STEAM WORKS FOR ELM CITY ROBO SQUAD

For the 2017 FRC game STEAMWORKS teams are working together to place gears on a gear train to engage the rotors on their airships. Similarly, our Service, Teamwork, Evolution, Ambitions, and the Measurable Impact that we have on our team members all serve as gears that interconnect to power FRC Team 558, Elm City Robo Squad, from New Haven, CT.

SERVICE

One of the greatest qualities of Elm City Robo Squad is the impact that we have on those around us. From FLL to FRC, our team strives to make a difference, no matter how small. We aim to spread the message of FIRST within the FIRST and local communities.

The students of today are the engineers of tomorrow, making our work with children in FLL very important. We mentor FLL Team 1097, the MASHbots, at Mauro-Sheridan school in New Haven. For four years we have hosted our own FLL qualifying event, Elm City Robo Fest, where students volunteer as announcers, referees, field managers, judges, and technical staff, among other positions. We also volunteer for the Shelton FLL qualifying event and the CT State FLL Championship.

Our team recognizes the importance of serving as a role model for the FRC community. Team members present at NEFIRST University Day, with topics including drivetrain design, use of pneumatics and off-the-shelf components, talking to judges, and Chairman's discussion. Our alumni have also gone on to serve the FRC community after graduation by mentoring: one alumni, Manaf Sami, mentors Team 5856, The BullBots; another alumni, Jacob Sussman, mentored Team 5400, WARP; and several alumni--including UCONN student, Duna Sami, and Yale student, Vishal Patel--have returned to Elm City Robo Squad to mentor our team.

For five years we have helped fellow FRC teams by running a chassis Quick-Build Class during the Connecticut FRC Kickoff, and we noticed that some teams needed extra help during build season. This inspired our team to collaborate with 20 mentors from seven Connecticut teams to start a new program and website: FRCrentamentor.com. The site matches skilled mentors to teams with specific areas of need, such as building a sturdy drivetrain, LabVIEW programming, and brand identity. FRCrentamentor.com is our way of providing access to help in a concise format so that teams can easily ask for assistance.

In addition to serving our FIRST community, we also serve our local communities. For the past two years our team has conducted demonstrations at Camp Rising Sun in Colebrook, a camp for children diagnosed with cancer. Students demonstrated the robot and showed the children that the technology they usually associate with stressful medical treatment can bring them joy. Our annual service project, helping to make 50 blankets for children that receive services from the Dept. of Children & Families, began two years ago when the Orange Congregational Church reached out to us for help. In 2016, we ran a Polar Lights Robot Workshop at the Minds in Motion event in Westport, where we taught middle schoolers how to build a lighted robot display and provided an introduction to FIRST. We also broaden our outreach by attending events such as the East Haven Fall Festival, the Spooktacular Cruise-In Car Show in Guilford with FRC Team 2067, and the Cheshire Memorial Day Parade with FRC Team 999, where we are able to inspire members of our community to get involved in FIRST.
TEAMWORK

Our mentors and veteran students work with the team to ensure that every student has a well-rounded skill set. With the growth of our team in the last 2 years, we created a checklist to track members’ proficiency in various skills, including use of hand and power tools, proficiency in manufacturing software, and award, fundraising and outreach skills. This allows us to track which students are capable of leading projects and which students need more experience.

Not only do members of Elm City Robo Squad work together on our team, but we exhibit Coopertition by working with other teams in the heat of competition. Last year when fellow New Haven magnet school team, FRC Team 5142, the Robodominators, had wiring trouble at the Hartford District event, our teams worked together to fix their robot. This season we are continuing to help Team 5142 by providing wiring and Java programming assistance in our workroom. In 2015, we reached out via Facebook to FRC Team 4481, The Rembrandts, from the Netherlands, to offer assistance because they were having trouble getting parts from companies that only ship to North America. We set up a plan to ship them parts and the partnership continues today.

EVOLUTION

Elm City Robo Squad has changed dramatically over the past 17 years. We have grown from a handful of students meeting in our school basement to a team of more than 30 committed students who meet every weekday in a robotics workroom. We established a communication network using a variety of resources including our website, blog, social media, and email. This allows us to communicate with more than 200 students, alumni, mentors, parents and sponsors.

As we have grown, we have become sustainable by fundraising. We cultivate multiple streams of income to ensure that we bring in the funds necessary to sustain the team. In addition to grant writing and soliciting corporate sponsorships, we have special fundraising events that are run by our students. At fundraisers, our students demonstrate our robots, show children videos of our robot, and inform parents about getting their children involved in FIRST. While hosting typical fundraisers such as bake sales and Shake-the-Can events, we spread the FIRST message to the public.

Last season, the team began keeping a budget, financial statement and business plan. We also worked to strengthen relationships with our sponsors, including Yale, United Technologies, Comcast, Parker, United Illuminating and Best Buy, by sending thank you letters, visiting them and inviting them to visit us at our workroom and competitions.

Not only have we watched the team evolve but we have seen each student grow as an individual. Students who are tentative about using tools and technology become proficient and able to teach their fellow students. Some become passionate and outgoing team leaders. Our students inspire change within our school; last year, robotics students formally requested the addition of AP Physics to the curriculum and asked a physics teacher to become certified to teach AP Physics. Thanks to their efforts, the class is being offered this year.

AMBITIONS

We are aggressive in growing our program through sponsorship. Our team can’t be competitive or educational if it isn’t properly funded. For two years, we have won grants from the Best Buy
Foundation for the purchase of a mill, lathe, a tabletop CNC router and computers to teach computer-aided design and machining. These additions to our program help us to prepare our students for college and the job market and help us to bridge the digital divide in the inner city. We have also been able to add five corporate sponsors (Parker, Square 9 Softworks, National Instruments, BAE, and Svigals & Partners), three foundation sponsors (Best Buy Foundation, Walmart Foundation and Frederick A. DeLuca Foundation), and several bronze and silver level sponsors.

We are also working towards our goal of starting an FRC team abroad. Last year, one of our students wrote a proposal to start a new team in her country of origin, Sri Lanka. The future team contacted their education department and introduced the school system to FIRST. We were able to facilitate a discussion about how to create an FRC team, and provide information about the required finances and resources. Now, educators in Sri Lanka are planning to start an FRC team at Prince of Wales’, a high school in Colombo, Sri Lanka. The team is looking for funds and sponsors in order to begin their FRC journey. Thanks to the efforts of Elm City Robo Squad, students halfway across the world will soon be able to join in the excitement of FIRST.

**MEASURABLE IMPACT**

One of Elm City Robo Squad’s greatest attributes is our immense diversity. We are fortunate to reside at Career High School, an inner-city school in New Haven, as it provides us with students from various ethnic, religious and cultural backgrounds. Our student diversity translates to multiple perspectives and problem solving approaches to any challenge that we face. Our team demographics are 61% female, 39% male; and 12% Black, 44% Asian, 15% White, 20% Hispanic, 7% Arab, 2% Other.

Elm City Robo Squad recruits diverse students by offering a fee-free program for both membership and competition travel and without rigid membership requirements. Because of this, we are able to recruit students of all backgrounds that do not have the resources to be on a pay-to-play team. All students are welcome regardless of time commitment. This is important in the inner city where students have limited access to transportation for activities. We believe that if we can touch the lives of many students with a small amount of education that this is better than nothing at all. This translates into more students interested in school and STEAM, and more students likely to graduate, go to college, and even obtain scholarships. Elm City Robo Squad has a measurable impact on its students: we have a 100% graduation rate and all of our students attend college or join the military. This is dramatically successful when compared to the New Haven Public Schools where only 76% of high school students graduate. Many of our students receive scholarships and most major in STEAM fields.

**STEAMWORKS**

STEAM works for Elm City Robo Squad. By Serving our community, emphasizing Teamwork, Evolving together, sharing goals and Ambitions, and having a Measurable impact on our participants, we are able to embody what it means to be a FIRST team.