



The Highlanders Chairmans Essay

The Highlanders are on a journey. This journey has taken our team on many adventures to grow our knowledge, pursue education, and find out who we are. Our motto, "It's not about the game, it's about the journey," explains our drive and support for FIRST and robotics. This is the story of our journey, the first steps, the people we meet, the lessons we learn, and our journey ahead.

The First steps

On 4499, we are on a journey, but to see where we are want to go, we need to start at the beginning. Our team began 12 years ago as two different FLL teams that then transitioned to FTC. The two FTC teams then decided to come together and start 4499. We came from different schools, backgrounds, and friends, but we all shared the same passion: FIRST and robotics. We created a 501(c)(3) nonprofit company, Neaera Robotics, to assist our team. With this, we have been able to help **10** FIRST teams sustain funding by local and nationwide businesses, growing our family. We enjoy home-cooked meals at our practices, provided by our parents while talking about our daily progress. Our alumni are a vital part of our team and help teach, guide, and coach us.

When you're a Highlander, you're family. Focusing on our mission: to provide youth with the opportunity to explore STEM, we strive ahead in a student-led program. This required a foundation of a robust leadership model. For this, the TARTAN leadership initiative (Training And Readiness: Teach, Appoint, iNteract) was created. The TARTAN leadership initiative is inspired, developed, and led by students. These students are responsible for training, teaching, guiding, and expanding the knowledge of current and new team members. This initiative is critical for maintaining and developing the team's knowledge base now and in the future. Succession planning is crucial for a team to continue; TARTAN encourages us to train new members in programming, machining, and outreach activities. High schools underclassmen hold 57% of leadership positions. A quote from John C. Maxwell, "Leadership is not about titles, positions or flow charts. It is about one life influencing another", explains our initiative to the core foundation. We are only as strong as our peers, and we can reach further because we have bonded together.

The people we meet

Over the past couple of years, we've built connections with people all over the world. Whether it be orphanages in India, schools in Peru, or students in Kansas City, we contribute and lead them on a journey of discovery. We add our content and KILTS on YouTube, we host Shop Talk

to share with the FIRST Community, and when not virtual, we show up to share at expos across the Front Range of Colorado. Together, we bring together a diverse group of students from a community of curiosity to build tomorrow's engineers and leaders.

We share our love of STEM with cities spanning Fort Collins to Denver. We create Halloween costumes for our robots and bring them along for the mysterious journey every year. Kids have run up to a glowing red spider, bobbing snake, pneumatic powered dragon, and a LED-lit ghost in awe, always wondering how the "big kids" built them. This tradition has evolved into volunteering at more significant events like HP's haunted house event and trick or treat street at the local community center. Reaching over 54,000 people in the past three years, 4499 has also shown our robots at Shepardson Elementary and other outreach events such as Energy Day Colorado, Apolopalooza, and the Defense Advanced Manufacturing conference.

The Colorado FIRST community is another group we've engaged with. We expanded the Colorado FIRST family by starting 5 and mentoring 10 FLL explore teams. Working with FLL and FTC teams, We listen to presentations, leave suggestions, teach brainstorming processes, and come up with brain break games together. Team members from these teams often continue their STEM path and join the Highlanders later on. 4499 has run the FLL Challenge Liberty qualifier for the past decade. Every year we see new and old teams come together with the most exciting designs and thought processes through our volunteer roles: Students, alumni, parents, and coaches act as referees, MCs, Judges, scorekeepers, head refs, participate in planning committees, and run the concessions stand. Our FIRST support expands out of local areas. We provided a student tournament director and referees to the North Denver qualifier (FLLC, 2yr). We assisted the Weld County qualifier (FLLC, 1yr), Kendrick Lakes (FLE, 1yr), Stevens Elementary(FLE, 1yr), Northern Colorado Expos (FLE, 5yr), Boulder qualifier and State Championships as referees, MCs and judges. For the 2021 virtual tournaments, we recorded two videos about FIRST and FRC for CO FIRST, provided backgrounds for FIRST volunteers, and announced the award ceremony virtually. This year, we have returned to in-person volunteering at multiple events such as the North Denver qualifier, and in April, we plan to attend the FLL Explorer event.

Our students and mentors are always willing to lend a hand to other FRC teams: embroidering bumpers (1339), machining parts (1410/4388), transporting supplies (4550), and providing meals (1138). Through COVID, the team has recorded webinar presentations for vision code, upside-down electronics boards, CAD, and live presentations on Adobe Creative Cloud to assist teams in making video production for the At Home Challenges. In-person shop tours are available for teams (FTC 5899, 15403, 11308). We have created a shop tour video that describes our machines and workshop on our website and YouTube channel for virtual teams. Sharing through the unofficial Colorado FIRST discord, we have notified teams that our shop and student training is open to all and run weekly Shop Talks, creating a place where students can actively discuss different topics with other teams. At tournaments, 4499 passes out rookie

survival kits, SPORRAN (Safety, Protection, Observation, Report, Respond, Awareness) safety kits, and tools, helping aspiring engineers get the tools they need to get a head start. We have inspired, taught, and shared STEM with people across the world. We've reached communities worldwide through our series of both collaborative and reusable science experiments designed around FIRST core values, KILTS (Kits that Inspire Leadership and Teamwork in STEM). In the past three years, we have visited schools and orphanages in Kansas, USA, Lima, Peru, and Shishu Mandir, India, to teach and hand out 50 KILTS to create interest in STEM. In addition, 4499 engages younger students with Rocky the Robot, a four-part, Amazon-published book series. This student-authored book presents FIRST Core Values through Rocky's various adventures. We have translated our books into English and Spanish to reach a diverse audience. This series is a team-collaborative project; our members write the stories and translations as others help illustrate. KILTS and Rocky the Robot are publicly available on our website and YouTube channel as pdf documents and videos.

The Lessons we learn

The Highlanders have seen many students come and go along this journey, all while the team continues to improve with each new batch of diverse and creative minds. As the team develops each new generation of students, the students develop the team. Whether it be the adoption of kilts as a source of team imagery or introducing new manufacturing and software tools, the Cycle of Success continues, and the team retains a distinct, if ever-changing, identity.

The Highlanders are committed to an environment that promotes diversity amongst team members and assists students in balancing robotics and family. 4499 is a team where students are valued and can succeed, increasing independence to achieve goals and inspirations. Our diversity plan builds talented students, motivates team members, and encourages a collaborative and respectful environment. Today, 82% of students on the Highlanders are from minority groups and are drawn from 5 schools across 4 cities in Colorado, spanning a nearly 70-mile radius across the Front Range.

The Journey Ahead

Our passion has compelled us to immerse youth in STEM from around our community. Partnering with the Jeffco school board, we plan and run events to continue bringing FIRST into the district. As well as organizing future FIRST events like an FLLE expo in April. We are looking forward to supporting FIRST in its path out of the pandemic and strengthening our community with onsite demos, a new Halloween costume for our robot, new Rocky the Robot adventures, KILT kits and webinars. We are utilizing our leadership structure to obtain new skills and engage in new community programs in our team. This leadership has led us to an opportunity with our main sponsor, Neaera, to build a fully autonomous rover to deploy lights on a highway to notify travelers of an accident. This summer, 8 Highlander team members will partner with VTTI and USDOT to design, build and program this robot. We are helping to jumpstart the students' professional careers. This project is made possible by a \$150,000 grant from USDOT, where 30%

of the profits from this project will be donated back to our nonprofit to give teams new skills and funding to take on their journey.

The future is bright for the Highlanders. Our journey started within FIRST but led us to new communities, places, and potentials to engage people. Transferring our knowledge has allowed us to develop our skills by creating an opportunity for all Highlanders to become future engineers, business leaders, and humanitarians. Through our outsized impact, our students inspire communities with support from 4499. We aspire to grow the team, focus on finding more creative ways to spread FIRST and continue our team camaraderie. After all: we may be small, but we are mighty!