"Stronger Together" ~ *The Journey of 1715X*~ A Girl Powered Robotics Team

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Girl power is such an immense term that cannot be defined in a dictionary.

Why? If you asked twenty ladies what it meant to them, you'd get twenty answers. A woman of wisdom might tell you that it's one's strength and confidence through sexism. An activist might say it means empowering females around the world, and an athlete might express her joy of winning despite the many who tried to put her down.

To us, it's a combination of all these qualities. It means females persevering with diligence and dedication. Females proving they shouldn't be underestimated, for they have as much to give to the STEM world as men.

Who are we? We, like our STEM role models Ada Lovelace, Marie Curie, Sally Ride, and countless other girls, have endless effort and persistence. We are girls who will make it to the top, despite the many hurdles on the way to the finish line. Girls who will ensure our voice is heard.

We are female Robo Hillers, fueled by Girl Power and proving our mission.

We are 1715X, undaunted by any obstacle in our path.



Our journey began in September 2019, the first robotics meeting of the year. We - Ally, Anoushka, Jessica, Mahnoor, Surina, and Avary - formed an all girl team. We were determined to work together and succeed in competitions.

The new school year also brought team job opportunities. We decided on our roles based on our interests and experiences from last year and outside of Robotics. Avary and Mahnoor, precise workers and deep thinkers, chose to be builders. Jessica, who had a great love for design and writing, took up the role of notebook manager. Ally and Anoushka, who learned various programming languages and had a passion for coding, became programmers. Meanwhile, Surina took an interest in STEM and chose to be the STEM manager.

To strengthen cooperation and spread ideas, everyone experimented with different roles. Anoushka helped with building the robot and provided a hand with the Engineering Notebook. Meanwhile, Avary and Jessica pitched in to create a STEM project. This helped us become a more inclusive group. Each girl had a unique perspective on how to make the design successful. When all of those perspectives were combined, we got closer to success.



Along with jobs, we created rules to establish organization and fairness on a team with so many people of different personalities, experiences, and ideas. This way, every girl could have their voice heard. Later, we held a team meeting to brainstorm our robot prototype. Everyone had different thoughts on what it should be. While some of us wanted to build a robot with an arm and claw that would pick up cubes and balls, others contributed with plans to create a shovel attached to a chain that could pick up cubes with balls on top and move them. Our final design combined the advantages of both ideas. We figured that the more diversity involved in a task, the more beneficial.





Our year was off to a great start. However, success doesn't come easy.

One afternoon, Avary and Mahnoor were making final adjustments to the claw. Surina busied herself with the team website, and Jessica had the notebook open, busily scribbling down diagrams and notes. After all, the competition was no more than three weeks away!

The robot, on the other hand, was by the table's edge.

Just then, someone came running down the aisle. Her arm hit the one thing we wanted to keep safe - the robot.

Within moments, our work of three months became a jumble of parts on the ground. Shock reverberated around the room, everyone turning to get a glimpse of the chaos. Our team rushed over, faces frozen in shock.

Then, the tension burst.

"How could this happen?!" we fumed. "We were SO CLOSE to finishing our robot!!"

We met at each other's homes, constantly adjusting and repairing the robot piece by piece. To add to the matter, there was still programming to be tested! If we didn't finish the robot in time, we couldn't compete, our effort and struggle would go down the drain.





Recovery took some time, but we finally managed to pull through as a team. Many hectic weekends later, the robot was fixed and ready for final testing. One day before the competition, we found a major issue. The left and right drive motors weren't functioning! Stress took over the team. This was a terrible time for this to happen!

A few hours later, Anoushka finally found the source of the problem. It turned out that the arm put too much weight on the motors, preventing them from working. After some debugging, the remote was able to control the drive motors and the robot could move again. The struggle was over!

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It was Saturday morning, and our team gathered at the high school to prepare for competition. As other roboticists came and went, we made final adjustments to the robot. Drivers Avary and Anoushka began practicing, and Jessica updated the engineering notebook to track our progress.

Within the hour, we lined up with the rest of the teams to compete.

Our first few matches went well, and we were able to place in the top ten. We sighed in relief. Our efforts had been rewarded!



Even better, we were granted an interview with the judges based on our design and engineering notebook - an opportunity given to five of thirty teams that day. It qualified our team for the Design Award, which if we won, would make us eligible for Regionals. We described to the judges the design of our robot, our program, the biggest challenges we faced, and how the competition went for us. Overall, we had a strong interview that included everything we wanted the judges to know, and the effort it took to get to where we were.

After the interview, we continued to the second match. Although it went smoothly and it gained us additional points, the arm was slowly tipping and malfunctioning due to its weight. Our next match was going to start in a matter of minutes - we couldn't fix it. So when the time came, we just went. That was when the arm problem worsened. While driving, the arm jammed in a cube and wasn't able to lift it up. No matter what we did, the cube wouldn't come off. Desperate, we tried moving the arm backward, but the shoulder motor extended beyond its limit and partially snapped off the base. We found out later that it was caused by the shifting of gears in the arm and a stability issue, as the arm was too heavy. Bringing the robot to the corner of the gym, we frantically analyzed the situation. We realized it would take less time to go with another idea than fixing what we had - but this meant that we had to forfeit the last two matches. If we wanted to compete in the Driver Skills challenge, we had only an hour to rebuild.

We chose to go back to one of the designs we brainstormed in the engineering notebook in September, finishing minutes before the Driver Skills challenge closed. Much to our relief, the new robot functioned properly, and we were able to add points to our score.



Pictured: An idea we planned at the beginning of the year. Although we drafted them into the Engineering Notebook, they weren't planned to be used in the competition.



Next competition, we plan to rebuild our robot with this design and add more components to maximize our score. We hope to do the same with our learning and progress as the year continues.



Setbacks happen to everyone, even the most resilient of us. However, it's the way we conquer these setbacks that truly define our paths. As our robot tumbled to the floor, three months of hard work was gone. But what mattered was that we didn't falter. We worked as a *team* to build back up what had been lost.

What does our journey prove?

It proves that girls *everywhere* are capable of succeeding *anywhere*. That girls *can* succeed in the STEM field - including robotics. No matter who you are and what you want to do, hard work *will* get you to the top.

With girl power, you are unstoppable.

