# Chairman's Award - Team 4201

Print Close

2021 - Team 4201

**Team Number**

**4201**

**Team Nickname**

The Vitruvian Bots

**Team Location**

El Segundo, California - 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 our students graduate high school with 98% attending college and 91% as a STEM major. 11 alumni are now FIRST mentors, sharing their experience from their university experience and/or as professionals at Raytheon Technologies, Boeing, and SpaceX. One of our alum and mentors, Vince, is the Director of IT Operations Starship at SpaceX and uses his position to donate over $30,000 of equipment to local FIRST teams and offer internships to students!

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

Our community is economically diverse. We support Robotics 360 events that cater to lower-income communities by exposing them to STEM through hands-on demonstrations for students and presentations to school administrators. We also started FRC Team 6904, located in Watts, and continue to mentor them in strategy, design, business and more. With higher income communities, we support Abundance 360 to share the benefits of FIRST and inspire high-end technology executives to become investors.

**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?**

For the past 7 years, we have hosted a robotics summer camp which has attracted over 1,000 students to compete in challenges based on the season's FRC game. The counselors for our summer camp are then prepared to use the curriculum to mentor VEX Robotics and FLL teams throughout the year, teaching both technical skills and teamwork. The VEX teams we mentor learn about the way our team is operated which prepares them to join FIRST teams. 12 of these students have joined Team 4201 this year.

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

We strive to be the LA FRC hub by training over 25 other teams in CAD, robot assembly, machining, and team organization during the preseason and provide design strategy support, machine parts, and host scrimmages throughout the build season. For example, we taught 3408's and 2637's in CAD and prototyping processes. We also trained teams 5510 and 6904 in programming and offered assistance in Chairman's to team 3455 explaining our outreach events and Chairman's process.

**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 many initiatives to assist teams at competitions, like giving 51 Rookie and International Care Packages to welcome these teams. We made our Vitruvian Works program to provide teams mechanical and programming support such as helping diagnose gearboxes, loaning tools and brainstorming solutions to mechanical issues. Beyond supplying team 7524 with students at their pit to ensure competition legality, we mentored by providing strategy and mechanical assistance over the next couple of years.

**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 inspire students by volunteering at STEAM events, including school demonstrations, Hackathons, and FLL competitions. We've introduced over 500 students to FIRST through the district-wide Rock Around the Block event. We have started 6 FLL teams through our Summer Camp and work with Raytheon Technologies to offer grants to 20+ FLL teams annually. We then work with coaches to plan out schedules, set goals, obtain equipment, and mentor students in technical and presentation skills.

**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 attend Raytheon's annual Engineering Games to display our robot, inspire employees to mentor teams, and show corporate the impact of their support. We partner with Raytheon for projects like designing a prosthetic arm, encouraging girls through a Women in STEM panel, and teaching 3D printing at the Fort McArthur Makerspace. We also have a strong partnership with our sponsor NEXT Trucking in our goal to reduce costs for teams by transporting robots and tools to the Championship free of charge.

**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 inclusion, as seen with this year's Uplifting Black dialogues which offered a safe space for members to discuss racial injustice. We promote equity, as our students lead the school's Society of Black Engineers, Hispanic Society of Engineers, and Society of Women Engineers. We uplift diversity by hosting monthly SWE days full of inspiring engineering challenges and guest speakers who share their experiences with our students, other teams, and the teachers and students at our schools.

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

To sustain our member pipeline, we devote over 350 hours of manpower annually to mentor our local middle school and inspire their ever-growing STEAM clubs and programs. We teach their VEX Robotics and Aerospace's Herndon teams CAD, problem-solving, and critical thinking skills. At district board meetings, we present our annual build and anecdotes of the team's impact on students, generating $300,000 in financial support to other STEAM organizations in our community!

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

We create weekly build season vlogs and/or letter updates to track our progress and show sponsors their impact. Our alumni get opportunities to intern with our sponsors Trapac and Raytheon Technologies. We engage our sponsors through demonstrations by displaying our robot to employees to interest them in mentoring FIRST teams. Last season, Smith Co. not only funded us but taught our members the skills and safety of construction for our full-sized practice field, which was used by 33 SoCal teams!

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

In past years, veteran members dove into projects during the Fall, leaving new members without direction and feeling intimidated by the pace and knowledge gaps, causing some to leave the team and those who remained to be unprepared for the build season. So, this year, our veterans spent the preseason training members in various skills and gave them projects to practice these skills. This kept our members engaged and excited students to lend their new skills to the coming season.

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

We foster communication and innovation by establishing formative relationships between our team members and mentors. Our weekly check-ins give students the opportunity to seek advice from mentors on career/life aspirations and have them invest in our lives outside of robotics. Our buddy system enables veterans to mentor rookies through feedback and support on tasks, giving every student leadership experience, the chance to hone their technology and engineering skills, and a friend to lean on.

**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.**

During this online season, we strive to continue to make an impact for teams in the South Bay Area. We hosted events like Expert Talks for Innovation Challenge teams to gain insights into the medical field from professionals. We continue to support teams like rookie team 8600 with a registration grant and mentoring them in team organization and schedule. We started mentoring team 691 by providing WFAA mentorship, a kit bot, so they can test new code, and road case design support.

**Essay**

"Fail early and fail often." Achieving our mission of inspiring youth in our community to become future leaders and innovators in STEM is only possible because we're willing to take risks, fail, and get back up again each season. We've struggled against internal challenges of communication and student confidence as well as global challenges of diversity and inclusion. We seek to tackle these obstacles as we work to break down barriers, create familial bonds, generate student-led success, discover technical solutions, and embrace our differences.

Lack of effective team communication, underutilized students, unassigned tasks, schedule delays, and overwhelmed mentors were some of the failures that drove our team to form a large and diverse leadership structure that serves our 60 students and 10 mentors. Our team is broken into directorates with each one having its own student leader(s) in charge of tasking and coordinating their directorate. This gives more leadership opportunities for students, increases collaboration, and creates higher efficiency and organization on tasks. We not only want student leaders to embrace the experience of failure as they grow as leaders but to use it to develop others. Overcoming the fear of failure has empowered our students to become more independent in leading the team, such as running team meetings, scheduling events, reaching out to sponsors, and running the machinery. Our team structure has generated greater student-led success than we could've ever imagined, and we've inspired other teams to encourage their students to do the same.

By overcoming the challenge of trusting our students and encouraging them to trust themselves, we create fearless STEM leaders and innovators. Our veterans teach new members to stop fearing failure, whether it's prototyping or writing an essay. We created the Rookie Bot project for 20 of our new students to go through the strategic design and CAD processes in the preseason. Although veteran members teach skills and provide feedback, the robot is led by our rookie members. This prompts students to fail early and equips them with lessons learned for the build season.

Our rookie training and student-led philosophy have caught the attention of many teams in our community. Our shop or Zoom room is always open to the 20+ teams that visit us annually to chat about our team organization/culture or to use our wealth of technical resources. In the Fall of 2020, we were invited by FRC Shanghai to do both a pre-taped and live Q&A with teams in China, so they could learn different approaches to running a team. At around the same time, FRC team 597 wanted to use quarantine to restructure their leadership. Since each team has its own values and circumstances, we take the time to learn about their team and share about our failures and lessons learned. This allows them to make the decisions that work best for their students. When FRC team 691 approached us about their problems regarding team culture, we saw them facing similar issues as us in past years. Our mentors and student leaders discussed our past failures, team cohesiveness, and techniques to improve student engagement. We then amended their team handbooks to better clarify the roles of team members. Other teams come to our shop or Zoom room for technical support. Team 2239 struggled to set up their pit promptly at competitions and fell in love with our solution of road cases. We understood their resources and circumstances, shared our designs, CAD files, invoices, and lessons learned to help them and 35+ other teams start making their own cases.

While we love when teams come to us for help, we also recognize the need to be the ones to reach out and offer support. In this time of lock-down, teams are more isolated and don't know who to turn to. During a normal season, our school would be buzzing with other teams using our practice field, learning how to use CNC machines, or chatting with the awards teams. Now, we share our Java lessons and loan out kit bots, so teams can run programming and assembly in parallel at different members' homes. We also invited local teams' Innovation Challenge groups to the three Expert Talks where students heard from medical professionals and asked questions about physical and mental health. We remain active mentors to team 6904, whom we founded in 2018, and provided a lot of support during their transition to virtual meetings. Because 97% of their students are below the poverty line, they don't have computers powerful enough to run video-editing software or other tools needed for the 2021 season. To remedy this, we set up times for their students to remotely log into our students' computers and get their projects done. When we heard that FRC team 8600 would be starting up this January, we leapt to their aid with a registration grant through Raytheon Technologies, one of our main sponsors. We also provide technical training, advice for approaching the challenges, and regularly chat with their leadership team to ensure that they have all the resources they need and answers to all their questions. Our Zoom room is always open to them and any other team in need.

Another failure that we are seeking to remedy is a world-wide lack of historically underrepresented groups in STEM. From our team's inception, we've partnered with our school's SWE chapter. Together, we've planned field trips to local aerospace companies, hosted panels of professional female engineers, and staffed annual hackathon-like events for 90+ local elementary and middle school girls.

Our core sponsor, Raytheon Technologies, shares our desire to increase the engagement of women in STEM. We've collaborated on events like the 2020 Women in STEM Panel where female STEM professionals, including one of our alumni mentors, shared their experiences and the impact of FIRST with 70+ young girls at the LA Regional. Our Robotics 360 events at schools such as Girls Academic Leadership Academy and the Barack Obama Prep Academy allow 200+ students to drive the robot and ask questions about FIRST. One 7th-grade girl approached one of our student leaders and said, "I'm really glad there are girls who look like me that are in STEM." To continue our impact, we also begin conversations with the schools' administrations to start FIRST teams at their schools. In a similar spirit to the Robotic 360 events, we participated in the FIRST Robotics Virtual Reality Experience in 2020. We offered a VR tour of our workshop and talked about FIRST's life changing impact, reaching over 16,000 people to encourage more schools and administrations to bring FIRST to their schools.

**Essay - page 2**

Besides building role models, our team also strives to build a culture of inclusiveness in a world that fails to understand how much better we can be with greater racial diversity in STEM. In 2020, we were invited to star in a FIRST-themed episode of Black-ish. Our members operated our robot during the on-show competition where the main character and his family realized the value of the FIRST program. We were thrilled to reach millions of people with this episode!

We also seek to increase the racial diversity of STEM locally. After the social unrest of Summer 2020 due to harmful, racially-motivated events, we created our "Uplifting Black Voices Dialogues". Members of our team, other FIRST teams, and the community came together on Zoom to discuss ideals and events impacting the Black community in a safe place. Attendees talked about their concerns and feelings while simultaneously educating others on the struggles they face. One team's mentor said, "the team knew and acknowledged the differences in over 100 participants from all over LA and asked thought-provoking questions on equity." As a result of this dialogue, we've been able to bridge the social and cultural gaps within our community. We challenged people to gain new perspectives, think critically, and feel inspired to take action in transforming a more inclusive and empathetic culture in STEM and everyday life.

In 2014, we saw a lack of awareness of FIRST and engineering engagement within our community. In response, we created our annual VEX/LEGO summer camp which inspires and exposes hundreds of K-9th students to STEM. The students' desire to continue after the camp led us to start 6 FLL teams in their schools/communities. As we began to expand our FLL efforts, we learned that many teams struggle to compete year to year due to cost and lack of resources. We've connected 25+ teams to our sponsor, Raytheon Technologies, to provide registration grants. We loan equipment and send mentors to 30+ teams to teach design, programming, and presentation skills. This season, we started FLL team 50743, Mission Mavericks. Using lessons learned from our own transition to virtual meetings, we've hosted programming lessons and weekly Project meetings through Zoom and mentored students at in-person, socially distanced robot sessions. We also transitioned our support of FLL Tournaments to the virtual setting by volunteering as referees for all of the LA FLL Qualifying Tournaments and the Championships. We will also be supporting the Spring round of tournaments in March.

Although our team urges our members to fail early and fail often, we also realize that failing with little consequence is not an option for everyone. Understanding this privilege, we strive to give similar chances to others in our region by providing historically underrepresented groups opportunities to engage in STEM, exposing our communities' youth to the engineering industry, and opening up our resources and home to all. With the help of our supportive sponsors, mentors, and students, we've flourished into a world-class robotics team that allows members to learn, fail, and attempt numerous times without significant impacts on their careers. In the words of our aerospace mentors: "It's better to fail on a $5,000 robot than a $1 billion satellite."