



TITLE: Bristlebot: Creating Vibrating Robots

GRADE LEVEL: 3rd grade

STEAM AREAS:

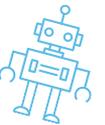
Science, Technology, Engineering

MATERIALS NEEDED:

- Coin cell battery
- Vibration motor
- Toothbrush (preferably with a removable head)
- Double-sided foam tape
- Scissors or pliers (for cutting the toothbrush head)
- Optional materials for decoration:
- Googly eyes
- Craft supplies (markers, colored paper, etc.)

OBJECTIVES:

- Students will successfully construct a functional bristlebot following step-by-step instructions;
- Students will be able to explain the concept of a closed circuit and how the completion of the circuit allows electricity to flow, resulting in the vibration of the bristlebot;
- Students will be able to identify and resolve common issues such as disconnected wires or short circuits, allowing their bristlebots to function properly.



PROCEDURE

Introduction (5 minutes)

Begin by introducing the concept of building a bristlebot and its components. Show the Science Buddies video (<https://youtu.be/Q1zToREgV0c>) as a visual reference for the construction process. Discuss the objectives of the lesson and the importance of following the step-by-step procedure.

Step 1: Prepare the Toothbrush (10 minutes)

With adult supervision, cut the head off the toothbrush using scissors or pliers, leaving the handle intact.

Ensure the cut end is flat and even for stable placement of the bristlebot.

Step 2: Attach Double-Sided Foam Tape (5 minutes)

Take a piece of double-sided foam tape and place it on the top of one end of the toothbrush handle. Press down firmly to ensure it sticks securely. Peel off the paper backing from the foam tape.

Step 3: Position the Battery (5 minutes)

Take the coin cell battery and place it on top of the double-sided foam tape.

Press down firmly to ensure it adheres to the tape.

Ensure the battery is centered on top of the toothbrush handle.

Step 4: Prepare the Vibration Motor (5 minutes)

Flip over the vibration motor and peel off the paper backing on the bottom.

The motor has a built-in sticky adhesive, so no additional tape is required.

Position the motor directly on top of the toothbrush handle, behind the battery.

Ensure both the motor and battery are centered to prevent the bristlebot from falling over.



PROCEDURE

Step 5: Connect the Wires (10 minutes)

Examine the wires of the battery and motor. Red usually indicates positive, and black or blue indicates negative. Twist together the exposed metal ends of the two red wires tightly. Twist together the exposed metal ends of the two black or blue wires tightly. This step completes the circuit and allows electricity to flow.

Step 6: Test and Troubleshoot (15 minutes)

Check if the bristlebot is vibrating. If not, troubleshoot by ensuring the wires are securely connected. Avoid short circuits by ensuring the red and black wires do not touch each other directly. If the bristlebot stops moving at any point, check for disconnected wires and reattach them tightly.

Step 7: Decoration (5 minutes)

Optional: Add googly eyes or other decorations to personalize the bristlebot.

Conclusion and Reflection (5 minutes)

Discuss the success of the bristlebot construction and encourage students to reflect on their experience. Emphasize the importance of following instructions, troubleshooting, and persistence in problem-solving.

Note: The time durations provided are approximate and can be adjusted based on the pace and needs of the students.

ASSESSMENT

After building their bristlebot robots, students will complete a worksheet to assess their understanding. The worksheet will require them to identify robot parts, explain how they work together, and describe their robot's decoration.

REFERENCES

- <https://www.sciencebuddies.org/stem-activities/bristlebot>
- https://www.teachengineering.org/activities/view/cub_robot_lesson02_activity1
- <https://www.steampoweredfamily.com/activities/bristlebot-steam-activity-for-kids/>