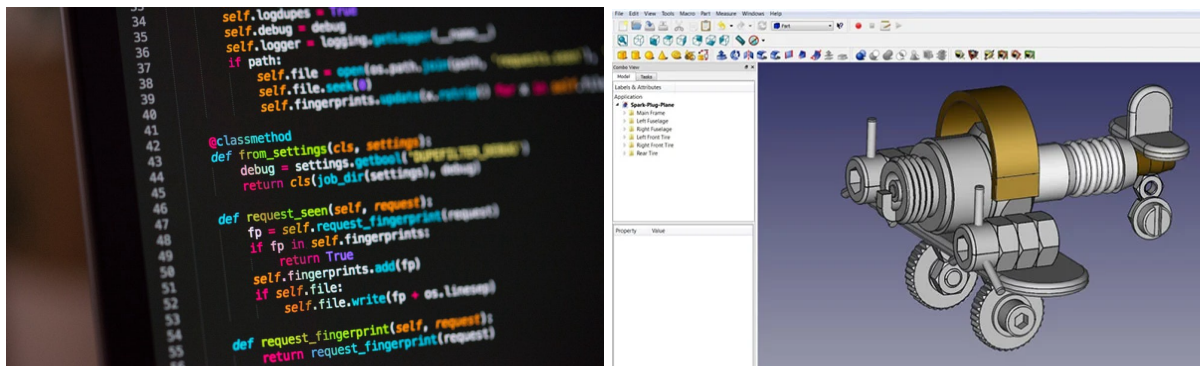


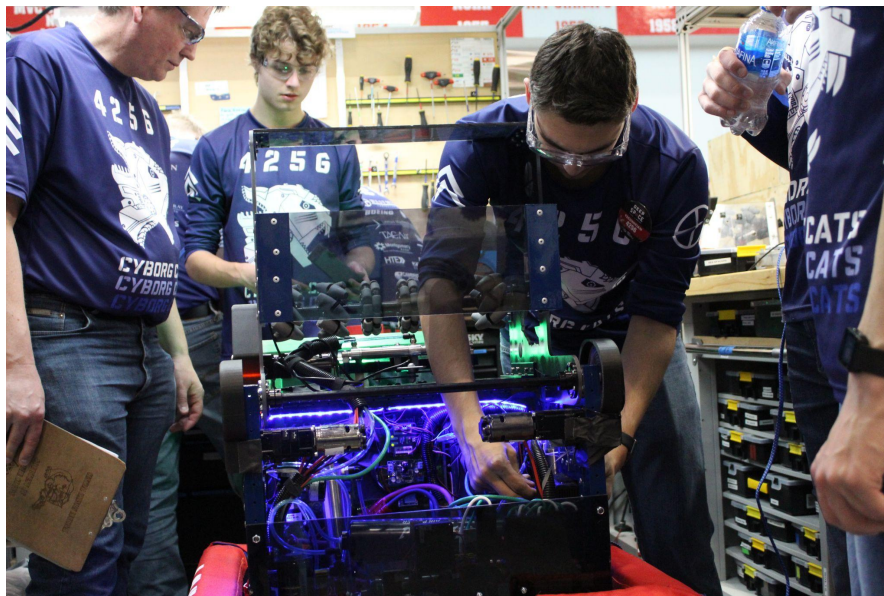
Story: All About STEM!

Tippy is a robot that competes in a game called *FIRST* Robotics. Teams from all over the world compete in the *FIRST* Robotics Competition. Tippy was made by the Cyborg Cats, a team in Missouri! The people who create Tippy are called engineers. Engineers are people who use STEM to design and build different machines like cars, spaceships, or computers. STEM is a different name for Science, Technology, Engineering, and Mathematics. We use STEM everyday, even if we don't know it! When we bake cookies or when we ride our bikes, we use STEM!

Different engineers have different jobs. One kind of engineer is called a programmer. Programmers write something called code, which is a special language! Code is a special kind of language because engineers type it on computers and it tells their machines what to do. For example, Tippy's code tells it to raise its arms, pick up hatches, or spin around. Another kind of engineer is someone who works in electronics. Electrical engineers use wires and batteries to give their machines power. Without electrical engineers, Tippy wouldn't have the power to move! One special kind of engineer is an engineer who uses CAD! CAD is another way to say "computer-aided design." Engineers who use CAD draw the design for their machine on a computer. This way, other engineers can know what kind of pieces to use, what place these pieces need to be in, and what the design will look like at the end.



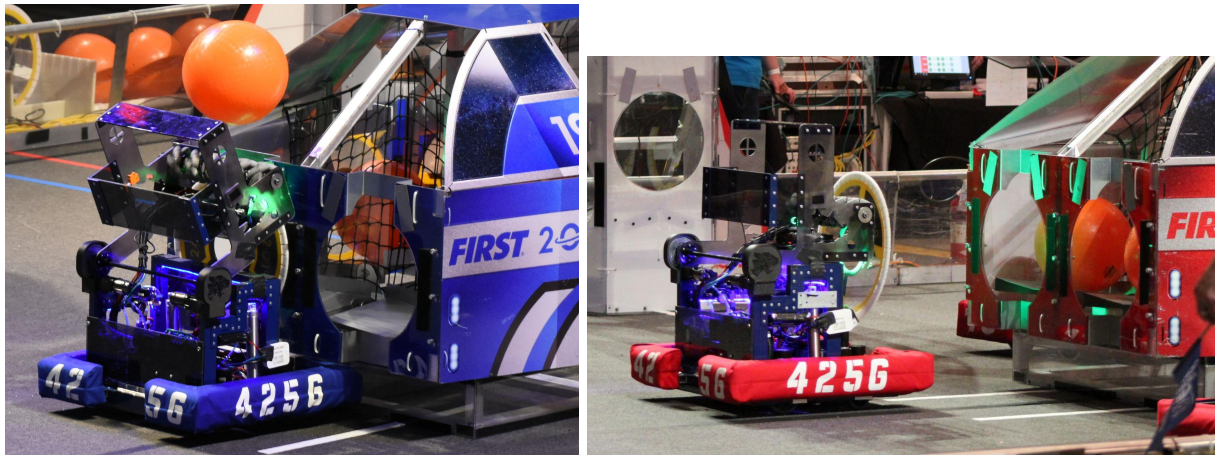
Before any of the engineers can do their different jobs, they all work together during something called the “design process.” The design process is one of the most important parts of STEM and engineers’ work. The design process has six important steps. The first step is to define what problem you want your machine to solve. For engineers who build cars, their problem is that without cars, people can’t get to work or school fast enough! For the Cyborg Cats, our problem is to be faster and stronger than other teams’ robots so that we can collect more points! After you define the problem, the second step is to research and learn more about the problem you want to solve, and what it will take to solve it. The third step of the design process is to brainstorm! This is one of the most fun steps — you get to design a new machine that can solve the problem. When engineers brainstorm, they come up with a lot of different designs, not just one or two.



Step four of the design process is to make something called a “prototype.” A prototype is the first working design of the machine. The finished machine usually looks different than the prototype, but the prototype includes the most important parts of the design so engineers can test how they work! After engineers create a prototype, the fifth step of the design

process is to test it. Prototypes are one of the most important parts of engineering because engineers can test them to see what the problems are with their first design. After engineers test the prototype enough, they can move on to the sixth step. The sixth step is to change their design to fix all the problems and create a better machine.

After they complete all six steps, engineers can use their different jobs to finish their machine! Because the engineers used the design process, their machine should have no problems, and should be ready for other people to use it! Our engineers used the design process to decide what Tippy would look like and all the different things Tippy can do. Because of this, Tippy can move around, play catch, and even climb!



Without STEM or engineers, we wouldn't have things like phones, planes, or even lightbulbs! Even if we aren't all engineers, it's important to learn about STEM so that we can solve problems too!

Review:

1. What is the main idea of the story?

- Tippy is a robot that can move around and catch balls.
- STEM is important because we use it in everyday life and we can use it to solve problems.
- There are different kinds of engineers.

2. Circle True or False:

True **False** - Programmers use wires and batteries to give machines power.

True **False** - A prototype is the first working design of a machine.

True **False** - CAD is another way to say “computer-aided design.”

True **False** - The design process is one of the least important parts of STEM.

True **False** - Electrical engineers use CAD to draw designs on their computer.

3. Answer the following questions:

What does STEM stand for?

Science, Technology, Engineering, and Mathematics

How is a Programmer different from an Electronics Engineer?

A programmer uses code to give the machine instructions, an electronic engineer gives the robot energy through wires and batteries.

Why is it important to learn about STEM?

Because we use STEM everyday! It can help us learn how to solve problems too.

4. Number the steps of the design process:

- _3_ Brainstorm different designs.
- _2_ Research the problem and possible solutions.
- _4_ Create a prototype.
- _6_ Change the design to fix any problems.
- _1_ Define the problem you want your design to solve.
- _5_ Test the prototype.

5. Fill in the blanks:

Tippy is a robot created by a team called the ___Cyborg Cats_____.

The design process has _____6_____ different steps.

Engineers create _____prototypes_____ to test their design and see what problems their first design may have.

Programmers write something called _____code_____, which tells their machine what to do.

-----**Engineers**----- are people who use STEM to design and build machines.

Word Bank: Engineers, Prototype, 6, code, Cyborg Cats

5. Definitions:

Design Process-

A long process that identifies our problem, and steps on how to solve it

Engineer-

A person who builds and designs things with STEM

Code-

A written language programmers use to give commands/commands to the machines they are using

6. Fact of Opinion

Robots need code, wiring, and batteries to function! **Fact** **Opinion**

The Cyborg Cats are the best robotics team. **Fact** **Opinion**

Paper Rockets Activity

Have you ever seen NASA launch a rocket into space? Without engineers or STEM, we wouldn't be able to build these rockets. In this activity, you will get to be an engineer and test the design process to make your own rocket out of paper! Compete to see who can launch their rocket the farthest!



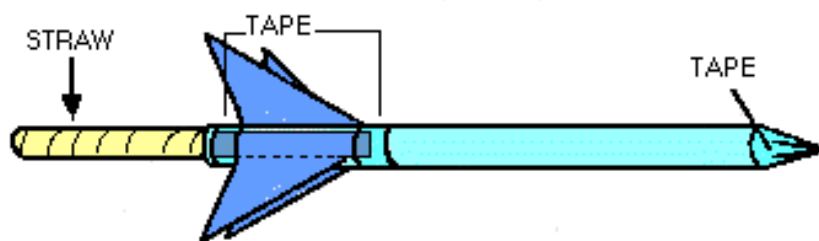
What you'll need:

- Multiple Sheets of Paper
- Tape
- Scissors
- Plastic Drinking Straws
- Markers (optional)

Instructions:

1. Decide the size: Do you want your rocket to be big or small? If you want it to be small, cut a sheet of paper into 4 smaller rectangles - you will only need one of these rectangles to make a small rocket. If you want it to be big, don't cut the paper at all!

2. Wrap your piece of paper into a cylinder shape. It may help to wrap it around a pencil to help form this shape.
3. Tape the paper so it stays in the cylinder shape.
4. Pinch the top end of your rocket and tape it shut. Do not tape the other end.
5. Add any other parts to your rocket and decorate it! You can cut paper into triangles and tape it to the sides of your rocket to make fins, or you can make a paper cone to tape to the top! Or, if you want, you can come up with your own design to add! You can use markers to add color, or even sign your name!
6. Once you've finished designing your rocket, take it to a clear space with room for your rocket to fly, like an empty hallway.
7. Slide your rocket onto a drinking straw.
8. Blow as hard as you can into the other end of the straw to see your rocket fly! Compete with your friends to see whose rocket goes the farthest!
9. If you have time, try making changes to your design! Once you've made changes, shoot your rocket again and see if it flies a longer or shorter distance.



Example Rocket Design