

# 6328

---

## MECHANICAL ADVANTAGE

---

LITTLETON, MA

*Chairman's Submission*  
*2022 Season*



# Chairman's Executive Summary

1) 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.

Annually we have 35-45 FRC and 50-60 FLL students, growing over the last 3 years to draw from 10 school districts. Students learn design, CAD/CAM, software, machining, media, and project management. Our student leads coach subteams of their peers, gaining valuable leadership and management experience. 100% of our alums are pursuing STEM majors in college; our oldest alums graduated in 2021. Many of our FLL alums become FRC teammates and return to coach and referee FLL.

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

Our team's guiding principle: "With a robust trunk, lengthening branches, and deepening roots, our 6328 family tree thrives in the larger ecosystem, providing shade for generations of saplings to come." As a community team, we are uniquely positioned for wide reach such as organizing WaterFire in RI (2019), where we brought 15 teams to 100,000 people! Our commitment to our team family and nurturing our larger communities, inside and outside of FIRST, means our impact isn't bounded.

3) 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 many branches like *FIRST* Global, town events, and Open Alliance. Robot demos at town parks delight onlookers. We design new missions/field elements for in-house summer FLL programs. Through COVID, we continued virtual outreach, including a Team Sustainability talk for 24 Hours of STEM and a virtual Holiday Bazaar. All 6328 members participate in outreach/fundraising to fully understand team sustainability. We totaled 2027 outreach hours in 2019, 1927 in 2020 and 2250 in 2021.

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

As one of six founding members of the Open Alliance in 2020, we publish design/CAD, software, outreach resources, and scouting data as we build. We provide important resources and training guides for FRC teams, especially rookies, and encourage others to do the same. As members of the Compass Alliance, we run local quiet rooms and assist teams worldwide. We also volunteer at various *FIRST* events, outreach events, as LGBTQ+ ambassadors, as advocates for STEM education legislation, and much more.

5) Describe your team's initiatives to assist, mentor, and/or start other FIRST teams with emphasis on activities within the past 3 year.

Our emphasis on mentoring, assisting, and guiding other FIRST teams helps to build a stronger FIRST community. We coach up to 10 FLL teams annually, and have assisted 50 FIRST teams. In 2020 we delivered care packages to all NE rookie teams, and will again in 2022. We have 39 published resource guides/curricula on our website and add to the list every year. Since 2019, we have worked closely with 8604, 8567, 2168, and 7407 to directly support each other and share resources.

6) 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 efforts in the past 3 years?

Last June we lobbied for STEM education in underserved areas to Congress offices as Student Association for STEM Advocacy ambassadors, securing funding for legislation to support youth in need. Since COVID, we continued virtual training of Leadership, CAD, Software, Sponsor Outreach, etc. to build student confidence. We published a guide on our Student-to-Mentor transition program for college students, introduced robotics to Scouts, and hosted annual FLL Practice Interview Days for local teams.

7) Describe the partnership 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 meet with local government boards regularly and our state reps attend our events, providing key opportunities for STEM advocacy. In 2020 we helped found the Open Alliance to shift the culture of secrecy around the build season which connects us globally with FRC teams. We work with WPI students in our Student-to-Mentor Transition Program, and have partnered with FRC7407 to pilot the Chairman's Alliance in 2022 to give teams a space to work together when developing their CA presentation.

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

Our FLL-to-FRC Transition program exposes FLL members to FRC early on, decreasing intimidation for girls. In 2021, one of our mentors joined the FIRST Access Advisory Board to advocate for more inclusion across FIRST. In 2020, we ran a public social justice book club to discuss important questions, and held a pride merch fundraiser for local LGBTQ+ organizations, raising nearly \$1,000 over two years. In 2019, we ran a LEGO robotics event at Jackson Mann community center for low-income youth.

9) 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 ones. We plan equipment investments to foster multi-year learning and meaningful partnerships with sponsors. We engage directly with our FLL teams, knowing many will join FRC. We have a Student-to-Mentor Transition Program that helps newly graduated students turn from learning to guiding. With student learning as the heart of our team culture, we know there's always room to add, improve, and adapt.

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

Pre-COVID, we hosted annual Pasta Dinners and Open Houses, which were well attended by sponsors, and regularly visited our sponsors to show their impact. To pivot during Covid, we developed a virtual Sponsor Outreach training, along with a coordinated sponsor outreach program, training all new teammates on the benefits of getting to know our sponsors. We send regular Sponsor Newsletters to maintain relationships, including thank-you letters to each sponsor detailing our accomplishments.

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

We are constantly working to improve team organization and efficiency. During the 2021 season, we worked to incorporate project management principles into team operations through GANTT charts, allowing us to keep track of projects. After the season we held "lessons learned" sessions in which we reflected on the season and identified specific action items to further improve team efficiency. We also held project management training to get our students well versed in project management principles.

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

We prepare STEM leaders through collaborative learning to build confidence and skills in teamwork, leadership, communication and technical skills. The Open Alliance brings this commitment to the FIRST community at large. It can be scary to share as we go, knowing it could blunt our competitive edge, but a rising tide lifts all and we focus on making useful info available to all. As one of 6 OA founding members in 2020, we are thrilled to watch OA grow to more than 40 teams for 2022.

13) 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 partially noteworthy.

FRC6328 is a close-knit family. We like being together. Our students, mentors, and families are bonded together in a supportive environment and we enjoy fostering that environment with other teams, as we have with 8604, 8567, 2168, and 7407. Student mental health and life balance is a priority on FRC6328, and we implement quiet rooms in every FLL and FRC event we attend, including 2019 World Champs, and publish relaxation tips/mental health guides through The Compass Alliance.

# 2022 Chairman's Essay

**"Family: like branches on a tree, we all grow in different directions, yet our roots remain as one."**

**- Benjamin Williamson**

With humble roots in Littleton, MA and just 11 students, Mechanical Advantage 6328 began in 2016 as a small family. Since then, our team has grown to 37 students across 6 towns and 9 schools (22% identify as female and 41% as POC). We draw 17 mentors from different backgrounds, including experienced FIRST alumni, college students, and parents, several of whom have continued as dedicated mentors even after their student graduated. Although we encountered challenges with finding a workspace at first, we overcame this by reaching out to the local community. The Littleton Selectboard connected us with our premier sponsor, Patriot Beverages, who provides our 6,269 SF headquarters. In 6 years, the 6328 family tree has grown branches to support different ecosystems while staying rooted to our core values.

**"Learn character from trees, values from roots, and change from leaves."**

**- Tasneem Hameed**

As Dean Kamen says, "FIRST is more than robots." For our team, FIRST involves extensive outreach to advocate for change. Last summer, our students attended training sessions by the Student Association for STEM Advocacy (SASA), a 501(c)4 nonprofit, and met with the offices of Congresspeople as to advocate for STEM education for underserved and underrepresented students. Working with students from other teams in our congressional district, we secured continued funding for Title IV Part A: Every Student Succeeds Act that supports quality education in public schools, including disadvantaged students. In 2021 we also advocated with state legislators for Massachusetts bill H.700/SD.2559 to establish a robotics grant program for public schools in the commonwealth.

We have volunteered as a mentor team for FIRST Global since 2019, providing strategy and technical advice to teams in Liberia, Afghanistan, and Belarus. Reflecting on our own challenges as a rookie team, we sent rookie care packages to all New England 2020 rookie teams. Due to COVID-19 we could not send these in 2021, but we are thrilled to bring back the practice in 2022, teaming with FRC 7407. In support of girls in STEM, we are partnering with Girl Scouts of Eastern MA and FRC5422 to host Programming Robots Badge events in May and attending the Girl Scout STEM Expo in April. In the wake of resurging social justice movements in 2020, we started a public social justice book club where we read *So You Want to Talk About Race* by Ijeoma Oluo and discussed related issues. This club was open to all, including people outside of FIRST. After hearing about Girl Up, a United Nations campaign allowing American

girls to support adolescent girls around the world through UN programs, we were inspired to make change happen for the upcoming generation of bright minds. Our Girl Up Club launched in 2019 and we attended community events and raised awareness, fundraising \$1000 to build a classroom for refugee girls in Uganda. In 2019 a student and mentor worked with NE FIRST to organize a Robots on Fire demo at WaterFire in Rhode Island, an event that reached over 100,000 people! They pitched the idea to NE FIRST, worked with the event creator, and coordinated the attendance of 15 FIRST teams across New England. Our team hosts Girl Scouts and Cub Scouts robotics badge events annually, teaching and inspiring young children through presentations on FIRST and the real-world applications of robotics. At our headquarters, we host annual college counseling seminars to equip our students with the information and tools they need as they move on to the next stage of life after high school. Through outreach we can inspire youth in local and global communities to pursue STEM and provide them with opportunities of a lifetime.

For us, mental health is a top priority. As a member of the Compass Alliance, we host Quiet Rooms at FIRST events to provide a peaceful environment separate from the loud, intense atmosphere at competitions that can be overwhelming for some. This initiative started at 2018 RoboNautica, the MA West FLL Championship, when a student played with Play-Doh with his team in the Quiet Room after a big loss and emerged recharged for the next match. After seeing the calming effects of the Quiet Room at this event, we continued bringing it to other events at the FRC level. During the pandemic, we started a series of Mental Health Mondays social media posts that gave tips on practicing mindfulness and breathing techniques. Resources published on our website include mental health guides and relaxation tip cards. By providing opportunities and resources through many leaves and branches of outreach to enact change in communities, we strengthen our trunk's character as well.

**"In a tree there is a spirit of life, a spirit of growth, and a spirit of holding its head up."  
-Robert Henri**

As one of six founding members of the Open Alliance in 2020, FRC6328 has embodied Gracious Professionalism where competition and cooperation are not mutually exclusive. The Open Alliance initiative takes place primarily on Chief Delphi, a discussion forum for the FIRST community, to execute an open build season where we share *every* aspect of the build process such as our kickoff strategies, scouting app, CAD designs, prototypes, odometry system, awards submissions, and more! We have received many software questions this season, often around our vision code, gaining attention from teams as far away as Israel! We were one of a handful of teams able to continue the Open Alliance in the 2021 remote season but for 2022 there are nearly forty teams joining! By publishing our work online, we are shifting the culture within FRC to one of openness, sharing, and learning from each other. In our first 2020 competition, 4 teams included parts of our robot design such as the climber and the event

winners relied on our scouting data! As of today, our 2022 build thread has 12,400 views and 52 replies. Our online presence can be felt elsewhere as well, with 40,789 views on our team Youtube channel. As in Henri's words, our family tree continues to uplift the forest with a "spirit of growth."

**"The true meaning of life is to plant trees, under whose shade you do not expect to sit."  
- Nelson Henderson**

We recognize the importance of maintaining sponsor relationships across seasons. Since 2019, we hold an annual in-house sponsor training, where mentors and experienced students educate team members on why sponsors are crucial to the sustainability of the team and how to formally reach out to previous and new sponsors. In its first year, our sponsorship training was so successful that a student member created a corresponding resource guide to join the collection of 39 published resources on our team website. From the 2022 season training, we retained 66% of our sponsors and 34% of our sponsors are new. We also hold an annual sponsor open house at our shop where we showcase our robot, FLL projects, team outreach, and other activities to visiting sponsor representatives.

One of our primary team goals is sustainability. So, we started two transition programs to ensure a STEM pipeline from as early as second grade through college. Our FLL-To-FRC Transition Program provides older students from our FLL teams the opportunity to join us at FRC offseason competitions and take on roles with the drive team, pit crew, and scouting. At these competitions, rising FRC members can see the intensity and fun of FRC without the pressure of an actual season, try out different positions, and figure out which are most suitable for them. Older FLL students also participate in our offseason training programs, where experienced FRC members teach the technical and business skills needed during build season. Our FRC Student-To-Mentor Transition Program launched in 2021, in response to a growing number of college-age mentors on the team. To bridge the large gap from high school to post-high school life, we help ensure that younger mentors can adjust to their new role and the expectations of their team while balancing all their priorities.

Our team structure allows for mentorship to happen not only between mentors and students, but also with experienced and newer students. Every year, students apply for student lead positions in different subteams including CAD/design, software, manufacturing, electrical, scouting/strategy, outreach, awards, and technical and business team project management. Throughout the year, student leads act as leaders, role models, and teachers at all times: when building the robot, at competitions and outreach, in offseason training. This structure supports a continuous transfer of knowledge from one generation of FRC students to the next for many



years to come. For instance, ten students participated in our first leadership training program in 2020, a prerequisite for student lead applications. In 2021, three of those former trainees volunteered to teach the training to a new round of students, and similar examples can be found in our other training programs. Our sustainability-focused structure builds an extensive tree to encourage STEM education for future FRC students and alumni.

**“With a robust trunk, lengthening branches, and deepening roots, our 6328 family tree thrives in the larger ecosystem, providing shade for generations of saplings to come.”**  
**- The 6328 family**

In recent years, we have flourished in countless ways. Our neverending outreach allows us to maintain a sturdy foundation that drives youth to be passionate about STEM and build leadership skills for life. With a continual focus on the Open Alliance, we have cultivated a culture shift to become more transparent about the design and build process. Our emphasis on sustainability supports students' progression through FIRST programs, from young children to emerging adults. The journey to grow our family tree has just begun!