



## Virtual STEAM Mobile—Robotics

Design a Robot! (Cadette, Senior, Ambassador)

### Badge Requirements:

- Cadette Robotics 2, Designing Robots: Steps 1 - 5
- Senior Robotics 2, Designing Robots: Steps 1 - 5
- Ambassador Robotics 2, Designing Robots: Steps 1 - 5

### Suggested Materials

- Paper, pencil
- Crafts materials: Construction paper/cardstock, tape (duct, electrical, foam), glue (hot glue, glue dots), zip ties, twist ties, pipe cleaners, craft sticks
- Household supplies: Drinking straws, bamboo skewers, balloons, batteries, rubber tubes and oral syringes, foil tape, wire
- Recycled materials: Cardboard boxes and canisters, bottle caps (for wheels), electric toothbrushes (for motors)
- Electronics parts: Motors, LEDs, wires, test leads/alligator clip wires
- Old toys: RC car, dolls or action figures, stuffed animals
- Building sets: LEGO®, K'Nex

### Introduction

- What is a robot?
  - A robot is a programmable, self-controlled device that has electronic, electrical, or mechanical parts.
  - What are some examples of robots?
    - Movies, TV, real life, etc.
- How do we communicate with robots?
  - Algorithm: Computer programs are written in the form of an algorithm – a step-by-step set of instructions that tells the computer what to do.
- Commands: Computer programs use commands to tell the machine what to do. A command is one step in a program. Name, Purpose, and Function
  - All robots have a name, a purpose, and function
    - Purpose: why it was made
    - Function: How it does something
  - What makes them different than other electrical devices?
    - Sense: A robot has sensors that give it information about the physical environment, the “real” world around it.
    - Think: The input from the robot’s sensors controls the robot’s movement and actions.
    - Act: A robot usually has some way to move or affect the world around it.

### Activity

- The Design Thinking Process
  - A series of steps you can take to help you identify problems and come up with creative solutions.
    - Empathize: develop an understanding of the challenge
    - Define: clearly define the problem you want to solve
    - Ideate: brainstorm solutions, select and develop your solution
    - Prototype: design an example to test your solution
    - Test: test your design, continue to improve your design by repeating the process

- Let's Design!
  - You can work individually or in teams.
  - Brainstorm ideas about real life issues in your schools, communities, or world that the robot could make a difference today or in the future.
  - After choosing the purpose of the robot, what will the robot need?
    - You need to include the following:
      - Follow the Design Thinking Process
      - Create detailed drawings
      - Create a material list for what they would use to build this robot (can be the craft supplies first, and then if you were to create it in real life what would those materials be?)
      - Be prepared to answer the following questions about your robot:
        - How does it move? How does the robot take in information? How does it communicate with humans? How does it get power? How will it be maintained if it breaks?
  - Once you are done designing, present your robot and answer the questions above.
    - What is the name, purpose, and function of your robot?
  - After your presentation, allow for time to make edits or changes based on the feedback you received.
- Let's Build!
  - Once you have feedback on your robot design, refer back to the materials list for ideas on what to use to make a prototype of your robot!
  - Gather supplies and start creating! This can be for fun or try and make it as realistic as possible!
  - If you don't have all appropriate electronics to build a working robot, don't worry! This can act as a model for what you could create.

### Wrap Up

- How do robots help us in our daily lives?
- Do you think the use of robotics will increase over time?

