

Chairman's Award - Team 3504

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2021 - Team 3504

Team Number

3504

Team Nickname

Girls of Steel

Team Location

Pittsburgh, Pennsylvania - 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.

Our members gain technical, business, communication, and leadership skills, as well as a sense of community from our team. Our members are also imbued with a sense of confidence from working with STEM professors and professionals, who help guide them not only in robotics, but into the future. With 100% of our students attending college, and 80% pursuing STEM majors, GoS gives its members well-rounded skill sets that prepare them for success.

Describe your community along with how your team addresses its unique opportunities and circumstances.

Our team includes members from 20+ different schools across the Greater Pittsburgh region and we are supported by very generous sponsors, including Carnegie Mellon University (CMU), which gives us access to resources that other teams may not have. We are dedicated to sharing these resources, including the a 5000sqft practice facility containing the only full-sized practice field in the region, with the rest of our community via our extensive outreach program.

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?

Over the past 3 years, we have held 54 events with our Chassis Project, helping us reach people not previously involved in *FIRST*. These events are scalable, being held at school events, fairs, and conventions. They are unique to our team- we designed the kit, and have held events since 2013. We created our Outreach Impact Document to measure our outreach effectiveness; it allows us to determine which of our outreach has the most impact and maximize it.

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

GoS is a model program for including women in STEM fields. As directors of *FIRST* Ladies, we coordinate events and provide resources for 35 partner teams worldwide; host an annual Women in STEM panel at the Greater Pittsburgh Regional (GPR) and various movie/game nights regularly (reaching ~30-75 people at each); run the *FIRST* Ladies website, blog, and social media accounts. Through this, we are creating an accepting community for the 30% of FRC participants who identify as female.

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

We have started, run and mentored 9 FLL Jr (in 2019; edited FLL Jr. curriculum in 2020; reached 50 students both years), 4 FLL and 3 FTC teams. We run an open practice field (65+ FIRST teams have used since 2012; 4500+ visits in past 3 years); connected 7 Pittsburgh FRC teams for sharing knowledge via Steel City Robotics Alliance group server; hosted Virtual Event after suspension of 2020 season to facilitate discussions and connection-building between FRC teams (80 people from 24 teams).

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?

Hold FLL and coding summer camps to successfully recruit 19 students to join our FLL or FTC teams (2020). Hold an annual AI, Robotics and STEM Symposium at CMU (2018+2019: reached 160 middle school girls, 22 joined our FLL or FTC teams). We host Feiyue, a summer camp held at CMU modeling an FRC build season for international students (70 in 2018+2019). Graduates have joined or started 4 FRC teams in their home countries and 1 graduate is even mentoring us this year.

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

As a member of the Steel City Robotics Alliance (SCRA) we provide volunteers to the SCRA offseason competition, assist summer CAD classes (about 40 people in 2020), and facilitate joint outreach. Our partnership with CMU has let us directly impact our community by beta-testing the CMU COVIDcast website and by working together with CMU alumni/STEM professionals as guest speakers at our annual Symposium (63% participants reported increased interest in STEM afterwards over 3 years).

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

The GoS program as a whole was created to promote Diversity, Equity, and Inclusion (DEI) in STEM. Our DEI subteam (formed 2019) runs team bonding events to promote inclusion; has a suggestion box to ensure that all voices are heard. Outside our team, we partner with organizations like Assemble, Gwen's Girls, Boys & Girls Club, and Center of Life to run outreach in underserved communities; use our Outreach Impact Doc to effectively reach our target communities.

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

In 2020 we restructured our team (smaller business subteams, more co-leads, more subteams) to maximize efficiency & dedicate support to specific initiatives. Our Outreach Impact Doc evaluates outreach events to ensure greater and lasting effects. Our program pyramid creates a sustainable pipeline for FIRST in Pittsburgh, and our mentorship of the teams below us enables them to stay strong. In 2020, we sustained our community connections virtually through our program pyramid and outreach.

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

GoS and the Robotics Institute of CMU (RI) work together to promote diversity/gender equality in STEM & robotics. We act as ambassadors for RI & prospective students to create recruitment opportunities, & some of our students even attend RI in grad school. We've also created a group within our team dedicated to forming partnerships with local businesses (having been in contact with 3) and is dedicated to fortifying our existing relationships by inviting our sponsors to speak at team meetings.

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

We strive to keep our outreach relevant. In 2020, we updated our Chassis Project and designed a new Outreach Bot that is easier to transport and operate than our competition bot; ensuring that we can bring robots to more events, engage more people without technical flaws. We also created new virtual outreach, including online summer camps, Rosie Talk presentations (live panels with GoS members+alumni who are working in STEM with the public), and the GoS Virtual Expo.

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

We strive to inspire young people, specifically girls, to take interest in STEM and provide them opportunities to develop confidence and skills. Alongside outreach to spread FIRST, we focus on team member development by expanding skill sets (business & technical subteams) and encouraging leadership roles. We help career development by inviting STEM/business professionals to speak to us. 80% of our grads pursue STEM and 25+ of our members have received an NCWIT Award for Aspirations in Computing.

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.

This year, we embraced Covid restrictions to make our team better. We were more active this past summer than ever

before, leading internal restructuring, outreach revamp and virtual outreach initiatives. Our virtual camps reached 104 students (more than the in-person counterparts), and we collaborated more with other teams through SCRA, Chairman's Exchanges and our 2020 Virtual Event. We even set up a 24/7 Zoom room to promote team bonding by providing avenues for socialization during lockdown.

Essay

At Girls of Steel (GoS), our mission is simple: to empower everyone, especially women and girls, to believe they are capable of success in STEM. Through our extensive outreach program, we are building a more inclusive STEM community within our team, Pittsburgh, and FIRST.

OUR TEAM: Our team structure encourages individual growth, collaboration, and inclusivity—skills that help us become STEM leaders and bring more people to FIRST. Being on GoS inspires us to be leaders, take initiative, and offer new ideas for outreach. All members are open to our leadership council positions and leadership meetings, asked to plan outreach events through our Champion system, and encouraged to participate in offseason projects. Everyone is also a member of both a business and technical subteam, widening our professional and technical skill sets, and also preparing us for success after graduation. We foster inclusivity through our Diversity, Equity, and Inclusion (DEI) subteam, which hosts team bonding activities (self-defense classes, Zoom game nights) and coordinates our Big/Little Sister program that pairs up veteran and rookie members.

This strong internal structure is a critical foundation upon which we can build sustainable, impactful outreach. For example, in 2020 we created new subteams for Advocacy and FIRST Ladies to reflect our growing emphasis on these areas. In past years we've attended the FIRST National Advocacy Conference, presented to our congressional representatives and school officials about increasing funding/support for FIRST teams, and even spoken at the White House about the importance of STEM education. Our new Advocacy subteam allows more members to be involved in these efforts and introduces unity and consistency to our planning. Similarly, our FIRST Ladies subteam gives us the ability to execute more time-intensive projects like sending a regular FIRST Ladies newsletter to 1,063 people.

THE PUBLIC: The core of our outreach is within Pittsburgh, where we educate the local community about STEM through hands-on programs that have directly reached over 10,000 people at 180 events over the past 3 years. One of our most important tools is our Chassis Project, a kit we developed to demonstrate that anyone can build a robot. At 49 events (extended workshops & shorter interactions at larger events) in the past 3 years, we have walked participants through each step of constructing a 50lb robot. Our Chassis Project is most effective when we get to work with young girls, expanding their view of who can be a STEM leader.

Our annual Artificial Intelligence, Robotics, and STEM Symposium is one of our largest events, increasing STEM exposure for 4-8 grade girls. This hands-on event that we host at Carnegie Mellon University (CMU) features professional speakers, engineering activities, and FIRST info sessions. Around 63% of participants report increased interest in STEM after the event, and from 2018/19, 22 attendees joined GoS-run FLL/FTC teams. We were unable to hold a 2020 in-person Symposium,* so we instead hosted a Virtual Expo for which 59 families registered, including 7 who later joined our program.

Our annual co-ed summer camps enable us to form deeper connections with our students by working together for extended periods of time. Since 2017, we've partnered with Gwen's Girls to hold a robotics camp for about 15 girls of color per year. We also host a co-ed FLL Workshop, which typically serves around 30 students annually. This year, we adapted the camp to an online format, which expanded enrollment to 52 4-8 graders. Because we provided physical materials to the students, we had to cap enrollment. Since some interested students could not participate, we took this opportunity to create a 2-week Intro to Scratch Programming Workshop later in the summer, teaching 53 students programming fundamentals. All students who completed our feedback form indicated that they would participate in another similar program if offered; 19 joined our FLL/FTC teams.

Our DEI subteam analyzes ways to improve the diversity of our outreach. We compare GoS's diversity to the overall diversity of Pittsburgh, and pair this data with our Outreach Impact Document. This system ranks our outreach based on factors like audience demographics and number of people reached to determine how to improve our impact on underserved students. DEI then works with local organizations like the Boys & Girls Club, Gwen's Girls, Center of Life, and Assemble to introduce STEM to these groups and encourage their participation in FIRST. This season, our biggest challenge was planning events that were COVID-safe while remaining engaging. As live virtual outreach is not viable for some students right now (who are currently online all day for school), we are creating hands-on pre-recorded lessons to send students at Center of Life until in-person outreach is safe again.

FIRST: We build Pittsburgh's FIRST community by starting, mentoring, and supporting other local FIRST teams. Our "Program Pyramid" encompasses 156 students in 16 teams in every level of FIRST, creating a pathway for students to stay engaged in STEM as they age. The peak of the pyramid, our FRC team, consists of 54 girls who run, mentor, and serve as positive female role models to the boys/girls on the teams below us. The next level of the pyramid is our 3 all-girl FTC teams, consisting of 14 8-9th graders who work alongside the FRC team at CMU/on Zoom. As extensions of our team, they attend our weekly all-team and leadership meetings, participate in our outreach and Big/Little program, and shadow us in build season. Because of this relationship, most FTC students choose to continue up the pyramid, and this past year, 94% of them joined our FRC team. The next level of the Program Pyramid is formed by our 4 co-ed FLL teams (37 students total). Annually (pre-COVID), we hosted 2 educational scrimmages for FLL teams across Pittsburgh, and in 2019, all 4 of our teams won awards at the Pittsburgh championships. This year, we took on more responsibilities by adding a subteam specifically dedicated to planning/mentoring each FLL meeting, ensuring its sustainability of our FLL teams. The base of our pyramid, FLL Jr., is run by individual FRC members in their school districts with support from the team as a whole. In 2019, we ran 9 in-person teams (50 students). In spring 2020, we created an online version of the FLL Jr. curriculum and met virtually* with 50 new students.

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Through Pittsburgh's Steel City Robotics Alliance (SCRA), we step up to support and collaborate with other local FRC teams. We assist in hosting the biennial Steel City Showdown, an offseason competition at CMU for 20 teams, and present annually at workshops hosted by FRC 3260. In 2019 we collaborated with 2 SCRA teams to build a swerve drive robot, strengthening our relationship and expanding our teams' technical understanding. Last summer we felt that more casual, continued community building was essential to the success of SCRA during COVID, so we initiated a SCRA messaging server, which 70 people from 7 FRC teams participated in. Connections between our teams improved, and through that platform we collaborated with teams 117, 3260, and 4467 to run SCRA CAD classes, serving roughly 40 students. This type of coopertition helps strengthen each team individually, and our FIRST community as a whole.

We also run the largest practice facility in the area, which all FIRST teams are invited to utilize. Since its creation in 2012, we have had 10,000+ visits to the field by 65+ FIRST teams. During build season we often practice there with other FRC teams, raising the local level of play. We host summer camps, FLL/Jr. Demo Days, FLL scrimmages, and an annual Week Zero Scrimmage (attended by 9 local FRC teams in 2020) at the field.

When the 2020 FRC season was suspended, we planned and executed a 2020 Virtual Event to celebrate the hard work everyone put into the season, and encourage continued team interactions. Roughly 80 people from 24 FRC teams across the U.S. signed up to share their experiences from the season and showcase 2020 robots. The event improved our relationship with both local and distant teams, for example leading to Chairman's Exchange meetings with FRC 4467 in Pittsburgh and FRC 2468 in Texas (prompting participation in their virtual speaker series and FIRST Signing Day initiative).

We also work to grow FIRST internationally. Each summer (except 2020*) we hold Feiyue, a 2-week camp modeling a FRC build season for 30-40 students from Asia. We serve as mentors to the students, who compete with their newly built robot at an offseason competition at the end of the camp. Many former participants have joined/created their own FRC teams (6414, 6947, 7529, 7635), who we maintain online contact with. Some have even attended regional events with us, where we collaborate with them in-person, and this year, a Feiyue alum is mentoring our team!

As directors of FIRST Ladies, an international online program that promotes inclusion and provides a place for girls in FIRST to connect, we commit to making FIRST a safe space for women. We help our 35 regional partners (from 22 states and 6 countries) host their own Women in STEM events. We run the FIRST Ladies website and social media (which our partner teams contribute to), provide event resources/ideas, and organize the partner teams. For our own "partner team" duties, we hold an annual Women in STEM Panel at the Greater Pittsburgh Regional (which became virtual in 2020, reaching 40 people) and hold movie nights and game nights (our virtual game night this year reached about 30 people from 6 teams).

On GoS, we are building more inclusive communities in our team, Pittsburgh, FIRST, and across the world. Even through COVID, we are working to improve our outreach and empower everyone to believe they are capable of success in STEM.

*due to the COVID-19 pandemic