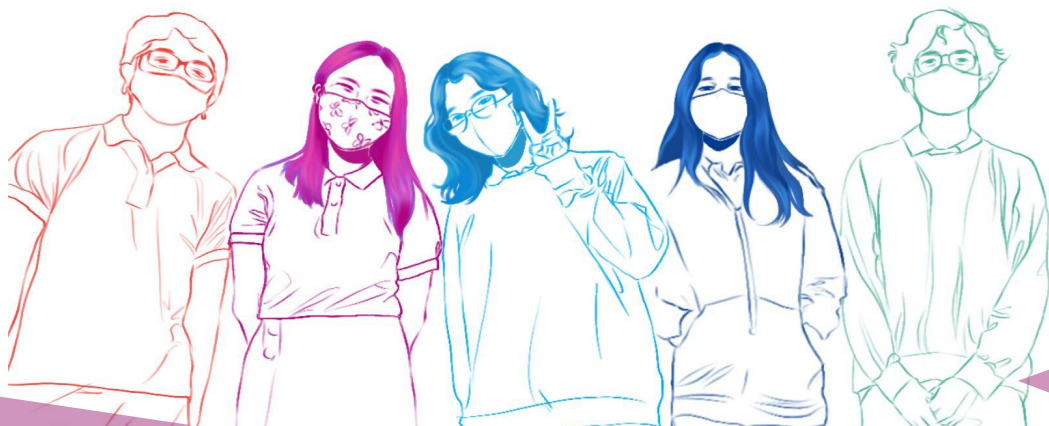


Team 6456-E Presents.....

Girl Powered

Shattering Expectations, Pioneering the Future



Meet the Girls

Adriana Tan (she/her)



Documentation and Builder

Adriana's sturdy work ethic inspires our team to always produce quality work. In spite of not enjoying writing, Adriana undertook the task of overseeing our engineering notebook. She pushed herself to produce quality writing and as a result her writing skills have improved dramatically over the course of the VRC season. Her consistent updates to the engineering notebook keep everyone updated.

Anna Cho (she/they/he)



Designer and Builder

Anna's passion for art means that she's a creative thinker who views the world from an abstract lens. She has helped our team generate innovative ideas and produce concept art that helped everyone on the team visualize our robot. Despite being a beginner to robotics, she has constantly been pushing herself out of her comfort zone resulting in her skills growing at an astonishing rate.

Chloe Dimmock (she/her)



Programmer and Builder

Chloe's growth mindset and can-do attitude meant that she never backed down from any trouble she faced as she programmed our VEX robot. Although she knew nothing about programming when she joined robotics, she has created both the driver and autonomous code for the X-Drive from scratch. Her ability to persevere through challenges has helped the team work at a fast pace.

Our Other Members

Uddalak Sarkar (he/him)



Designer and Builder

Uddalak contributes innovative ideas and has a positive attitude that motivates the team.

Emilio Orcullo (he/him)



Designer and Builder

Emilio encourages the team to express their ideas, and has the courage to take a risk and try something new.

What Is Girl Powered?

When we hear the phrase “Girl Powered,” we think of girls achieving their goals and having the courage to strive for their dreams without being judged differently regarding their gender. “Girl Powered” means motivating each other to put in the best effort we can, and to pursue our passions despite the difficulties.

For our team, Girl Powered wasn’t a phrase or some sort of saying. For us, “Girl Powered” was an action. We shattered expectations as a predominantly female beginner team. And we pioneered future females in STEM by supporting and encouraging them.



Our STEM Role Model

Even though there are countless amazing female leaders who helped change the world, Katherine Johnson is our STEM role model because **she influences us to never give up** even if we are the few girls in the field. Katherine Johnson was a research mathematician. She worked as an aerospace technologist, and she calculated the trajectory for the May 5, 1961 space flight of Alan Shepard, the first American in space.

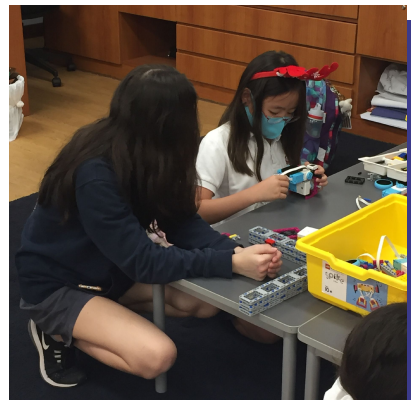
Throughout her life, Katherine Johnson redefined what it meant to be an African American woman working as a mathematician for NASA at the time. She was the third African American to earn a Ph.D. in mathematics. She graduated with the highest honours in 1937. She was greatly valued by the members of NASA, so much so that in an article by NASA, it mentioned that John Glenn specifically requested Johnson to validate the calculations made by the new electronic computers before flying. This was a great example of how Katherine Johnson became such a valuable member of NASA, her brilliance as a mathematician was appreciated in the NASA team and her race and gender didn't define her role in the STEM field. And it didn't stop there, even after retiring from NASA Katherine Johnson pushed the boundary even further by also encouraging students to join the field of STEM.



Pioneering the Future

Katherine Johnson represented all the things we aspired to be. She **stepped out of a typical gender stereotype** and never gave up despite the constant challenges of being an African American female in the field of STEM. **She constantly challenged and defied all expectations for a female.** Her persevering attitude while working in the STEM field influences us in our STEM Journey as well.

Similar to how Katherine Johnson encouraged students in the field of STEM, **we aimed to aid the future of women in robotics.** We did that by volunteering to mentor the younger generation of girls in STEM. In the First Lego League competition (FLL), elementary school students are introduced to STEM, where they gain real world problem solving experiences. **We wanted to encourage girls in the field of robotics to understand the importance of females in STEM,** and how we shouldn't disregard our own ideas because of gender. To do that, when mentoring the younger girls, we constantly motivate and ensure that if they have any ideas or suggestions they aren't ignored. By mentoring the future generation of girls in STEM, **we hope to inspire them and provide them with role models that they can look up to.**



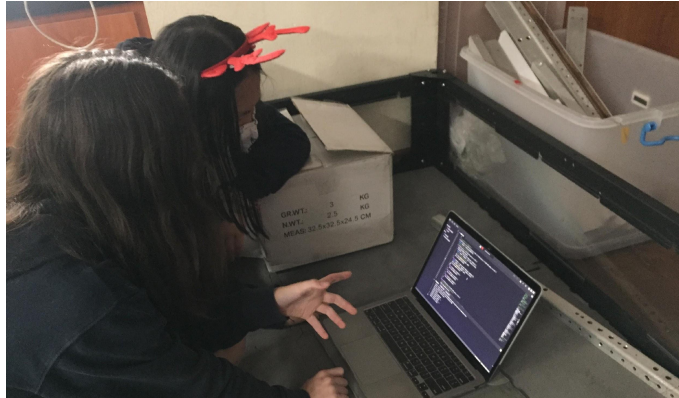
Our Diverse Perspectives

Our team is composed of both girls and boys and a wide range of nationalities and ethnicities. **We put emphasis on having an inclusive space for us to collaborate in.** As a team, our goal was to include everyone in every decision made. We involved everyone in the robot design process, analyzed problems found in the mechanisms together, and challenged each other's ideas to make the best robot we could. By doing so, **we had the ability to create great team chemistry** and understand each other's strengths and weaknesses and how it would benefit the team.



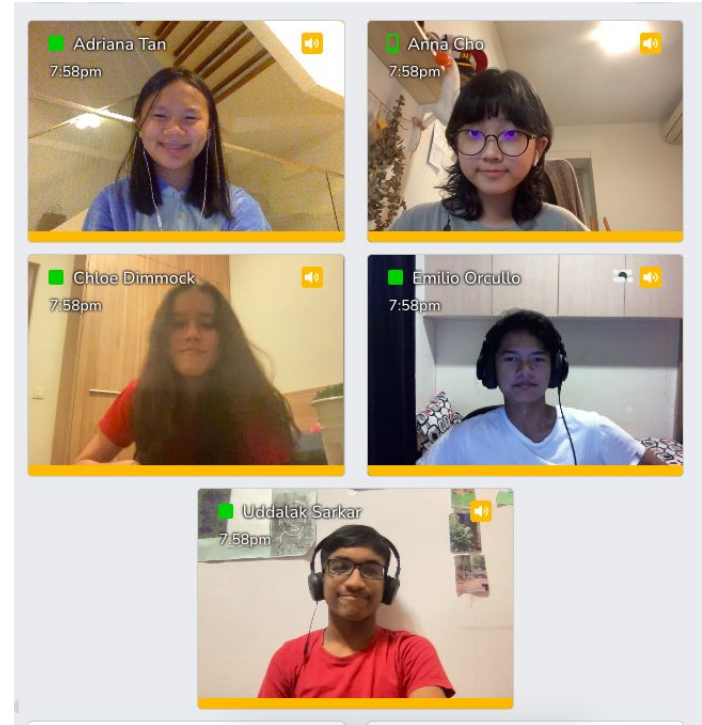
Exploring Everything

The team created an inclusive environment and we encouraged each other to explore all the aspects of robotics. With a pragmatic outlook, **we strived to develop our understanding of the competition and pushed each other to take risks and step out of our comfort zones.** Even though we learned all aspects of robotics, from CAD to documentation. We wanted to give each other the opportunity to deepen our knowledge in a specific aspect of robotics that we felt would suit us best. So rather than designating a specific role for each member of the team, we first explored the different roles on the team and then chose our roles based on our individual interests and goals we wanted to achieve.



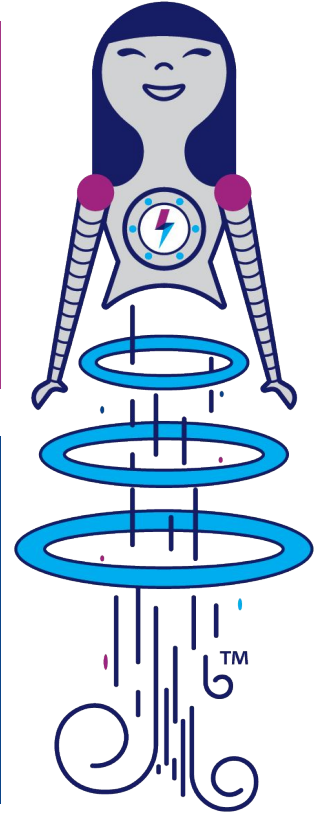
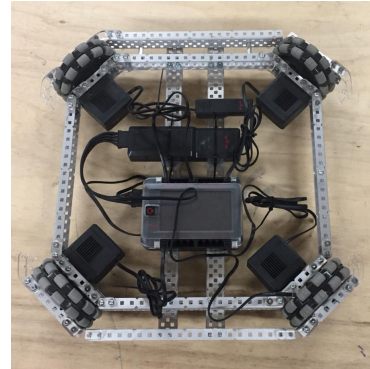
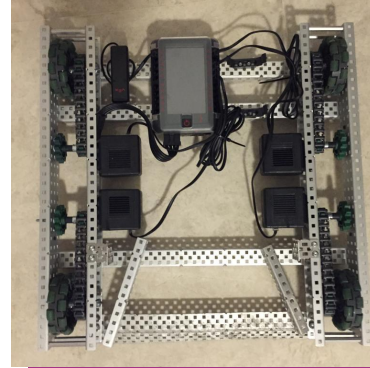
Team Design

Because we were so adamant to create an inclusive team that consistently motivated each other, **we were able to accomplish feats similar to experienced teams.** Within the first month, our team completed the robot design. The team's individual ideas and perspectives helped move the process forward. We found multiple methods to express our ideas so that members who had strengths in drawing could visualize their ideas as well. Our diverse perspectives helped improve our robot design as we would challenge each other's ideas to create an efficient robot idea.



Building

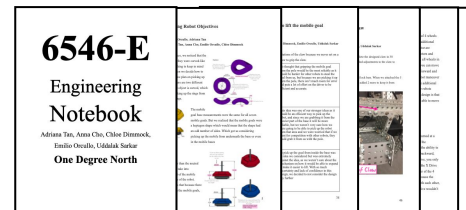
After we designed the robot, **our enthusiastic teamwork drove us to complete building the robot in the following month.** Despite the inconveniences that Covid brought us, we persevered through the design process virtually, consistently updating each other with our process. As soon as we could gather in person, we immediately got to work on constructing the robot. Once we completed the first robot, we wanted to improve our initial design. We began to experiment with different drive bases. In the end, we built two separate drive bases that we used to compare and identify how each drive base would benefit the robot.



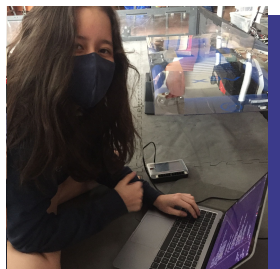
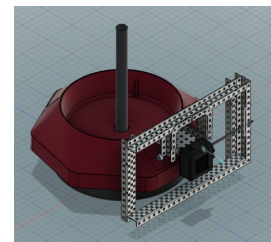
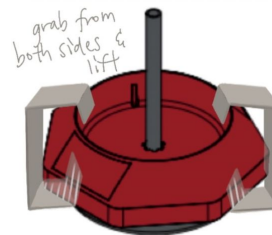
Shattering Expectations



Adriana's dedication to the notebook allowed us to have over 75 pages of documentation in our notebook. She didn't let her lack of experience in robotics confine her to the simple work, she persevered and was able to shatter the expectations of what a beginner in robotics could do.



Similar to Adriana, Anna's dedication to robotics gave her the opportunity to convert her 2D sketches into CAD. Anna's artistic abilities were an incredible asset for the team, her drawings helped us ideate and visualize the mechanisms we wanted to use. And with the ideas she drew on paper, she was able to convert them into CAD and shatter the expectations in the design process.



Chloe shattered the expectations when she not only learn the basics of programming but also created both the driver and autonomous code for the X-Drive from scratch. This was not an easy task for Chloe, but she stayed motivated, and with the support of her team, her code got the robot to travel efficiently.

```
114 // if quadrant 1 or quadrant 4
115 if(((left_axis_x >= 0 && left_axis_y >= 0) || ((left_axis_x <= 0 && left_axis_y <= 0))) {
116     double degree = (theta_g1 + 180/M_PI);
117     //Brain.Screen.print(degree);
118     if (((left_axis_x >= 0 && left_axis_y >= 0)) {
119         right_side.spin(forward);
120         if((M_PI/2 >= theta_g1) && (theta_g1 >= M_PI/4)) {
121             double speed = ((degree - 45) * ((hypot(2)/45));
122             //Brain.Screen.print(speed);
123             left_side.setVelocity(speed, rpm);
124             left_side.spin(forward);
125         }
126     } else if((theta_g1 >= theta_g1) && (theta_g1 >= 0+M_PI)) {
127         double speed = ((45 - degree) * ((hypot(2)/45));
128         left_side.setVelocity(speed, rpm);
129         left_side.spin(reverse);
130     }
131     else if((theta_g1 == M_PI/4) {
132         left_side.stop(brake);
133     }
134     else if((theta_g1 == M_PI/2) {
135         left_side.spin(forward);
136     }
137 }
```

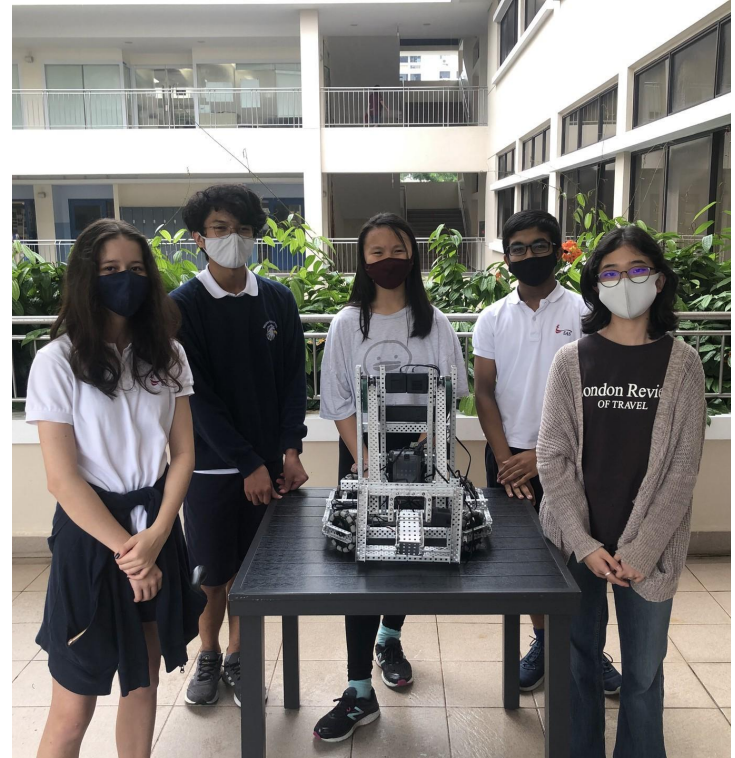
Ready For The Future

Katherine Johnson once said

“Like what you do,
and then you will do your best.”

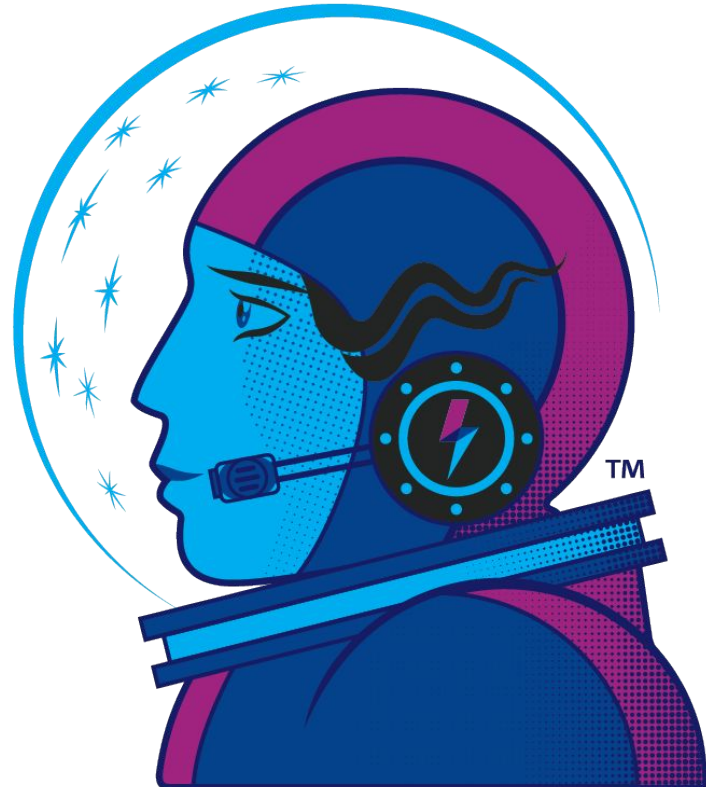


She inspired us to explore different roles of robotics so that we could find something we enjoyed. We created an encouraging environment for each other and with that came our successes. Using this mindset, we look forward to participating in the Singapore 2022 VEX Regionals!



Sources

- <https://www.nasa.gov/content/katherine-johnson-biography>
- <https://www.nasa.gov/audience/forstudents/k-4/stories/nasa-knows/who-was-katherine-johnson-k4/>
- <https://www.britannica.com/biography/Katherine-Johnson-mathematician>
- <https://www.space.com/katherine-johnson.html>



Credits:

Names of Members: Adriana Tan, Anna Cho, Chloe Dimmock, Emilio Orcullo, Uddalak Sarkar

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