FIRST Impact Award - Team 8033

2024 - Team 8033
Team Number
8033
Team Nickname
Highlander Robotics
Team Location
Piedmont, CA - 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.
100% of alumni graduate HS and 90% major in STEM at schools like Cornell, UW, Harvey Mudd, WPI, UCLA, UC Berkeley, and USC. We host an annual alumni panel to discuss how FIRST and our team prepared them for college and work. Our alumni network, mentor career talks, and field trips to STEM companies inspire our students and help them plan their career paths. They resulted in 3 internships. 90% of students take STEM honors/AP classes and 92% express interest in STEM futures.
Describe your community along with how your team addresses its unique opportunities and circumstances.
8033 is based in Piedmont, CA, a STEM rich area with many industries, universities, and career opportunities. Piedmont High lacks an advanced engineering path curriculum, which we provide. In partnership with PUSD, we created a new engineering lab and used it to reach community and students outside of Piedmont. We leverage our location to attract expert mentors, including from UC Berkeley, and we engage with local STEM companies.
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 use many media channels: ~1K followers on social media; the Makers newsletter reaches 2.5K monthly; 2 local newspapers reach 10K weekly; global impact through a CNET photo essay with a readership of 200M. We also spread FIRST with robot demos: we host open houses, Girl Scout workshops, Maker Faires, and engage in community events like the Harvest Festival and fundraising events. Altogether, these events have brought ~2.5K visitors to our lab, many of whom wouldn't have exposure to FIRST.
Please provide specific examples of how your team members act as role models within the FIRST community with emphasis on the past 3 years.
Volunteered at 18 FLL/FTC tournaments for 300+ hours and ran the 2022 FTC Qualifier; volunteered at CalGames 2023; our scouting app is used by 90+ teams; shared our software training materials with

~100 people; gave presentations on design and controls at WRRF to 30 people; presented at the 2024 FRC Warmup to 130 people; one of our leads is a FIRST For All Fellow and our captain was a Dean's List Finalist in 2022. We won EI in 2022 for our advocacy in favor of engineering at the school board

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

We've mentored 7 FIRST teams, including FTC 16278 and legacy team FTC 11201, resulting in 650+ hours of mentoring. Two of our leads mentor Worlds division finalists FTC 16236 with CAD and software. Beyond our community we have mentored FRC team 9400 and assisted FRC 1072, 4131, 5027, 7525, 9274, 9442, and FTC 14525 with CAD support, design process, workflow, software, pit, and logistics.

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?

8033 leads open houses and robot demos at our annual Maker Faire with >2K attendees. We demoed our robot at the FTC 11201 Open House and hosted 20 FTC students at our lab. 100% of 11201 members joined our team in 2021. Last summer we launched an annual CAD camp for 20 middle schoolers. We had a booth at the 2023 Harvest Festival where we helped young kids explore engineering by making wooden catapults. We ran a tech social on rocketry with ~30 attendees with a hands-on project.

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 PUSD to expand use of the engineering lab for school and community. The partnership is sustained through the Lab Advisory Committee which our team chairs. We partner with Piedmont Makers to support our local FIRST community, to reach potential sponsors, and to advertise our team in their newsletter. We demo and speak at their events and this year they granted us a 20K donation. We partner with OUSD to build adapted toys and assistive technology for their Special Ed Department

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

8033 is an inclusive community that believes STEM is for all. We consist of nearly 35% girls, who hold 50% of lead positions, and promote gender equity in STEM by hosting workshops at our lab for local Girl Scout troops and with the AAUW-OML. As a community team, we welcome students from 17 different schools that would otherwise not have access to FRC, and are not application-based to expand STEM education to all. 8033 also covers costs for those in need to ensure equitable access.

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

We actively recruit from the FLL/FTC teams we mentor. We engage FTC students in team activities to secure a healthy pipeline membership. We develop written training to turn new members into future leads. We document our robot built, training, and operations activities to pass down our knowledge. We keep a list of sponsor and outreach contacts and our new liaisons actively reach out to them. We build a sustainable budget by hosting fundraising events and paid camps in the community.

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

We recruit local sponsors who support us in our mission to grow as community leaders in STEM education. We make sponsor recruiting a team effort where every team member reaches out to 2 companies, which raised us 50K this year. We held our first fundraiser that allowed us to expand financial aid. We retain our sponsors by sending updates throughout the season and showcasing them in local events and on our website, robot, Instagram, and shirt. We invited them to the lab inauguration in 2023

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

With 40-60% new recruits, our biggest challenge is onboarding and training to ensure broad participation, safety standards, and effective preparation for the season. In response, we surveyed the best practices of senior teams (254, 1678, 971) and created a training program for tool certification, safety, and technical skills. A highlight of this is our off season bot, which was key to integrating trainees into the team. We are also developing a system for perennial documentation and tracking.

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

Our goals are 1. Inclusivity: we welcome students from any school and skill level, and provide financial aid. Leadership: we are a student-led team with ~50% female leads. 3. Community engagement: we actively involve sponsors, mentors, students and industry leaders in STEM education. Our growth metrics show our success. We work with Piedmont HS to expand STEM in the district, and have a strong presence in our community's media spreading the FIRST message. We engage and support our First league

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.

Our team passes down outreach initiatives to engage upcoming generations. Our fabrication project with OUSD has transferred leads this year, and so has our Summer Camp. We have consistently mentored FTC 11201 with graduating members joining our team and serving as mentors on their previous team. We provide training to adults to broaden our impact: we have trained teachers at PUSD, occupational therapists at OUSD, and FTC coaches.

Judge Feedback

Who/When	Feedback
Mar 31, 2024 08:57:29 PM EST	**How did you get involved with FIRST?** **An area the team has an opportunity to improve.** **Something that really impressed the judges.**

Essay

Founded in 2019, Highlander Robotics 8033 is a community-based team committed to expanding hands-on STEM education in the Bay Area. Despite high demand, access to FRC remains limited due to an area shortage of school-affiliated teams per capita and insufficient community options in the regional system. As one of just 6 community teams within a 25-mile radius of Piedmont, 8033 helps fill this gap.

Our numbers show significant demand and growth. Since 2020, our student membership has risen from 11 to 57, nearly 35% female. We've expanded our mentorship team from 5 to 15 and gained additional assistance from over 20 parent volunteers. Drawing students from across the Bay Area, our budget has tripled, largely due to a dramatic increase in community contributions. In 2022 we moved our workshop to the Piedmont HS Engineering Lab, which allowed us to greatly expand our outreach initiatives.

To support this growth, 8033 has undergone substantial transformation. The team is now organized into three branches: Mechanical, Software, and Operations, each with numerous specialized sub-leads. Operations, established in 2022, includes Outreach, Business, Marketing, and Enrichment, attracting a new cohort of students. Also in 2022, our team formed the scouting and strategy group which successfully designed and launched the team's first scouting app, now used by over 90 FRC teams. In 2023 we added the training department, which designs and coordinates new member training, ensuring inclusion and team longevity.

Throughout this journey, 8033 has defined its identity with three concepts: open-access, student-led, and community-based. To execute outreach with precision and purpose, we turned them into guides for actionable commitment.

1.Access – we promote inclusivity by actively reaching out and remaining open to students of diverse backgrounds, skill levels, and schools 2.Agency – we empower youth to be leaders in STEM by fostering a student-led team with high participation of female leads 3.Ambition – we lead in STEM education by building lasting relationships with community partners.

A Team for All

A defining aspect of 8033 is inclusivity. At the core of our mission is commitment to providing access to FIRST and STEM education for all students in our community. Our team invites students from any school to join, leading to a diverse membership from 17 high schools across 11 districts (almost 30% non-PHS members). We embrace students of all skill levels. In the past 3 years, 40-65% of our roster have been new members, with many lacking any prior engineering exposure. In response, our training program, designed and executed by student leads, educates students from the ground up. Rookies gain experience by building an off-season robot and participating in off-season tournaments. Finally, we provide financial aid to ease registration and tournament costs. This year we raised $2700 through an AI fundraising talk that has enabled 9 additional students to join and travel with our team.

Student leaders

8033's commitment to cultivating the next generation of STEM leaders goes beyond technical skills and extends to fostering leadership qualities that transform members into effective STEM advocates. Students oversee every aspect of our program—from CAD and prototyping to programming, fabrication, scouting/strategy, and training new recruits. Nearly half of our student leads are female, including half of

our mechanical leads and our captain.

We believe that exposure to STEM role models cultivates leadership and ignites interest in STEM careers. To inspire our members, we arrange visits to local institutions such as Astra, Lawrence Livermore Labs, and UC Berkeley, where students explore potential career paths. We host annual events where alumni share insights about their college experiences.

A Community Team

We are a team sustained entirely by community support. We do not receive assistance from schools. Our adult volunteers collectively provide over 60 in-person hours weekly, with additional time for logistics. Our main funding comes from community donations and STEM events we organize. As a result, giving back is our priority. We accomplish this through partnerships with community organizations in pursuit of shared goals.

PUSD Engineering Lab

We highly value our partnership with Piedmont HS. It has facilitated the relocation of our workshop to the school lab and enabled us to leverage the lab for outreach initiatives. This collaboration began in 2020 when our team helped raise $420,000 for lab equipment. Now under the oversight of the Lab Advisory Committee, with representatives from our team, the school, and community organizations, we actively mobilize the lab for community engagement. Our team hosts Girl Scouts workshops, runs a Summer CAD program for middle schoolers, and showcases our program at events like our open houses, the community-wide Piedmont Makers Faire, and the 2023 lab inauguration attended by our sponsors. We conducted lab tours for the principal and promoted our program with staff and students during school lunch. Additionally, we consistently provide training to FTC coaches and school staff on lab equipment and software, enabling them to use the lab for their own educational purposes.

Supporting the FIRST community

In partnership with Piedmont Makers, we actively support our local FIRST community. Our team has staffed 18 FLL and FTC local tournaments and scrimmages, dedicating over 300 hours to fulfill more than 60% of volunteer roles at the FTC Piedmont Qualifier. 8033 also plays a valuable mentoring role. Our students have mentored 5 FTC and 2 FLL teams, totaling ~650 hours in the past 3 years. One notable experience is mentoring FTC team 16236 on hardware for over 2 years, resulting in their success as division finalist captains at Houston last year. We introduced 16278's all rookie members to FIRST and continue to mentor legacy team 11201. Additionally, our leads have dedicated over 400 hours to assisting FTC and FRC teams with CAD review, game analysis, workflow, and fabrication, including FRC teams 4131, 7525, 1072, 9442, and FTC team 14525.

To foster the FIRST pipeline, our team has initiated a new program to inspire FTC students to continue their robotics journey. During our current build season, we organized an "FTC day" at our lab, where over 20 FTC students learned about FRC, our build process, and the various roles within our team, with many expressing interest in joining. These same 6 teams have been invited to join us at our first regional, where 8033 members will guide students through the pits, watch matches together, and even invite them to do some scouting for our team!

Lastly, we actively pioneer new technology and share knowledge with the broader FIRST community. Our leads lectured at the 2023 WRRF on strategic design and control theory as well as at the 2024 FRC Warm Up conference, reaching an audience of over 150 people. Our software group has extensively contributed to Choreo, an open-source trajectory planning framework, while our scouting group has shared their system with the FRC community, opening access to intuitive data collection and advanced analysis.

Assisting OUSD Special Education Department

Over the past two years, our team partnered with OUSD's Special Education Department to apply our robotics skills and fabrication resources to create assistive devices for students with verbal and mobility differences. We created nearly 30 iPad communication guides tailored to each student's unique needs. This year our collaboration expanded to producing over 25 cases for Bluetooth buttons essential for special needs children to access computers. Additionally, we created a library of adapted toys, modifying over 50 toys to provide accessible options for families with special needs at a fraction of the cost of commercial alternatives.

Beyond that, we empowered occupational therapists by training them on 3D printing, enabling them to independently create custom accessibility solutions. The final culmination of our collaboration was the creation of an adapted bumper car power chair that gave previously immobile children the ability to drive independently. Our contact at OUSD remarked that she had "never seen him smile so much." We aim to expand this project by creating more adapted bumper cars and further integrating this work into the fabric of our team. Fundraising and Media Over the past three years, our budget has tripled thanks to a 4,000% increase in community donations and sponsorships, now making up 46% of our budget compared to 3% in 2021-22. Additionally, we diversified revenue sources this year by hosting a tech talk fundraising event and launching a paid CAD Summer Camp for middle schoolers, which funded our offseason training bot.

We maintain close engagement with our sponsors through regular email updates, robot reveal videos, featuring them on our social media and website, and inviting them to our workshop and robot demo events. One of our major sponsors, Piedmont Makers, has generously pledged a two-year bridge donation to support outreach, more extensive financial aid, and our training program.

To connect with our community, we document our journey through Instagram and our website. We publish regular updates in local newspapers, reaching an audience of 10,000, and the Piedmont Makers newsletter, with 2,000 readers. Last year, 8033 was featured in CNET, a tech magazine with wide global readership. The photo essay provided an overview of FIRST and the FRC program, showcasing our team as we tackled various tasks during our robot building process.

Conclusion

8033 fills a crucial gap in STEM education in our community. Our dedication to inclusivity, student leadership, and community engagement embodies our mission. The City of Piedmont has recognized our contributions by declaring Highlanders Robotics Day, an honor we uphold and celebrate. ;