

LESSON PLANS

Title – Build a Bristlebot, a Tiny Toothbrush Robot	
Lesson plan to be implemented in Robotics class	
Aim	<p>The main goal of this lesson plan is:</p> <ul style="list-style-type: none"> - to provoke curiosity in students; - to build a small robot from everyday items; - to learn about electrical circuits; - to become aware of the concept of STEM; - to encourage creativity and individual work;
Students age targeted	8 th grade students / 13-14 years old
Estimated time	35 - 40 minutes
Topics covered	<ul style="list-style-type: none"> ● Robotics ● Science ● Circuits
Facility/ Equipment	<ul style="list-style-type: none"> ● Classroom ● Internet access ● White board ● Mobile phones ● Toolkit
Tools/ Materials	<ul style="list-style-type: none"> ● Handout 1 - Instructions ● Coin cell battery ● Vibration motor ● Toothbrush head with the handle cut off ● Small piece of double-sided foam tape ● Scissors
Development of activities	<p>Activity 1: Ask an adult to help you cut the head off a toothbrush using a strong pair of scissors or pliers.</p> <p>Activity 2: Follow along with the video to assemble your bristlebot. Be gentle with the motor wires. They are thin and can rip if you are not careful. Optionally, you can apply a dab of hot glue at the base of each wire to help reinforce it.</p>



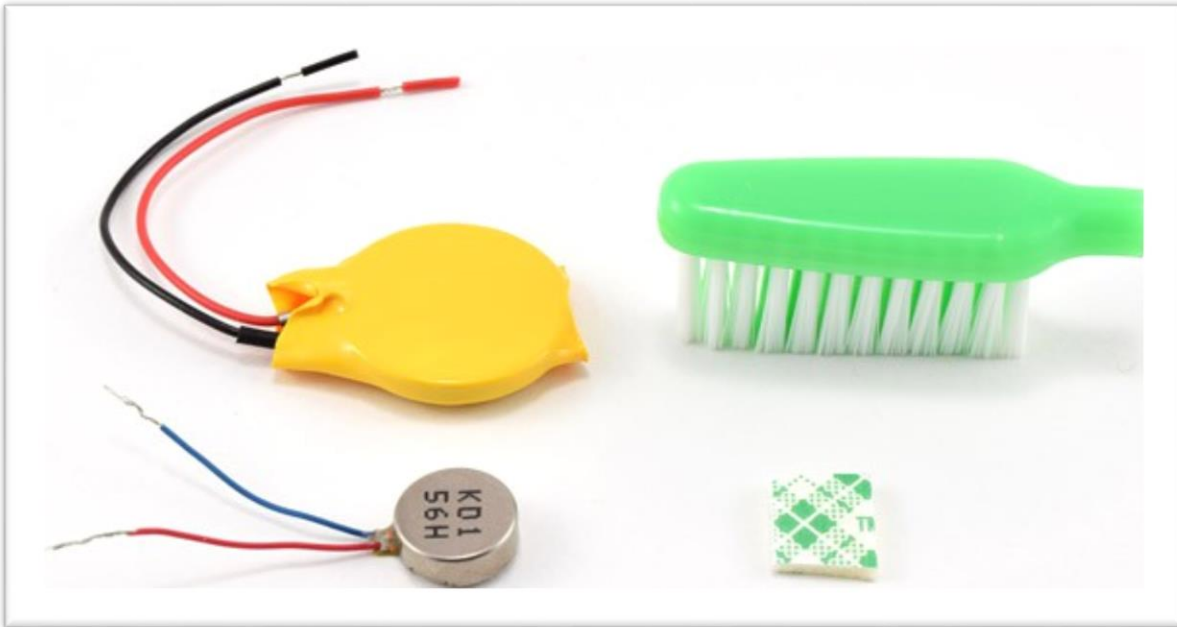
Activity 3: Make sure to follow these tips when using your bristlebot:

- a. Do not let the exposed metal parts of the red and black wires touch each other directly. This will create a short circuit and drain the battery very quickly, and will prevent the motor from vibrating.
- b. If your robot stops moving suddenly, check to make sure that one or both sets of wires did not come loose. This will create an open circuit and prevent the motor from vibrating. Tightly twist the wires back together if this happens.
- c. If your robot falls over a lot, make sure the motor and battery are centered on top of the toothbrush. You can also let the robot run continuously for 5–10 minutes, and it will slow down slightly as the battery begins to drain.
- d. To turn your bristlebot off, just untwist one set of wires (you do not need to disconnect both). Make sure you turn your robot off when not in use to conserve battery power.

Activity 4: Wrap-up (5-10mins) Discuss what happened: When you connected the motor and battery wires, you created a closed circuit. This causes electricity to flow through the motor. The motor is the same type found in cell phones and video game controllers to make them vibrate. The electricity makes a tiny weight inside the motor spin, which causes the entire robot to wobble. This makes the bristlebot buzz around the table.

HANDOUT 1: Instructions

Materials needed:



Watch the video:

<https://youtu.be/Q1zToREgV0c>

