

## Chairman's Award - Team 4201

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2022 - 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. 12 alumni mentored *FIRST* teams, sharing their experiences as students and professionals from Raytheon Technologies, Boeing, and SpaceX. 2021 alumni, David, got an internship because of robotics for Northrop Grumman. His use of robotics knowledge and overall success earned him a return offer. David is just one of 11 of our alumni to intern for one of our sponsors.

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

Our community is economically diverse. We support local schools with events that cater to our low-income community by exposing them to STEM through demonstration and hands-on experiences. We also started FRC Team 6904, located in Watts, and continue to mentor them in strategy, design, business, and more. We share our wealth with lower-resource teams in our community such as our machining parts and sharing out-of-stock parts.

**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 8 years, we have hosted a robotics summer camp that has impacted over 1,100 students. Our students have also mentored 33 FLL teams, teaching both technical skills and teamwork. We teach these teams the skills and structure of our team to equip them for success in FRC. About half of our team now was once a member of one of our mentored middle school teams. This creates a never-ending cycle of passionate students ready to grow, learn, and teach.

**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, from rookie team 8600 to Hall of Fame Team 597, by training over 25 other teams in CAD, robot assembly, machining, and team organization. We've taught teams 3408 and 2637 CAD and prototyping processes. We also trained teams 5510 and 6904 in programming and offered Chairman's assistance to Team 3455, explaining our outreach events and process. Our team has assisted 28 FRC teams and mentored 8. No matter the status of teams, we share our knowledge and resources.

**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 had the opportunity to be a part of a Blackish episode "You Don't Know Jack" which focused on how robotics inspires students and parents. We hosted 4 elementary school expos in the past 3 years, impacting 450 kids. We have started 6 FLL teams through our Summer Camp and work with Raytheon Technologies to offer grants to 20+ FLL teams annually. We 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**

Our team works with NEXT Trucking to cover costs for transportation of tools and robots to Houston for teams in SoCal. Through our relationship with Raytheon Technologies, our students teach 3D printing to military kids and demo our robot at company events. Many of our alumni interns and employees represent the company at the 2021 LA Awards Show and the 2022 FTC Game Reveal. We have recruited several mentors to other local teams and advised the company of teams in need of grant support.

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

We strive to promote inclusion within our team through dialogues like Uplifting Black Voices and Stop the Hate, providing a safe space for students to discuss racial injustice. 100 people from the *FIRST* community attended the UBV dialogue and 70 people attended the STH dialogue. This year, we hosted weekly Zoom Women in STEM panels so students of local teams could meet different women and discuss their experiences in the STEM field.

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

Our team produces confident leaders through a team structure that pushes students to take charge. Our bi-weekly team meetings are led by students and student leads ensure tasks are completed well and on time, developing both technical and leadership skills. Our team is the face of our school. When they need a student leader, from tour guides to valedictorians, the first choice is a robotics student. Molding students into the face of our school ensures their continual support of our program.

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

We send regular newsletters and media posts to our sponsors to keep them updated and engaged with the team. We visit our sponsors and display our work to interest employees in mentoring *FIRST* teams. We engage our sponsors through Expert events.. We hosted and invited 10 professionals from surrounding companies corps to give Project advice to FLL teams and invited other teams to join us in interviewing health technology experts for Innovation Challenge.

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

Not all students know what the other students on the team do, because our team struggles with inter-directorate communication. However, knowing how to collaborate with those outside of their field is important to students' future careers. Currently, our team meets bi-weekly to update everyone about the progress of current tasks in other directorates. We also have a systems directorate in charge of helping our team communicate and facilitate the entire team's work.

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

We want all students to be confident in their understanding of a subject and see their contribution to the team, including our rookies. Last year, to help rookies over zoom still improve their skills, we guided them in designing a robot by themselves! This preseason, those students learned how to machine and assemble that robot. Many of those students learned so much that they are now leads in design and prototyping this year!

**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.**

We were honored to be selected by Disney to be a featured team in their new documentary "More than Robots". This film follows us through the build season and our regional competition. Our neighbors, Team 6904, were also featured which gave us the opportunity to highlight some of the inequities in STEM access, even between teams in the same county.

The film will premiere at SXSW to an audience of approximately 16K people. The trailer has reached over 300K viewers and is growing each day!

## Essay

"It's Technology Respect Teamwork It is More Than Robots". It was amazing to hear Jacob, our software director, speak these words in the trailer for the upcoming Disney+ Documentary which follows the 2020 journey of four teams from around the world. "It's More Than Robots" has been our team motto since our inception, reminding us we are not here just to win a competition, but to further the relationships between our teammates and our community.

To prepare our students for the future, our team promotes collaboration, communication, and outreach. Our four directorates - business, systems, hardware, and software - must work in a cross-disciplinary team, similar to what they will see in the industry, to make a myriad of projects possible. This enables our interactive pit presentation, care packages for rookie teams, and our Vitruvian Works initiative to offer assistance to teams at our competitions. Since our team's inception, we have been fortunate to have the resources to support FIRST teams both in our local area and around the world. In the past five years, we've assisted 45 FRC and FLL teams with technical support, tools, mentorships, and funding.

Over the years, we have developed a comprehensive team handbook, drawing from the community's best practices and our own experiences and challenges. We share this document with teams looking to improve team engagement. We meet with student leaders from every area of a team to share methods and resources. Team 3408, shared that their visit to our team's workshop inspired their members to improve their CAD skills and provided the resources to use their new CNC machine.

Team 597 visited our facility many times in the last few years and even joined a zoom session during our virtual season. Our student leaders impressed their lead mentor, Darryl, by running meetings and breakout rooms with minimal mentor guidance, inspiring him to rethink his communication strategy with his team during the pandemic.

We founded Team 6904 in 2018. We support them through training, loaning them tools, sharing our practice field, and this year, we are providing them a build space after the pandemic caused them to lose theirs.

We partner with our sponsors to support many local teams. When starting FRC teams 6904 and 8600, we shared their needs with Raytheon Technologies covering their rookie registration costs. We connected 33 of the FLL teams we mentored for sponsorships too. We demonstrate our robot at the annual Raytheon Engineering Games to recruit employees to FIRST like mentors for teams 702, 6904, and 294. We work with our sponsor, NEXT Trucking, to provide free transportation of robots and equipment to the Houston Championships, as just another resource we offer teams to reduce the cost and logistics of competing.

Each year, we host the FRC kickoff at our facility, allowing 15-20 teams to watch the livestream and pick up their Kit-Of-Parts. Some teams stay after the kick-off to join in our strategic discussions, game simulations or receive aid in assembling their kitbot. Team 691's lead mentor, Aaron, shared, "the strategy meeting allowed us to focus and hone down on what is feasible. Seeing 4201's prototypes and past robot designs provided a jumping off point for our own design and prototyping thinking."

In the first few weeks of the season, a large portion of our team builds a full-sized practice field in our AndyMark perimeter for teams to use. More than 20 teams regularly use our field each season which has increased the competitiveness of the region. A student from Team 2637 said, "it is really cool to come to their field and integrate with them because we aspire to be like them." We also host formal scrimmages both in the Fall and Spring, providing teams a competition-like setting for preseason training, mock inspection, pre-regional testing, and more.

Additionally, we were proud to host the 2020 LA Regional at our school and are preparing to host the 2022 event too, with our students and families supporting the events as volunteers. We operated our machine shop to create high-quality parts for their robots during competitions, and our practice field allowed teams to accurately tune their autonomous modes. We filled roles such as safety attendants, webcast operators, field reset, and field assembly/disassembly.

We always support teams at events but hosting allowed us to go a step farther, such as when Team 5553 from France had to bring their robots unassembled for their flight to the US. We hosted them earlier in the week and provided personnel and material to reassemble their robot. It was also a great opportunity to learn about robotics in other parts of the world.

We also celebrated the LA Regional with a Glow Dance, giving teams an opportunity to unwind after practice day and hang out outside of the competition. Teams from all over the world shared their cultural dances and songs while everyone built friendships that lasted long after the event.

We see how difficult it can be for women to engage in STEM fields in the industry. Two primary reasons are 1) girls aren't engaged in the field as early or frequently as boys and 2) women often do not feel supported in their technical roles. To increase gender diversity in STEM, our team created opportunities targeted at females in the FIRST community, from elementary to high school students. We aim to inspire younger girls by partnering with our school's SWE chapter.

Together, we've hosted three STEM activities, each impacting 100 elementary to middle schoolers.

## Essay - page 2

We support older students through weekly preseason Women in STEM panels, offering students from local teams an opportunity to hear from women in a variety of STEM-based fields. Each panel had about 15 attendees from teams in our region. One student from Team 691 said, "One of the speakers inspired me with her non-traditional path to a STEM career. I realized there is more than one way to become an engineer, that I can pursue all of my interests, from writing to research, and still tie them into my job." The panels gave students an insight into a variety of industries such as aerospace, construction, medical, while also giving general college and career advice. Our team also partnered with one of our sponsors, Raytheon Technologies, for the Women in STEM panel at the 2020 Los Angeles Regional which impacted 100 people.

To increase the STEM pipeline and bring younger students into FIRST we support Hackathons at our feeder elementary and middle schools. Our students work with teachers to organize activities, assemble building kits, and mentor student groups. Through engineering-based activities we introduce STEM concepts and encourage the continuation of STEM activities at home. Over the past four years of mentoring students at these Hackathons, we have impacted 350 students. Maya, one of the students who consistently supports these events said, "It is amazing to see a student who starts out nervous and quiet at the beginning of the day, leading the group to success by the end of the event."

Beyond engaging our community for FIRST, our students gain experience in running events and teaching the next generation. These roles help students become better collaborators and feel more confident with themselves. For eight years now, we have hosted summer camps, teaching K-9 students robotics skills with an FLL-style recreation of the season's FRC game. Many of the students who consistently help out moved on to become strong leads on the team. Over 1100 students participated in our camp and went on to join one of our middle or high school robotics programs. One of our students, Matt, was a camper from 3-8 grade. He said, "The student mentors made the activities very fun and engaging, I kept wanting to come back every day. The problem solving skills I learned have helped me out on the team now." Over half of our current members attended a summer camp or were mentored by our students at a local Hackathon!

Through hosting these summer camps, we built connections to mentor 31 and start 7 FLL teams, impacting over 300 students through weekly mentorship. Our students also volunteer at FLL tournaments as referees, field reset, scorekeepers, judges each year. Our students inspire the FLL students so much that parents from FLL Team 50743 wanted their students to switch school districts so that they could attend Da Vinci and continue to participate in Vitruvian-run events. We connected those parents to teachers and administrators from our local middle school, and two of the students transferred and participate in our middle school robotics programs.

We started and mentored FLL Team 16555, teaching them about time management, decision matrix, and the engineering design process. After consistently performing well at tournaments, other FLL teams began reaching out for help, starting 16555's run as a mentor team. We taught them how to effectively mentor teams virtually through Zoom meetings and regular follow-ups.

Our Robotics 360 events target students in economically impacted regions of our community. We gave over 200 students a taste of FIRST experiences like driving robots and began discussions with administrators on implementing FIRST programs in schools. Though the pandemic certainly challenged these efforts, Girls Academic Leadership Academy (GALA) started their award-winning FTC and FLL programs, and we are eager to continue traveling to schools around the LA Area and encouraging such programs.

FIRST offers a bounty of learning opportunities to impact our futures. Our mentors love to tell our parents that "FIRST is sneaky students focus on the robot and the competition, but we trick them into becoming the next leaders and innovators of society. It is definitely more than robots and the only sport where everyone can go pro!" It is with these words that our students collaborate, communicate, grow, and inspire to share that experience with as many students as we can.