

Chairman's Award - Team 6024

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2021 - Team 6024

Team Number

6024

Team Nickname

R Factor

Team Location

Mumbai, Maharashtra - India

Describe the impact of the *FIRST* program on team participants within the last 3 years. This can include but is not limited to percentages of those graduating high school, attending college, in STEM careers, and in *FIRST* programs as mentors/sponsors.

Every member is an uncontested team player & works towards shared goals with coopertition, fostering friendships for life. Hands on learning satisfies our curiosity, brings intellectual joys & critical thinking with 100% sustaining interest in STEM. 3 first generation girls of our team from rural India are pursuing engineering bringing a transformative cultural change. Our FTC KOP & alumni led disruptive innovations in drone & ventilators have enhanced self-belief and problem-solving skills.

Describe your community along with how your team addresses its unique opportunities and circumstances.

In our STEM community there is no dearth of talent or will power; people need support, direction & means. Being the first FRC team from India, we have a parental responsibility to foster FIRST. Our extensive & innovative outreach of 12000+ hours fulfill our mission to Promote, Connect & Integrate FIRST. With our vision of #FIRSTWITHOUTBOUNDARIES we strive to achieve diversity, inclusivity and equity to give the necessary experience of hands-on learning to impart life skills to the youth of India

Describe the team's methods, with emphasis on the past 3 years, for spreading the FIRST message in ways that are effective, scalable, sustainable, and creative. How does your team measure results?

Our First Facilitation Center creates a sustainable ecosystem for teams, FIRST program delivery partners, STEM centres & schools. We measure results by the teams impacted and people reached. There is an increase of FLL from 44 to 200; FTC 9 to 47; FRC 1 to 7 & 3 FGC teams. At Technovanza, we hosted SOPHIA AI Humanoid to reach 80000 attendees. We conducted 3-day FTC masterclass and 15-day Future Innovators Robotic Competition. Times of India featured us reaching out to 15 million readers.

Please provide specific examples of how your team members act as role models within the FIRST community with emphasis on the past 3 years.

Team members conducted FTC Kick off, KOP demo, sessions on programming, electricals, CAD & chassis building inspiring students to experience the budding engineer within. Captain Stuti mentors all girls team 8621 from farmers community & empowers 40 girls to pursue STEM. We mentored 22 hearing impaired students for FLL. At FTC & FLL events we help to troubleshoot in robot inspection & breakdowns. Securing admission with scholarships, in top US universities, our alumni inspire many to join FIRST.

Describe your team's initiatives to Assist, Mentor, and/or Start other *FIRST* teams with emphasis on activities within the past 3 years.

Since 2018, with our FIRST FACILITATION CENTER, we started & mentored 7 FRC, 12 FTC, 3 FGC, 5 Jr.FLL & 15 FLL teams & assisted over 200 FIRST teams. Our KOP will be distributed free to all Indian FTC teams. Conducted FTC masterclass over 30 hours to 30 FTC teams. Assisted in 4 Woodie flowers & 11 Dean's list award submissions. Assist teams by distributing Safety, Robot and Engineering, outreach handbooks. Simplified playfield construction for FIRST programs

Beyond starting teams, what initiatives have you done to help inspire young people to be science and technology leaders and innovators? What results have you seen from your efforts in the past 3 years?

Involved engineering majors from 5 universities to volunteer & mentor; donated Lego & Laptops to underserved schools to fuse theoretical & hands-on learning. Over 75 outreaches-Tech and kid fairs, TED talks, chassis workshop, hosting Sophia Humanoid. We published "DREAM ON INDIA" book, inspiring youth to have a sense of belonging in STEM. Our KOP is a tinkering DIY kit in STEM learning. We bridged the technology divide between urban and rural and shattered stereotypes with more girls in STEM.

Describe the partnerships you've created with other organizations (teams, sponsors, educational institutions, philanthropic entities, etc.) and what you have accomplished together with emphasis on the past 3 years

Along with 5 FIRST program delivery partners, we hosted 3FTC/2 FLL national championships, engaging 3500 FIRST students. PTC India & Rockwell Automation endorse our KOP. Invited to M&M Auto founders' day & Infosys prize event annually. N Sekhsaria helps us sponsor underserved FIRST teams. 3 schools give space to conduct FIRST events. Partnered with 5 universities & National science centres for tech fest, recruiting FLL volunteers & judges. We conducted Mock FLL's & FLL trainings at STEM centres.

Describe your team's efforts in the past 3 years to promote equity, diversity, and inclusion within your team, *FIRST*, and your communities.

We are a pan-India team of 28 students with 3 girls from rural farmer's community and invited students of FGC India 2020 in our team on pro bono basis. We mentored all-girls FLL team from rural India & 22 hearing impaired for FLL 2018/2019. Started & mentored all girls teams-FGC 2019, FRC 8621, 3 FTC (40 girls) breaking stereotypes. FGC team India 2020, started by us, had students across India & is epitome of Unity in Diversity. Free-of-cost KOP has enabled equal opportunity for participation.

Explain how you ensure your team and the initiatives you have created will continue to run effectively for the foreseeable future

Outreach and Robot display at FLL & FTC events serve as a magnet to induct new members and mentors. Building up inventory with custom-made parts cuts costs. Continuous upskilling & certification programs gears students to take on new challenges. Collaboration with all FIRST stakeholders is the best investment to remain sustainable. Our handbooks & documentation are living entities which rookies learn to review them to get into the team's culture.

Describe your team's innovative strategies to recruit, retain, and engage your sponsors within the past 3 years

N. Sekhsaria & MESCO Springs are main sponsors for past 5 years. At sponsor demos, we present FIRST & excite parents, kids & future mentors about STEM. M & M Auto, Rockwell automation & PTC India have endorsed our KOP & offered us internships. This year with "FUEL A DREAM" campaign we have reached out to 55 funders for our all girls FRC & FTC teams from rural India. We sponsor technical fests in engineering colleges, who send judges & volunteers for FIRST events that we host.

Highlight one area in which your team needs to improve and describe the steps actively being taken to make those improvements.

Sustainability is the biggest challenge for a community team like ours. Retaining mentors & team mates and time management in a traffic prone city of Mumbai makes us look for workspaces which are accessible and affordable. We have transformed ourselves into a year-round team by engaging members with upskilling, certification courses and outreach. By inviting FGC members and mentors to join our team annually on a pro bono basis, we strive for sustainability and growth.

Describe your team's goals to fulfill the mission of *FIRST* and the progress you have made towards those goals.

Our mission of promote, connect and integrate and our vision of FIRSTWITHOUTBOUNDARIES are completely aligned to the FIRST mission. We have made progress in building capacity of FIRST community by training mentors, sharing tools and resources, inspiring innovation and leadership. By our innovative outreaches and humancentric approach to learning, we have set the blueprint of diversity, equity and inclusivity in FIRST India. We bring everyone in, lift everyone up!

Briefly describe other matters of interest to the *FIRST* Judges, including items that may not fit into the above topics. The judges are interested in learning about aspects of your team that may be unique or particularly noteworthy.

Altruism underpins our team's philosophy to use grants, from our sponsors and the reward money that we win, to start

underserved new teams. Our journey of 6 years with 3 Woodie Flowers, 3 Dean's list and 23 international awards has been legendary. We are an inspiration for rookie and veteran teams who emulate us with our creative handbooks, innovative outreach and entrepreneurship. We won the PTC Onshape Challenge, and we used the \$1000 reward to sponsor all girls FRC 8621 from rural India.

Essay

An animated discussion on the new challenge of game design was in process. Suddenly the pizza on the table became the protagonist of the theory of area of a circle and calculus. Curiosity piqued. It snowballed into applying the concepts of mechanics and projectile motion. With a spark in his eyes, the rookie exclaimed 'my mind is blown by how everything is connected'. This is a regular phenomenon at R factor where the transfer of knowledge is seamless and the veterans in the team find ways to engage the rookies in meaningful learning with loads of fun and camaraderie.

ONE TEAM = 28 GAME CHANGERS

R Factor emits good VIBES (Values Inclusivity, Beliefs, Equity in STEM). We are a PAN INDIA community team with a legacy of 6 years presently made of 28 students from 15 schools and 8 mentors igniting the spark of curiosity. We have included 3 girls from the farmer's community and students of FGC 2020 over 3 cities pro bono, setting a blueprint of diversity, inclusivity and equity in the FIRST India community.

Our team structure maximizes leadership opportunities for students. Our team's fearless atmosphere encourages debating, thereby creating rich discussions where failure is welcome to ensure learning never stops. Over the past years, the foundation of our team has been built through the concepts of Kaizen, Fishbone analysis, PDCA, Root cause analysis, and 5S.. This made our processes streamlined and helped us create SOPs which save time, money, and resources.

COVID 19 came with adversities as India faced the strictest lockdown. Here, we saw an opportunity to focus on upskilling the team online with over 5400 hours of CAD, JAVA, and Python programming, electrical, mechanical design, design thinking, and More than Robots" outreach. This resulted in our students getting certified in SolidWorks by Dassault Systèmes at the level of Associate and Professional.

FIRST FRENZY

We have a record of creating the FIRSTS of FIRST.

We are making consistent progress in our mission to Promote, Connect and Integrate FIRST with our vision of #FIRSTWITHOUTBOUNDARIES. We catalyzed all stakeholders of FIRST in India. We conceptualized and created our FIRST FACILITATION CENTRE in 2018 to share published documents, resources, tools, handbooks and encouraged many teams across India to participate in FIRST programs. Political borders haven't stopped us from reaching out to teams in Bhutan, Nepal, Pakistan, Bangladesh, Sri Lanka, Indonesia, Turkey, Libya, and Taiwan. We have hosted and ran 3 FTC and 2 FLL national championships at 3 schools in collaboration with 5 program delivery partners-India Stem Foundation, InfinityX, Duck learning, Edutech, and Stem Education Trust-as a long-term commitment towards FIRST. At such events, our robot functions as a magnet to excite students and parents. Our endeavor to seek out corporates for roles of judges and to enable grants for underserved teams is successful which has been essential in percolating the philosophy of FIRST. We trained 150+ students from 5 reputed engineering colleges to be volunteers. Our partnerships with 10+ STEM centres and 25 schools have ensured the progression of students through the FIRST pipeline of programs. Since 2018, we have mentored and started 5 Jr FLL, 15 FLL, 12 FTC, 3 FGC & 7 FRC teams.

We mentored and sponsored 2 FLL teams of hearing-impaired students that went on to win the Core Values Award at the national championship in 2019. Ultimately, knowledge transcends all barriers and proves that passion for STEM learning can bring infinite joy.

PTC released the "Robots To The Rescue" challenge in March 2020. COVID-19 may have upended our FRC season but couldn't dampen our spirits. Our strength of customizing parts, manufacturing feasibility, cost estimation, and documentation enabled us to win the competition. We received a reward of \$1000 as a grant for the FRC 2021 season.

This was an opportune moment for the team to apply its philosophy of using grants to start and uplift teams. We used the grant to sponsor and start the first ALL GIRLS FRC TEAM 8621 from the Indian subcontinent.

We ran and hosted the FTC India Kick-off virtually (with program delivery partner InfinityX) with 500+ participants attending the event. We held a historical FTC masterclass for 3 days with more than 30 teams where we had expert professionals and experienced students discuss the best ways to approach the challenge. Here, we explained the game manual, playfield & robot construction, programming, outreach, Dean's List, and other awards.

Our efforts over the past three seasons through 75+ outreaches of 12000+ hours have been instrumental in spreading FIRST awareness to newer audiences. In 2020, we co-hosted FUTURE INNOVATORS Robotics Competition(FIRC) with OMOTEC, a series of lectures by tech leaders to 200 participants. In 2019, to enable teams with fewer resources, we simplified the FGC 2019 Playfield. We have advocated FIRST as a "Mind Sport" to 200 students at the Young Engineers Club. We held FLL Kickoffs at the American School of Bombay and Dhirubhai Ambani International School. We held mock FLLs for 9 teams of OMOTEC. At Technovanza 2019, we hosted Sophia, the AI Humanoid to reach out to a crowd of over 80000 people and conducted chassis building workshops, sparking curiosity in them by showing them the potential of STEM. We were instrumental to publish a book, "Dream on India" reaching 37 schools all across the country signed by the President of India.

Due to our consistent efforts, we have seen exponential growth in FIRST programs with an increase of FLL from 44 to 200; FTC 9 to 47; FRC 1 to 7 & 3 FGC teams. We have created a FIRST Frenzy.

WHEN SHE RISES, WE RISE

GRIT, GUTS, AND GLORY IS WHAT OUR GIRLS IN STEM HAVE DEMONSTRATED

Their story starts with FGC India 2019. An all-girls team was started and mentored by us. We enabled them by enhancing their technical skills, helped in the engineering notebook, designing the playfield, and driving skills over 600 hours.

At the same time, across the country in the rural farming community in Akola, we started an all-girls FLL team from Manutai School. These girls were the first-generation from their families to go to school and went on to shatter records winning the Championship and the Core values awards. Overwhelmed by this achievement, one girl remarked "This opportunity has changed our lives. My father gave up alcohol to support me. He and I found a purpose in life because of FIRST. Thank you R Factor". To make FIRST programs sustainable in this school, we have donated Lego kits, held a laptop donation drive, and provided infrastructure to enable internet connectivity.

We were inspired to empower 40 girls from the same school to continue their curiosity and determination to participate in FIRST programs. We persuaded program delivery partner INFINITY X to give them grants.

Moreover, we mentored and started the first ALL GIRLS INDIAN FRC TEAM 8621 from the same village. Our "FUEL-A-DREAM" campaign for FRC 8621 received donations from 55 funders. We have also inducted 3 girls from the same school into our team. This has brought a transformative change in mindsets of the farmers of Akola towards girls' education.

We could count on our teammate who conducted a chassis building workshop in Technovanza 2019. She took to the stage to address 3000 engineering graduates and spoke about FIRST and girls in STEM. It's all about making STEM feel more accessible, welcoming, and exciting. We are showing results demonstrating truly what it means to be a part of FIRST and a force for change.

KOP: MAKE IN INDIA

Approximately 68.8% of the Indian population lives in rural India and a large proportion of the population has an annual income of less than \$137. Here, obtaining resources is a huge constraint.

FTC Teams struggle to scale up with their pre existing platform, logistics and import levies add to the constraints. In line with our vision of creating a sustainable ecosystem of #FIRSTWITHOUTBOUNDARIES, our team took on the task of designing a cost-effective Kit Of Parts (KOP). We followed a rigorous and highly methodical design process with 12 students working for a total of 1080 hours. We built a cross-platform compatibility chart for popular systems such as REV, GoBilda, Tetrax, and Andymark, displaying and comparing mating procedures, pros and cons, and common elements in each of the systems. Armed with this information, we created a modular chassis, elevator, intake, and shooter mechanisms that was compatible with all existing platforms. We proudly presented our KOP to FTC program partners in India. PTC INDIA and Rockwell Automation endorsed our kit. This kit will be provided free of cost to all FTC teams from India and thus will scale up hands-on learning and FIRST participation. This kit inspires all teams to take up custom manufacturing and CAD.

The acknowledgement from InfinityX says it all! "The true volunteerism shown collectively by the team will empower students to be future change makers and make a positive impact on their communities and the world. We appreciate the teams dedication towards FIRST philosophies".

CULTURE MAKERS

Our team has evolved as an organization that invests in the future of children and everyone in our community to help realize their glint of curiosity. Even in times like these, we have shown resilience to rise above in this incredible journey of 6-years. We have come on top of challenges to change the culture of STEM in India, with impactful outreaches and success in inclusive growth and the game-changing KOP. It's a result of our behaviors, our commitments, our curiosity, how we collaborate, and the ways that we courageously share our perspectives and encourage others to do the same. It brings us together in ways that help us stand out.

Building the change, we wish to see.

Team R Factor, Winning hearts with winning efforts!