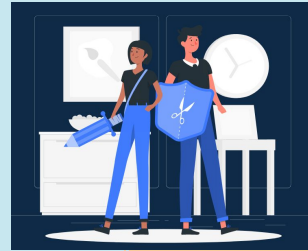
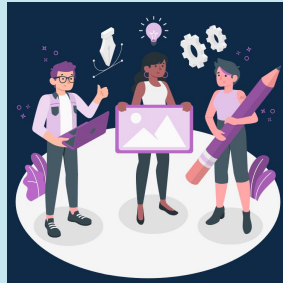
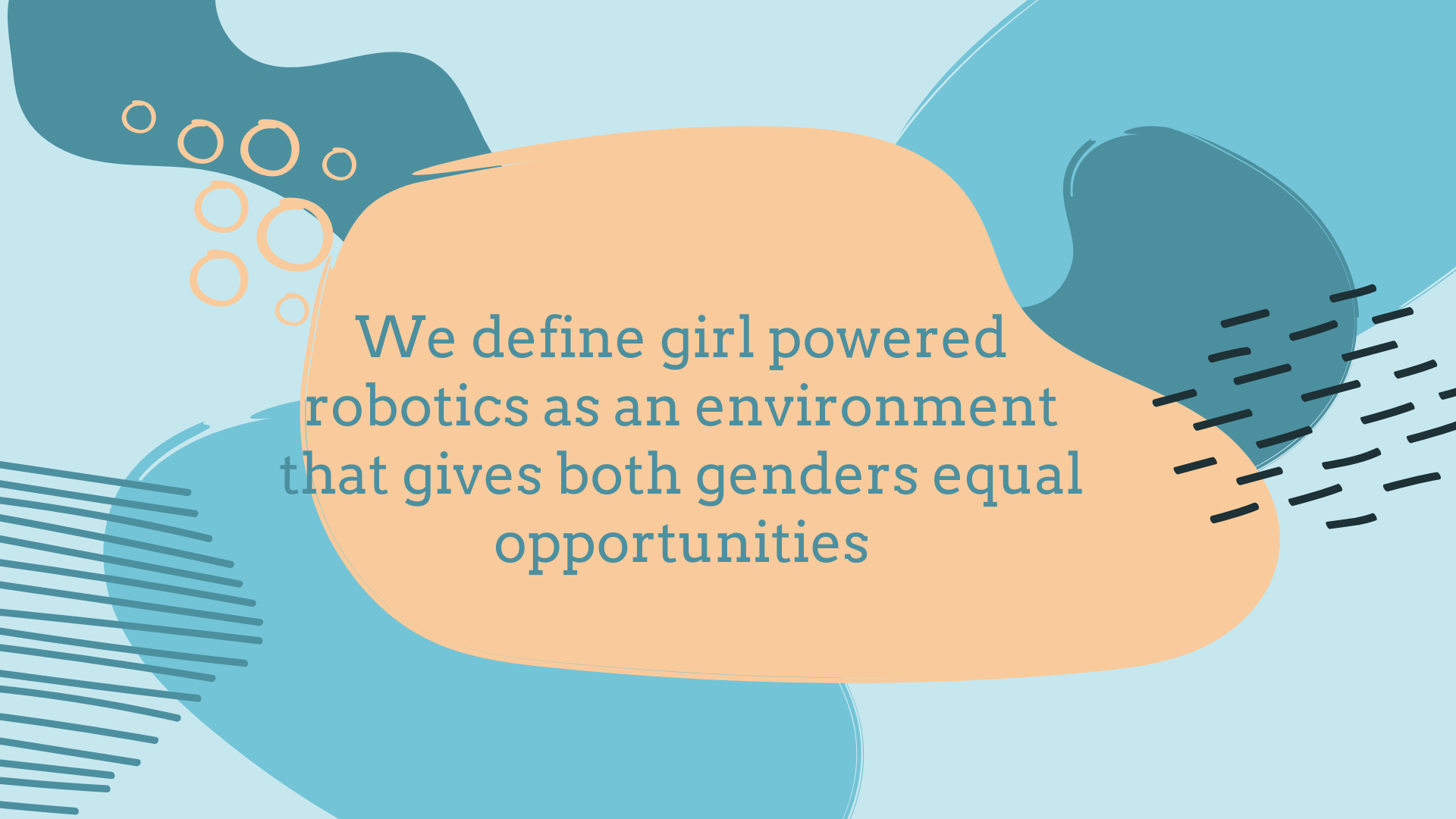



Girl Power in Stem: Fostering an Inclusive and Empowering Environment



The background features a light blue gradient with several abstract teal shapes. In the top left, a dark teal shape contains several orange circles of varying sizes. In the bottom left, a series of horizontal teal lines of varying lengths create a brushstroke effect. On the right side, a dark teal shape has several short, black, horizontal dashes radiating from it, resembling a fan or a spray. The central focus is a large, rounded orange shape containing the text.

We define girl powered
robotics as an environment
that gives both genders equal
opportunities



“Girls are capable of doing everything
men are capable of doing. Sometimes
they have more imagination than
men.”

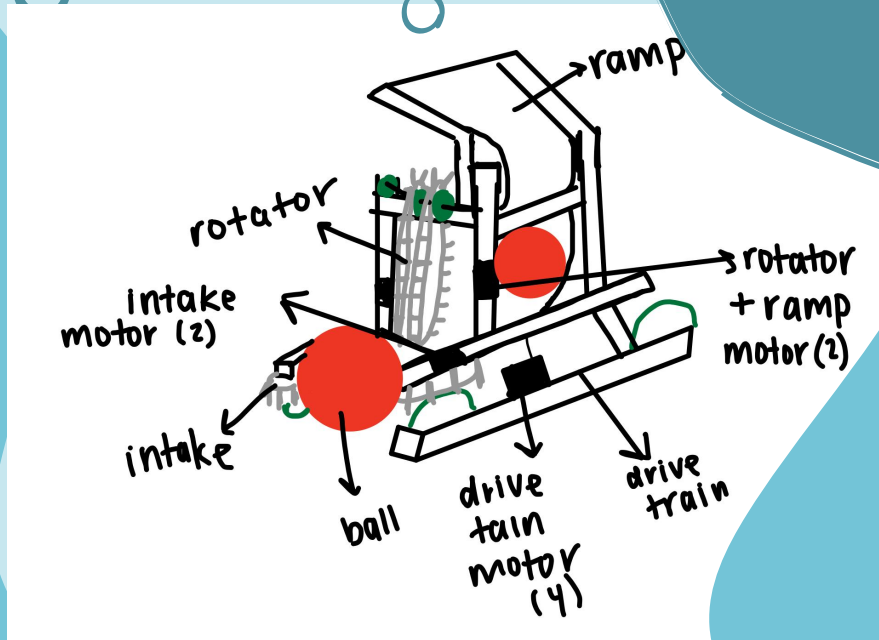
—Katherine Johnson


Our role model



This definition is inspired by our STEM role model, Katherine Johnson. As both a woman and a person of color, she dealt with endless trials and tribulations at her time at NASA. Her resilience and determination resulted in her being the author of 26 influential research papers; a woman being mentioned as an author of a research paper was practically unheard of at the time. Most notably, her mathematical calculations were a key part of sending the first astronauts into space. We've strived to embody her message of girls being as capable as men by creating a safe, inclusive environment for everyone from our very first meeting.

When we all first applied to get into VEX at our school, we did not know what to expect. We all tried our best in the application and interview, and eagerly waited to hear the results. When we were all called for the first meeting, we realized that our team was made up of four boys and three girls. Looking around the room we recognized that we had more girls in the team compared to the other 3 teams in our school. During our first meeting, we all shared ideas we had for the robot. Because we all had different experiences with technology and different perspectives on how to solve the Tower Takeover challenge, we were able to come up with several creative ideas. For example, one team member had extensive experience building clawbots, so they suggested that we build a clawbot. Another team member thought that we should prioritize getting as many blocks as possible at once, so they proposed that we use a six-bar lift. We tried to combine some ideas and finally took a vote on which robot design to use. This process ensured that everyone had a chance to share their ideas and voting ensured that we did not let biases play into our decision-making process.



The background features a light blue gradient with several abstract teal shapes. On the left, there are several orange circles of varying sizes, some overlapping. Below them, a series of horizontal teal lines of varying lengths create a textured effect. On the right, a series of short, dark teal horizontal dashes are arranged in a pattern that suggests movement or a specific design element. The central focus is a large, rounded orange shape containing text.

Once we decided on our robot design, we spent the next few meetings trying out different roles. We wanted to promote equality in our team by making sure that no unfair biases played a role in deciding roles. This process was also very valuable because our various roles taught us things that helped us when we finally settled into our main role.

Roles



Eesha

I helped to draw out the basic design for the robot and worked on the engineering notebook. Through this experience, I learned how to think creatively and how to stay organized and set agendas. I also learned that I preferred logical thinking and problem solving as opposed to coming up with general ideas, so I settled into my main role of coding the robot.



Shreeya

I initially wanted to help with building and potentially help the main coder with the programming. I did help with building when the builders needed help. I mainly worked on the engineering notebook to document the design process, meeting agendas, and testing for code and the robot. I learned that I was better at documenting the whole process of making our robot over time instead of focusing on just building the robot.



Stephen

I first naturally gravitated towards building because that is what my expertise was. I tried to help with the notebook and the coding of the robot, but my handwriting and coding experience wasn't very good, so I just did the building and came up with ideas for the robot. Trying to help with the notebook and coding taught me to think creatively.

Roles



Anish

I thought that I would do a lot of coding, as I hadn't done that before and was taking a class on coding. However, I tried out building and designing and I found out that this was something that I enjoyed much more. This experience helped me realize I like to do hands on tasks.



Shreekar

I first tried coding at the beginning of last year. However, because we needed more builders, I shifted to building. Coding taught me how to think through problems logically, a skill that also helped me solve building problems



Ella

At first I started off mainly as a builder. Soon I realized that I enjoyed doing the notebook as well because it was really interesting documenting how our team has grown and changed our ideas through the year. I still help with building, but the notebook is my main role.



Ali

I first started off doing CAD. However, I eventually shifted to building because I wanted a more hands-on role. However, 3-D modeling the robot enabled me to have a better understanding of our robot's design.

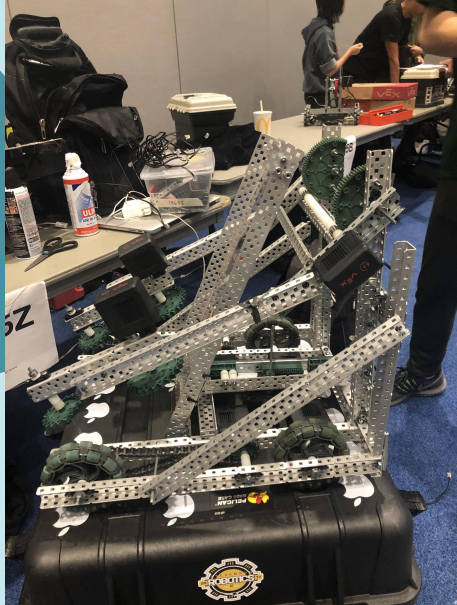
Before Competition



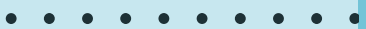
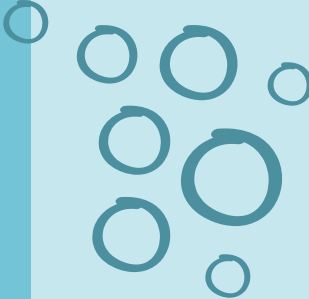
Once we finally settled into our main roles, time flew by as we prepared our robot for our first competition. We all became close friends as we spent all of our free time working on the robot together. One of our most memorable experiences from this time was the Thursday night before the competition we would attend in a couple of days. It was 7:30 at night and we were all incredibly stressed out since we had to change our robot design close to the competition day. Finally, Shreeya suggested, “Hey guys, why don’t we all take a ten-minute break? I know we’re under a time crunch, but we can’t produce a good robot if we’re not thinking clearly”. Grateful to take a break, we spent the next few minutes chatting and joking around with each other. As we did, we felt our tension start to slip away. When we got back to work, we made sure to support and encourage each other. We realized that it would be close to impossible to build a perfect robot so close to the competition date. Instead, we needed to compromise and listen to each other to get our robot completed. With having both girls and boys on our team we are able to encourage, support, and help each other at different times.



Competition



There was a lot of stress for our team in the first competition we went to because most of us didn't know what to expect going into it. We had to fix our robot and code between each match when we observed mistakes or flaws that needed to be corrected. We also had to get everything fixed before inspection. We needed to be calm during the matches to get the best performance possible. Even though we were under a lot of stress throughout the competition, all the team members were hands on in helping each other with whatever we needed along with assistance from other teams in our school. We calmed each other down by staying positive and encouraging each other after the matches. Our diverse personalities played a large role in our ability to succeed. Whenever someone would feel discouraged and want to give up, we would encourage them to keep moving forward. Or when someone was feeling too stressed out, we would encourage them to take a break and temporarily take over their duties. As we continued to motivate each other, we were able to remain calm when making last minute changes to the robot and code. We even noticed that we were doing better in our matches and interviews.



This year

Even though we didn't do as well as we wanted to in the first competition, we all became closer after the competition and had a growth mindset. We were motivated and worked harder to make adjustments to the robot for our next competition. We stayed positive and helped each other out to get the best design we could and ended up doing better in the next competition. Now that we have a year of VEX Robotics under our belts, we are passionate about creating a more diverse and inclusive environment for others. We have found that the majority of young girls are intimidated by technology because STEM fields are usually male-dominated. We all try to encourage our younger friends and siblings to try out for VEX and the other technology clubs in our school to help break down these harmful stereotypes and get rid of the gender imbalances. We are also creating a workshop to teach elementary and middle school children about CAD and coding. This includes boys and girls because we want to encourage more girls to pursue technology in high school. Boys and girls of our team teaching younger boys and girls will normalize STEM for females in the community and also help bring everyone together during this time to learn and share knowledge.





Credits

Name of entrants: Eesha Santosh, Ella Brody, Shreeya Ryali, Stephen Freihammer, Anish Nadella, Ali Hussain, Shreekar Earanti

Team number: 1965Z

Title of submission: Girl Power in STEM:
Fostering an Inclusive and Empowering
Environment