

More Than Robots

Walk onto the Da Vinci Science High School campus almost any day of the week and you will find Team 4201, The Vitruvian Bots, hard at work. Our team has evolved from a rookie team to a successful, established team in just four years because of the dedication of our students and mentors. As we have worked to establish our team, we have also been reaching out: we are now spreading our passion for engineering to the younger generation and sharing the FIRST message throughout our community. This year, we founded and mentored FLL team 16555, who won the Robot Design Award and the Industrial Design Award. We taught 230 students robotics, teamwork, and engineering design at our summer camp. We volunteered at more FLL competitions than any other local team, winning two volunteer awards. We've assisted other FRC teams, including helping one rookie team get started by teaching them programming and electronics. And we're proud to have introduced 200 middle and elementary school-aged girls to STEM through our Femineers days.

When asked, many children in our community say that they want to grow up to be firefighters, football players, or even movie stars, but very few of them say "engineers." Team 4201 is working to change this. As engineering aficionados ourselves, we understand the importance of introducing engineering to children at a young age, and therefore have worked to expose the kids in our community to engineering in fun and captivating ways.

Over the past three years, 4201 has provided yearly two-week engineering summer camps for local middle and elementary schoolers where the students get to design their own robots using VEX equipment. This past year we had our highest enrollment yet with 200 children in grades 1-8 attending. Team members design the curriculum and invent a new game challenge each year. In addition, each 4201 member teaches and mentors a small group throughout the design, building, and competition stages. During the two-week engineering camp, students learn the importance of working as a team while participating in a competition with one another. Many of the kids are so enthusiastic about the camp that they choose to come back for an extra week to get even more exposure to engineering. Team 4201 hopes to encourage these young people to continue their engineering education and pursue a career in STEM. Of course, we also hope they will choose to attend Da Vinci Science High School and join us on Team 4201.

We started our own FLL team this year, Team 16555, The Masterminds, at our sister K-8 school, the Da Vinci Innovation Academy. Our 4201 students are The Masterminds' primary mentors. At the November 2015 Qualifier match, 16555 won the first place Robot Design Award, and at the December 2015 LA FLL championship, they won the Industrial Design Award out of the 349 teams in the greater LA area and qualified for the FLL North American Open. To help the team, three of our members visited them weekly, or more often, to advise them on robot design and coding, and they continue to mentor The Masterminds as they prepare for the FIRST Lego League invitational at Legoland.

For the past two years, 4201 has contributed to FLL by volunteering at local competitions as judges and referees. Our lead mentor, Fazlul Zubair, has volunteered with FIRST every year since 2011; in 2015 he worked with his company, Raytheon, to raise \$95,000 for FRC teams

and the LA regional event. In addition, he is on the FIRST LA Regional Organizing Committee, where he is in charge of mentor recruitment. In 2015, under the mentorship of Mr. Zubair, every single member of 4201 volunteered at at least one FLL event in the LA area. In fact, 4201 collectively won the Outstanding Volunteer Award for over 350 total hours of work at the tournament this season and one of our members won an Outstanding Individual Volunteer Award for his willingness to take on any task.

As the Vitruvian Bots have grown as a team, we have expanded our efforts to reach out and assist other FRC teams with less experience or fewer resources. Last year, our team's Programming Lead has helped two teams in the pits with last minute programming challenges during competitions, and this year he has provided technical assistance to one of those teams, 5678, which focuses on autistic students. 4201 has reached out to various other FRC teams, spreading the spirit of FIRST during and outside the build season. For example, our Director of Controls has helped several FRC teams, including 5851, a team who visited us and requested assistance with coding and programming. We have also assisted team 1759 by recommending design components of their drive train, and we have helped 294 with CNC machining.

Our team also inspires more female and minority students to pursue engineering. Team 4201 members lead Society of Women Engineers (SWE) and started Femineers Day, a monthly event hosted by the 4201 SWE members and dedicated to inspiring more than 60 5-to-14-year-old girls in our district to pursue STEM. In addition to SWE, 4201 members founded our school's other engineering clubs, Society of Hispanic Professional Engineers (SHPE) and National Society of Black Engineers (NSBE). Because 47% of the students at Da Vinci Science are considered low income and 55% are Latino, clubs like these help spread our love for STEM on campus and foster a racially diverse 4201 team.

SWE, SHPE, and NSBE were founded by our team members who wanted to share the love for engineering they had discovered in FRC. Many 4201 alumni are now at MIT, RIT, Stanford, UC Berkeley, Cal Poly San Luis Obispo, and other four-year universities. Among the Team 4201 graduates of 2015 (84% of whom are minority students), 92% are majoring in STEM fields, 75% are majoring in engineering, and 67% are majoring in mechanical engineering specifically. The 4201 class of 2015 was recognized with prestigious national and university awards such as the National Society of Black Engineers' Scholarship, the Engineers' Council Scholarship, the Stanford Fund Scholarship, the RIT Achievement Scholarship, and the Gates Millennium Scholarship.

Team 4201's outreach is not limited to the younger generation and our own students. We also share our work and accomplishments with adults in the professional world to change perceptions of FRC and engineering for the better. This past season, Hasbro Studios sent a director and writers to observe our team at work for a film they are producing about kids in the STEM fields. In fall of 2015, four 4201 members competed at Google Headquarters in Los Angeles to brainstorm ways to incorporate STEM topics into media, specifically TV shows. Each group worked with the producer and writer of their assigned show to incorporate STEM, and one of our groups won first place for their ideas to be used in the television series *Pretty Little Liars*. In November 2015, Team 4201 presented at Barnes and Noble's nationwide MakerBot Fair and educated the South Bay community about STEM, FRC, and our robot. We also presented at SpaceX, Boeing, and Raytheon, all of which are team sponsors. Five 4201 members presented

as interns at the event, and they worked over 125 hours over 7 weeks during the summer. One of our team members received the “Overachiever Award” for going above and beyond in his work at Boeing.

We have been successful in keeping our 4201 alumni involved with the team: some visit bi-annually, some come every few months, and one has been a team mentor for two years. One of his most significant accomplishments has been working with our team to create a scouting app for competitions. Alumni also volunteer at FLL tournaments and work at our engineering summer camp. They attend meetings to give their input on our work. We have added an alumni section to our 4201 website and started an alumni Facebook group so that former team members may still be involved. They continue to express their love for robotics by helping current 4201 members develop ideas and strategies.

Over the past five years, 4201 has grown to become a strong, well-known FRC team because of the incredible learning experiences provided by mentors and sponsors over the past seasons. Since the establishment of 4201, we have been awarded the following achievements: Ventura Regional Finalist, 2015; Industrial Design Award, 2015; Imagery Award and Quality Award, 2014; and Highest Rookie Seed Award, 2012. Our 4201 members have also received recognition for their passion for FIRST by the Dean’s List award: one member won the national award in St. Louis in 2014 and another member was a finalist in 2015. Last season, our team’s hard work and preparation paid off and 4201 attended the World Championships, reaching the quarterfinals in the Archimedes Division. Evolving from a rookie team to an accomplished team with a dedicated outreach effort in only four years demonstrates our dedication to FIRST and the passion that fuels 4201 to continue to expand and develop the FRC family.

As proud members of the Vitruvian Bots Team 4201, we realize that we can accomplish even more within our community. Next year, we will start a second FLL team, expand our Summer Engineering Camp, and continue our outreach with FLL and FRC. In 2017, our new campus facility will open and will also house two sister schools, Da Vinci Design and Da Vinci Communications, which don’t have a STEM focus. We’re looking forward to helping these schools start their own FRC teams.

We know that if we push ourselves and continue to spread the FIRST message, we can truly affect and inspire our community. We are a family that sticks together, learns from mistakes, and encourages each other to strive to do our best. As we grow as a team, so will our capacity to reach out to the younger generation, other teams, our campus and alumni, and the professional community. In the end, it’s more than robots -- it’s inspiration.