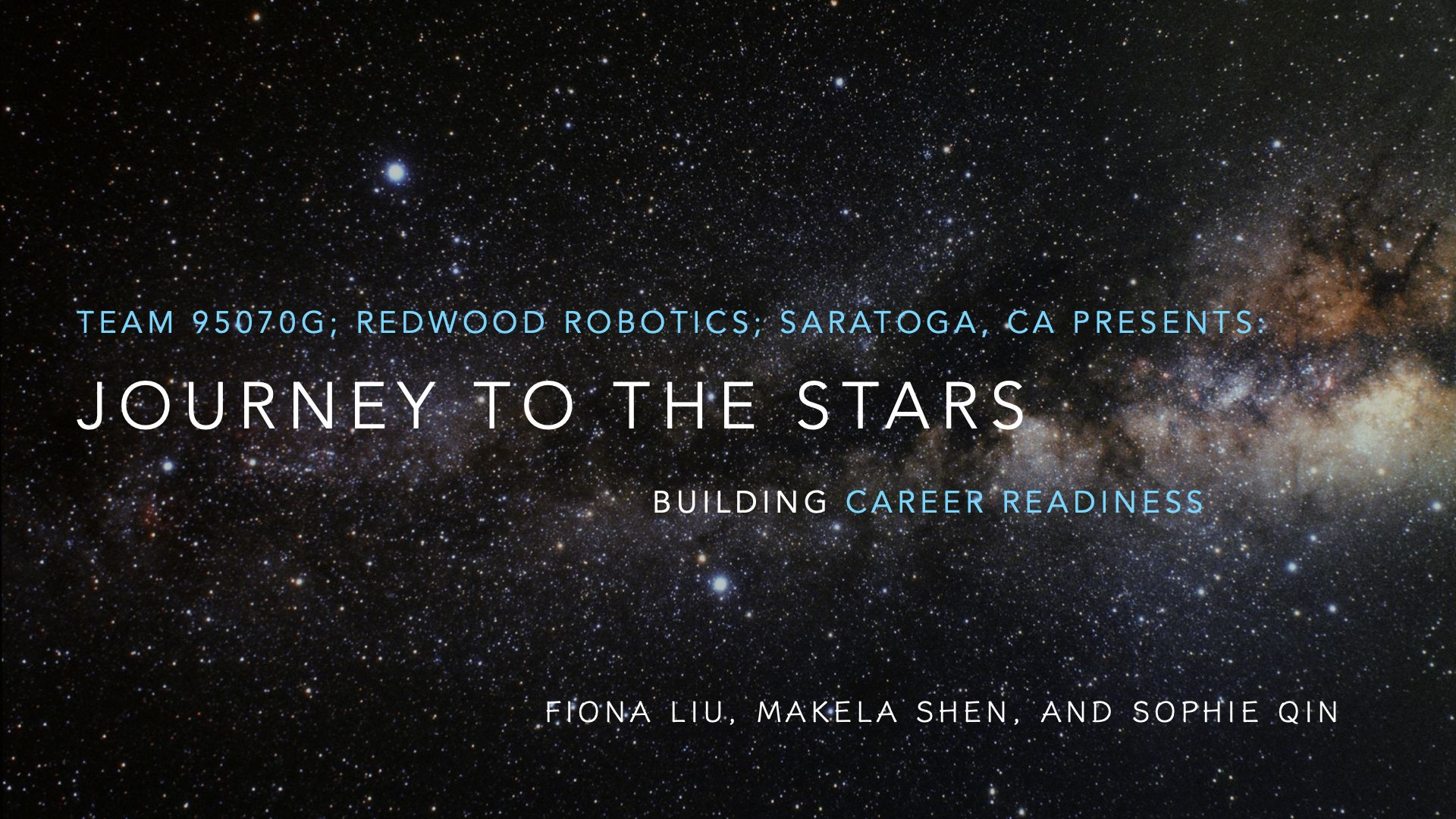
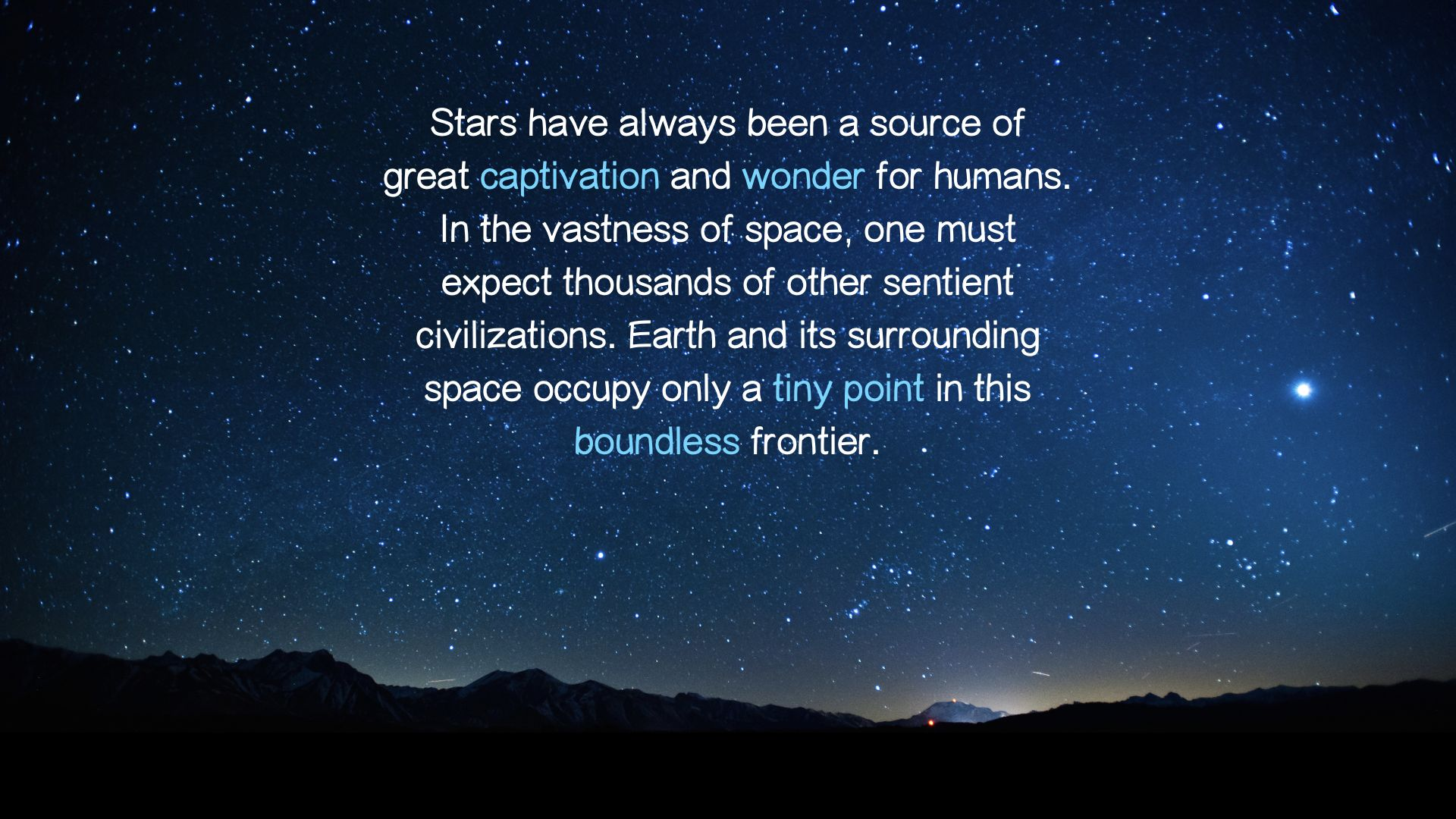
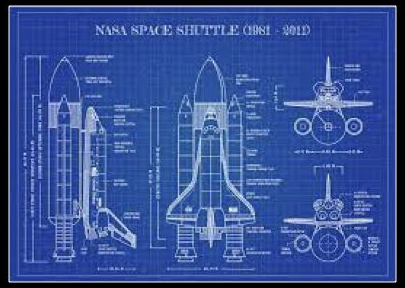

TEAM 95070G; REDWOOD ROBOTICS; SARATOGA, CA PRESENTS:
JOURNEY TO THE STARS
BUILDING CAREER READINESS
FIONA LIU, MAKELA SHEN, AND SOPHIE QIN

“Exploration really is the essence of the human spirit, and to pause, to falter, to turn our back on the quest for knowledge, is to perish.”

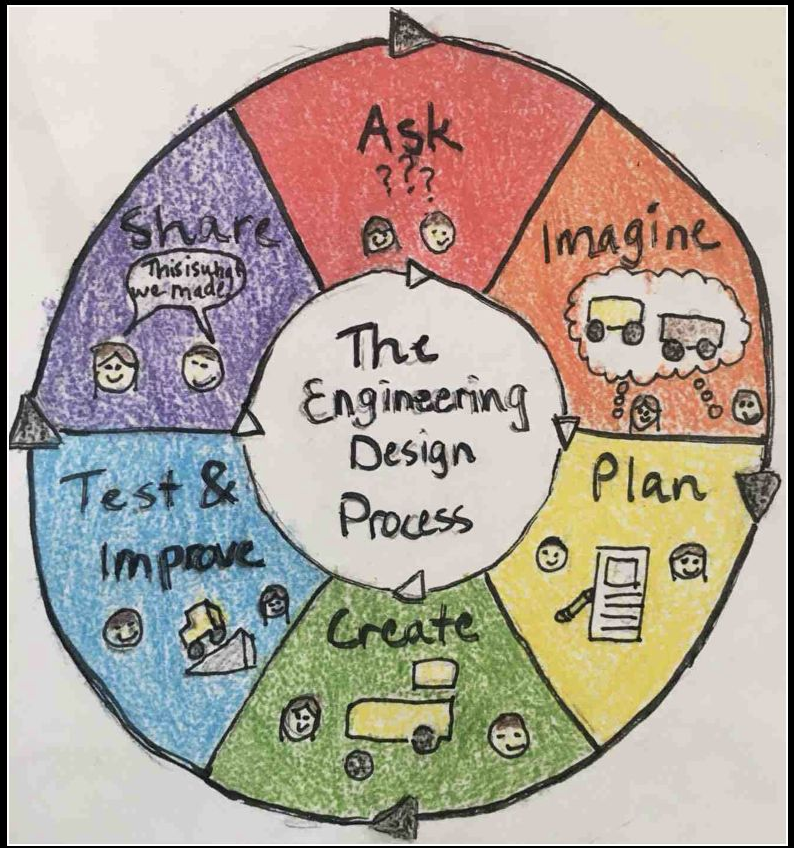
- Frank Borman


Stars have always been a source of great captivation and wonder for humans. In the vastness of space, one must expect thousands of other sentient civilizations. Earth and its surrounding space occupy only a tiny point in this boundless frontier.

In our nature is the hunger for knowledge and the desire to explore; to be “the first,” and do what no one has ever done before. NASA was thus created, with the signing into law of the National Aeronautics and Space Act on July 29, 1958, to “provide for research into problems of flight within and outside in the earth’s atmosphere, and for other purposes.”



NASA takes our dreams of reaching the stars, creating, testing, and recreating until they come out with a successful solution. With VEX Robotics, students are able to do the same thing: design, build, test, and redesign to solve a real-world problem, a procedure termed the engineering design process.

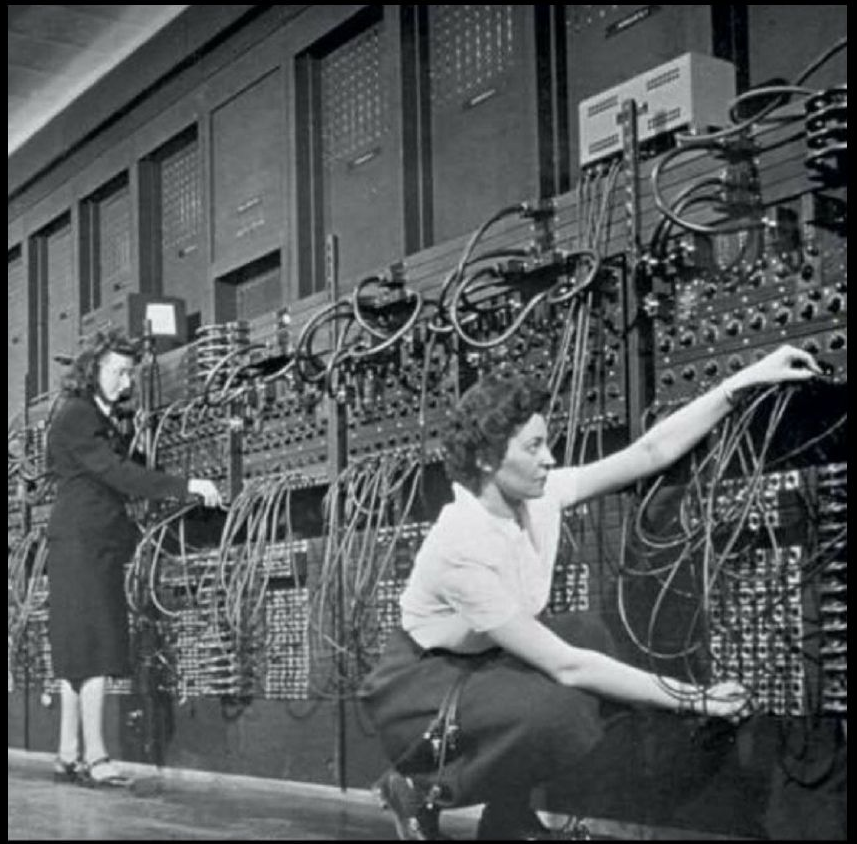


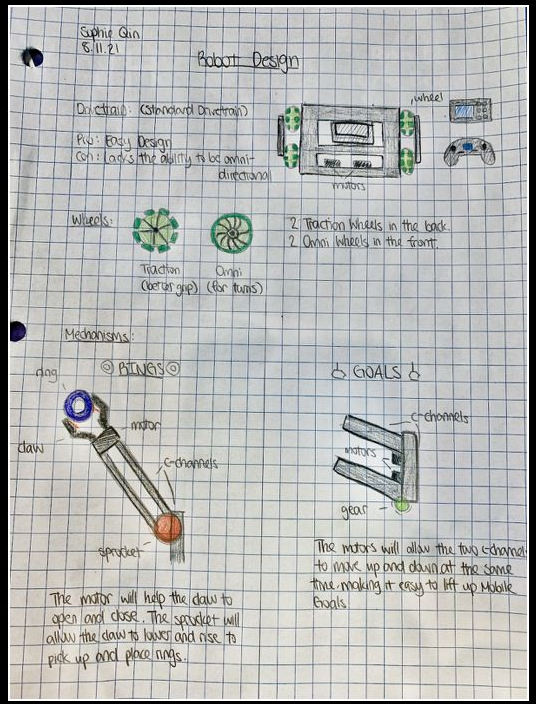
At NASA, engineers use the engineering design process to build, test, and improve prototypes. From testing airplanes in the 1930s to designing spacecrafts now, the design process is a staple for the NASA engineer.

In the 1930s and 40s, researchers at the NASA Langley Research Center in Hampton, Virginia, concerned themselves primarily with analysis on the aerodynamic properties of wing sections, propellers, and even whole airplanes.

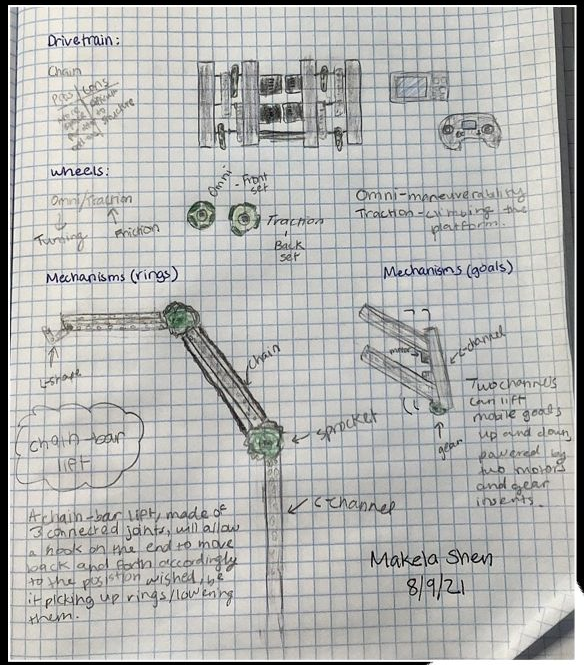
As explained by the Smithsonian National Air and Space Museum in Hidden Figures and Human Computers, “Engineers would begin their work by selecting a trial shape.They then built a scale model and placed that shape in a wind tunnel. In the tunnel, a battery of instruments measured its performance.”

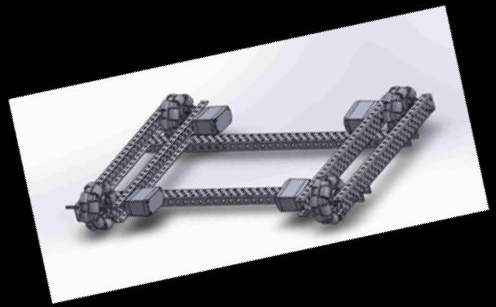
“The data from the test was then reduced and analyzed. Based on the results one parameter of that design was changed by a small increment and tested again. The steps were repeated until the performance was optimum for any given parameter.”

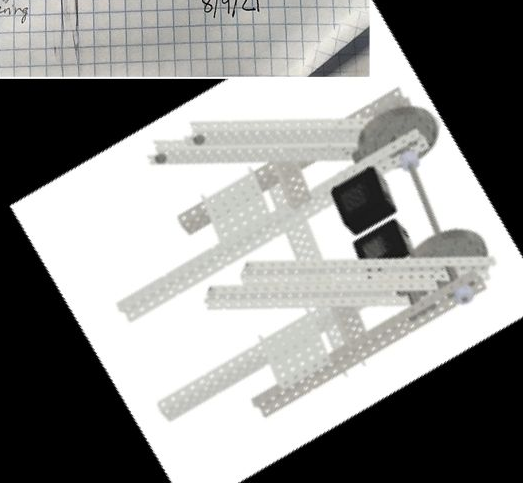




In robotics, we use the Design Process similarly to create our robots. We analyze the problem and brainstorm possible ways to score the most points while fitting within constraints, using a decision matrix to make final design choices and make sure everyone's ideas are included in the final design.

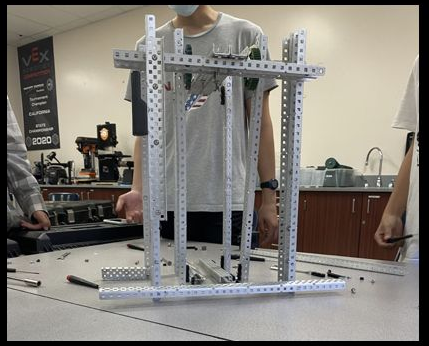






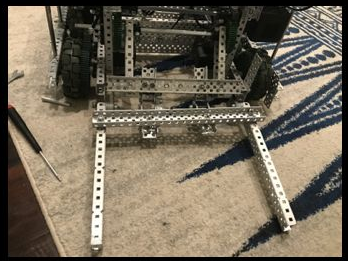
Building and programming follows. During this process, we often have changes in our design due to gained experience or new insight.

V1: Forklift with 4 omni/2 traction drive



V2: four-bar

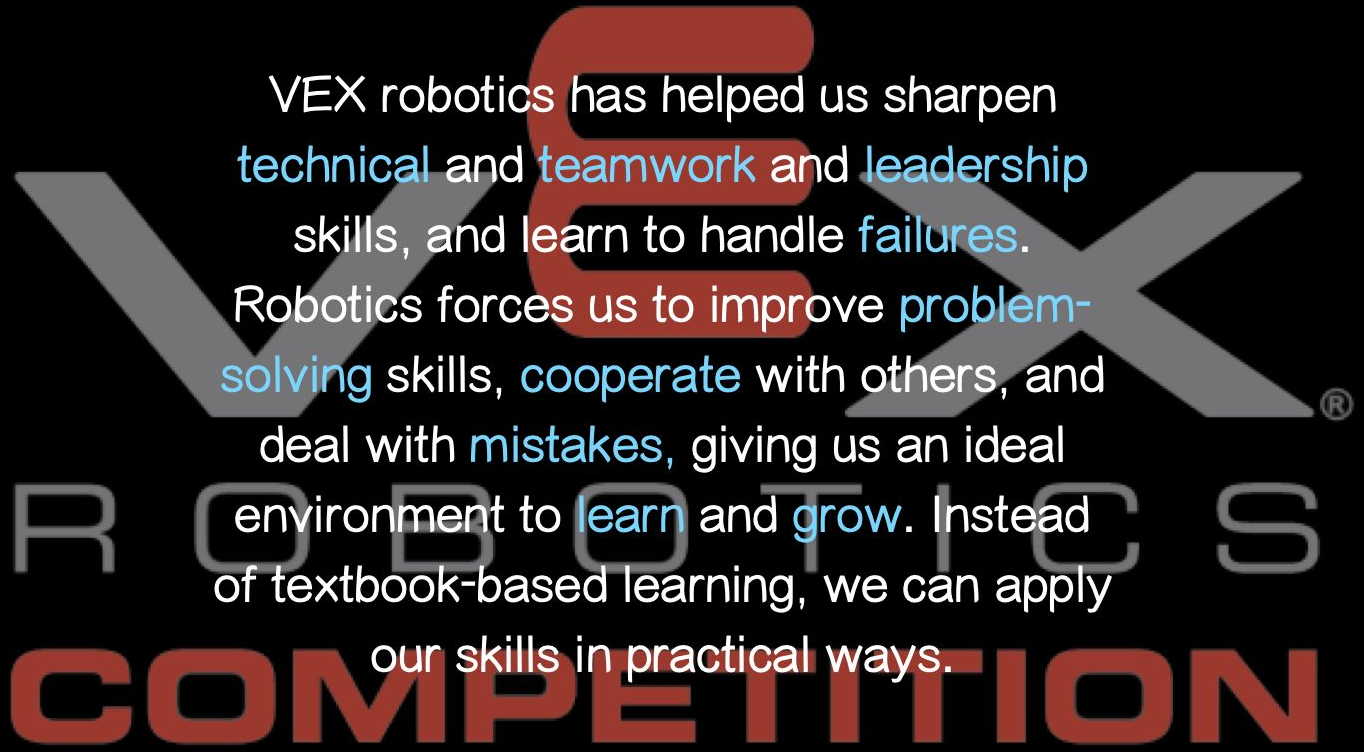
[Versions 3 - 5]

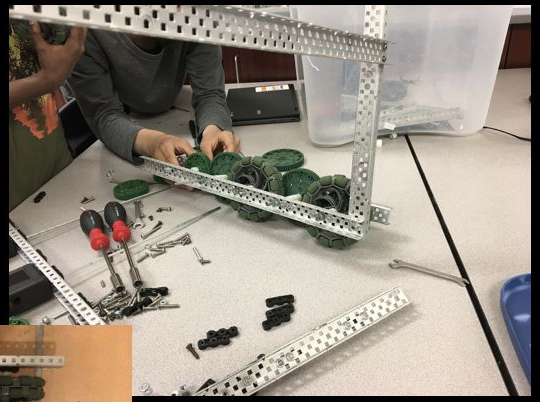


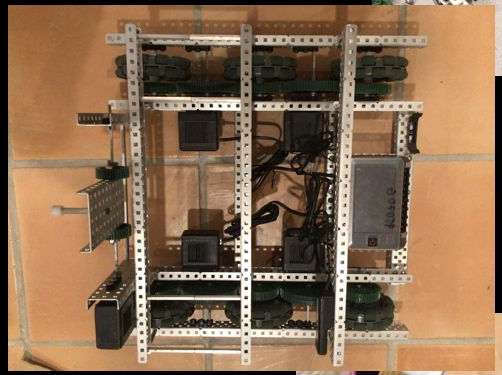
V6: four-bar + forklift

Along the way, we conduct many tests of our design in scrimmages and competitions. Using inspiration from other robots, we revise our design to improve our bot. Autonomous testing is especially tedious. Through constant testing and adjusting, we make minor changes to our code until execution is optimal.

VEX robotics has helped us sharpen technical and teamwork and leadership skills, and learn to handle failures. Robotics forces us to improve problem-solving skills, cooperate with others, and deal with mistakes, giving us an ideal environment to learn and grow. Instead of textbook-based learning, we can apply our skills in practical ways.

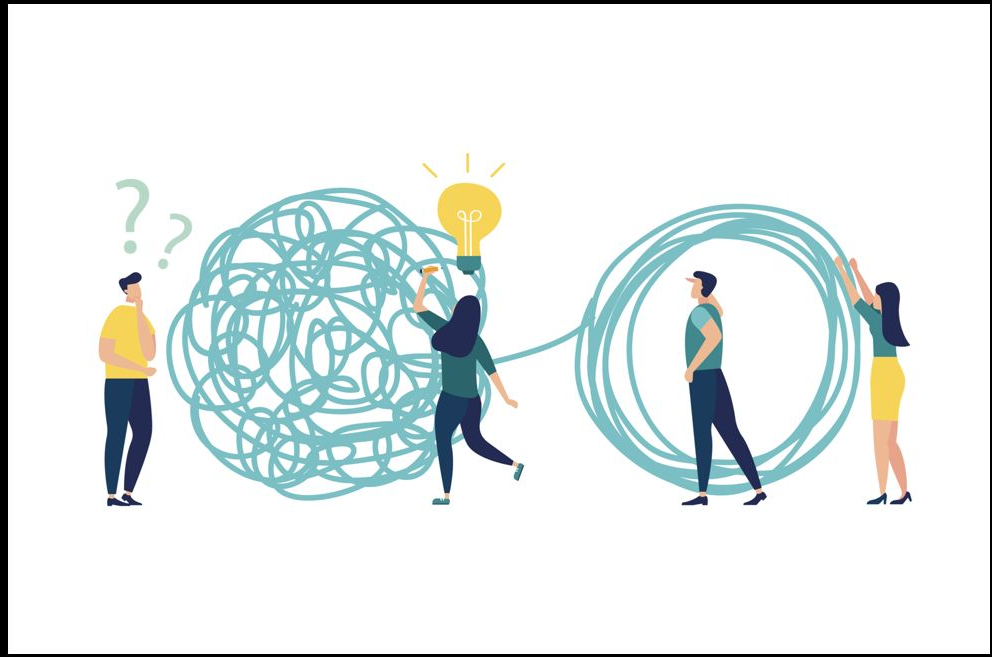






We have learned over and over the importance of a good initial plan. We build up our building and programming knowledge, while at the same time having fun! We gain mechanical skills that can help us understand and solve any practical mechanical problem. Attending competitions has helped us realize the importance of repeated testing and careful precision.

We've encountered many problems throughout our journey, such as being unable to climb the platform, or faulty autonomous code. These challenges, in turn, have helped us boost our problem-solving and creative skills, as we are forced to become creative thinkers in order to win competitions and build a better robot.



They have prepared us for challenges in higher education, and beyond.

In order to create a robot, we have to work together. Through robotics, we learn to become a team player, and our differences have made us grow stronger as a team. We learn to hear everyone's voices and consider everyone's input. Often, the silent one can have the most to say. Our team is unique in that we have no one leader. This ensures everyone has to step up and become a leader.

Perhaps the most important takeaway is to never give up. Over the course of several months, we have been to numerous competitions - and suffered many failures. But overcoming failures makes one grow stronger, and we have learned to look past the failure and work to make sure the next time we improve. By being persistent, we have improved tremendously, going from last to tournament finalists in the space of two competitions.


VEX Robotics has played a crucial role in helping us develop career skills which will last us a lifetime. We've discovered the importance of teamwork, improved leadership, learned to handle failures, while using the engineering design process to create robots. With more and more children given such opportunities, perhaps our generation will be the one to take humanity to the stars and beyond.