

DREAM. BUILD. BECOME.

ACE METAL
FOUNDATIONS

By IACMI

Kinetic Critters

CIRCUIT

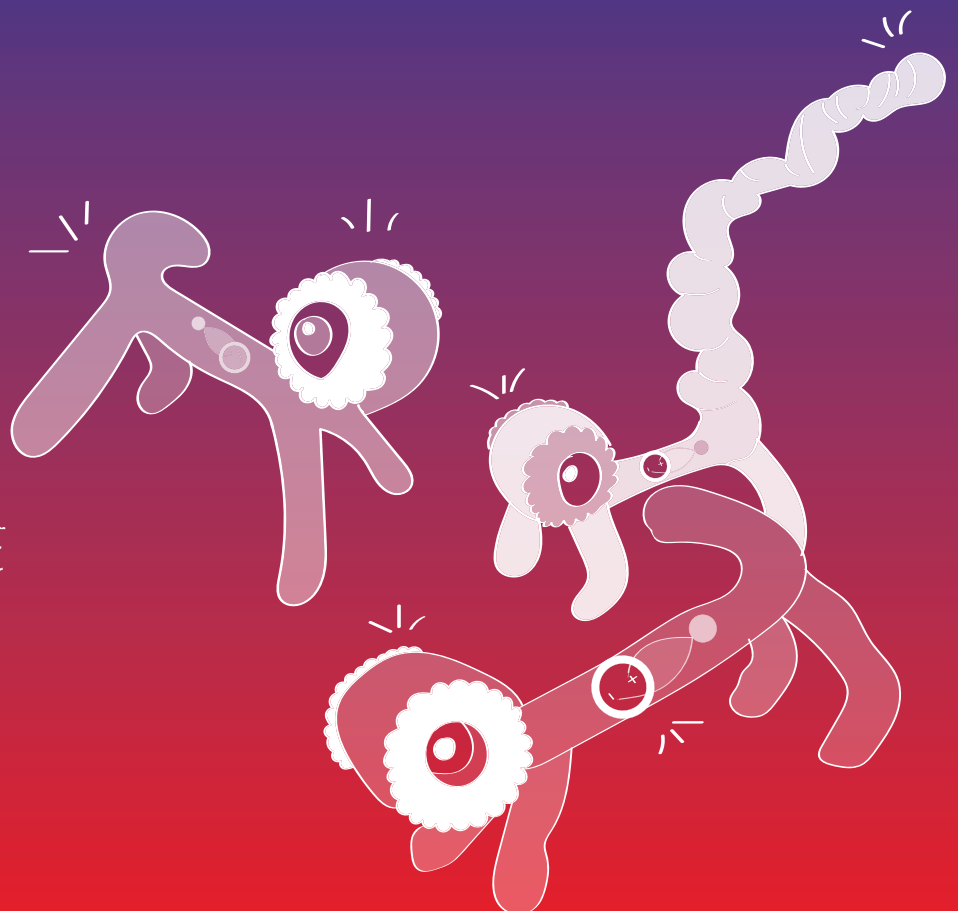
VIBRATING
MOTOR

POSITIVE
WIRE

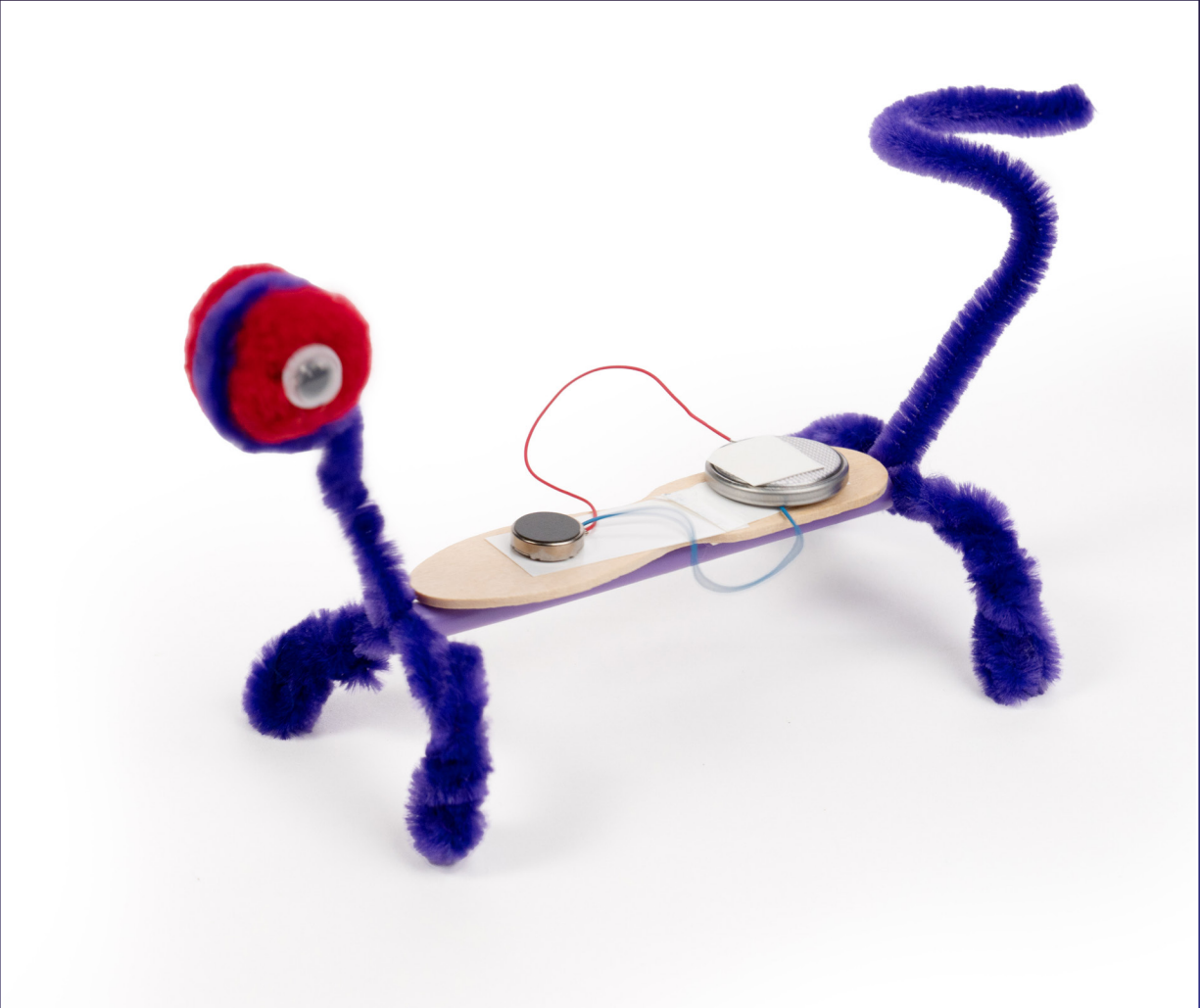
NEGATIVE
WIRE



BATTERY



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Prior Knowledge

Students should be able to follow multi-step instructions and would benefit from having built simple models using classroom materials in the past.

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Lesson Overview

In this activity, students build a small creature that moves using a battery and motor.

Students assemble the creature from individual parts and connect the battery and motor so the creature can move. As they test their designs, students observe that the motor only works when the parts are connected correctly.

After testing, students make simple adjustments to the creature's legs, balance, or motor placement and test again to see how these changes affect movement. Through building and testing, students gain an early, hands-on experience with how batteries and electrical parts work together to make something move.

Vocabulary

Battery – A small power source that provides energy

Motor – A device that moves when it gets power from a battery

Energy – Something that makes things move, light up, or make sound

Movement – When something changes position or location



Figure 1: A technician measuring voltage of a car battery.



Figure 2: A photo of electricity pylons carrying high-voltage electricity.

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The Foundations of Powered Motion

Many things we use everyday move because they use energy. Some toys light up, some make sounds, and some move across the floor because they use electrical energy from a battery.

A battery stores energy that can be used to make something happen. When a battery is connected to a motor, that energy can be used to make the motor move. When the connection is made, the motor turns on. When the connection is broken, it turns off.

In today's activity, you will use electrical energy in a simple way - to make a creature move. As you build, you'll discover that how parts are connected matters. If the motor doesn't move, the energy isn't reaching it yet.

You will test your creature, notice how it moves, and make changes to improve it. Engineers and builders do this every day: they try something, see what happens, and make adjustments to make it work better.

Materials

Materials Supplied in Kit

Per Student

- 1 drinking straw (cut to approximately 2 inches)
- 3 pipe cleaners
- 1 pom-pom
- 2 googly eyes
- 1 wooden ice cream spoon
- 1 small vibrating motor with wires
- 1 coin-cell battery
- 2 adhesive tabs or pieces of double-sided tape

Shared

- Craft glue
- 1 emery board (teacher use)

Materials Supplied by Teacher

- Scissors

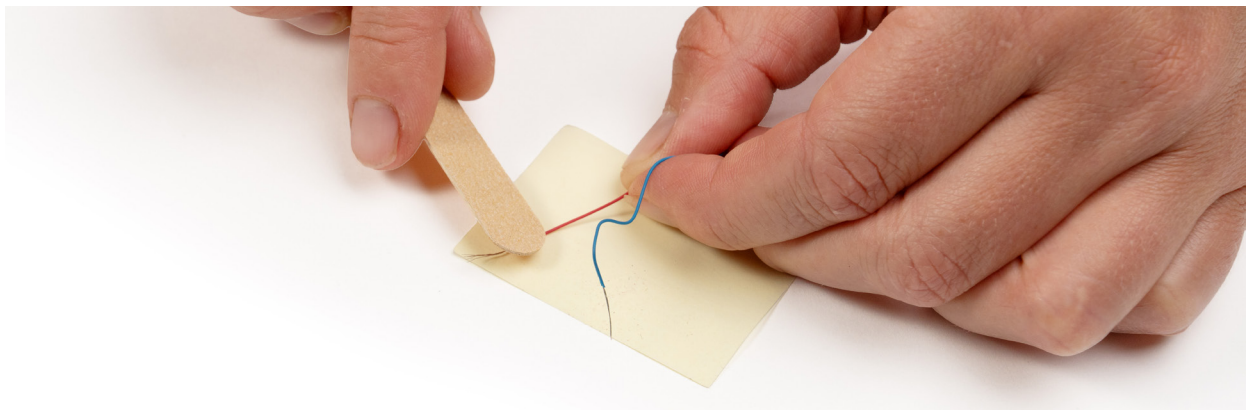


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Activity Directions

Recommended Teacher Preparation

- The vibrating motors included in this activity have very thin wires that are partially stripped, but often not enough to make reliable contact with the battery
- To reduce frustration during the activity, it is recommended that teachers prepare the motor wires in advance by gently removing a bit more of the wire coating to expose additional metal
- Use the provided emery board to gently rub off about a half-inch of the wire coating near the tip of each wire
- Pre-stripping the wires helps ensure that students can successfully complete the circuit by simply touching the bare wire to the battery during the activity



Step 1: Build the Body

- Cut a piece of straw that is the length of the wooden spoon, and glue it to the center of the spoon lengthwise with a few dabs of craft glue



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Activity Directions Continued

Step 1: Build the Body Continued

- Line up three pipe cleaners side-by-side and twist them together in the center several times



- Slide the pipe cleaners through the straw, leaving equal lengths of pipe cleaner on either side



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Activity Directions Continued

Step 2: Prepare the Creature's Head

- Gather one pom-pom and two googly eyes
- Add a small dab of craft glue to opposite sides of the pom-pom and attach the googly eyes



Step 3: Add Legs and Head

- On each end of the creature, bend two pipe cleaners downwards to form four legs
- Bend the third pipe cleaner upward to form a tail
- Adjust the legs so that the creature can stand
- Wrap one of the front pipe cleaner ends around the pom-pom between the eyes to secure the head.



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Activity Directions Continued

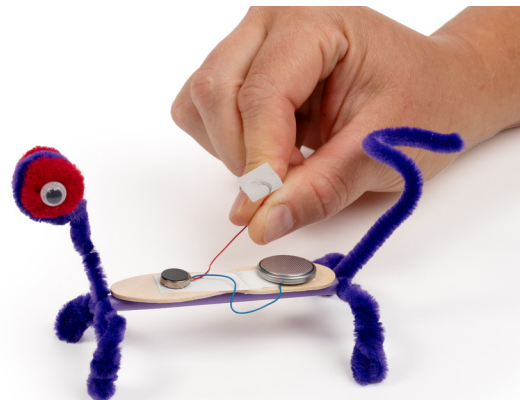
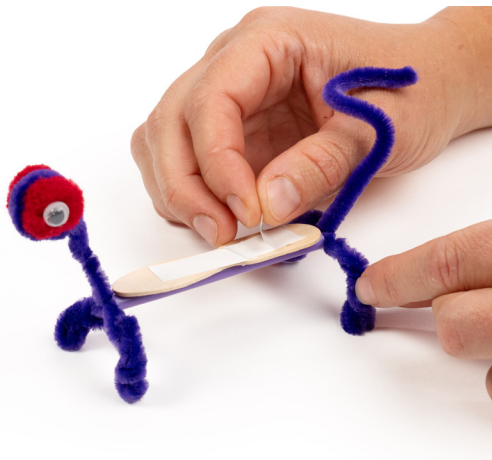
Step 4: Test the Circuit

- Touch one exposed motor wire to the top face of the battery, and the other to the bottom face of the battery. This should activate the motor as a test.
- Make sure the motor vibrates. If not, adjust the wires so they make contact with the battery surfaces.



Step 5: Connect the Circuit

- Touch one exposed motor wire to the top face of the battery, and the other to the bottom face of the battery. This should activate the motor as a test.
- Make sure the motor vibrates. If not, adjust the wires so they make contact with the battery surfaces.
- Tape the second motor wire so it can be lifted on and off the positive side of the battery. When the wire touches the battery, the circuit closes and the motor activates.



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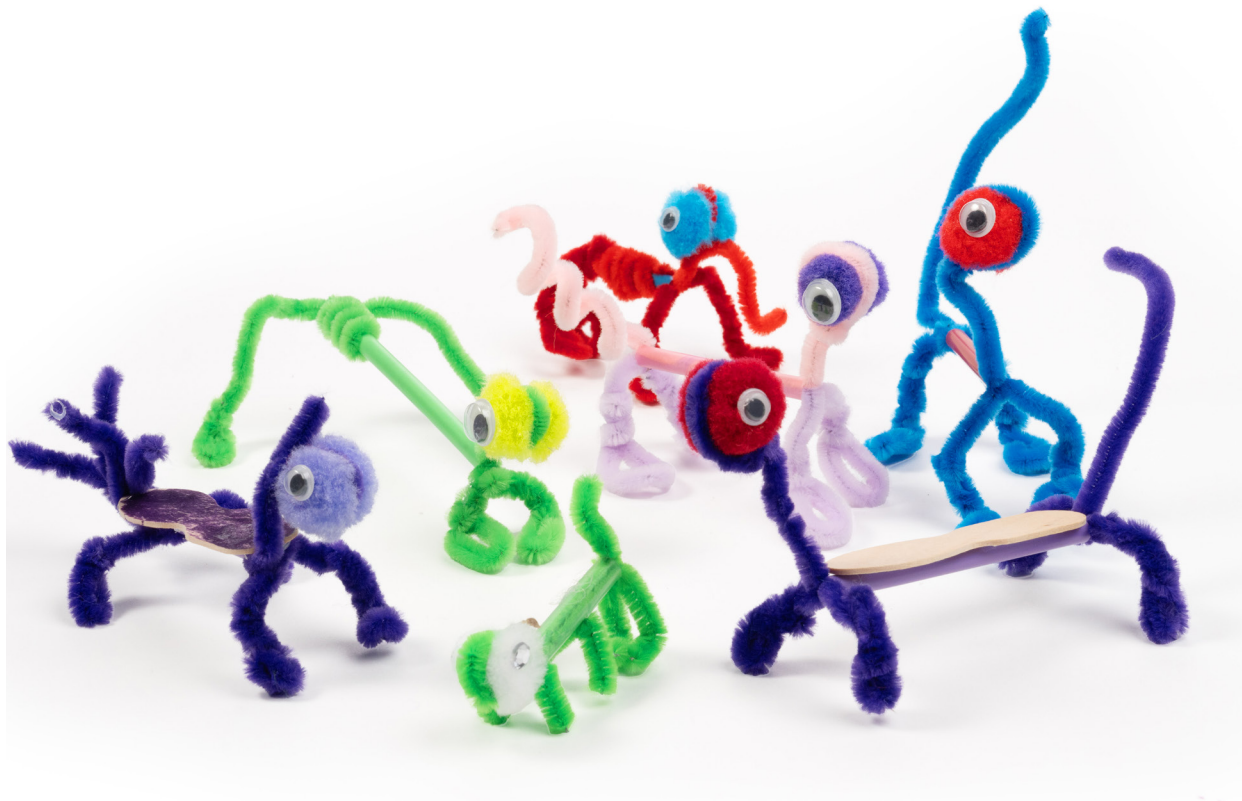
Activity Directions Continued

Step 6: Test

- Place the creature on a flat surface and activate the motor.
- Observe how it moves.

Step 7: Improve

- Adjust the legs, balance, or position of the motor.
- Test again and compare how the movement changes.



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Discussion Prompts or Reflection

- What made your creature start moving?
- What changes did you make to your creature, and how did those changes affect how it moved?
- What happened when the weight shifted forward or backward?
- What did you notice about the battery and motor working together?

Variations and Enrichment

- Students may experiment by changing leg length or bending the legs differently to observe how motion changes.
- Students may test the creature on different surfaces such as smooth tables, textured surfaces, or paper.
- Students may measure how far the creature travels in a set amount of time and compare results.

Foundation Exploration

- **Electrical engineers** work with batteries and wires to help power toys, tools, and machines
- **Mechanical engineers** design parts that move and help things work together
- **Manufacturing technicians** put parts together, test products, and make sure everything work properly
- **Toy and product designers** create fun products that move, vibrate, or light up using simple electrical parts