

Chairman's Award - Team 4468

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GE Volunteers/H.B. Fuller/Johnson Research & Development/Gate 6 Solutions/SOLIDWORKS/Novelis/Invention Studio at Georgia Tech/Automation Direct/Fastenal&Fernbank Science Center

Briefly describe the impact of the *FIRST* program on team participants with special emphasis on the 2018/2019 year and the preceding two to five years

Fernbank LINKS is a student-led organization where members are introduced to the possibilities of STEM by traveling through the STEM Pipeline, a clear pathway of LINKS programs for students as young as 9 years old, stimulating interest and providing direction in STEM. Team members gain skills necessary to enter and succeed in STEM careers through competition preparation, community outreach, and exposure to job opportunities in industry, as proven by our alumni in top universities and companies.

Describe the impact of the *FIRST* program on your community with special emphasis on the 2018/2019 year and the preceding two to five years

In the DeKalb County School District (DCSD), the number of elementary and middle school students actively engaged in STEM has greatly increased. Science Night Out (SNO), our original STEM program held every spring, and FIRST Lego League (FLL) summer camps have inspired students who attended them to join or create their own FLL teams after learning about the fundamentals through hands-on activities. In the past 5 years, the number of FLL teams in DCSD has grown from 56 to 84, an 67% increase.

Team's innovative or creative method to spread the *FIRST* message

The FIRST message of inspiring young students to become STEM leaders is ingrained into every aspect of LINKS' operation. All of our outreach programs, from SNO to FLL trainings, to school and community events utilize FIRST to provide a clear pathway for ethnic minority, female, and low income students to break into a viable STEM career. This STEM Pipeline is the cornerstone of the work that we do in the community, impacting over 50,000 students in the past 3 years.

Describe examples of how your team members act as role models and inspire other *FIRST* team members to emulate

Through leading our FLL trainings, scrimmages, and tournaments, we serve as role models for students on FLL teams. These students observe how we are organized and how we work together to efficiently accomplish tasks. LINKS members also invite their friends from other teams to volunteer at the FLL tournaments we host. Additionally, LINKS has helped other teams start similar outreach programs, based on the model of our original STEM enrichment program.

Describe the team's initiatives to help start or form other FRC teams

Since 2014, LINKS has been an integral part of the Johnson STEM Activity Center (JSAC), not only by using the center as a workspace but also providing resources to new FRC teams. In the past few years, LINKS' members have served on the JSAC board to help develop the 20,000 square foot space into a hub of STEM resources. We have been able to serve 6 other FRC teams so far by providing a space for them to work in, STEM classes to improve their skills, a full-sized field to practice on, and more.

Describe the team's initiatives to help start or form other *FIRST* teams (including Jr.FLL, FLL, & FTC)

LINKS gets students involved in FLL starting from 3rd grade through our many outreach events where we promote FLL and get students interested. During the FLL-themed SNO night and our FLL camps, students are introduced to designing, building, and programming FLL robots. These programs have prompted 90% of the 300+ annual participants to join or start FLL teams at their own schools in the DCSD. This model has had a direct impact on the 20% increase of FLL teams in the DCSD in the past 3 years.

Describe the team's initiatives on assisting other *FIRST* teams (including Jr.FLL, FLL, FTC, & FRC) with progressing through the *FIRST* program

In 2003, LINKS founded the first FLL team in DeKalb County. Since then, we have gained the financial and material backing from the DCSD and other sponsors to provide 4 FLL trainings, 2 scrimmages, 2 tournaments, and over 1200 hours of annual support for 84 DCSD FLL teams. We provide teams with free fundamental support and guidance in Core Values, Robot Design, Projects, and Game Strategy. We have prepared more DeKalb County teams for the World Championships than any other county in Georgia.

Describe how your team works with other *FIRST* teams to serve as mentors to younger or less experienced *FIRST* teams (includes Jr.FLL, FLL, FTC, & FRC teams)

LINKS works at JSAC with 6 FRC teams, 2 FTC teams, and 1 FLL team, often sharing resources, advice, and tools. JSAC is home to one of 4 full-sized FRC fields in Georgia and a pre-bag day scrimmage called Development and Enrichment (DE) Day for teams to prepare for competitions. As one of the main teams of JSAC, we host visiting teams on DE Day, helping them with anything they need. LINKS members and alumni also created an FRC Survival Guide, posted on Chief Delphi, with resources for new teams.

Describe your Corporate/University Sponsors

Because LINKS is a community based team, Johnson Research and Development (JRD) and Fernbank Science Center (FSC) provide us with workspaces. We contract with the DCSD, who funds us to provide FLL trainings and tournaments free for students. Novelis and Fastenal provide material resources, and Gate 6 Solutions and General Electric provide us with mentors. Grainger, H.B. Fuller, and Diversified Metal Fabricators provide us with capital support to fund our team's travel and registration costs.

Describe the strength of your partnership with your sponsors with special emphasis on the 2018/2019 year and the preceding two to five years

Since 2005, LINKS has maintained strong partnerships with H.B. Fuller, Gate 6 Solutions, DCSD, FSC, and JRD. They have provided funds and facilities to host outreach, build robots, and collaborate. General Electric has supported us with mentors and registration since 2013. New sponsors, impressed with our impact, join the team each year. We strive to create strong, symbiotic relationships with our sponsors so our partnerships aren't just built on capital, but on mutually sustainable support.

Describe how your team would explain what *FIRST* is to someone who has never heard of it

FIRST is a K-12 experience that immerses students into the world of STEM and business through exciting robotics competitions. The program inspires students to set and keep high academic standards while infusing them with an entrepreneurial spirit and leadership skills to impact the world around them. FIRST provides hands-on STEM education and opportunities that allow students of all ages and capabilities to apply what they learn in school and gain a broader perspective of STEM's role in society.

Briefly describe other matters of interest to the *FIRST* judges, if any

LINKS showcases robots and gives demonstrations to the public at community STEM events such as various Science Nights and Career Days at local schools, the Atlanta Maker Faire, and the Atlanta Science Festival. We are a student-led and mentor-supported team of 29 students from 14 different schools. Because we are based from several schools from the Atlanta area, we consist of students from different experiences and backgrounds. This year, we are approximately 41% female and 48% persons of color.

Team Captain/Student Representative that has double-checked this submission.

Olamide Zarya

Essay

Fernbank LINKS (Linking Ideas and Networking Kids with Science) was started as a Team America Rocketry Challenge team in 2002 by 5 Lakeside High School students who had one interest, one outreach program, and one goal. They originally planned to just "have fun" in this experience, but not wanting their energy and passion for STEM to go to waste, they created an original STEM outreach program for elementary and middle school students called Science Night Out (SNO) as a means of inspiring the next generation of students to get involved with STEM.

Since then, LINKS is continuing the legacy of our founders. Besides SNO, which has expanded greatly over the years (now reaching over 250 local students annually), we have been able to reach over 50,000 people in the past 3 years through over 21 unique outreach events. We have been competing in the FIRST Robotics Competition for 6 years and have been leveraging FIRST to accomplish our goal of spreading STEM to as many individuals as possible. Our motto is Building Robots, Developing Minds, and Changing Lives, which we exemplify through everything that we do, with an emphasis on changing the lives of as many people as we can. By serving students of all ages, we can provide them with a pathway to a successful STEM career via our version of the STEM Pipeline.

The STEM Pipeline is a path that takes students from their early education to futures in a viable STEM career. However, this pipeline consists of leaks: the exclusion of students of color and lower-income students, leading to underrepresented groups in STEM career fields. These students aren't presented with many opportunities to engage with STEM outside of the classroom and are therefore unable to discover their full potential. We aim to fix these leaks with our 5-step outreach structure: community outreach, SNO, FLL summer camps, FLL trainings, and other FIRST support. These programs inspire all students, regardless of ethnicity or income status, to get involved and stay involved in STEM.

LINKS strives to inspire the next generation of STEM leaders and innovators through our version of the STEM Pipeline. Outreach acts as the first link for students to develop an interest and passion for STEM. We introduce FIRST programs to students of all ages through the first step of our STEM Pipeline: community outreach. We reach out to our community through numerous local events, such as the Atlanta Maker Faire, the Atlanta Science Festival, the Newnan STEAM Expo, and various Science Nights and STEM Career Days at elementary and middle schools. At these events, we showcase our robots, give demonstrations to the public, and advertise our outreach programs. For many of the students attending these events, this is their very first encounter with STEM outside of the classroom, presented as something interesting and fun.

The next step of the pipeline is the first outreach program created by the team, Science Night Out. SNO is a series of 5 evenings for 3rd through 6th graders to learn about STEM and its real-world applications through exciting hands-on activities. Each evening has a different theme, ranging from LEGO Robotics Night, where students learn how to build and program a basic LEGO robot, to Engineering Night, where we invite local engineers to talk about their work in the community. SNO now reaches over 250 students annually and is entirely student-run, just as it was back in 2002.

The third step of the pipeline is our original FLL camp held multiple times every summer, where elementary and middle school students experience the FLL build season in 5 days, learning how to build attachments, use sensors, complete complex missions from the previous year's game, and competing in a mock tournament on the final day. This week-long immersive program gives students a taste of the FLL experience, which has encouraged 90% of the participants to join or create their own teams in DeKalb County.

In 2003, LINKS started the first FLL team in the DeKalb County School District (DCSD) and began sponsoring new teams starting the following year. Sixteen years later, the number of FLL teams in DeKalb County has grown to 84, which equates to 10% of all Georgia FLL teams. As the fourth step of the pipeline, LINKS contracts with the DCSD to provide and host 4 free trainings, 2 scrimmages, and 2 tournaments for these teams. In these student-led trainings, teams learn about the fundamentals of FLL through specific workshops: project, core values, programming, robot strategy, and robot design. LINKS members also hold teacher trainings for FLL teachers and mentors so they can better serve their students and help them succeed in competitions. By primarily serving DeKalb County, where 80% of K-12 students are African-American or Hispanic and 17.3% are living in poverty, we are able to provide a next step for these students in their STEM journey without their background being an obstacle.

LINKS not only engages with FLL students but also with other FIRST teams as the final step of the pipeline. Since we are not a school based team, we work at Johnson Research & Development (JRD), sharing the space with 6 other FRC teams, 2 FTC teams, and 1 FLL team. We have played an integral role in developing the Johnson STEM Activity Center (JSAC) by serving on the advisory board, which is located at JRD and provides free STEM resources to Georgia's most underrepresented communities. JSAC is a driving force behind Georgia leading the nation in African American students involved in robotics. JSAC is home to one of the only four full-sized FRC practice fields in Georgia. A pre-bag day scrimmage called Development and Enrichment (DE) Day is held there annually for local FRC teams to practice before competitions, and we welcome these teams to the scrimmage, providing assistance and resources where needed.

LINKS mentors, alumni, and current members have also used their experiences in FIRST to create an online compilation of resources for teams new to FRC or robotics. This guide compiles the best online resources about the essentials of competing in FRC, including team organization, marketing, awards, strategy, CAD, mechanical design, and much more. This guide can be found on the FRC forum Chief Delphi and currently has been downloaded over a thousand times.

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Over 200,000 students have been impacted through our STEM Pipeline over the past 17 years. By catching students' interest through robotics, they become interested in pursuing STEM by advancing through FIRST programs. 67% of current LINKS members previously participated in our programs like SNO and FLL camps and were encouraged to continue to pursue their interest in STEM by joining LINKS. Middle school students can enter LINKSters in Training, a program that allows students interested in LINKS to learn and contribute to the team before joining in high school. After inspiring and engaging with students, LINKS aims to continually foster these students as well as our own team members with well-rounded life capabilities and skills. We are a team of 29 members from 14 different Atlanta schools led by a student leadership team. We are committed to diversity of all students on our team, regardless of skill set, gender, ethnicity, or economic background. LINKS is broken up into 5 subgroups; mechanical, controls/programming, marketing, business, and outreach. These groups are each led by a student leadership member who reports back to the leadership team weekly to keep things running smoothly. With this model, students are able to gain and strengthen their leadership, collaboration, and communication skills throughout their involvement with the team.

41% of LINKS members are female, many of whom have won prestigious awards at the regional and national levels, such as the National Center for Women & Information Technology Aspirations in Computing Award, 2018 Women in Technology Girl of the Year Award, Georgia Youth Leadership Award, and Harvard as well as MIT Engineer of the Year. 48% of LINKS members are people of color and have spread their passions in STEM to younger students of color by serving as role models. For example, several of our members worked with mentoring FLL teams that consist of primarily African American students and teaching design thinking classes to African American students at a low-income elementary school.

LINKS members receive opportunities such as internships at Georgia Tech Research Institute, Delta Innovation Center, and several impactful nonprofits. Multiple LINKS students have also been inspired to pursue entrepreneurial endeavors, building impactful business ventures. 90% of LINKS alumni graduated from prestigious universities like Harvard, MIT, Carnegie Mellon, and Georgia Tech with STEM degrees and 80% have gone into STEM careers. Many of our alumni also return to the FIRST community by mentoring FIRST teams and volunteering at our outreach events as well as local FIRST events.

Moving forward, LINKS values sustainability in everything that we do. By employing a deliberate recruitment strategy, maintaining strong partnerships with our sponsors, and continuously encouraging more young students to get involved in FIRST programs, we are ensuring that there is always a next generation of LINKS members ready to continue the LINKS legacy and the mission of FIRST.

All in all, Fernbank LINKS is committed to continually inspiring, engaging, and fostering a passion for STEM in the hearts of young students. By leveraging FIRST through our improved version of the STEM Pipeline, we hope to safely carry students through their STEM journey without any leaks along the way. From getting kids excited about STEM from a young age to developing their well-rounded skills to build and sustain a career in STEM, utilizing FIRST in our pipeline can create the engineers and innovators of tomorrow and make the STEM field a more diverse and inclusive place.