400 billion neutrinos from our Sun pass through each person on Earth every second. Like the particle, Team Neutrino is in constant motion, aiming to have a positive impact on everyone we meet. We foster self-discovery and growth, empowering students to dive into an array of STEM domains and hone their abilities.

Through our 8 off-season training camps, we introduce NEWtrinos (new members of Team Neutrino) to different subteams, including design, controls, and graphics, where they gain hands-on experience in CAD, programming, and video editing. Returning members take time to train new students on the basics of each subteam, passing down experience and cultivating leadership skills. Sarah, a returning controls member, shared, “I was teaching [NEWtrinos] how to code the LED subsystem, and one time I walked into controls and they were coding it by themselves! And that made me really happy.” In 2023, we built on those fundamental skills with advanced projects for returning members to practice and enhance their skills over the off-season. One such project involved building a swerve drive; both design and controls members coordinated together to complete this ambitious project. In addition to swerve, the controls subteam provided extended opportunities focused on computer vision systems and creating custom HID (Human Interface Device) to be incorporated into the team’s current robot. The training and growth of Neutrino members ensures that knowledge is passed down and prepares the team as a whole for the build season.

Maintaining a functional and sustainable team not only requires the strengths of individuals but also a space where members feel safe asking questions and expressing ideas. On our team, we are not afraid of being judged for our mistakes; we learn from our mistakes and embrace them. We encourage all members to participate in multiple subteams to develop a diverse skill set. This year, all members are involved in 2+ areas of the team, providing each subteam with fresh perspectives. The small-group structure of subteams fosters strong interpersonal relations between students over shared passions.

We create off-season opportunities to strengthen and build relationships with individuals both within the team and the community. Summer outreach events such as the Mini Maker Faire, RAGBRAI, and the Iowa State Fair engage Neutrinos through volunteering and provide them with the opportunity to connect over a shared activity. At the Science Center of Iowa’s (SCI) Mini Maker Faire, Neutrinos spend the day running a team booth, demonstrating our robot, and filling an overwhelming majority of the volunteer shifts to keep the event running smoothly. Between these responsibilities, students take the time to explore the SCI and get to know their peers. Since 2013, we’ve hosted annual team bonding events such as a holiday party and girls’ night for students to get to know each other and connect before further collaborating during the build season. Members initiated more frequent get-togethers in 2023 such as bowling and volleyball. Social events have extended beyond the team, creating more personal relationships within FIRST. After roller skating with nearby FRC team 9092, Morgan, our team captain, expressed, “Having more FIRST connections has been great; being able to share experiences as both of our teams try out new things like swerve, and on a more personal level, learning how to balance leadership and dynamics within our respective teams.”

As Neutrinos gain confidence, they become proactive leaders. This year, we brainstormed ideas for a new passion project to engage the entire team and address needs in our community. To expand our FLL mentoring program, we are starting the FLL Blastoff summer camp for elementary and middle school students with an interest in STEM. At this camp,

Neutrino mentors will guide small groups of students through a weeklong curriculum. Our goal is to introduce new students to FLL and provide current FLL students with the opportunity to enrich their experience. Thus far, the project's student leaders have initiated meetings internally, with FRC teams 1730 and 167, and with 4-H coordinators to discuss key ideas and logistics. We have planned a two-week pilot camp for the summer of 2024, with the project's subgroups actively preparing a curriculum with LEGO SPIKE Primes. Neutrinos continue to display leadership qualities beyond the FIRST community. For the past two years, we have presented at the Iowa Technology & Education Connection, a state-wide conference for educators and administrators. We reversed the traditional teacher-student roles, sharing our strategies for engaging students with STEM and providing student insight with a focus on creative curricula.

Collaboration across communities is essential to expanding our impact. Our team collaborates on three primary levels: within the FIRST community, our local community, and globally. To broaden the reach of FIRST in our school district, we started FTC 18050 Team Photon at a local high school in 2020. We have continued collaborating with Team Photon by assisting them with programming and supporting their events. We have also volunteered with them at local outreach events, such as the annual 4th of July parade, since 2021, representing FIRST and showcasing our robots side-by-side. At the Iowa State Fair in 2023, we demonstrated our robot alongside other FRC teams and volunteered for Blue Origin, an aerospace manufacturer, reaching over 580 people total. In our community, we engage diverse audiences. The past two years, we have shared our team's journey with and demonstrated our robot for senior citizens at Golden K Kiwanis. In 2023, we initiated STEM Saturday at the Slater Public Library, engaging with young students and providing fun, hands-on, STEM activities. This event, proposed by a NEWtrino, has given us a new partnership and extended our impact to a new community.

We are role models and teachers who push the boundaries of traditional STEM engagement. At Enrich Empower Excel (EEE), an elementary school summer program, we've taught students fun and engaging STEM curricula since 2012. We prepare creative, themed lesson plans "for students, by students" at our week-long outreach training camp. These lessons cultivate a genuine interest in STEM and show Neutrinos the impact they have. Chloe, a NEWtrino and teacher at EEE, expressed, "I enjoyed working one-on-one with kids and helping them learn about STEM. I could see how they grew from that and wanted to keep on learning." Our volunteering and outreach also create memorable interactions. Sarah, another team member and EEE teacher, recalled a young girl from the program recognizing her at a local store and giving her a big hug! We recognize that the needs for STEM education exist internationally. In 2023, we donated a 20 gallon tub of LEGOs to Life-to-Life Africa's Critical Care Center in Zimbabwe. This provided 23 preschool orphans with access to hands-on activities that stimulate creativity and problem-solving.

We display the Team Neutrino core values of professionalism, growth, ownership, excellence, and community throughout all levels of FIRST. Through The Circle of Inspiration, a team concept inspired by the progression of FIRST programs, we uphold a continuous cycle of mentorship, inspiration, and sustainability. Since 2021, we have mentored 271 students on 36 FLL teams. William, a freshman on Neutrino, shared his FLL experiences, "[Team Neutrino mentors] taught us good values that helped us work together and helped us learn how to think like an engineer, to design, and code our robot instead of just doing it for us." This year, half the

team mentored FLL, and 60% of current Neutrinos are FLL alumni. William elaborated on his FLL transition from student to mentor, stating, “Neutrino and FIRST inspired me to be a better person and mentor another FLL team. My FLL team made it to State and [we] had a lot of fun. We also went to [Iowa State University] to see the robotics teams in college. [The FLL students] are hoping to join Team Neutrino or another robotics team in the area.” To further encourage students’ involvement in FIRST, we have provided an associate role since 2018. This enables students to explore opportunities with a flexible time commitment and provides a preview before potential full team membership. Five associates from last season are now full team members, ensuring continued interest from new students.

Our fundraising subteam sustains valuable sponsor relationships and this support helps us champion STEM and inspire future generations. Their generosity allows the team to partake in two regional competitions and the FIRST Championship if we qualify. One unique partnership is with CIT Signature Transportation, a team sponsor since the team was founded in 2011. We initiate sponsor visits throughout the off-season, traditionally meeting first with CIT owner, Kim, to review our year with their support and receive feedback for the following sponsor visits. Our visits allow for team members to make meaningful connections with sponsors. Cale, the Controls Manager, recalled a sponsor visit to Interstate Batteries; their employees were fascinated with how we incorporated their batteries in our robot, displaying the impact of their support.

We establish an impactful and sustainable legacy through promoting the individual and collective growth of our members, collaborating with others through outreach, and sustaining the future of FIRST through the Circle of Inspiration. This approach allows us to perpetuate our team’s legacy, one that begins in the formative years and *crescendos* into the future.