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I had the opportunity to lead Team SIGMA #20890 for the 2023-24 FTC Season 'Centerstage'.

Technical Information

To build the robot, our team split into sub-divisions, each focusing on a specific aspect such as the grabber, drone launcher, and programming. I was part of the hanging system team, where we took a unique

approach by designing a non-motorized hanging mechanism—something we hadn't seen used by any other team in the Indian national round, nor online by other global teams.

This approach presented four key challenges:

1. **Hanging Mechanism**: We opted to use a wedge-based system rather than DC motors, requiring precise calculations to determine the ideal angle and dimensions. After multiple iterations, we finalized 13-degree wedges attached to bars that were released by servos and pulled up using surgical tubes.
2. **Load Balancing**: We spent hours adjusting the robot's components to ensure it hung correctly, moving mechanisms and the battery pack to achieve proper weight distribution.
3. **Odometry Retraction**: Our hanging system raised the robot less than 5mm, causing the deadwheels to touch the ground. I suggested an odometry retraction system linked to the hanging activation, which solved the issue.
4. **Servo Torque**: The servos (MG995s) initially struggled under the force of the surgical tubes, leading to false releases. I proposed switching to higher-torque MG995R servos, which resolved the problem.

This project pushed me to develop creative solutions and enhanced my engineering skills, ultimately resulting in an efficient and high-quality mechanism.

Community Upliftment

Our team held a variety of outreach programs, but I was primarily involved in the following:

1] Corporate Pitches & Lab Setup at the Dhai Akshar Foundation

This FTC season, our goal was to raise ₹2,00,000 to establish a robotics lab at a non-profit school. To achieve this, we designed a curriculum, selected STEM kits, and planned a three-day teacher training program. I participated in three corporate pitches, which we secured through a cold email campaign and team networks.

We pitched to D'Decor, Sapura Energy, and SIB Infotech, presenting our team's achievements, goals, and funding plans. These experiences helped me improve my communication skills, particularly in responding to questions and applying my knowledge of Corporate Social Responsibility (CSR).

Through these efforts, we successfully raised **₹2,00,000**, which has been **allocated to the Dhai Akshar Foundation to establish a robotics lab**, potentially impacting hundreds of students.

2] Everyone Can Code! OctoStudio Tutorials

My team launched a **free tri-lingual YouTube tutorial series** on MIT Media Lab's new block-based coding app, OctoStudio, in **English, Hindi, and Marathi**. By offering the tutorials in regional languages, we **aimed to make coding accessible to millions of Indians** who might not typically engage with English-based content.

I created the lesson plans for all five episodes in each language and oversaw the planning, recording, dubbing, and editing process. This experience enhanced my leadership and organizational skills as I took a hands-off approach, overseeing the project and delegating responsibility rather than producing it directly. After three months of effort, we successfully published the series, expanding access to coding education.

Tutorial Playlist Hyperlinks:
English | Hindi | Marathi

3] FLL Kickoff

My team, along with help from our alumni, organized the fifth edition of the FLL Kickoff—a mini version of the FIRST Lego League (FLL), which has been discontinued in India due to supply chain issues. The event served as an introduction to STEM for young students and featured 21 teams from three cities.

Me (presenting in the white shirt), introducing the competition

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We built basic EV3 rovers, guided teams through designing custom add-ons, taught them block-based programming, and had them compete in three timed challenges, earning up to 200 points. I presented about FIRST, Team Sigma, and the competitions, mentored a team as well as managed event logistics.

The highlight was inviting three teams from the Dhai Akshar Foundation, an NGO for underprivileged students—two of whom placed 1st and 2nd in the senior division. Hosting this 7-hour event was a learning experience, as I underestimated the effort required to organize, plan, and execute such a large-scale event.

4] NESCO World Education Fair

As part of our Community Upliftment program, I participated in a three-day event at the NESCO World Education Fair in Mumbai, where I engaged with around 500 visitors, showcasing various robots—from LEGO EV3 models built by 5-8-year-olds to our FTC prototype. I explained our 'CENTERSTAGE' challenge and demonstrated our robot's mechanisms, which helped me refine my communication skills. Though language barriers posed a challenge, I adapted and enjoyed interacting with people from diverse backgrounds, making it a valuable learning experience.

5| Oberoi Splendor Housing Society

At the Oberoi Splendor Carnival, our team ran a six-hour stall featuring 'RoboSoccer,' a game we designed using LEGO EV3 robots. I connected with hundreds of attendees, introducing them to STEM and robotics while managing our stall and tracking funds. We raised ₹7,500 through the event, which, combined with other outreach efforts, allowed us to contribute **₹20,000** to purchase **6 robotics kits for the Bima Nagar School** in Mumbai, enabling them to **launch a program for underprivileged students**.