4th of July parade and Market Fest, reaching >6000 people. We hosted an FLL camp at a summer free lunch program.

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

We partnered with 4400, 1856 and 1156 on an FRC WarmUp to help 125 teams prepare for the season. We run seminars on robot design, outreach and safety at 5 off-season events. We worked with 2177 and 3883 to run female STEM professional panels. We conducted outreach and demonstrated our robot during STEM Day at the MN State Fair. We raised money and supplies to support humanitarian efforts in Ukraine. We ally with 5 FTC teams to run food drives and donate gratitude baskets to frontline workers.

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

We promote STEM equity, and inclusiveness is a core value. We completed diversity training and discussed how to model inclusive behavior. We started and mentored an FLL and an FLL Explore team at a homeless shelter. We ran free robot build and programming classes for girls and students of color. We increase women in STEM with leadership roles, female professional panels and organizing tours at local technology companies. We offer scholarships to economically disadvantaged team members.

Explain how you ensure your team and the initiatives you have created will continue to run effectively for the foreseeable future

Our team mission and core values guide the team; we develop new outreach activities every year that focus on our mission of impacting our community. We promote student leadership; veteran team members train new team members. Students lead projects and activities they are passionate about. We document events and survey participants so that we can make improvements. We track and manage our

budgets and pursue local, targeted grants and fundraising, including Eagan Rotary and Eagan Foundation.

Describe your team's innovative strategies to recruit, retain, and engage your sponsors within the past 3 years

Our key sponsors, 3M and Thomson Reuters provide financial aid and valuable mentors. We strengthen our partnerships by demonstrating our robot at their events: TR Unconference, 3M Robots Invade the Plaza, and 3M Super Science Saturday. We provide pictures/videos to post on their websites. We created a fun video to engage new sponsors and show the impact on our community. We also get financial aid, Onshape software, and robot parts from Gene Haas Foundation, PTC, and Rev Robotics, respectively.

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

Our team has struggled with maintaining gender parity. This year we created an onboarding process specifically for girls that provides training focused on helping them find their interests within the team. They learned to use power tools, soldering, basic programming, and outreach planning. We will increase opportunities for all-girls FLL teams for middle school girls. We will continue to offer customized training for girls, and also target our outreach initiatives to girls in younger grades.

Describe your team's goals to fulfill the mission of *FIRST* and the progress you have made towards those goals.

Our team mission is to build robots, develop student leaders and expand FIRST with a focus on promoting STEM equity. We engage diverse groups by offering free classes to the underserved and by starting and mentoring diverse FIRST teams. We worked with a FRC team on the Red Lake Indian Reservation to provide a robot building and programming class and a tour at 3M. We support girls by building their skills and confidence to succeed in STEM fields through free classes and customized onboarding.

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 or particularly noteworthy.

We have a comprehensive set of 4 initiatives and we create new activities each year under each of these, to ensure we deliver on our mission and promote STEM equity. We created a lesson plan and taught the first class for underwater robots for Girl Scouts. This was an engaging and fun class including workshop time and time in the pool. These girls achieved a deeper understanding of robotics, increased interest in joining a robotics team, and 75% indicated a stronger interest in a STEM career.

Essay

In 2006, Blue Twilight set out to change the culture in our local community and the world by upholding our team mission: to conduct STEM outreach, build student leaders and expand FIRST locally and globally. We demonstrate our core values of teamwork, curiosity, integrity, respect, inclusiveness, and fun. Through strategic planning, we create new outreach events each year for our four initiatives that provide sustainability for our team. In the past 3 years, we have conducted 40+ outreach events annually, and this year we reached >30,000 people.

Eagan FIRST Robotics (EFR) The EFR initiative expands FIRST Robotics in our local community. We have significantly grown the FIRST program at our school with FRC, FTC, FLL, and FLL Explore teams, allowing for a full progression of FIRST within our community. We support EFR with a 501(c)(3) booster club that offers scholarships to students in need. The 28 students on our team come from a wide variety of backgrounds, as our team encourages all interested students to join the team to find their passions.

In the past three years, we presented 20+ training seminars for other FRC and FTC teams including The Impact Award, STEM Outreach, CAD & 3D Printing and Safety. We assisted 4 FRC teams with their Impact Award submissions and participated in Chairman's Exchanges at regional events.

Each year, we host 4 FIRST events: an FLL practice tournament, FLL and FTC qualifying tournaments and an FRC Week Zero competition. The Week Zero event invites teams to practice with their robots in a competition format prior to tournaments. We build a full size field including all field elements and run matches for two days so teams can test their robots and sharpen their skills. This year, 35+ teams and 800+ people are attending our event.

We distribute the Kit of Parts to 60+ teams at the annual kickoff. We mentored teams in safety, donated safety supplies, and created an FTC Safety Manual approved by UL. We host local robot demos in middle school classrooms, 4th of July parades, and market fests. We annually demonstrate at the MN State Fair, reaching 8000+ people, and our team captain was interviewed by local ABC TV.

We assembled gratitude baskets to show appreciation for our first responders. We organized food drives by partnering with Eagan FTC teams. We donated >2500 lbs of food and raised >\$300. We donated N95 and cloth masks and collaborated with Team 2052 to make 3D printed face shields for local hospitals.

Women In Robotics Empowering Sisters (WIRES) WIRES increases the awareness and opportunities for young women in STEM by introducing them to robotics and STEM career options. We develop girls in leadership positions, maintain >40% female leadership, and have had female captains for seven years in a row. Over the past 3 years we have held 6 Cookies, College, and Career panels to introduce high school girls to female STEM professionals. We hosted two "Girls Night in the Shops" where girls on the team gave girls who were considering joining FRC one-on-one training to give them skills and confidence to succeed on the team. We keep middle school girls engaged in FIRST by starting and mentoring an all-girls FLL team.

Each year, we hear the question: is it going to be a water game? This year, we made an underwater game! We studied existing designs, bought components for the robot and obstacle course, created prototypes and tested them in a pool for proper operation, design flexibility, and functionality. We developed our own underwater field elements, obstacle course and rescue mission. We created a lesson plan and taught the first class for underwater robots held for two Girl Scout troops. The girls designed

their own robot frame to maintain proper orientation, neutral buoyancy and level trim. They learned to solder, create waterproof seals for the motors, and studied buoyancy. They practiced maneuvering the robot through our underwater course. After the class, the girls reported a deeper understanding of robots, increased interest in joining a robotics team, and 75% of the girls were more interested in a STEM career. "It was fun and we learned about a lot of different design elements of underwater robots," said Grace.

We ran free Learn to Solder and Line Following Robot classes for Girl Scout troops to increase their confidence in themselves and their STEM abilities. One student said, "I learned about robots and soldering, and I found that I really like soldering".

We worked with an organization focused on supporting disabled young adults; we created and helped run a hands-on STEM workshop to show the girls the science behind volcanoes. To create an inclusive community, we presented about several women inventors from history to our team and the teams at our Week Zero Event. This opens the eyes of students to the oppression women faced in the past, and helps them understand why there is a focus on getting girls involved in STEM.

Robots Without Borders (RWB) Our impact resonates not only in the local community but around the world. We founded RWB to spread FIRST globally. We worked with Team 4400 in Mexico and Team 1622 in San Diego to present an Impact Award Roundtable including a Q&A session as part of FRC Warm-Up, a series of free, virtual conferences that supports teams around the world. This event had 504 participants from 125 teams and 11 countries. We also collaborated with 4400 to be part of the seventh edition of the "OMG Robots" magazine, published to share more about teams and people from the FIRST community. Our article described how we made a positive impact in our community by teaching middle school girls how to solder discrete components and learn how to use hand tools to build a line following robot.

We created a video for a documentary being compiled by FTC 5773 in California to share experiences of teams at all levels of FIRST around the world. Our video briefly summarizes our sustainability initiatives and showcases the impact within our local community by sharing our outreach activities.

We met Team 5553 from France at a regional in Chicago last year and collaborated over zoom calls to discuss plans and strategy for 2023. We look forward to meeting them again this season at the regional in Montreal.

With a sister team in Ukraine, we were devastated when Russia invaded Ukraine. We organized a donation drive and collected 13 boxes of supplies flown to Ukraine. We organized a fundraiser, raising \$3000 to donate to the Ukraine Crisis Relief Fund to provide humanitarian aid. Finally, we packed 1500+ meals at Feed My Starving Children for Ukraine. Team 2220 developed Robot VPN, an innovative system utilizing Raspberry Pis to program and drive robots over the internet with imperceptible lag, where the driver can be anywhere in the world. We tested this and our robot was driven by our sister team in Poland. We worked with AndyMark to publicize and provide a prepackaged system including a supply list and step-by-step guide also available on our website.

STEM In Action (SIA) STEM In Action provides opportunities that increase diversity, equity, and inclusion within our local community. We offer innovative events, free STEM camps, and hands-on activities. Team 2220 started an FLL team at our local homeless shelter and mentored them in building and coding their

robot. These students, who are underrepresented in STEM, had their eyes opened to the possibilities of their own imagination. They were super excited to place well and win a Breakthrough Award at their tournament! After our success, we started an FLL Explore team at the shelter and team members taught elementary school aged children about energy and the mechanics of LEGOs.

We held two STEM classes for girls, students of color and economically disadvantaged students at no cost to them: How to Solder and Robot Building and Programming. We ran a special Robot Building and Programming class for Native American students on FRC 7235 from the Red Lake Indian Reservation. We were able to see some of the challenges they face within their own team. Team 2220 students led the online classes and provided instructions while getting frequent feedback. After participating in our local "How To Solder" class, three students joined our team. "This class vastly helped me improve my skills in robotics. These skills will definitely stick with me when I hope to become an aeronautical engineer in the future." ~ Amaan.

We had a broad impact in bringing STEM to the underrepresented in our local community. We ran a series of FLL demos and Snap Circuit activities at a local free summer lunch program for kids. We partnered with 3M to bring team 7235, from the Red Lake Indian Reservation, on a tour of the 3M 3D printing center. We partnered with an architecture group to build STEM kits for kids affected by the George Floyd protests.

We designed, assembled, and donated STEM-at-Home kits at a homeless shelter. We made and posted tutorials on how to use the kits. We got feedback from the children on what they enjoyed and on what could be improved. 88% of students rated the activities good to excellent.

Building Global Leaders: Our students are leaders both on the team and in our community. Students learn to excel in robot design/build, safety, outreach, and crucial soft skills. "Robotics helped me in every job interview and internship. I would not have been able to get any internships if not for my experience with FIRST & Team 2220." ~ Hans, Alum. Older students encourage and teach younger team members and inspire the next generation. Cassie graduated last year, but not before training Naomi, a first year student, to take the lead role for our More Than Robots subteam.

We change the culture of our school, community, and world through STEM outreach, student leadership, and the expansion of FIRST locally and globally. With the global leaders we build, our goal of "lighting up robotics, lighting up the world" has become a reality.;

