

## Chairman's Award - Team 2220

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2022 - Team 2220

### Team Number

2220

### Team Nickname

Blue Twilight

### Team Location

Eagan, Minnesota - USA

**Describe the impact of the *FIRST* 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 *FIRST* 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. All 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 is renowned for speech and debate, but provides no teacher guidance for FIRST programs. We are not part of a STEM school and have no special facilities for robotics other than the workshop in our school's warehouse. Although most of our members are from EHS, we accept students from any local public, private, or home school. We consider our team to be a "robotics family", where students of any background can be comfortable and have fun.

**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 spread FIRST through 4 initiatives: EFR, WIRES, RWB and SIA. We run demos for our community and have a full progression of FIRST programs. We provide opportunities to encourage more girls to join FIRST, including camps and panels. SIA created 8 camp curricula to introduce robotics to diverse students. We measure results by tracking events, outreach hours, and people reached. We improve events through participant surveys. We track hits on our website, facebook page, and followers on Twitter.

**Please provide specific examples of how your team members act as role models within the FIRST community with emphasis on the past 3 years.**

By focusing on COVID safe projects, we didn't let the pandemic stop us from conducting STEM outreach. We hosted 50+ seminars both locally and at Championships ranging from robot build to outreach. We partnered with 1816 to run an online Chairman's Chat to help new teams improve their submissions. We advocated for women in STEM at the UN, annually host 4 FIRST events, ran summer camps in Poland and Ukraine, started and mentored FLL and FTC teams, including one at our local homeless shelter.

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

In the past 3 years, we started 5 and mentored 17 FIRST teams. We started the first FTC teams in our school and FLL teams in every elementary school. We advocate for FIRST with government officials, global sponsors, local FRC teams, and the UN. We inspired and collaborated with 5883 in Poland to expand to >100 FIRST teams; they run 5 FIRST events. We started the first ever FRC Team in Ukraine (7851). We maintain contact with 5883 and 7851 through email, online meetups and video exchanges.

**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 22 free stem camps for underrepresented students. Our virtual classes included Learn to Solder and Robot Build & Programming. 72% of students were encouraged to pursue STEM, resulting in several joining our team. We assembled 50 STEM kits for MPLS students and 45 for the homeless shelter. We worked with 1250+ Girl Scouts to earn badges at the MN Science Museum. We run robot demos at the MN State Fair, Eagan 4th of July parade and Market Fest, for 5000+, 400, and 300 people respectively.

**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 partner with FTC teams to run food drives and donate gratitude baskets to frontline workers. We run seminars on robot design, outreach and safety at 5 off-season events. We work with a local non-profit to give girls with disabilities STEM experiences. We worked with 2177 and 3883 to run female STEM professional panels. We partner with 5883 in Poland and 7851 in Ukraine to run robotics camps and grow FIRST. We work with the UN by sharing STEM opportunities for low resource countries.

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

Inclusiveness is a core value. We completed diversity training from FIRST and discussed how we can model more inclusive behavior. With a FIRST Equity and Access Grant, we ran free robot build and programming classes for girls and students of color. We mentored two inner city teams and a Somali team in their rookie year. We increase women in STEM with female professional panels and connecting with 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 towards our goals. Four key initiatives keep us focused on achieving our mission and impacting our community. We promote student leadership; veteran team members train new team members. Students lead events and projects they are passionate about. We document our events and survey participants so that we can evaluate the impact and make improvements. To support our efforts, we track and manage our budgets and pursue targeted grants and fundraising.

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

Our long-term sponsors, 3M and Thomson Reuters (TR) provide financial aid and valuable mentors. Grants from Eagan Foundation and Eagan Rotary help fund our free STEM camps. We strengthen our partnerships by demonstrating our robot at their events: TR Unconference and 3M Robots Invade the Plaza, and by providing pictures and videos to post on their websites. We created a fun introductory video about our team to share with potential new sponsors to demonstrate the impact we have on our community.

**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 recruiting and retaining students in the past. This year we created an onboarding process that gives new students several weeks of training specifically focused on helping them find their interests within the team. They learned an array of skills, including using power tools, soldering, basic programming, and outreach planning. We had less than five students join the team in each of the past two years. That jumped this year when we had 21 new students join the team.

**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. To inspire future engineers and entrepreneurs, we spread STEM globally. We engage diverse groups to provide inclusion and equity by reaching out to the underserved through free STEM camps and by mentoring inner-city FIRST teams. We worked with a FRC team on the Red Lake Indian Reservation to provide them opportunities in STEM. We support girls by building up their skills and confidence to succeed in STEM fields.

**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.**

Due to COVID we created Robot VPN, a system that allows anyone to program and drive a robot from anywhere with an internet connection. This allows for remote competitions and safer meetings as students can social distance while working on the robot. The information to set up the system and a supply list was promoted by Andy Mark and has been viewed by 16 different countries on our website. This invention allowed hundreds of students to continue to pursue robotics safely throughout the pandemic.

## Essay

In 2006, Blue Twilight set out to transform the culture in our local community and around the world. Even through the difficulty of these past two years we pivoted our methods to uphold 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 created four comprehensive initiatives to provide sustainability that have been a guiding light these past several years.

### EAGAN FIRST ROBOTICS

The EFR initiative expands FIRST Robotics in our local community. We were the first FRC team in our district and we started the first FTC team at our high school. We started FLL teams in all 19 elementary schools in our district, assisting and providing funding to them. We have significantly grown the FIRST program at our school, as we have FRC, FTC, FLL, and FLL Jr. teams, allowing for a sustainable full progression of FIRST in our community. We support EFR with a 501(c)(3) booster club that offers scholarships to any students in need.

In the past three years, we presented 50+ training seminars for other FRC and FTC teams. Topics included COVID Meeting Safety, STEM Outreach, and 3D Printing. We also mentored teams in safety, donated safety supplies, and created an FTC Safety Manual approved by UL. Our team participates in the Chairman's Chat to support other FRC teams' outreach programs. We host local robot demos in middle school classrooms, 4th of July parades, and market fests. We annually demonstrate at the MN state fair, connecting with thousands and we were featured on KSTP channel 5 news. We also showcase FIRST by running news stories in our high school, exposing hundreds of students. We support many FRC teams by distributing their Kit of Parts at the annual kickoff event we host.

Every year, we host 4 FIRST events: an FLL practice tournament, FLL and FTC qualifying tournaments and a FRC Week Zero competition. The Week Zero event invites teams to practice with their robots in a competition format before their tournaments. Over 25 teams attend each year.

This year we created a new onboarding system to revitalize recruiting efforts while also engaging returning students. We set aside 4 weeks to focus solely on helping potential recruits learn about each subteam in robotics, while also training them in basic mechanical skills. This training provided confidence to these students and led to 53% of our team this year being new members.

We organized multiple food drives and expanded our impact by partnering with Eagan FTC teams. In total, we donated 2,417 lbs of food and raised several hundred dollars. We have collected and assembled gratitude baskets to show appreciation for the first responders in our community. We donated N95 and cloth masks in addition to collaborating with Team 2052 to make 3D printed face shields to donate to local hospitals.

### WOMEN IN ROBOTICS EMPOWERING SISTERS

Women are underrepresented in STEM and on robotics teams. WIRES increases the awareness and opportunities for young women in STEM by introducing them to robotics and numerous STEM career options. We have >50% female leadership and have had female captains for six years in a row. Over the past 3 years we have held 6 Cookies, College, and Career panels which introduces high school students to female STEM professionals.

We had a booth at the Girls in Science and Technology event where over 1200 girls got the opportunity to drive our robot. We worked with an organization focused on supporting and giving opportunities for disabled young adults; we created and ran hands-on STEM workshops focusing on girls exploring their interest in STEM. Workshops included a volcano experiment, exploring the physics of roller coasters and coding sphero robots. 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 such a focus on getting girls involved in the program.

### ROBOTS WITHOUT BORDERS

Our impact resonates not only in the local community but around the world. We founded RWB to spread FIRST globally. We partner with Team 5883 to grow FIRST in Poland by demonstrating robots for schools and businesses, and advocating for STEM with government officials. We donated FLL kits to start the first 12 FLL teams in Poland and they have continued to grow their program. We ran STEM camps in Gdynia and Gdansk, the first of their kind in N. Poland. We assisted the first ever FTC/FLL off-season event in Krasnik. "Team 2220 has been mentoring us since our rookie year 2016. Thanks to their priceless support, 5883 Spice Gears has developed immensely!" ~ Bartosz, 5883 Coach. Even with the constraints created by the pandemic our team has maintained contact with 5883 through email, online meetups and video exchanges. We share ideas about designs and prototypes as well as outreach opportunities.

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Partnering with 5883 and URGE robotics, a non-profit established to develop robotics and STEM, we started 7851, the first FRC team in Ukraine. We introduced FIRST Robotics at two panels for technology leaders in Kiev to inspire starting more teams.

We were invited to the UN International Day of Women and Girls in Science, where girls from our team presented 3 STEM opportunities for students in economically disadvantaged countries. We leveraged STEM programs to help the United Nations (UN) at the ECOSOC Youth Forum, UNESCO in New York and Engineers without Borders in Paris. Through our established partnerships, we continue to advocate for STEM and FIRST around the world.

Team 2220 developed Robot VPN, an innovative system utilizing Raspberry Pis to program and drive robots over the internet with about 200 milliseconds (imperceptible) lag, where the driver can be anywhere in the world with internet or cell service. Robot VPN was designed for students who were unable to return to school during the pandemic, and it allowed students to practice driving their robot while minimizing in-person contact. Robot VPN also provides the opportunity to conduct multi-robot remote matches. We gave a virtual presentation about the system at a local seminar and worked with AndyMark to publicize and provide a prepackaged system. A supply list and a complete step-by-step guide for the system is available on our website and is linked in an AndyMark newsletter. We saw visits to our website increase from 30 to 450 in a day, not only from the U.S. but from all over the world.

### STEM IN ACTION

We created SIA to increase STEM opportunities that improve diversity, equity, and inclusion in our local community. We offer innovative events, free STEM camps, and hands-on activities. Students selected for the classes were girls, students of color and economically disadvantaged students. We held two virtual STEM classes funded by a FIRST Equity and Access grant: "How to Solder" and "Robot Building and Programming". We assembled and created a soldering kit that was delivered to students' homes. All materials for the classes were provided at no cost to the students. We ran a special Robot Building and Programming class for Native American students on FRC Team 7235 from the Red Lake Indian Reservation. We were able to see some of the challenges that they face within their own team. Team 2220 students led the online classes and provided step by step instructions while getting frequent feedback. "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.

Team 2220 started an FLL team at our local homeless shelter and mentored them in building and coding their robot. These students, who are statistically underrepresented in FIRST, 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!

We ran 22 free camps for children, including at our local homeless shelter, to give them the opportunity to learn about STEM and FIRST robotics. These camps include eight curriculums that we developed (CAD, Website Design, Arduino Programming, Robot Programming, Drone Hacking Workshop, Line Following Robot, and two different pre-engineering camps) as well as FLL and FLL Jr. robotics curricula.

We had a broad impact in bringing STEM to the underrepresented in our local community. We partnered with an architecture group in Minneapolis to build STEM kits for kids affected by the George Floyd protests. We organized a donation of FTC parts to a local team with students on the autism spectrum so all of their students could build a robot. We designed, assembled, and donated STEM-at-Home kits for three age groups at a homeless shelter. We created 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. Of the students, 88% rated the activities good to excellent.

### BUILDING GLOBAL LEADERS

All students on our team become leaders who make a difference in the world throughout their lives. Team members learn how to positively impact diverse students by inspiring their passion for STEM through hands-on opportunities. Students learn to excel in robot design/build, safety and outreach, as well as 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.

We have changed the culture of our school, our community, and our 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.