Girl Powered : Team 7700C

How We Met By: Ariana Kassam

Rolling Robots is not a part of a school. It is an after school program where different kids from different schools come together and make a robot to compete.

I am Ariana Kassam and I am in the 6th grade at Paul Revere. I came here because I have always loved to build. I live 2 minutes away and I was coming home from school one day and saw that you could build robots at this place and compete. I was so happy to find a place where I could do what I have a passion to do.

Angelina Layug is also from Paul Revere and she is also in the 6th grade. She likes video games. She had seen a young kid 'driving' a robot and thought that was cool. She thought that it was similar to video games but realized that there is a major difference.

Julia Gong goes to Walter Reed middle school and is also in 6th grade. She came to know about Rolling Robots through our interaction while we were in the same Elementary School together. She also loves to build just like me so she joined the team.

Mia Nadel is from Sinai Akiba Academy. She is in the 7th grade. She loves to code and her sister had come to Rolling Robots during summer camp and she loved it. She had told Mia and since she too had an interest, Mia decided to join the group.

Since we are all are from different places, it makes it that much more interesting (and sometimes challenging) depending on the way you look at it. Julia, Angelina and I were in the elementary team together. Mia was going to join us but she chose the middle school team instead. That is when we first saw Mia.

Designing the Robot by: Angelina Laygug

Designing the robot wasn't easy at first, we had to come up with an idea on what the robot was going to look like and how it was going to function. There are many different decisions we had to make, and what type of claw we should have, what type of hang design, and much more. So let me tell what designs we had in mind to build our unique robot. First off we needed some basic information on what the robot was going to look like so we decided to use CAD (Computer - Aided Design) to guide us. We started off with two important files, one file that consisted of a two bar lift, and the other file showed a four bar lift. It took us a while to decide of what type of lift we should have to support our robot After awhile of discussing, (about the pros and cons) we finally decided to use a two bar lift. We also decided to use pneumatics which involve air, instead of gears and motors. Using pneumatics gave us a giant benefit, rather than gears and motors than barely gave us any benefit at all.

After we decided to use the four bar lift, we got on to building, because we had a CAD file with the two bar lift it was relatively easier for us to build the robot. This helped us a lot because we had a practice competition coming up in San Jose. Once we finished building our robot, we didn't have enough time to practice so we didn't do that well...BUT it was still a fun competition that all my teammates learned some stuff that we might want to improve in.

After that competition it motivated us to try harder, so we practiced 24/7 with our robot kept on improving, constantly making changes, for instance adding a few plastic pieces to our claw (which allows us to grab stars and cubes) grip, which was later removed because it interfered our drive (for example it would get stuck onto the fence, and would be a challenge to get the claw out, so it became extremely irritating). Eventually, with hard work and changes we were able to consistently score 16-23 points, rather than 2-9. We were confident that we were improving so we decided to build a hang! We knew that it was going to take a while to design it because there were so many possibilities that we could choose

from. Till this day, we are still improving our hang, hoping we can hang successfully with each try. ! It took us multiple times to make it. At first we couldn't make our robot get aligned with the wall so we couldn't get out hook to go inside the pole which means that we couldn't pull ourselves up.

The second attempt on building the lift also didn't go as well because we attempted to build a lock to hold onto an axle so that our robot would stay up and wouldn't fall down. When we tested it we thought it was fine but then when we used it in a competition it sadly leaked air and it only counted as a low hang. So because of that our team leader (Sean) quickly realized that he should take out the lock before it could affect our drive in any way.

We were so confident in our changes and our really good practices that we did really well in our next competition (the vex jets competition)! We beat almost everyone we were going against 0-something, that we made it past semi-finals, quarter-finals, and even beat the whole competition, that we won the tournament champion award! Of course their was some up and downs along the way but without those ups and downs we wouldn't be motivated and without being motivated we couldn't have made it to states. I knew all that hard work was going to pay off!

Building The Robot By: Julia Gong

Building the robot, wasn't a difficult challenge. With a lot of teamwork, we were able to accomplish this job with ease. Our robot is designed carefully from the base of the bot, to the wheels, the claw, the hang, the pneumatic system, and other major improvements. Each part of the robot was built diligently by our team members.

The base of our robot is simple but strong, like a sturdy foundation to a massive building. Our base has a bar, across the middle which keeps it study from any unnecessary movement. Such as wiggling, which may damage our drive.

At first our team members decided to use Mecanum Wheels so we could strafe easily. We later discovered that maneuvering with Mecanum Wheels would

be quite a challenge because they were far too slow. To fix this problem we decided to use Omni Directional Wheels. We changed our program to fit with the new wheels and we currently have a tank drive. (Pushing both Joysticks forward to go straight, pushing backwards to go back, and turning them left or right to steer in either direction etc.) Our robot has many important improvements and additions which will aid us in gaining more points during the drive and autonomous periods.

Our claw has a unique design, connected to pneumatics. Instead of having to replace motors every once in awhile due to burning, we instead can use air tanks for our clamp. Unlike gears and motors, pneumatics may take approximately less than a second to clamp and unclamp, wasting no time at all. With our claw we are able to pick up to 5 stars, 1 cube, or 1 cube and 1 star. (We have attempted and obtained to lift these items to the other side of the fence.) Currently we are limiting the load to 3 stars or 1 cube. Sometimes, due to the weight of a huge load, our claw tends to sag down when we attempt to carry it over the fence. We have fixed this problem in our new program which enables our claw to stay up unless we manually have it go down. After every competition our robot keeps on improving.

Our hanging system is quite unique. Attached to our claw, there is a V - Shaped part that we made, screwed on securely to our precious robot. We measured the pole carefully and placing the V - shaped bars into the correct position. We included a little bar sticking out of the bottom of the claw which benefits our hang. When we lift the claw up against the pole, the little bar sticking out from the claw, goes inside of the pole, and gets stuck, which enables us to continuously lift the claw up, to lift the rest of the robot's body onto the pole. Successfully hanging one foot up into the air. (Without the support of the wall, accompanying it on the sides.) In order for us to continue to hanging on the pole we inserted a unique pneumatic clamp that that hooks our claw to the main body of our robot, so it'll hang properly. Believe it or not we have made two different prototypes, both that led us to our current hang. We are still trying to improve are hang so it can be as efficient as possible.

Other improvements that we made are extremely important to our robot's design. One of our improvements is making the base smaller and easier to maneuver around various stars and cubes, and a lighter robot to hang with. Another improvement that we made was our valve. (That comes in the "Pneumatics" kit on

www.vexrobotics.com.) This is much easier to pump in air rather than pumping it into the larger air tanks. (Attached to the side of our robot.) We have also learned that by pumping the robot this is way more effective, doesn't loose much air at all. If we pump in 100 PSI (the limit), we would turn out with close to 100 PSI in our robot. If we pump 100 PSI into our robot through our bigger tanks, we would end up with 60 PSI which may not even last us through a whole 2 minute match. We tend to use around 3 PSI to clamp onto cubes and stars. This new way of pumping air into our robot is extremely efficient.

Code for the Robot by: Mia Nadel

Before I came to Rolling Robots I didn't know how to code or build. Each time I came to Rolling Robots I learned something new about robotics and I still do. Dr. K and my teammates taught me all about coding. They taught me how to write the basic drive code and how to write autonomous codes. Without their help I would never be the coder and the engineer I am today. We program with Robot C at Rolling Robots.

```
ClearGyro();

SensorValue [LiftPiston] = 1;

Piston(1,1,500); // Claw falls

Drive(127,127,127,127,800); // Drives forward

Drive(0,0,0,0,200); // Drive stops

Piston(0,0,10); // Claw closes

Drive(-127,-127,-127,-127,700); // Drives backwards to be aligned with wall

Drive(127,-127,-127,127,900); // Strafe left to rotate

Drive(0,0,0,0,200); // Stop Strafe

TurnRight(600); // 60 degree rotation

Drive(-127,-127,-127,-127,900); // Reverses into fence

Drive(0,0,0,0,200); // Drive Stops

Drive(-127,-127,-127,-127,1900); // Make sure not pushed off fence
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```
Lift(127,127,127,127,2700); // Lift claw

Piston(1,1,10); //Release stars/cubes

Lift(100,100,100,100,100);

Lift(0,0,0,0,10);
```

This is our autonomous code. We run this code every competition.

What this code does:

Robot starts off on the left square. First the claw falls and then the robot drives forwards. The claw grabs three stars, then closes and drives backwards. The robot then aliens with the fence and then the claw goes up and releases in mid-air. Currently, the highest amount of points we score each autonomous is 4. We are improving our code so we can score more points.

Basic Coding:
If you want to make your own robot but you only know how to build and not code. This is information that you need to know before coding.

- The computer reads 0 as off and 1 as on.
- Put information about your motors and any other sensors that are located on your robot. Put the port that the motor/sensor is plugged in to.
- If Robot needs to drive put the speed for each motor. For example, in our code we have 5 numbers because our robot has 5 motors. It is best to experiment with the numbers until the robot drives the way you want it to. There are three motors responsible for the Piston/Claw so there are three numbers.

- When robot needs to turn put the number of degrees it needs to turn. For example, we needed the robot to turn 60 degrees so we said in the code TurnRight (600)

- For Robot C, there are commands that are used a lot to program the robot. If you use Robot C you can drag the command that you need. So for people who are programming for their first time this function about Robot C makes it much easier.

You can use our code as a reference for when you write your own code!

And the Two boys : Sean and Guru

Of all of the team members on our team, I have had the longest experience at Rolling Robots. In the time I've been here, I have had many challenges that have helped me become a better problem solver. This season, I have noticed that our team has been doing much better, and that we are working as a team in a way that we had not been doing before. When I first started, I did not know much, but since then I have discovered that the best way to learn is to make mistakes. That may sound cheesy, but it is the truth. The mistakes I've made (and Dr. K) are the things that have taught me all of the robotics skills that I have today.

This team actually consisted of my first interactions and experiences with robotics. So, my experience on this team, hasn't been very long, but I cannot say it hasn't been very comprehensive. It started with me joining a team that was mixed in countless ways: in skill, gender, diversity, passion, and most certainly in personality. As soon as I joined the team I thought I could single out everyone into simple categories immediately only or just because of t heir interest or participation in the group. I wasn't instantly proved wrong, but as I stuck with the group and spent time with the group members, I was presented with a characteristic that was prominent in everyone on our team, 7700C. This was capacity, and potential. Within each of the comedic members of our team, you could spark insane determination and persistence, in addition to powerful and limitless creativity.

Our boy teammates Sean and Guru have a bit more experience. This is Sean's second year competing in Vex Robotic . Guru, on the other hand, has parents who are coders. Sean and Guru are best friends. Sean and Guru are great additions to our team.

Since our team is made up of boys and girls, we have different ways of approaching the problems that we need to solve. The Boys tend to just start building or make changes, on the other hand, we girls want to think things through before building or cutting metals. We have a lot of problems that we stumble upon while we work. This is a good thing because it allows us to think outside the box and be creative. Because of our difference, we end up with better ways to solve problems with design, build, and coding for our robots.

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Here is a picture of our whole team.

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