

Chairman's Award - Team 6328

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2021 - Team 6328

Team Number

6328

Team Nickname

Mechanical Advantage

Team Location

Littleton, Massachusetts - 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.

Our annual roster of 30-40 FRC and 20-30 FLL students over the last 3 years come from 8 school districts. Students learn teamwork, CAD/CAM, software, machining, and media. Our student leads coach subteams of their peers, gaining valuable leadership experience. They grow as engineers and as well rounded people. 100% of our alumni are pursuing STEM majors in college; our oldest alumni are about to graduate. Many of our FLL alumni have become FRC students and returned to coach and referee FLL.

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

Our community, FIRST and our global connections form our team and our motto: "Ohana means family. Family means no one gets left behind." As a community team, our family is uniquely positioned for wide reach such as organizing FIRST at WaterFire in RI (2019), where we brought 13 teams to 100,000 people! After going virtual, we continue outreach with CAD, software, and leadership training programs, partnering with other FRC teams for a summer camp, and leading online workshops to global audiences.

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?

Our outreach has 9 tiers such as FIRST Global, Girl Up, and Open Alliance. Pre-COVID, our local robot demos were a mainstay for kids, drawing them to FLL. We have now pivoted to virtual outreach, including a Team Sustainability talk with 24 Hours of STEM. All 6328 members participate on our business team; every year they propose new outreach/fundraising ideas. We carefully track outreach hours, with 2027 outreach hours before the 2020 season and 1659 hours during COVID as of mid-Feb for 2021.

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

FRC6328 embodies Gracious Professionalism in all we do. We are founding members of the Open Alliance, publishing our design process, outreach resources, and scouting data for a full transparency. We provide important resources and training guides for teams, including rookies, and encourage them to do the same. As members of the Compass Alliance, we run local quiet rooms and assist teams worldwide. We volunteer at events at every level of FIRST, outreach events, as LGBTQ+ ambassadors, and more.

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

We strongly emphasize mentoring, assisting, and guiding other FIRST teams. We coach up to 10 FLL teams, and have assisted 29 FRC teams. In 2020 we delivered care packages to all 8 NE rookie teams. Our 9 published resource guides include starting an FLL team and running a sponsorship campaign. We host 5 annual FLL events and have hosted 2 FLL camps overseas. For 2021, our mentors started rookie FRC8604 and our students are assisting FRC811, rookie FRC8567, and supporting the NE 2020 rookies.

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?

In COVID, we created virtual training programs including Leadership, CAD, Manufacturing, Sponsor Outreach, and Project Management. We run many FLL teams, our successful FLL-to-FRC transition program, and our FLL coaching program. We partner with Scouts to bring robotics to scouting and are developing a Student-to-Mentor transition program for college students. We host an annual college counseling seminar open to our community and NE FIRST. All of our alum so far pursue STEM college majors.

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 work with Patriot Beverages, the provider of our workspace, to promote STEM and we have met with Littleton's and Bolton's Select Boards several times. Our state reps regularly attend our events; these are key relationships for STEM advocacy. We work closely with our rookie sister team FRC8604 to share enthusiasm, ideas and resources. Our passion for the Open Alliance connects us with global teams. In 2019, a local foundation was inspired to provide an additional grant for a 3D printer.

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

One of our core tenets is to support female students at a time when they are most likely to leave STEM. Our FLL-to-FRC Transition program helps engage and maintain their momentum. We have team members with special needs, and work with them and their families at whatever level is appropriate. We ran several programs with Best Buddies in 2018 and 2019. In summer 2020, we ran a social justice book club, open to the public, to discuss important questions that impact all aspects of our world.

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

Sustainability is the core of our planning with experienced students mentoring newer students. We plan equipment investments to provide multi-year education and foster meaningful partnerships with sponsors. We engage with young students at community events, knowing many will join us in 8th grade. Annually we evaluate and improve our program for a better student and mentor experience. With student learning as the heart of our team culture, we know there's always room to add, improve, and adapt.

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

We host an annual Pasta Dinner and Open House, which are well attended by sponsors. We send regular Sponsor Newsletters to maintain relationships. In 2020, we sent a thank you letter to each sponsor detailing our accomplishments despite COVID. We regularly visit sponsors to show their impact. Two of our alums have interned with sponsors and will continue this summer. To pivot during Covid, we developed a virtual Sponsor Outreach training, along with a coordinated sponsor outreach program.

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

FRC6328 is constantly working on our team structure and striving to find the most effective way to engage all students in areas that interest them. For 2021 our team is revising the student-led approach with 10 different technical and business student lead positions open to all students with the goal that students will take on more project management each year. As students graduate and new students join, more robust documentation practices are required to sustain this student-led approach.

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

We prepare the next STEM leaders through collaborative learning to build confidence and skills in teamwork, leadership, accountability, and communication as well as technical and business work skills. All of our team alumni are pursuing STEM fields in college; our oldest alums graduate this spring, and will bring their FIRST experiences into the workplace. Our commitment to honestly evaluate the successes and struggles of each season means that each year we push our limits to meet our goal.

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.

FRC6328 firmly believes a rising tide lifts all boats. We focus on making useful information available to all with our resource guides, virtual training programs, and Open Alliance dedication. We participated in the 24 Hours of STEM to present rookie team sustainability, which is very close to us as we foster our sister team FRC8604 and assist other rookies. Mental health is a priority on FRC6328, and we implement quiet rooms in every FLL and FRC event we attend, including 2019 World Champs.

Essay

Part 1: Our Roots

"New branches are formed every second of every day□ Each twig has traveled only one journey. But there are still other twigs□ This is a tree of life," according to Matt Haig's *The Midnight Library*. Our team is a family tree with twigs and branches grown from the same roots, yet developing in different directions. Mechanical Advantage was formed in 2016 with 11 students who left a memorable impact on the Littleton, MA community, and has continued to grow in numbers and experience. FRC6328 currently has 30 students from 7 school districts in grades 7-12, with people of color comprising 33% and female students comprising nearly 25%. Our 23 mentors come from a variety of backgrounds including college students, parents, and adults with abundant FIRST experience.

As our tree grew from a sapling into full blossom, we worked in multiple workspaces such as a vacant high school classroom, a home garage, and our current 6,269SF space. Generously provided by Patriot Beverages, our biggest sponsor, the space has given our team a unique opportunity to work safely in-person amidst COVID-19. A former R&D building, our workspace has a shop, assembly room, and several other rooms, allowing for social distancing. Following state guidelines, we rotate in small groups of students and mentors and make improvements on the 2020 robot. Since the start of lockdown, most of our subteams have been entirely remote, holding weekly meetings online for updates.

To prepare for each season, we evaluate the current team structure and make necessary changes to give more students leadership and learning opportunities. For 2021, we divided FRC6328 into a mechanical team and a business team that are further subdivided into CAD/design, electrical, scouting/strategy, manufacturing, software, awards, marketing, and outreach. We strongly reinforce student leadership by encouraging every student to apply for a leadership position, and we create new positions as needed to give more students a lead role. By requiring minimum outreach hours for student team membership and giving all students opportunities to work on the robot, we emphasize the importance of balancing technical and business aspects. Training programs that cater to both facets have been a major focus and opportunity for team growth in the past year. Formerly, some new students had trouble finding footing on the team. To tackle this issue, a handful of mentors and students designed and held extensive offseason training programs consisting of scouting/strategy, software, CAD, manufacturing, sponsor outreach & fundraising, leadership & communication, and project management training from the summer to fall of 2020 (most of which are available to all on our website). Through these programs, students tried their hand at different areas of the team to find what best suited them. The training helped equip students with technical, leadership, and life skills they use every day inside and outside of FIRST. To further increase involvement of new students we introduced a 1-to-1 learning model, in which we pair new and experienced students to give students more exposure in their subteams. This helps us create experienced young leaders who are ready to fill the roles of older, graduating students. Passing on knowledge creates long-term sustainability by strengthening our tree, allowing us to build more branches in the future.

We express gratitude and thanks to our sponsors with newsletters during the build season, an annual fall update, and an End of Build Open House. Communication with sponsors to stay updated on our build, competition, and off-season activities is a critical part of our roots. The story of how we acquired our workspace underscores the key role outreach and community connections have in maintaining team function and sustainability. In response to our efforts to spread the FIRST message through different forms of outreach, sponsors have invited us to visit their operations and taught us about various industries, worked with us to place interns, and we are currently working with two Senior Mentors to develop a more comprehensive relationship between NE FIRST and one of our sponsors.

Part 2: Growing Branches

Ahead of the 2020 season, we reached out to all 8 New England rookies to provide support. Our mentors and students spent several weekends driving around New England to meet them, assisting with technical issues, making parts, programming, and gifting care packages. These "Welcome to the Family" bins included FRC6328 resource guides and mini quiet room setup among other items. We are continuing our rookie team support into 2021, reaching out and working with some current rookies. Through 2019, we were delighted to work with two all-female FIRST Global teams in Liberia and Afghanistan. For 2021, one of our founding mentors started FRC8604 at Minuteman High School as our sister team to further support FIRST and provide STEM opportunities for students. Since kickoff, our mentors and students have been regularly attending FRC8604 meetings and social events to share ideas, advice, equipment and experiences with our rookie sister team.

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Mental health has always been a primary branch for FRC6328. We posted weekly on our team social media in the summer of 2020 with #MentalHealthMondays. Each week, we created encouraging reminders on social media to spread positivity. Over that summer, our team members also ran a Social Justice Book Club to support the Black Lives Matter movement. We held weekly meetings with people inside and outside of FIRST to discuss *So You Want to Talk About Race* by Ijeoma Oluo, and sold t-shirts to raise money for BLM groups. In June, we held a Pride Month fundraiser by selling FRC6328 pride socks and t-shirts. Profits proceeded to Time Out Youth mission, an organization that supports LGBTQ+ youth in Charlotte, NC.

We are a founding member of the Open Alliance. It quickly became one of our primary branches and participating teams became an extension of the FRC6328 family tree. We collaborated with FRC teams across the globe to share our build season progress on Chief Delphi. We published all aspects of our work from 2020 including our design process, CAD, outreach/awards resources, and scouting data. We have continued this effort into 2021, striving to be a source of inspiration for teams that have struggled due to the pandemic. For our build thread this year, we continue to upload CAD and videos of our robot, updates of our progress for different challenges and awards submissions, and training programs. Overall, we have 22.8k views on our YouTube channel, and 39.1k views and 265 replies on our CD thread as of mid-February.

Part 3: Strengthening Our Trunk

Team sustainability is the most important way to build and strengthen our family tree. We integrate FLL graduates onto the FRC team with our FLL-to-FRC transition program, encouraging them to try out pit crew and drive team roles at offseason competitions and giving them hands-on technical experience. FRC6328 mentors and students coached 6 FLL Explore and 4 FLL Challenge teams last year. These teams draw from multiple communities to promote involvement in STEM to more audiences. Close relationships between coaches and students extend the feeling of family to FLL, making their transition onto 6328 smoother so they aren't intimidated by the intensity of FRC. We also engage 8th graders as full FRC members to maintain their momentum from FLL to FRC.

To spread the word of FRC6328's approach to maintaining a long-term stable structure, our team members recently gave an hour-long presentation on team sustainability for 24 Hours of STEM. Through a Zoom meeting broadcast on YouTube, we gave our know-how and advice on how to tackle issues that can come with the different life stages of an FRC team. In addition, our team supports sustaining girls in STEM. We expanded our traditional Girl Scouts badge events held in 2018, 2019, and 2021 by developing an event for Girl Scouts Daisies to acquire 3 robotics badges.

With COVID-19, we converted many of our outreach activities to a virtual format. The team designed new curricula consisting of at-home challenges for FLL teams and put together a packet, partnering with MA FLL to send it to every state FLL team as well as regional partners in New England and NY. Our annual in-house FLL summer camp adapted a similar structure, where we provided kids with weekly robot, project, and core values challenges to complete at home. We ensured all FLL students either had access to an EV3 kit or a virtual robotics toolkit, which allowed them to build and program their own FLL robot in a virtual environment. Participants could share their work and ask questions during weekly online meetings. We are proud to have 4 competing FLL teams this COVID season that function while meeting all safety regulations, keeping students from missing out on yet another fun activity this year. In response to COVID-19, our team has also participated in PPE work. A mentor on our team collaborated with FRC5254 in NY to make PPE, printing over 500 face shields and 100 ear savers. We are proud that our outreach hours grew from 854 in 2018 to 2027 before the 2020 season, and we are on track to reach more than 1700 outreach hours even during the pandemic, keeping our trunk strong.

Conclusion: Our Family Tree

Each of us brings a fresh perspective to our team, allowing our family tree to weather even the fiercest of storms. When a storm hits and a branch is broken, it leaves behind a scar-like knot that can make the tree stronger. COVID-19 has created a knot and pushed us to improve our communication and cooperation skills. We continued our outreach efforts while developing new ways to hold meetings, share progress, and resume technical work. Every subteam contributes to nourishing different parts of the tree. Each season, our roots grow deeper into the soil and our branches grow higher into the sky!