

## Chairman's Award - Team 1403

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2020 - Team 1403

### Team Number

1403

### Team Name, Corporate/University Sponsors

Montgomery Township School District/Bristol-Myers Squibb/National Defense Education Program&Montgomery High School

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

Team 1403 Mentors hold Cougar Classes to help students develop leadership and communication skills as well as engineering experience. This teaches us to solve problems and collaborate with our peers. Knowledge is passed from member to member through our leadership model in this collaborative environment. Members may earn a varsity letter for their quality work and dedication. Many of our members pursue a career in STEM and our alumni often return to mentor Team 1403 and other FIRST teams.

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

For the past 5 years, we donated thousands of food/toiletry items to the Trenton Area Soup Kitchen. For the past 7 years, we collected over 10,000 can tabs which we gave to the Ronald McDonald House Charity. At STEM night and the Science & Invention Convention we demonstrated robots and our VR system and judged projects. We teach elementary/middle school students how to program Lego NXT robots every summer and once a week during the school year. We host Women in STEM events open to the public.

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

Team 1403 continues to maintain sustainability, effectiveness, creativity, and expand its current impact. We continue to mentor FLL teams, teach special education students, and judge the Science & Invention Convention. Values are instilled in members through Cougar Classes, where creativity is key when solving engineering challenges. To spread on a larger scale, 1403 has increased participation in TCA, now working with help hubs, call center, and making resources.

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

Team 1403 believes in consistency and sets standards for both professional documentation and conduct. We document progress through our team timeline, handbook, robot user manual, and Chairman's Binder. We post Kickoff workshop presentations on our website and resources for The Compass Alliance on their website. Whether it is our team uniform or safety standards, we always maintain a professional stature. We continually offer assistance to other teams throughout build season and at competitions.

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

The area we are located in is saturated with FRC teams so groups looking to start an FRC team are often difficult to find. Therefore, we instead help teams in need of assistance and formed The Compass Alliance (TCA) with 7 other teams to provide detailed guides, resources, offer mentor support for new teams, and work a 24-hour hotline to help teams across time zones to answer any questions other teams may have.

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

Five years ago we started two FLL teams at Montgomery Upper Middle School. We have been mentoring both teams, Team 26361: Montgomery Thundercats and Team 26362: Roboclaws for a total of 2,852 hours. Last year, we also mentored a Girl Scout Troop to start their own FLL team. Team 42298: Star Scouts were working on earning Girl Scout badges. We also mentored 2 Jr. FLL teams in our local area. In total, we have mentored 3 FLL teams and 2 Jr. FLL teams in our local community.

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

With 7 other FRC teams across the globe, Team 1403 started The Compass Alliance. We are 1 of 4 core teams, providing resources, 5 of which have been published by FIRST. Through TCA we also assist with call centers, help hubs, and creating resources. We video chat with other FRC teams weekly to encourage collaboration. We help FLL and Jr. FLL teams by mentoring them throughout our preseason. This year we will start "Service Stations" at competitions in order to assist other teams in the pits.

### **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)**

Members from all subteams on 1403 work to mentor the 2 FLL teams at Montgomery Upper Middle School. As mentors, we guide students with their robot and project challenges, but also instill FIRST's core values. We hope the FLL members will join 1403 so we can prepare them for their futures inside and outside the engineering community. Our members have devoted 2,852 hours over the past 5 years to 3 FLL teams and 2 Jr. FLL teams and 2 of our 1403 members have even won Outstanding Mentor Awards.

### **Describe your Corporate/University Sponsors**

The Montgomery Township Board of Education is our largest sponsor. Picatinny Arsenal hosts a Women in STEM event to motivate women on our team to pursue STEM fields. Our other sponsors include Bristol-Myers Squibb, Department of Defense STEM, A&K Equipment, Integra LifeSciences, Verizon, Google, Slalom, and Johnson & Johnson Foundation. Our sponsors provide us with financial support. At our Women in STEM events, women from these companies participate in our panel and discuss their experiences.

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

We have a mutualistic relationship with the Montgomery Township Board of Education providing us with funding and facilities. Team purchased machinery is used in engineering classes. Picatinny Arsenal holds a Women in Engineering event every year, inviting us to speak with female professionals and they have also given us a 3D printer which we often use to create prototypes. Many of our sponsors contribute to our Women in STEM panel and speak at the Montgomery District Event.

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

FIRST is a community of students and mentors brought together not only to solve a robotics challenge, but to develop the students' futures. Through their general shared interest in robotics, students develop their passion for STEM, build lifelong connections, and learn valuable skills. These connections are a source of opportunity that students can utilize beyond FRC to help establish themselves in the workplace.

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

Team 1403 consists of two halves: a robot side and logistics side. The robot side is led by a Robot Manager and Assistant Manager and is made up of the Mechanical, Design, Electrical, and Programming subteams. The logistics side is led by a Logistics Manager and Assistant Manager and consists of the Outreach, Strategy, Audio/Visual, and Business/Communications subteams. Each subteam has a different purpose but in the end, come together to create one team and one family.

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

Team 1403 began with just 35 members in a garage, with the bare minimum goal of creating a working robot. This has evolved to 115 members, and through various outreach events and the hosting of FRC events, we have evolved our mission to include the value of STEM education. Our alumni have moved on from Team 1403 to various STEM fields, with 3 returning to mentor our team, 9 mentoring other teams, and one moving on to create an FRC team on his own: FRC 5125 Hawks on the Horizon.

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

Ria Bhatia



## Essay

Dedication. Family. Quality. These are the fundamental pillars that form our team's mission and drive our team to sustain and expand the frontier of STEM education. Our team began with only 35 students building robots, but over the past 17 years, expanded to 115 students, stretching our intentions to include a diversity of STEM-related outreach. We start from within and work our mission outward; moving from our team, to our school, into our district, and finally to our international community. We recognize the importance of STEM advancement and are working to contribute to this global community. Who are we? 1403!

### OUR TEAM

Our team is run by 2 Team Captains with Robot and Logistics Managers. The team has 8 subteams with 20 captains as shown in the Chairman's Binder.

We hold 6 Cougar Classes where members learn life lessons that will help them both in and out of robotics. After a presentation, members are given challenges that utilize the lessons learned. Our first one was for captains and included a presentation on leadership skills. The final class expanded upon cultures through brief presentations done by members on their heritage, helping our team have an open mind concerning diversity, and enhancing the culture of FIRST. Other topics included Intro to Robotics, Ethical Decisions, Social Media, and Business Etiquette.

The team website is our primary method of communication with members, mentors, parents, sponsors, and other FRC teams. It features our 6 weekly newsletters, which discuss the team's current activity and progress throughout the build season. Other pages detail the team's programs, outreach, and resources including those maintained by The Compass Alliance.

We use our Facebook and Instagram accounts to reach more people. With a total of 1,733 followers, we post about our events, sponsors, and progress.

Last year, Team 1403 expanded our technology with a Virtual Reality (VR) system. We made animations of our robot and displayed them during kickoff, competitions, and other school events. At the 2019 FIRST Championship, we demoed our VR to General Abramson from Picatinny Arsenal.

Our team created and published "Cougar Echo" on our website, a public Java recording library designed to create and load autonomous paths without needing to hard-code each path. We also published the 1403 Belt and Chain Calculator on our website, helping teams with power transmission calculations.

During build season, meals are served by members and parent volunteers. Throughout the meal, students play a Kahoot quiz designed by other members. While it is competitive, it relieves stress from the build day and creates bonds among students. Topics include the FIRST game rules, team facts, and etiquette.

Since 2014, members have been able to earn varsity letters based on team contract requirements. The letter shows the students' extended efforts and commitment to FRC. Since 2014, 144 letters have been earned.

The Montgomery Township Board of Education (BOE) is our largest sponsor; team-purchased machinery is used in engineering classes, giving back to the school. Every year, our team presents our robot and team to update our progress and achievements at a BOE meeting.

Picatinny Arsenal is another sponsor of ours. Every year, female team members attend their annual "Women in Engineering" event. Other sponsors include Slalom, Bristol Myers Squibb, Google, DoDSTEM, A&K Equipment, Integra, Verizon, and Johnson & Johnson Foundation.

### COMMUNITY IMPACT

We repurposed 2 FIRST field carpets for children at our elementary school; 1 in a general and 1 in a special needs classroom. We also helped the school guidance counselors prepare for a career fair by folding 500 brochures last-minute.

Members assisted in 3 Boy Scout Eagle Projects which involved 12 students contributing 88.5 hours at our local schools. These projects were a "MakerSpace", outdoor classroom, and garden beds.

Last spring, our team assisted a national "Go Baby Go" event for the Children's Specialized Hospital of Toms River. This program allows young children with disabilities to move independently and promotes developmental growth. We retrofitted 5 donated power wheel vehicles to accommodate their needs and are currently working to assist another "Go Baby Go" event.

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At our 7th annual food/toiletries drive, subteams competed against each other to donate the most amount of items to the Trenton Area Soup Kitchen, collecting over 350 items, and bringing our 7 year total to over 2,000. We also collected over 10,000 can tabs over this time to donate to the Ronald McDonald House Charities.

### STEM IN THE COMMUNITY

For the last 6 years, our team has helped at our district's annual Science and Invention Convention. This year, 26 members volunteered as judges for 216 students. The team also set up a booth where children were able to explore VEX robots and our VR system. It was so popular with visitors that the convention was extended an hour.

For 3 years, members taught children with special needs the basics of EV3 LEGO Robots at the Rock Brook School of Skillman NJ. For 2 years we have worked with our school's special education program, assisting them in creating a Raspberry Pi face-tracking program.

We volunteer at an After School Robotics Recreation program for kids grades 5-6 under the technology teacher, Mrs. Young, helping them build and program LEGO EV3 robots.

For the past 5 summers, members mentored students grades 4-8 at the Student Opportunities for Academics and Recreation Program. For 382.5 hours, 32 members taught how to make and program LEGO robots.

Since 2017, our team has been assisting the district's Family STEM Night. Our VR and VEX robots were available at our booth. This year we are collaborating with the Montgomery High School's (MHS) Computer Science Club to start a STEM event for kids grades K-8. This event is slated for April.

We encourage young women to pursue careers in STEM fields. For the last 3 years, we ran 5 events: 2 at Skillman Kickoff and 3 at the Montgomery District Event. We have a panel of successful women in STEM fields who discuss their achievements and struggles, inspiring others to pursue futures in STEM. At this year's Kickoff, we had 6 presenters, 2 of whom were alumni. For the 2020 District event, we have 12 women planning to participate in the panel, greater than before.

### FIRST

Team 1403 was instrumental in starting FLL Teams 26361 and 26362 4 years ago. This year, 28 of our members mentored these teams for a total of 731 hours before the qualifying event. Mentoring these students inspires them to join our team. We also mentored FLL Team 42298, Star Scouts, and helped them earn Girl Scout badges, as well as a FLL Jr. team for a total of 170.5 hours.

Our team began the Skillman Kickoff event 15 years ago and we have been running it since. This year we had 800 attendees and distributed 35 kits. We ran 7 workshops including Intro and Advanced Autodesk Inventor, Linear Motion and Pneumatics, Mechanical Power and Power Transmissions, Bumpers, Sensors and RoboRIO, and Women in STEM. We raised over \$700 for our Sister Team 3132 in Australia to distribute to other FIRST Teams affected by the bush fires.

We hosted Monty Madness for 10 years, leading us to start and run the Montgomery District Event 5 years ago. In 2019, we had 35 teams and 180 volunteers including team members, parents, and alumni. Our parents ran our biggest fundraiser, selling food/beverages.

Our alumni are still a part of FIRST: 4 mentor our team, 9 mentor other teams, and 1 started FRC Team, 5125, Hawks on the Horizon.

### TCA

Our team was asked to be one of the founding core teams of The Compass Alliance (TCA) in 2017 and we continuously contribute to the sustainability of other FIRST teams. Our team has been a part of many different services including Help Hubs, in which we answer questions regarding awards, administration, and team structure. In 2019, we introduced a "Hear For You" station through TCA at our District Event and Lehigh District Championship. This was a designated area away from teams where students could go to destress with quiet and coloring. We also provide written and video resources for other teams to use; last year, FIRST officially published 4 of our resources on their website.

This year we have added 2 more resources: 1 on how to organize a team and 1 on Autodesk Inventor, bringing our total to 9 written and 52 video resources. We also monitor the call center at specific times of the week, answering questions including how to be a better human player, belt calculations, and how to start a rookie team. This year we will introduce our team's "Service Stations" at competitions, where members of 1403 will walk through the pits, offering service assistance and items to teams who need it.

Team 1403 participates in video calls during preseason and build season with other TCA core teams to create new initiatives and further the progress of the current ones. We also call Team 3132 weekly during build season to discuss progress and help each other with issues.

To strengthen our local FMA community, 1403 hosted our first TCA Workshop in September 2019, where 18 teams of all experience levels attended to share resources. The event included 12 workshops presented by our team and 5 by other

teams. Topics included swerve drive, judging advice, and running an off-season event with a focus on helping teams. The event also gave mentors the chance to directly communicate with the FMA Board of Directors.

Since our team's inception, we have been growing at a steady rate through which we incorporate new and innovative STEM ideas and solutions for education. At MHS, 1 in every 14 students is a robotics member. This season, members have dedicated 10,482 hours to our team so far. Members share the same motivation, passion, and fundamental pillars that help drive our team, expanding the limits of what we are able to do.