# YOGURT-CUP SPEAKERS BLUEPRINT

1. Create electromagnets by winding roughly 6 to 15 feet of wire around the D-cell battery. Leave 2 inches of wire hanging off at each end.

2. While keeping the wire in the shape of a coil, carefully remove the wire from the battery and tape the coil so it does not unravel.

3. Rub a piece of sandpaper on each free wire end to remove the enamel insulation. Remove about 1 inch of insulation from each end.

4. Hold the ends of the wire to opposite ends of the battery to make a series circuit with the battery and the coil. Move the coil close to the magnet and observe its motion. Hook the battery up differently and see what happens to the magnets. (When the coil is connected to the battery in one way, one side of the coil is the north pole and the other side is the south pole of the electromagnet. The north pole of the electromagnet will be attracted to the south pole of the permanent magnet. When the battery is turned around, the poles of the electromagnet are reversed.)

5. Attach the coil and a permanent magnet to the bottom of the container with tape. Attach the coil and magnet in such a way that the coil and magnet are next to each other. There are many different creative ways to do this.

6. Connect the ends of the speaker wire to the speaker output of the radio. On the back of the radio, look for plugs to connect the speaker wires to. These are usually holes that the wires are pushed into. Choose the plugs for one speaker (the left, for example) and insert one end of the wire from the yogurt speaker into one hole, and the other end of the wire into the other.

7. Turn the radio on and adjust the volume. When more current flows through the wire coil, the electromagnetic force increases. As the radio changes the current very fast, the changing electromagnetic force causes the plastic cup to vibrate. The vibration creates sound waves in the air, which are heard.

8. The wires of the speaker may get hot. When electric current flows through the wire, some of the electrical energy is converted to heat energy due to the resistance inside the wire. If you touch the wire, the heat will transfer to your skin. When the volume of the radio is turned up, more electricity flows through the wire and more heat is generated. If the speaker gets too hot, turn down the volume.