

Chairman's Award - Team 3792

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2020 - Team 3792

Team Number

3792

Team Name, Corporate/University Sponsors

3M/Boeing/University of Missouri-Columbia, College of Engineering/Crawford's Inc.&Family/Community

Briefly describe the impact of the *FIRST* program on team participants within the last five years.

Army Ants students develop both technical and leadership skills through collaborating with others from diverse backgrounds. They also gain an appreciation for community and diversity through mentoring in our extensive outreach programs that target underrepresented groups. After graduating, Army Ants stay involved in STEM and FIRST: 16 of the 18 graduating seniors in 2019 are currently pursuing STEM degrees and 7 of our 14 mentors are Army Ants alumni.

Describe the impact of the *FIRST* program on your community within the last five years.

The Army Ants have interacted with thousands of Columbia youth through STEM engagements such as outreach camps and community presentations. Furthermore, we strive to spread robotics to new demographics. Through our partnerships with Granny's House, Grade A+, and IGNITES, programs for African refugees and low-income children, we have introduced FIRST to a new generation of young engineers. Within the community, the Army Ants have been recognized as a focal point for promoting STEM education.

Describe the team's methods for spreading the *FIRST* message in ways that are effective, scalable, sustainable, and creative.

The Army Ants philosophy is focused on the quality of each interaction with the community, bringing forth the message of FIRST and inspiring participants to explore STEM. Our outreach means more than robots alone, as we strive to develop a sense of problem solving, communication, and cooperation among participants - the essence of the FIRST experience. For example, we bring concepts of engineering and programming into our mBot camps and encourage participants to seek out FIRST experiences.

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

The Army Ants set an example on and off the field, by providing programming and electronics tutorials. At events, we help other teams by trouble-shooting code, and providing mechanical resources to help other teams. Woodie Flowers always said that an opponent one match could be your alliance member the next, so we always strive to uplift teams by lending a hand. Our team sets an example of graciousness and positivity that helps build relationships with the rest of the FIRST community.

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

In 2016, the Army Ants elected to focus on our own sustainability before starting another FRC team. We decided to grow FLL and FTC, and support our alumni organization to create a pipeline of interested students as well as a mentor base to draw from. Our team has experienced consistent growth and now, in 2020, we feel that Columbia can sustain a second FRC team. We have identified several possible locations and mentors, and hope to establish a second team to compete in the 2021 season.

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

In 2016, the Army Ants established the Columbia Educational Robotics Foundation (CERF) as a 501(c)(3) non-profit. With Army Ants students and mentors as well as local teachers and advocates involved, CERF connects robotics and STEM enthusiasts from across the community. This has resulted in the formation of new FLL teams in Columbia, from 6 in 2015 to 16 in 2018. Additionally, CERF provided funding to start, support, and sustain the first FTC team in Columbia in 2017.

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

The team encourages all *FIRST* participants to continue with *FIRST*. For example, we promote FTC and FRC at events such as the FLL tournament in the Fall and the University of Missouri Robotics Challenge in the Spring. In addition, we encourage Army Ants alumni to stay involved in *FIRST*. By promoting our alumni organization, Mizzou *FIRST*, all *FIRST* teams have an experienced mentor base to draw from. In particular, Army Ants alumni have taken the lead in mentoring Columbia's first FTC team.

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)

We build relationships with other *FIRST* teams through outreach. We collaborated with the Fantastic Lego Ladies, a 4th year FLL team, to hold our 2017 and 2018 FLL Coopertition Workshop. Lego Ladies assisted in advertising the event to new teams, and joined Army Ants in teaching programming and robot design sessions. The workshop not only benefited the 12 FLL teams, but it also gave the Lego Ladies an opportunity to mentor, which they will surely continue to do when they join the Army Ants.

Describe your Corporate/University Sponsors

The team is 4-H affiliated through the University of Missouri (MU) Extension. It has access to classroom and workshop facilities through the Biological Engineering Department. The Colleges of Engineering and Arts and Science, and the Connector are the major MU sponsors. Our 2020 corporate sponsors include Boeing and 3M, and several local businesses that have donated materials and services. Additionally, our mentors include engineers from Boeing and 3M, and several MU faculty.

Describe the strength of your partnership with your sponsors within the last five years.

Our partnerships expand the team's ability to spread STEM to underrepresented groups. In collaboration with IBM, the Army Ants ran a programming workshop for 40 aspiring young female engineers. Since 2017, the Office of Diversity at the University of Missouri has provided the team with \$13,000 to support our scholarship mBot camps. We have received uninterrupted funding from Boeing and 3M since 2014 and 2017, attesting to the success of our programs in promoting STEM among diverse communities.

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

The Army Ants have fostered tremendous growth in STEM education across Columbia. Since 2011, we have helped over 300 Boy Scouts earn their robotics merit badges and cultivated a partnership with a Title I STEM school through our outreach. Our long-term commitment is evident; 35% of current Army Ants students felt inspired to join the team due to our extensive outreach in the previous years, and are now dedicated to sharing this experience with the community.

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

FIRST is a youth leadership program where students develop teamwork and communication skills within a collaborative atmosphere. Students learn through overcoming challenges, developing the vision and confidence to create their own future. Through robotics, *FIRST* participants also gain technical exposure in areas such as programming, CAD, and fabrication; these unique experiences serve as a catalyst to inspire students into the increasingly growing STEM field.

For FRC teams older than 5 years, briefly describe your team's broader impact from its inception.

Since 2016, the Army Ants have been an independent team located in and generously sponsored by the University of Missouri - Columbia. Because of our independent nature from the public schools district, we have been proud to provide the immersive *FIRST* experience to students from all four public and private high schools within the Columbia community, as well as many home-schooled students.

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

Jonathon Zars

Essay

Hardworking, down to earth, and immensely social; these words not only describe army ants, but also FRC team 3792. For 10 years and counting, our team has been a strong leader in spreading FIRST and STEM throughout the Columbia community. By promoting FIRST at all levels, from kindergarteners to high school students, our team has worked hard to promote diversity and inclusion, creating a sustainable program that encourages thousands of students to continue learning and discovering STEM throughout the rest of their lives.

We excite those around the community by igniting a passion for STEM through our interactive and inspiring outreach. We present at local elementary, middle, and high schools, introducing thousands of youth annually to FIRST. Our presentations are interactive; they are always excited to catch game pieces, dance in front of the camera, or even drive the robot themselves. These student-led community presentations have had a significant impact: In 2018, 43% of new Army Ants learned about the team from one of our presentations. Jefferson Middle School now eagerly supports two FLL teams and the first FTC team in Columbia after learning about FIRST. The great Woodie Flowers believed in gracious professionalism; we too believe it is our duty as professionals to inspire others in the community to explore STEM.

The Army Ants strive to broaden the FIRST community by bringing the spirit of FIRST into the community. We host 20-30 events every year, totaling over 1,300 hours of volunteering by our team members—roughly 35 hours per student. These events range from guiding Boy Scouts through their robotics merit badge - over 300 completed and counting - to educational robotics camps targeted towards underrepresented students in STEM. The Underwater Robotics Camp, for example, introduces 4th through 8th-grade students to a wide array of mechanical techniques, as well as electronics development and fundamentals of the design process. To conclude the camp, the robots are tested at a local pool. As expected, all the campers end up in the water with their robot.

Our outreach has been measurably helpful in bringing in a more diverse group of people, in both our demographics and team culture. The team's diversity has significantly increased in the past five years: minority participation on the Army Ants has increased from 19% in 2015 to 38% in 2020. Beyond the mere demographics, we welcome all high school students from our community; the Ants trace their origins to all four local high schools, as well as homeschool.

Furthermore, our outreach creates a culture of inclusion and leadership. All camps and presentations are student-led, and we encourage veteran Army Ants to lead at least one event per year to ensure that everyone acquires the leadership and communication skills essential to their future technical careers. For instance, our FLL Coopertition Workshop was first created by a team member for his Eagle Scout project. He handled all the organization and recruited other Army Ants to run the stations. The next year, another Army Ant continued leading this event. By developing communication skills through outreach, the team is more effective at working together and can become more successful. After spending the fall semester rotating through all specialties, each new Army Ant joins one of our four departments: mechanical, design, programming, and business. This ensures that every Army Ants has a place on the team. Each department creates its own internal structure and curriculum to integrate new members. For example, mechanical pairs new members with experienced members while new programmers work in groups with a veteran to assist them. Additionally, every Army Ant joins one or more non-technical subgroups, from social media to fundraising. With involved participation from every person and a diverse team culture, we are comprised of brilliant and ambitious individuals who work together seamlessly to produce a phenomenal robot.

We are best described as a synergetic team. As the only FRC group in Columbia, we have had tremendous success in growing the FIRST community. Columbia is home to all four levels of FIRST, from K through 12th grade, as well as an active alumni and volunteer network. Our outreach is demonstrably effective at provoking interest from the public about STEM, especially communities and demographics that are currently underrepresented. Since our inception in 2011, we have become the main source for promoting FIRST and STEM education in our school system and our area.

In addition to underrepresented minorities, the team is especially dedicated to bringing girls into STEM. We run programming sessions at a Columbia College camp for minority girls and at the IBM's Girl's camp, where we taught NXT line following to dozens of middle and high school girls. After Girl Scouts offered a robotics merit badge in 2018, we helped the first troop in Columbia earn it, and we are excited to continue this partnership. By actively recruiting girls, the percentage of female Army Ants doubled between 2015 and 2020, increasing from 16% to 35%. For comparison, the engineering classes at Columbia Public Schools remain around 15% female. Additionally, female Army Ants are in leadership positions in all departments, and 45% of the team's Student Leadership Council is female. Younger girls have role models on the team to look up to, inspiring them to become leaders as well.

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One of our most successful programs is our mBot camps. Each camper receives their very own mBot (\$90 value) to assemble and then program. Equipped with a variety of sensors, as well as a remote control, these robots allow for beginner to advanced projects. We start with lessons on the basics of Scratch programming, then lead on to more complicated projects, like our Momma Bird project, integrates concepts such as loops and ultrasonic distance sensing. We teach older campers Arduino programming and help them integrate multiple sensors. Throughout these camps, kids always brim with ideas, like creating programs that can navigate mazes or play soccer. At the end of the camp, they get to take the robot home to continue to explore with their mBots by using the online programming resources on our website. Although we initially held mBot camps as fundraising camps, we discovered that mBots are the perfect avenue to introduce low-income and underrepresented youth to programming and robotics. We now hold a scholarship mBot camps for underrepresented minorities by partnering with programs like Granny's House and Mizzou IGNITES a total of 228 mBot scholarships for campers, primarily children of African immigrants and refugees. Through a partnership with the University of Missouri's Diversity office, we have distributed 200+ mBot scholarships to the community, totaling up to more than \$18,000 in value.

The Army Ants team has personally experienced the positive effects of our extensive mission to spread a passion for STEM to the community. 43% of current Army Ants members were inspired by past Army Ants outreach events and presentations to join the team during their freshman year. The team emphasizes diversity; between 2017 and 2018, the proportion of females on the team increased from 19% to 32%, while the proportion of minority demographics on our team increased from 22% to 43% in the same time period. The diversity of the Army Ants team goes beyond race and gender; the team welcomes homeschoolers from the Boone County region and students from all four Columbia high schools. The Army Ants Student Leadership Council has recently implemented a more inclusive team structure to better include new team members. Each Army Ant joins either the programming, mechanical, CAD, or business department, ensuring that even the newest of members are involved from their first year. For students with non-technical interests, subgroups serve as an outlet for their passions. Every member is encouraged to join a subgroup, from social media and marketing to outreach event planning, to promote a diverse skill set. Within each major department and subgroup, older members pair up with newer Army Ants for one-on-one training so that people with little or no technical experience can still be involved in the robot creation process.

The team actively reaches out to veterans of the Army Ants colony in Columbia and encourages them to give back to the FIRST program. The team has funded the University of Missouri's Ri3D team for three years, providing more than \$2500 and our shop space to foster the growth of the FIRST alumni community while also recruiting three FIRST alumni to mentor the Ant Colony FTC team.

The Army Ants team is at the forefront of a growing movement to spread a passion for STEM throughout Mid-Missouri. With the implementation of a purely student-run team structure, the team promotes leadership skills and technical expertise among high school students. Through educational robotics camps, engaging community presentations, and partnerships with local organizations, the Army Ants touch the lives of kids of all ages, inspiring them to unleash their scientific curiosity. When we look into the future, we see endless possibilities and many, many more years of spreading a passion for STEM to the community.