GUNN ROBOTICS TEAM

2023 Impact Booklet

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THANK YOU TO OUR GENEROUS SPONSORS WHO MAKE EVERYTHING WE DO POSSIBLE

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FIRST CALIFORNIA ROBOTICS

PALO ALTO Partners in Education OUR EDUCATION FOUNDATION

OUR TEAM

MISSION

Founded in 1997, Gunn Robotics aims to foster learning by immersing high schoolers in a student-managed STEAM workplace. Here at GRT, we prepare the engineers, scientists, leaders, animators, and programmers of the future with the real-world skills and experiences they need to succeed in their careers.

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47 members

1700+ training hours

6 mentors

9500+ shop hours

7 subgroups

26 years of FRC

LEADERSHIP

Captain

• • •

Team Manager Safety Captain Business Manager

SUBGROUPS

Controls • Drivetrain • CNC • Pneumatics

Animation • Welding • Business

2022 MONTEREY BAY REGIONAL SPIRIT AWARD WINNERS

GRT ALUMNI do amazing things

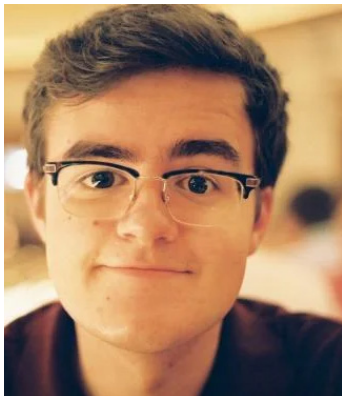
100% graduate high school and attend college

90% feel GRT was impactful

92% pursue STEAM careers

10% continue to volunteer for FIRST

ALUM MENTOR SPOTLIGHTS



MICHAEL DRESSER

Michael graduated from GRT in 2016. He studied Computer Science at CU Boulder and now works as a software engineer. This season, he has been volunteering as a mentor to keep the shop open so students have the time they need to work on their robot.

SAMIR GHOSH

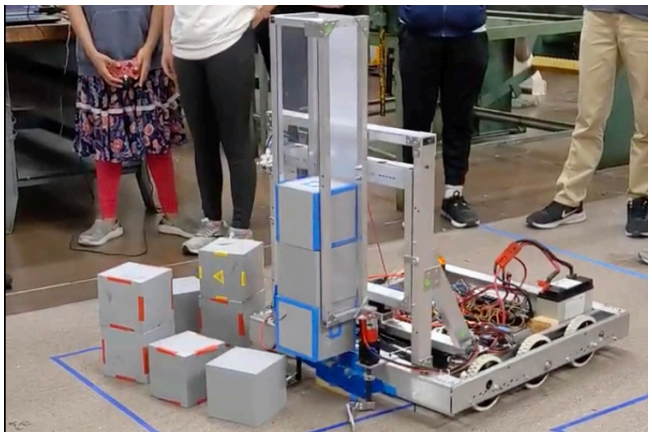
Samir graduated from GRT in 2014. He is currently pursuing a PhD in Computational Media at UC Santa Cruz, researching multi-user VR applications. This season, Samir advised the GRT animation team with their submission for the 2023 Digital Animation Award.

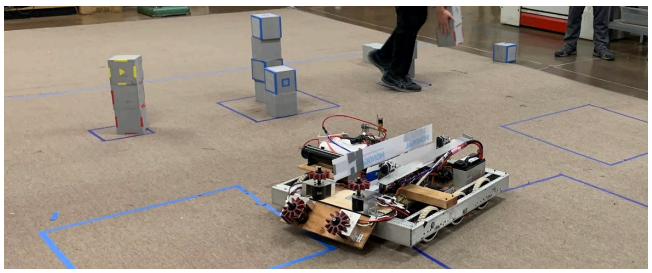
IN THE SHOP

TRAINING

During the first few months of school, our members go through a collective 1400 hours of training: safety; mill, lathe, and hand tools operation; CAD on onshape; and practice parts. Once every rookie can operate in our shop, we provide 300 hours of subgroup-specific training.

SHOP PROJECT





Each November, our leadership team presents a simple FRC-inspired game for the two class periods of GRT to compete in. This year, we were challenged to stack foam cubes in “Skyline Scramble!” This project gives new members a robot building experience in preparation for build season.

FALL AT GRT

TEAM BONDING TRIP

We believe that a bonded team is a successful team. Building relationships so rookies feel included is a crucial component of our first semester. Every fall, GRT goes on a camping trip, which helps our new members feel more comfortable talking to veterans.

STANFORD CONCESSIONS

We have partnered with Stanford Athletic Concessions for over a decade to help cover team expenses. Each GRT member volunteers at 3 Stanford sports game concession stands, totalling almost 1,000 volunteer hours. This year, our 9 games brought in over $10,000 for GRT.

OUTREACH

OUTREACH

We do more than build robots, FIRST is about spreading a love of STEAM throughout the community. Outreach takes 3 forms at GRT: **education**, **empowerment**, and **inspiration**.

THIS SEASON:

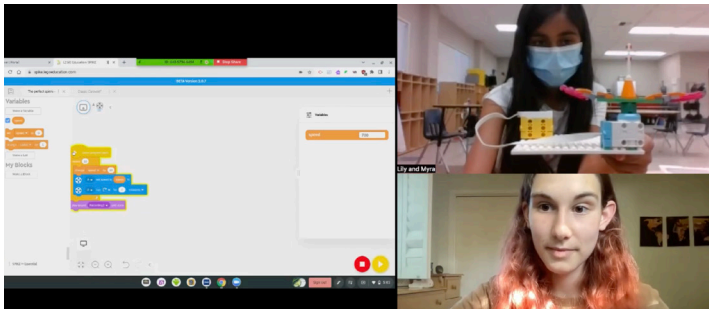
100%
of GRT members participated in outreach

2000+ outreach hours

450+ children inspired

FLL EXPLORE TEAM

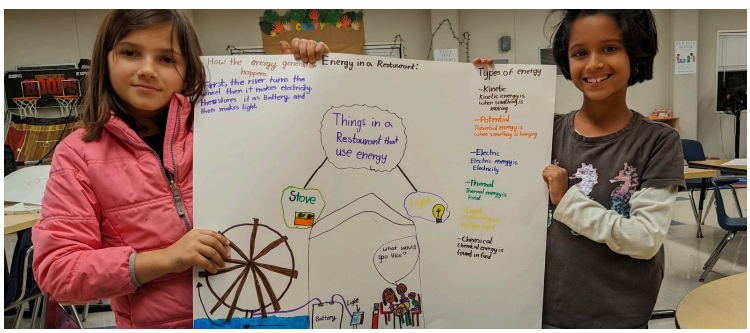
Education



ONLINE SPRING PILOT

In Spring 2022, the FIRST Equity Grant empowered us to start a LEGO Spike program for our community in partnership with the YMCA. This fall, we founded an official FLL Explore team at the YMCA Bubb Elementary school site, where 10 GRT members worked closely with 20 students. We're excited to expand to new sites!

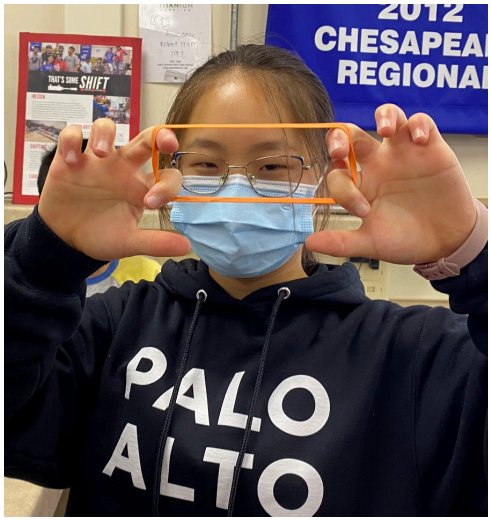
FALL TEAM AT THE YMCA



SUMMER CAMP

Education

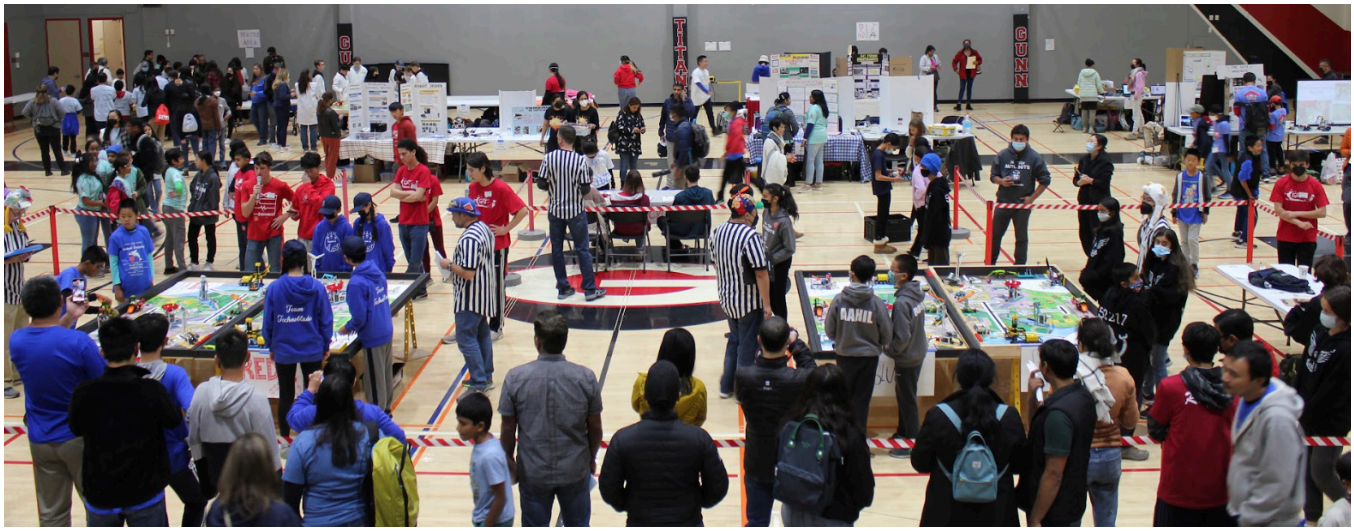
This past summer we ran our 4th annual robotics summer camp for middle school students. 10 GRT members taught engineering principles for VEX kits to 50 students over the course of 2 week-long sessions. The students' robots competed in our game "Planet Plunderers" to stack blocks and use color sensors. Our camp is free for anyone to participate, but we brought in $9,300 in donations for GRT.



FLL TOURNAMENT

Empowerment

This past fall we held our third annual FLL regional tournament for 24 teams in our community. Every GRT member volunteered to make the event happen, totaling over 430 hours. We invited team 1868 to join us at the end of the day for a robot demo to inspire students to join FRC teams.



MOONSHOTS

Empowerment

A special ed teacher reached out about her student Joel, whose spinal muscular atrophy prevents him from playing soccer. We immediately began brainstorming solutions. GRT spent over 1050 hours creating the SoccerDuck: a flywheel wheelchair attachment to shoot balls.

THE SOCCERDUCK

Similarly, we spent 490 hours building a mechanism to help a local middle schooler, Farin, play the trumpet. This project helped Farin overcome challenges from his cerebral palsy.

TRUMPET PROJECT

HAUNTED HOUSE

Inspiration

For over a decade, GRT has partnered with Juana Briones Elementary to bring their students a mechanized haunted house on halloween. This year we spent 660 hours creating and presenting the haunted house mechanisms, inspired by ideas from the fifth grade students.

IN THE COMMUNITY

Inspiration

JLS BACK TO SCHOOL NIGHT

Each year, we show off our robot at various community events to inspire students to participate in FIRST programs and provide resources for local engineering opportunities.

MAY FETE PARADE

IMPACT AWARD SUBMISSION

IMPACT ESSAY

The words of FIRST founder, Dean Kamen ring true at Gunn Robotics:

> Life is so short. Why waste a single day of it doing something that doesn't matter, that doesn't try to do something big?

Here at GRT, we ask the question: why should students wait until high school or college before being excited about approaching challenges with an engineering mindset? An important part of our mission is to leverage our own privilege of participating in FIRST by providing engineering opportunities for children of all ages in our community. We've created outreach initiatives for students starting in kindergarten all the way up to high school. Within our own team, we embrace the spirit of learning by ensuring everyone has a chance to master the facets of STEAM they are the

THE SPARK: ELEMENTARY SCHOOL

GRT employs our experience in STEAM to create robotics projects that inspire youth at local elementary schools. Every Halloween, our team constructs a haunted house full of spooky robotic mechanisms to display at the school and inspire the students. We begin the design process by inviting the fifth graders of Juana Briones Elementary School to our robotics shop where we tell them about FIRST and ask them to draw out ideas for the haunted house. Next, we split our team into small groups to create eight spooky mechanisms based on the students' drawings. Last October, our team committed over 650 hours designing, machining, and assembling the haunted house. During Halloween week we put our finished product on display at Juana Briones School, and GRT members conversed with students, answered questions, and shared ways to become involved in local STEAM programs. Our team has been running the haunted house

project for over a decade and will continue this partnership in the future. Building the spooky mechanisms is particularly special for Juana Briones alumni on GRT, who fondly recall being inspired by the house as elementary students.

GRT reaches the students at Benjamin Bubb Elementary School through our collaboration with the YMCA. In the spring of 2022, we purchased LEGO SPIKE Essential kits with funds from the FIRST Equity Grant. Using these kits, we ran a six-week LEGO pilot program for twenty students ranging from kindergarten through fifth grade in the Bubb YMCA after-school program. Students learned the fundamentals of building for strength, FIRST values, and the iterative design process. Our members spent over seventy hours planning lessons and mentoring for the program. Last fall, GRT founded and mentored a registered FLL Explore team for the Bubb students. We split the students into four small teams to learn closely from GRT mentors. Each group worked through the design process to create an “energy journey” based on this year’s Super Powered challenge. They built LEGO creations involved in sustainable energy generation and creative uses for electricity. GRT members created mini-lessons tailored directly to what the groups were interested in, their energy project, and experience level. The students learned about gear ratios, torque, sustainable power, and how different types of energy are converted into electricity. We volunteered over eighty hours teaching biweekly sessions at Bubb plus fifteen hours organizing and planning lessons. This collaboration between GRT and the YMCA gave the kids at Bubb experienced role models closer to their own age to inspire them to pursue STEAM. We are working to grow this program and start teams at additional YMCA locations in the coming years.

SPREADING OUT: MIDDLE SCHOOL

GRT continues to provide STEAM opportunities as students enter middle school with targeted outreach events. This year, our team attended the JLS Middle School Back to School Night where we showcased our robot to dozens of students and parents. We also introduced the attendees to FIRST and the variety of programs offered. Each spring, we march our robot in the Palo Alto May Fete Parade alongside local school bands and clubs to show the community our team's work from the season. Our efforts encourage and provide the tools for youth to get involved in the many hands-on pre-engineering programs our community has to offer.

For the first time since the pandemic, GRT was able to host our annual FLL regional tournament at Gunn High School last fall. Twenty four teams participated in the full-day event where they were able to show off their robots and projects. All together, GRT members volunteered over 430 hours to set up, staff and clean up the event, coordinated by our student organizer. Team members filled all roles open to teens from M.C. to floor manager to robot inspector. After all of the matches, we held a robot demo with another local team, 1868, to inspire students to participate in FRC when they graduate from FLL. This event is especially important to our team because it is a chance to pay forward the generosity of the volunteers at our own FRC events.

We also host an annual VEX summer camp for fifty students over two week-long sessions. GRT members teach principles of design and programming during the first few days, followed by a mock VEX challenge for teams of students to build robots. Last summer, GRT members volunteered 175 hours preparing for the camp and over 600 hours teaching. Campers were split into groups of four, each guided by a pair of mentors who provided hands-off support. When groups surprised us by working through our prepared curriculum faster than anticipated, our GRT members experienced with robotics challenges were able to improvise new

problems to engage the campers. For example, we challenged campers to lift their robot using a pull-up bar. We are proud to provide this camp for free to our community, making donations to GRT optional. Summer camp participants are inspired to join FIRST programs and often apply to our team once they reach high school.

BUILDING UP: GRT MEMBERS

GRT operates as a class at Gunn High School with significant after school commitments and activities managed by a four-member elected leadership team. As a course, we emphasize teaching and accepting members with diverse experience levels. We train each member to operate in our machine shop, where they gain proficiency using hand tools, mills, lathes and 3D modeling. After a full month of student-led shop training, some members continue designing and machining while others have the option to develop more focused skills. Those who are excited about specific facets of STEAM may choose to explore deeper into one of our team subgroups, including drivetrain design, controls, CNC milling, pneumatics design, welding, animation, and business.

Since 1997, GRT has prepared the engineers, programmers, scientists, animators, educators, and leaders of the future using our student-managed philosophy. Our mentors and more-experienced members guide new recruits with a hands-off approach, asking questions and providing suggestions while allowing students to think for themselves. Although challenging, this approach allows students to truly learn. GRT embodies the idea that good engineering must be experienced. The result is that GRT alumni go on to do incredible things. Over 90% of alumni say that GRT was impactful for them, citing soft skills like leadership, group dynamics, and communication, along with a range of technical skills. 100% of our alumni attend college with over 90% pursuing STEAM careers. GRT alumni find great success obtaining PhDs; working for companies including Google, Facebook, and Microsoft; and founding startups and companies including

ViaBot. After graduating, alumni continue to stay in touch with GRT and many return each year for kickoff or to mentor during build season. Over 10% continue to volunteer for other FIRST programs after high school.

MAKING CONNECTIONS: HELPING THE COMMUNITY

GRT is committed to improving the lives of individuals in our community. Our educational programs and outreach events have garnered GRT a reputation for using engineering to make an impact. In recent years, we have undertaken two major projects to directly assist local students with activities they enjoy. In 2021, a special-ed teacher contacted our team about one of her students, Joel, whose spinal muscular atrophy prevents him from playing sports with his brother and friends. We jumped on this opportunity to make a difference for Joel. A group of ten GRT members brainstormed a few ways to tackle this problem using an attachment to Joel's wheelchair. We used the same design process that we use for building robots to compete in FIRST competitions. After many iterations, we landed on the SoccerDuck: a flywheel shooter featuring four maneuverable wheels, a two-ball storage chute, and a laser pointer (per Joel's special request). We designed and machined the SoccerDuck at our shop to attach and travel with Joel's wheelchair across grassy terrain. After we delivered the SoccerDuck to Joel last fall, his family posted videos of him happily playing with the device to his Instagram account, thanking our team for our hard work.

Two band teachers from our school district reached out to GRT with another request. One of their students, Farin, has cerebral palsy which makes it difficult for him to push the valves on his trumpet. We were excited at yet another opportunity to use our engineering in action. Our team created a compact, hybrid trumpet stand and electric valve depressor to alleviate the physical stress of playing the trumpet. Farin brings this device to his new middle school band class where it has enabled him to play with his class

mates for longer periods of time.

This coming spring we will be undertaking a new project for another local student with spinal muscular atrophy to help him participate in class using a hand-raising device. These ventures show our members how powerful engineering can be not just for robotics competitions but to create real impacts for individuals in our community.

EXECUTIVE SUMMARIES

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, at-

GRT provides our members with an opportunity to explore a variety of STEAM interests—from design, to animation, to leadership—all with no prior experience required! Our team is entirely student-managed, and 90% of our alumni believe that GRT prepared them for their future workplace by teaching soft and technical skills. 100% of our alumni go on to graduate high school and attend college. After college, 90% pursue a career in STEAM and 10% continue to volunteer for FIRST.

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

Our community is full of engaging opportunities, from FIRST teams to sports to music. Unfortunately, many of these activities are not inclusive for those with disabilities. Since spring of 2021, our GRT members spent a combined 1550 hours designing and building assistive devices for two local students with physical disabilities. The devices helped them feel more comfortable in their extracurriculars; Joel could play soccer with his brother and Farin was able to participate in his school band.

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?

Each year GRT partners with Juana Briones Elementary School to design a haunted house for their Halloween festival. Elementary schoolers visit our machine shop to learn about GRT. They then brainstorm designs, and watch them come to life through our mech fabrication process. Team members introduce students to FIRST and present the final product during Halloween week. 64% of those students expressed interest in joining a FIRST robotics team according to our most recent annual survey last October.

Please provide specific examples of how your team members act as role models within the FIRST community with an em-

Each fall, GRT hosts a Norcal FLL Regional Qualifier. We model the ideals of the FIRST community by supporting teams during their matches and before judging. GRT members enjoy talking to the FLL teams and hearing about their projects and robots. We are able to connect over shared FIRST experiences and serve as role models for the younger students. GRT showcased our previous year's robot during the tournament's closing ceremony, demonstrating what a continued path in FIRST looks like.

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

Over the past two years, GRT has focussed on founding and mentoring a sustainable FLL Explore class-team to run year-after-year. During the fall Superpowered season, GRT members volunteered at the YMCA Bubb Elementary after school program to mentor our new team. The twenty students learned the design process, FIRST's values, and built energy journeys to showcase for parents. GRT has spent over 160 hours growing this program since 2022, and we plan to expand to more locations this coming season.

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?

GRT hosts an annual robotics summer camp to introduce middle schoolers to STEAM. After being canceled in 2020, the camp restarted for summer of 2021 as an online program focused on 3D modeling in TinkerCAD and programming with VEXcode VR. This past summer we invested 780 hours—a 520% increase from 2021—to expand and offer two one-week, in-person camp sessions. We challenged students to build robots for a unique competition. After completing our camp, members go on to thrive on FIRST teams.

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.

GRT participates in programs partnered with JLS Middle School to inform students and parents about getting involved with FIRST programs. For nine years, our team has worked with Stanford Athletic Concessions to obtain funding for our robotics program. This year, 47 GRT members volunteered over 1000 hours with Stanford. The past two years, GRT has volunteered at Bubb Elementary School to teach engineering concepts through our FLL Explore team.

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

GRT strives to create a diverse and welcoming community that prepares members to be equity leaders. Each year, our lead mentor hosts a night dedicated to discussing sexism in the field of STEAM, with the goal of creating a safe environment to consider gender disparities. She equips girls on the team with the knowledge and confidence to assert themselves as important members of the team. For the past three years, 50% of our leadership group has been female and empowered other women on our team.

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

GRT has competed in FRC since its inception in 1997. This longevity can be attributed, for one, to our rigorous training. All rookies go through hands-on, student taught, shop training, overseen by our Safety Captain. This year, we provided 1400 collective general training hours and 300 subgroup-specific hours. During the 2021-22 season, our members spend 9500 hours building and learning in the shop. This program guarantees that rookies are equipped to teach the next generation of members.

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

The past three years GRT has partnered with various organizations such as Bosch and Partners in Education. Our team's business subgroup writes grant applications to receive financial aid—notably, KLA, PG&E and FIRST NorCal. GRT's longest-lived sponsor partnership is with Bosch, which provides funding and our dear mentor, Phil Roan. Additionally, many of our generous parents provide donations to our team, often with matching donations from their employers.

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

In 2022, GRT struggled with meeting deadlines. A lack of experience post-pandemic led to a software squeeze at the end of build season. This year, our leadership team enforced realistic deadlines and efficient task delegation. Our lead mentor presented a lesson to the team about effective project management and the different strategies for developing timelines. These efforts have significantly improved our workflow and will help prepare GRT members for the workforce.

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

The goal of outreach at GRT is twofold: to share the joy of STEAM and FIRST with our community, and to instill the value of community service in our members, the next generation of engineers. To accomplish this, 100% of GRT members participate in outreach—some are then inspired to start initiatives for the team! Over the past three years, GRT has volunteered 4250 hours to improve our community; from STEAM education, to robot showcases, to engineering projects to aid underserved individuals.

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.

If you walk around Palo Alto with bright red hair, someone will stop you to ask: “are you on GRT?” Hair dyeing has been a GRT tradition for decades and has become a symbol for our spirit at our school, in our community, and at competitions. Dyeing each other’s hair is a form of team bonding; the process requires collaboration and trust, two skills we need throughout build season. GRT is a tight-knit, red-headed team—we work well together and we take joint pride in our accomplishments.