

This essay - dare we say, prose - is brought to you by Iqra Abdullah and Amrita Arora of team 65145A from Shades Valley High School in Irondale, Alabama. We're two of a six-member team (us, Aijah Padgett, Jack Michaels, Wyatt Mattson, and Leo Barnhart) and our story is what you might call an ordinary underdog journey. Our VEX robotics program was formally revived in 2018, in our freshman year, as a part of our school's Engineering Academy whose teachers' move to another school was entirely unknown to incoming students - you can imagine our surprise upon finding out that the faces we'd become so accustomed to seeing in orientations had now been replaced. Before we arrived, our school had a BEST and VEX robotics team. However, after this staff change, the school only had the capacity to run one program. Naturally, I (Amrita) asked on the first day what the plan for the robotics team was, as I was expecting to hear an elaborate setup for the season. Instead? "I don't know yet. Ask another time," said our new teacher, Mr. Kelley. Every day after his class, I'd ask him about the robotics team. Eventually, he relented, and we began to plan. A big thanks to Mr. Kelley for his patience and hard work over the last few seasons; without him we would not be where we are today.

Having helped rehabilitate my middle school's program and make it to World's in one year, I was expecting quick progress. Our progress was far from speedy - it took 2 months to get sufficient funds for the parts we needed, buy them, and wait for them to arrive. Then, we had our robot built by January, and having only finished it a week prior, did less than ideally at our first competition on the 19th, as shown by our match scores:

Our next two tournaments were similar since our teacher simply couldn't host practice/build sessions after school for the amount of time that we needed. We only had 2-3 hours a week.

We were making last-minute changes pre-Inspection as a result. We even had to saw off an inch of our

Team 65145A @ Hazel Green...				
Qualification				
Q 6	35216D 65145A	5	20	35125A 9848A
10:57 AM				
Q 17	66722H 8685A	14	10	95818S 65145A
11:33 AM				
Q 24	65145A 66722F	17	6	9225B 35216E
11:53 AM				
Q 28	8685Z 9848X	23	7	65145A 9848T
12:05 PM				
Q 37	35216F 8685C	5	16	65145A 8685X
12:35 PM				
Q 46	8388B 35216B	7	16	65145A 66722B
1:06 PM				
Q 54	65145A 35125B	5	13	66722G 9225A
1:32 PM				
Round of 16				
R16 2-1	8685X 65145A	12	14	8685A 56448A
2:51 PM				

robot's lift as a result of last-minute structure changes to its base pushing it up. A photo of our team at that competition is below.



Our second season was similar, and due to a combination of poor management, the aforementioned time issue, and lack of funds, we only attended 1 competition in February - we planned to attend a local tournament, but somehow, as not all team members were present, and the one present to represent us was redirected to a local scrimmage and we lost our only opportunity to qualify for state.

One year later, our obstacles are no longer funding or school bureaucracy, but COVID-19. We're currently finishing training everyone to have some basic skills while we meet virtually, and plan to build remotely. However, even though we can't see each other in person, our team's interactions are healthier than ever.

Amrita on interaction: "When it came to creating a more inclusive environment in the beginning, we had a ways to go. I was the only girl on the team and in charge of running it. Despite that, I was constantly talked over/interrupted/ignored during meetings and my attempts at facilitating any sort of productivity were seldom successful. Every conversation was a challenge. It was my first time being on the receiving end of misogynistic habits from my teammates, and it was difficult to carry on. However, with the help of our coach, we somewhat ameliorated this bias in our team and were able to cooperate to build our robot without excessive interpersonal issues as a result. 65145 was more cognizant as a whole of the way that boys are socialized to often interrupt, belittle, or minimize girls in the following season (2019-2020 Tower Takeover) and called it out whenever witnessed. We had a co-ed team of 1 girl and three boys, an all-girls time, and an all-boys team. This year, due to COVID-19, our numbers are much smaller but there is no longer a gender majority and we have an even split amongst the 6 of us."

Having a no-tolerance policy towards sexism in STEM does exemplify initiatives like Girl Powered, but countering this symptom of a social issue in STEM goes beyond that. It takes recognition of implicit biases and uncomfortable conversations. Girl Powered is bigger than a single diversity seminar. Systemic sexism in robotics doesn't manifest only as overt discrimination, via open

statements by men/boys about the inferiority of their female counterparts - it manifests as a "Let me interrupt you for a second-" that lasts twenty times longer than that. It manifests as only teaching the girls on a team to do the notebooking, leaving the coding and building exclusively to the boys. It manifests as the disbelief on someone's face when they hear the president of the club is a freshman and a *girl*. It manifests as ideas stolen in silence, and in tenfold other ways. Where do we look for these common culprits? In people's daily behavior. Countering those daily behaviors that we're conditioned to do *without hesitation* - as girls *or* boys, since internalized misogyny remains a worthy opponent - is what Girl Powered means to us.

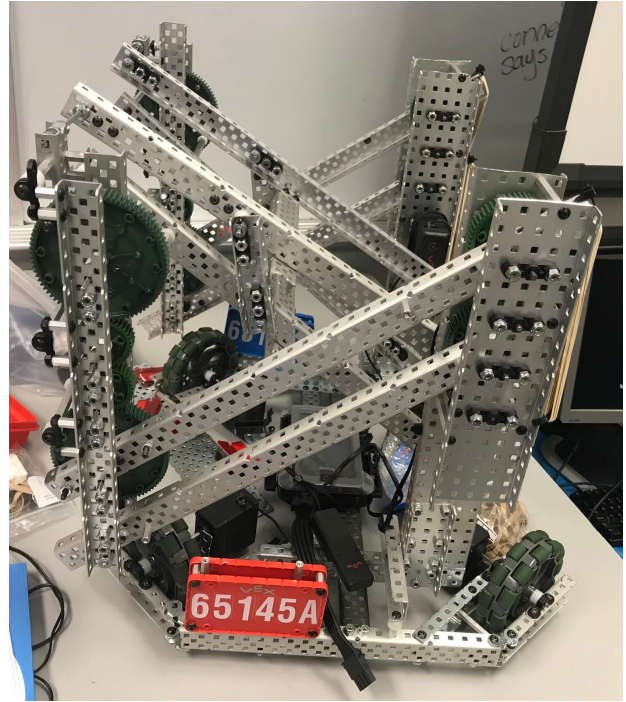
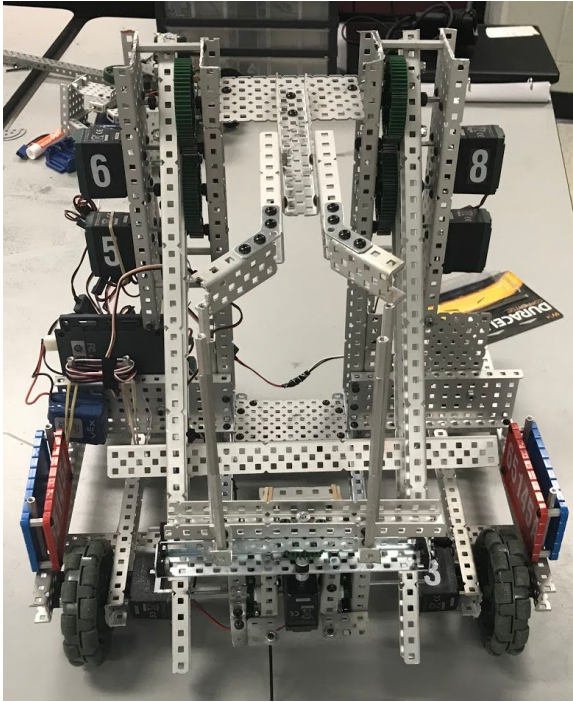


Girl Powered means honoring the legacies of trailblazers like Katherine Johnson: the first black woman at NASA whose extraordinary trajectory calculations propelled the Freedom 7 and Apollo 11 to proper space travel. Katherine Johnson's story taught us what the characteristics of a true leader are, and that a leadership position or title is far from necessary when it comes to being instrumental in a movement of progress. She broke barriers of race and gender discrimination to make those calculations. Ultimately, they had no hidden figures and neither will a truly Girl Powered program - which we are on our way to achieving.



To reduce the stigma of lack of experience for girls in our program, we train everyone on the team to use the hardware, Fusion 360, and VEXcode at a basic level before starting on robots.

During training, each team member rotates through different roles to learn about their respective responsibilities and get to know a day in the life of that role. Each of the team members has built skills from each role whether it be building, coding, or designing the clawbot during training sessions. By learning the skills for each role, we realized each one takes a labor of learning, and cooperation between them is crucial to effectively create great ideas and products. Here are images of our Turning Point and Tower Takeover robots, respectively:



There's diversity in the DNA and makeup of each and every brain. Every person has a unique contribution when it comes to appearance, emotion, and perspective. Analyzing things from different perspectives can help us look at things differently and make our final design better. Team chemistry is also made stronger with diversity in perspectives. While different outlooks or philosophies can cause conflict, once our team got past the initial fighting stage, we welcomed argumentative discussion in order to design our robot. Difference in perspective is not only a result of background but of chance - each team member has a different approach to research and design.

Iqra typically takes a macro approach, preferring to designate certain objectives and fit subsystems to each one. Amrita takes somewhat of a trickle-down approach, preferring to preview a horde of designs and narrow them down to what suits each purpose. Jack goes for a more randomized approach, building on the spot components that would fit our current prototype. Leo prefers to decide on one design early and continue to hone it for the season. Wyatt goes by the process of elimination. Aijah prefers to start with available parts and build on the spot after deciding on a general vision for the robot. As a result of these different approaches, we're able to synthesize different trains of thought to create an innovative design. Hence, we're adept at combining/welcoming new ideas.

Our team has made significant progress in several ways. We've gone from a 1:9 male-female ratio in 2018 to a 1:1 today and had an all-girls team last year.

We had 1/4th of our members drop the club the first year and this season, we have a 100% committed group. We reorganized our entire lab, cleaned it after years of dust accumulation, and countered bias from within our old program. Our leaders and our predecessors are female, and the boy AND girls of our team will maintain our ambition in our future plans, rendering us quite literally girl-powered.

## Works Cited

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Macro Changes to a Micro Program