The Highlanders
FRC Team #4499

Impact Essay

As new students join our ever-growing program, one of the first things they notice is our emblem. This symbolizes our team—25 students from across the Front Range (6 schools in 4 cities) coming together to build something truly greater than robots. Although our team is based in Ft. Collins, Colorado, its impact extends well beyond, reaching county, state, and national borders. Over the past 13 years, we've connected with STEM communities in 6 countries, fostering innovation and collaboration. Our team's motto, "It's not about the game; it's about the journey," captures the essence of our mission: elevating. We are dedicated to providing students, mentors, and communities access to STEM. Our vision is to create a vibrant, interconnected STEM ecosystem through teamwork, dedication, and a shared pursuit of inspiring excellence locally and globally.

Elevating Our Organization: Foundation

Team 4499 is built on the *FIRST* Core Values, with each student bringing a unique energy and personality to create a diverse team that thrives on collaboration and mutual support. This year, we have 25 students, representing 60% of our team over the past three years. With 36% of our members being first-generation immigrants, it is essential we create a strong foundation that all students can spring off. Team 4499 has an incredible group of mentors who are professional engineers, software developers, and experts in trade industries. This year, we emphasized mentor training, recognizing mentors as a keystone in the *FIRST* community. By utilizing a "train the trainer" approach, we empower mentors to build up knowledge and skills of their teams, creating a ripple effect that strengthens and uplifts the Colorado *FIRST* community. To do this, we created housemade "How-To" courses that include video podcasts on key STEM topics. Our team also contributed to the Colorado *FIRST* Mentor Workshop, with students teaching 6 separate classes to over 75 mentors, focusing on Core Values, programming, and outreach strategies across all competition levels.

To ensure a strong foundation for our team, we developed classroom courses on safety, team management, sustainability, and ED&I training. We have made these courses public, sharing them with 6 other Regional *FIRST* organizations and letting anyone use them for inspiration. The safety course consists of 30 documents and quizzes that cover topics from using

basic equipment to advanced technical skills. Our team management course adds 10 more documents to that training. Our Sustainability Course, with 9 modules, guides rookie and veteran teams alike on topics from business to outreach. Finally, our 7-document ED&I training is designed to guide students and mentors on the importance of ED&I not only in STEM but in life.

Elevating Our Communities: Spreading STEM

This year we expanded our science kits to 10 different experiments such as "How to Build a Bridge" for elementary STEM expos and rover kits for middle school robotics. These resources inspire children to explore STEM. This year we upgraded our rover kit, creating an exciting Robot Soccer challenge and building flexibility with multiple attachments. Over the past 3 years, we've distributed 149 STEM Kits and 51 Rover Kits, reaching over 680 students.

Leveraging our connections in *FIRST*, we work to share resources and support to strengthen the ecosystem. Over the past 3 years, 4499 students have contributed to this network by assisting 24 FLL, 12 FTC, and 42 FRC (4 rookie) teams with machining, strategy, and design, expanding the reach and impact of our community. For example, in the past 18 months, we've started and are directly mentoring 2 FTC teams (# 23477 and #28497), fostering growth and collaboration.

Elevating Communities: Local, Statewide, and International

Our local community is the foundation of our team's efforts; we aim to create a safe space for young minds to explore STEM. Now for 6 years, we've showcased our robot at a STEM night, engaging 2,000 attendees annually. Furthermore, at our Halloween Robotics tradition, we bring joy to the neighborhood by dressing our robots as a polar bear and a dragon, handing out candy, and sharing the wonder of STEM with local children. Partnering with Colorado State University (CSU), we hosted a STEM-based rover camp for the 4th year in a row, this year elevating 30 students' valuable skills. Building on this partnership, this year we designed and machined 2 robots for a class, Mech 202, and competed alongside college students at multiple community events with over 5,000 people, showcasing the valuable technical skills students on our team have gained through our program.

In our statewide community, our team has volunteered in FLLE Expos, FLLC, and FTC qualifiers for the past 10 years. We also showcased our passion and expertise at statewide events, including Medtronic and Energy Day, inspiring 28 teams across Colorado. Spreading STEM beyond our physical location, we host weekly shop talks that bring 15 teams from across the state—and now the world—together to exchange ideas on robots and outreach. This year, we expanded these to international shop talks, welcoming participants from countries like China, Mexico, and Singapore to collaborate and share designs and ideas. We also organize drop-in

shop days for local teams, 12 over the past 3 years, to stop by and share our space. More recently, we serve on the Colorado Connect board where we help machine parts for teams in need. Beyond the robot, our team co-leads the Colorado *FIRST* License Plate Initiative, collaborating with the Colorado *FIRST* organization and local legislators to create a Colorado *FIRST* license plate, gaining 700 signatures. Two of our students serve as members of the Colorado *FIRST* Student Advocacy Group, representing our team and contributing to the leadership of *FIRST*.

Going internationally, we continue to elevate organizations with STEM education. Our team has introduced STEM programs like our rover kits and science kits in 6 countries: Ecuador, Jordan, India, Peru, the US, and France, empowering students and teachers alike.

Establishing a connection in Amman, Jordan, we created relations with a refugee camp to inspire underserved communities through STEM. Breaking the language barrier between Arabic and English through cohesive translation, our students were able to mentor 240 children ranging from 4 to 15 years old through 12 Rover Kits across 2 camps. We additionally extended our impact through national news where 2,000 people were reached.

With our ongoing support in Ecuador, our team collaborated with local teachers to launch a mock *FIRST* program, running a 10-week season and forming 5 teams of 10 students—the only FLL experience in the country. We also partnered with Compassion International to host four *FIRST* summer day camps, reaching another 320 students. To ensure sustainability, we trained 7 teachers to run new mock seasons, with 4 more teams currently participating. We have guided 90 students through full mock seasons, impacted 320 more through day camps, and reached over 35,000 people through social media, ensuring this enclave of STEM continues to flourish.

During the 2024 offseason, we hosted 2 STEM camps for an all-girls orphanage in India, providing over 70 science and rover kits. Highlander students teaching this camp used a mix of the local language, Telugu, and show-and-tell to teach children who did not speak English. We also organized a mock FLLC day camp allowing 37 young students to directly get involved with *FIRST*. We presented the importance of STEM to 850 people at a rural school giving us the ability to deploy a STEM curriculum for the entire school district. Our efforts were extended to 3 major media outlets, reaching 18,000 people, and we're working to standardize an inclusive STEM curriculum for teachers across the region, creating vitality in the community for years to come.

Elevating Our Students: Workforce Development

Students on our team are encouraged to gain real-world experience while in high school. In our workforce development program, Accent Pathways, our students complete projects for a

panel of 10 professional engineers, who evaluate and award credits. In the last 3 years, 39 students earned 320 hours in Leadership skills, 380 hours in Trade and Skill Development skills, 200 hours in Business and Entrepreneurial Development, and 100 hours in Strategic and Analytic Skills. In the last 3 years, 30% of our students have held internships with our sponsors in biomedical engineering, mechanical engineering, and computer science. We frequently have professional engineers visit us from places like WYDOT, CDOT, and USDOT.

Elevating Our Organization: The Center of Excellence

We have worked to elevate STEM in Colorado for the future, ensuring that our team's legacy continues to inspire and empower the next generation of STEM leaders. We just launched the Center of Excellence (COE), a facility dedicated to advancing STEM education for all. This center serves as a dynamic space where individuals can visit, explore, be introduced to *FIRST* and hands-on activities, and even enjoy ice cream socials! With plans to include a common workshop, classrooms, and FLL, FTC, and FRC fields, the COE will be a cornerstone in building up the STEM community across Colorado for years to come.

Elevating The Next Generation

At Team 4499, we build more than robots—we build futures. Our efforts in mentorship, outreach, and workforce development create a thriving STEM ecosystem that spans local, national, and international communities. As we continue to expand our reach, we remain committed to inspiring, educating, and elevating the next generation of innovators.
Our journey is far from over. With every project, every partnership, and every student who joins our team, we extend our impact and grow this vibrant STEM ecosystem we envision. Together, we're not just shaping the future—we're elevating it.

NOT IN ESSAY

Elevating Our Organization: Women in STEM

This year, our team launched a Women in STEM initiative to inspire and support young women pursuing STEM careers. Through engaging events and connections with professional women in STEM, we aim to foster a welcoming and empowering environment. We kicked off the program with a successful event at our FTC state tournament, drawing over 40 young women! This is just the beginning—we already have plans for at least three more events, including at the Arkansas and Colorado FRC regionals.

Tell me a story

When we went to jordan tell me how you got there, why you were there and how you communicated…tell a story…

Talk about each ecuador, india

Story about how rocky was started and why…how it evolved

Women in stem - how and why we started

NOTES:

With our team containing 36% first-generation immigrants this year, ***it is essential we create*** **a solid foundation for our members to spring off of**. *This is done by our Cycle of Success where our team receives vital support from sponsors like Neaera Consulting, Lockheed Martin, and Medtronic, providing the resources necessary for growth. This support elevates our students, equipping them with skills that propel them into successful careers at companies. We have XX% of alumni in the STEM workforce at corporations like Tesla, Leidos, and Medtronic, ensuring they continue to thrive and inspire far beyond their time with the team.*

Mentors

We aim to equip mentors with the tools and knowledge needed to elevate and sustain their own FIRST teams. This year, we placed a strong emphasis on mentor training, recognizing mentors as a keystone in the FIRST community. By utilizing a "train the trainer" approach, we empower mentors to build up the knowledge and skills of their teams, creating a ripple effect that strengthens and uplifts the Colorado FIRST community. To further support this, we have developed, and are expanding, a "How-To" course featuring concise video podcasts on topics ranging from practical skills, like "How to Wire a Kraken Motor," to strategic guidance, such as "What Outreach Events Should You Do and Why?" Our team also actively contributed to the Colorado FIRST Mentor Workshop, with students teaching 6 separate classes focusing on Core Values, programming, and outreach strategies across all competition levels—FLL, FTC, and FRC.

We invite organizations like WYDOT, CDOT, and USDOT to visit our shop, enabling students to establish valuable connections with executives. As a result, XX students have been offered jobs or internships. Over the past three years, our sponsors have provided two internships, with 15 students (39% of our team) participating in them. In addition, students gain practical experience through a project-based workforce development program: Accent Pathways. Students submit their completed projects to a panel of XX professional engineers, who evaluate and award workforce development credits. Over the past three years, XX students have collectively earned XX hours in Leadership and Collaboration Skills, XX hours in Trade and Skill Development, XX hours in Business and Entrepreneurial Development, and XX hours in

Strategic and Analytic Skills. In total, XX students have earned XXX hours in the last three years, contributing to the team's overall historical total of XXXX hours across XXX students. These initiatives exemplify our Cycle of Success, empowering students to thrive in their careers. One alumnus reflected, "IXXXXXXXXXXXXXXXXXXXXXXXXXXXX," highlighting the transformative impact of these opportunities.

Altogether, our team has directly reached 15,000 people with STEM this year, 27,000 over the past three years, and 137,000 throughout our history. When including social media, these numbers increase to 57,000, 71,000, and 182,000, respectively.

Award Criteria/description:

The *FIRST* Impact Award is presented to the team judged to best exemplify the true meaning of *FIRST* through measurable impact on participants, school, and community at large with emphasis on promoting science and technology through *FIRST* programs.

While the *FIRST* Impact Award is about "more than robots", teams often leverage their robots to enhance their impact on the broader community. For this reason, it is expected teams in contention for the *FIRST* Impact Award will have built a robot appropriate to the game's challenges for the season. This does not require the team to have ranked at a certain level during the event but does require teams to put in more than just the minimal effort necessary to field a drivable robot.

The criterion for the *FIRST* Impact Award has special emphasis on recent accomplishments within the last 3 years. The judges focus on teams' activities over a sustained period, as distinguished from just the robot design and build period.

***FIRST* Robotics Competition is not about machines; it is about the experience of people working together toward a shared goal. Documenting and preserving your team's *FIRST* experience becomes an important component of the over-all *FIRST* experience.**

- **The essay portion of the *FIRST* Impact Award submission provides teams an opportunity to describe their activities and achievements in narrative form. While Judges encourage creativity of expression, the essay must clearly deliver information and facts describing what the team is about. Teams are encouraged to use some of this space to explain how their team is structured and the number of mentors and students on the team.**
- **The essay should avoid merely duplicating information provided in the executive summary questions. However, it is appropriate for the essay to further expand on those responses and provide more in-depth discussion of notable team achievements.**
- **The most effective essays are characterized by an overview of team activities during the last 3 years, followed by in-depth discussion of notable activities during the most recent 12-18 months. Judges use the essay to get a big picture view of the team and to learn about achievements that may be unique and noteworthy.**

Topics:

Intro

- **about your team**
- **How relate your metaphor**

measurable impact on Participants/Students(<3 years, focus on 12-18 months)

TEAM

- ***all graduate high school***
- ***>90% college & STEM***
- ***Scholarships & internships***
- **Hands on learning**
- **X% students develop leadership, technical and Workforce skills.**
- **100% students are part of outreach**
- **X% first generation immigrant students, demographics**
- **Alumni % working in STEM professional industries**
- **X% alumni return to mentor and support team**
-

measurable impact on school/organizations

measurable impact community

- **Local**
- **State**
- **International**

Conclusion

Measurable Success - Participants/Community/Spreading STEM

ESSAY Headings
Building UP!
<Hook Intro sentence>

Building up…Students

- **Background of Colorado statistics of graduation and STEM careers**
- **% graduate, % STEM College, % STEM processional job/industry**
- **MI - total # students through program, through college, internship/companies**

Building up…community

-
- **State wide shop talk**

- **International shop talk**

Building up…partnerships - sponsors

Building up… mentors - cycle of success

Building up our students for the future - WD

Building up the future for spreading STEM - Center of excellence

***** CHAT GPT ideas from using lots of teams and our past essays for help with re-write**

Elevating the Future of STEM

When new students join Team 4499, one of the first things they notice is our logo—a symbol of unity, diversity, and innovation. Our team of 25 students from six schools across four cities comes together to build more than just robots; futures. Located in Fort Collins, Colorado, our impact extends far beyond state and national borders. Over the past 3 years, we've connected with STEM communities in six countries, driven by our motto: "It's not about the game; it's about the journey."

Building a Strong Foundation

Team 4499 thrives on FIRST Core Values, with each student contributing unique energy and perspective. This year, 36% of our members are first-generation immigrants, bringing diverse

experiences that enrich our team. Guided by expert mentors in engineering, software development, and skilled trades, we recognize that not all teams have access to such resources.

To bridge this gap, 4499 prioritizes mentor training, implementing a “train-the-trainer” approach that empowers mentors to strengthen their teams, creating a ripple effect throughout the Colorado FIRST community. Our Colorado FIRST Mentor Workshop featured students leading six classes on Core Values, programming, and outreach strategies across FLL, FTC, and FRC. Additionally, we launched an ever-growing “How-To” video course, covering topics from “How to Wire a Kraken Motor” to “What Outreach Events Should You Do and Why?” allowing accessible guidance for teams worldwide.

Elevate from student to STEM Professional

Continuing our Cycle of Success, *where students learn/develop skills to prepare them for the workforce and return to support our team*, 4499 receives vital support from sponsors like Neaera Consulting, Lockheed Martin, and Medtronic, providing the resources necessary for growth. This investment translates directly into student success, with 72% of alumni now working in STEM fields at companies like Woodward, Leidos, and Medtronic, continuing to elevate themselves and others beyond their time with 4499. Committed to making STEM accessible to everyone, even in remote places like our support in Ecuador, we develop hands-on learning resources such as science and rover kits for hands-on robotics education, and our classroom courses covering safety, sustainability, and training resources to foster long-term team growth. Our STEM outreach spans three levels: local, statewide, and international.

Locally, 4499 has built a strong presence by showcasing robotics to 2,000+ attendees annually at STEM nights, continuing our halloween robotics tradition, where we dress up our robots and take them trick-or-treating in local neighborhoods, and partnering with Colorado State University (CSU) to host Rover STEM camps and collaborate on college-level engineering projects. <add more>

Statewide, 4499 supports 15 teams through weekly “Shop Talks”, now expanded internationally to include teams from China, Mexico, and Singapore, host drop-in shop days to provide machining support, co-lead the Colorado FIRST License Plate Initiative, securing 700+ signatures, and serve on the Colorado Connect platform to help machine parts for teams in need.

4499’s international impact continues to grow, hosting 12 CABER Camps in Jordan for 240 refugee students, establishing a mock FIRST program in Ecuador, guiding 90 students through full FIRST-style seasons, and introducing STEM to 320+ students through summer camps. <add more here about the type of students and conditions….very underresource> In India, we hosted two STEM camps at an orphanage, introduced rover design and science kits to 30 children, and launched a new STEM curriculum initiative after presenting robotics to 650 students in a rural school. <how are we continuing the support initiative?>

In total, Team 4499 has directly impacted 15,000 people this year, 27,000 in the past three years, and 137,000 throughout our history. When including social media outreach, these numbers increase to 57,000, 71,000, and 182,000, respectively, ensuring our mission continues to elevate STEM education worldwide.

Elevating our future: Workforce Development

Team 4499 prepares students for the future by providing real-world workforce development through three core pathways: workforce development certifications, internships, and industry exposure. Through our **Accent Pathways** program, students earn workforce development credits in leadership, trade and skill development, entrepreneurial and business skills, and strategic and analytical skills. Students submit projects and are evaluated by a panel of 10 professional engineers where they earn credits within different skilled pathways. Additionally, students gain hands-on experience through internships with sponsors in biomedical engineering, mechanical engineering, and computer science. In partnership with our sponsors we connected with industry professionals from organizations like **WYDOT, CDOT, and USDOT** to provide valuable insights into career opportunities like automation, connected & automated vehicles and road safety. Students who have interned with these companies were part of cutting edge technologies like designing, machining and programming a rover to ensure the safety of first responders and developing software to notify drivers of pedestrians through the use of advanced cloud and machine learning technologies. One alumnus reflected, “Being part of 4499 didn’t just teach me engineering—it gave me the confidence and connections to launch my career.”

Elevating a new future: The Center of Excellence

Our team’s commitment to the future extends beyond our students. In partnership with our nonprofit and mentors, we launched the Center of Excellence (COE)—a facility designed to elevate STEM education across Colorado. Currently, the 5 acre property is home to a fully functional machine shop, supplies and conference space. Our team has invited the community to social and fun events, hosted team and parent meetings and invited teams to our annual ice cream social! The COE will develop a common workshop and field space for teams, classrooms for hands-on training and dedicated FLL, FTC, and FRC fields, ensuring year-round access to robotics resources.

Elevating the Next Generation

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Our journey is far from over. With every project, partnership, and student who joins 4499, our impact grows. Together, we're not just shaping the future—we're elevating it.