Sound Automata

Explore the surprising sounds that everyday objects make. Build a noise-making contraption from these objects, then add a motor and PicoCricket to automate your contraption. Finally, add a light sensor and program your sound automata to "play" when triggered by light.
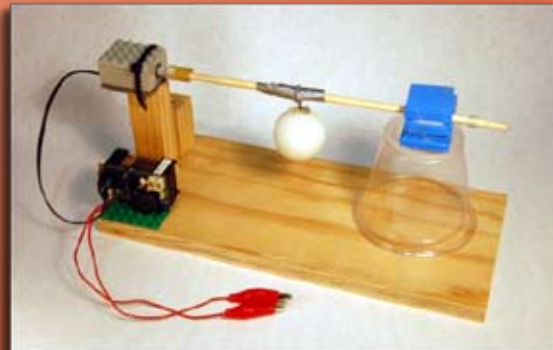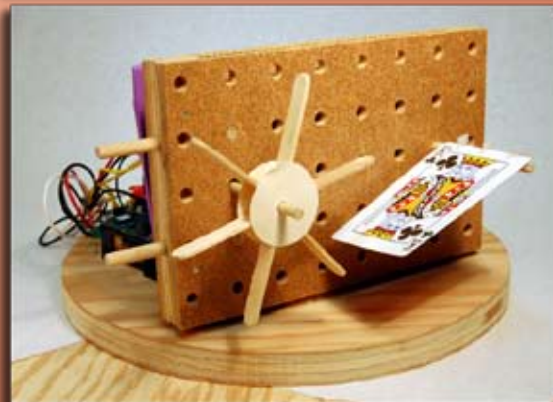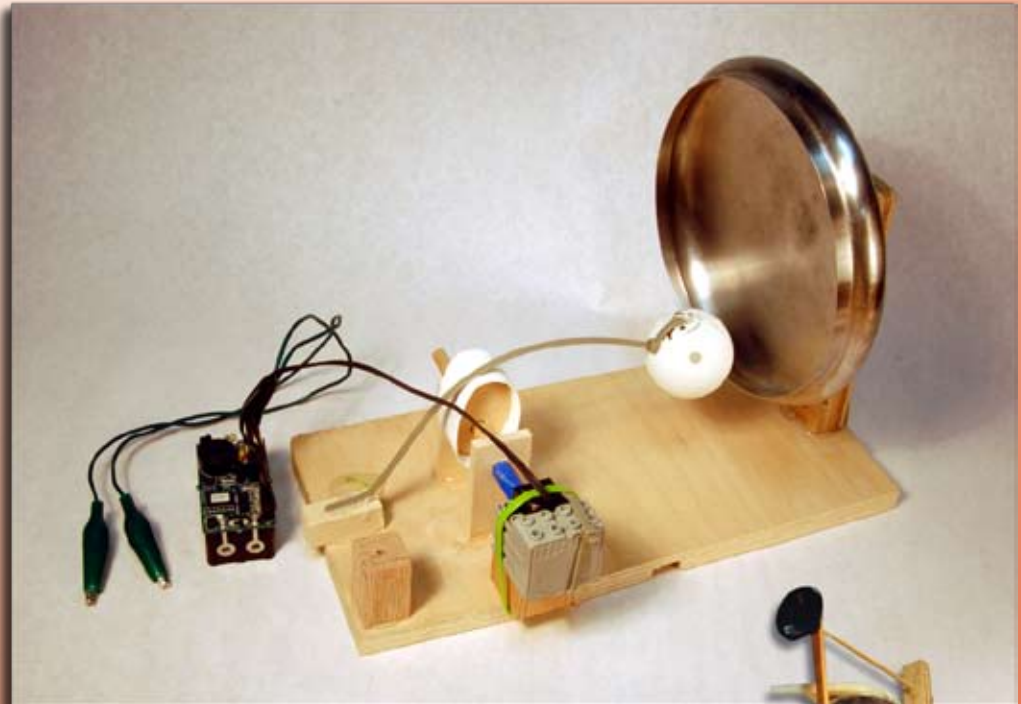
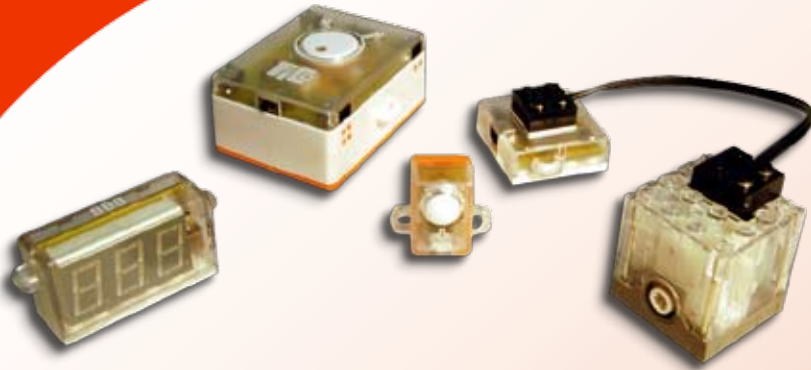The Sound Automata activity was inspired by

Cabaret Mechanical Theatre

PIE Institute shares a playful and inventive approach to teaching science, art, and technology.

PicoCricket, light sensor, motor and motor controller, display and a touch switch. (www.picocricket.com)

LEGO axles and axle extenders
hand saw or electric scroll saw
hand drill or drill press
and drill bits
Scissors, wire cutters, flashlight
hot melt glue gun and glue

Wood scraps: 20cm x 20cm (8"x8") for bases and other scrap wood for structural support

Connectors: string, masking tape, duct tape, cable ties, aluminum wire

Noise-making things: pots, pans, silverware, wooden spoons, toys, beans, misc. containers, etc.
Paper and pencils
LEGO gears and blocks for a geared down motor mechanism

MAKE A NOISE

Experiment with the noise-making things (tapping, scraping, shaking, etc.) until you find a sound that you like.

Try to discover as many sounds as possible from each object.

Once you find a sound that you like, pay attention to what your hands are doing in order to make that sound. Imagine how you might make a motor driven machine to make the sound instead of your hands.
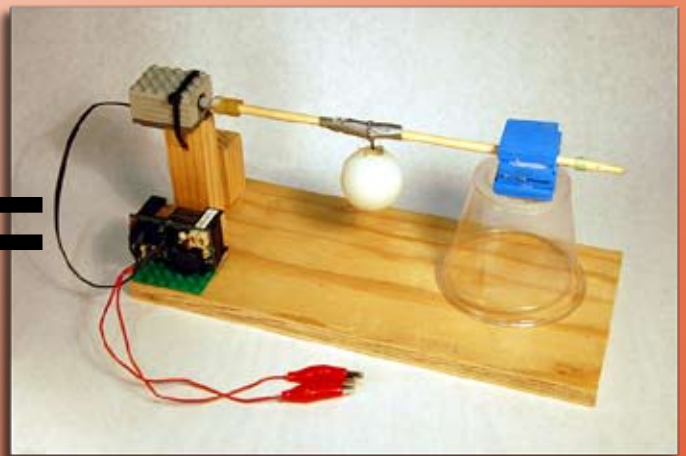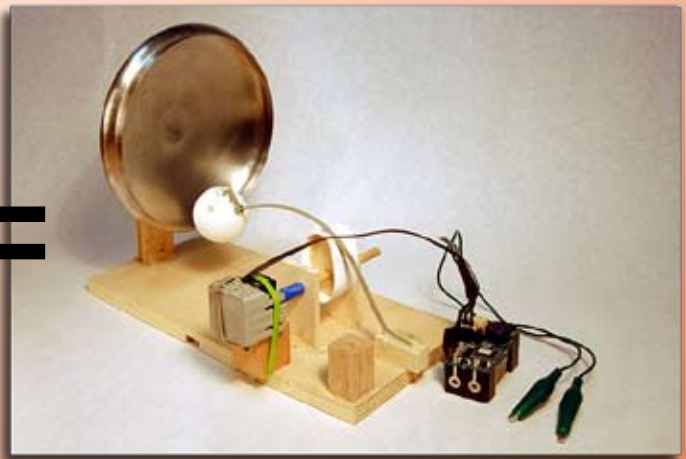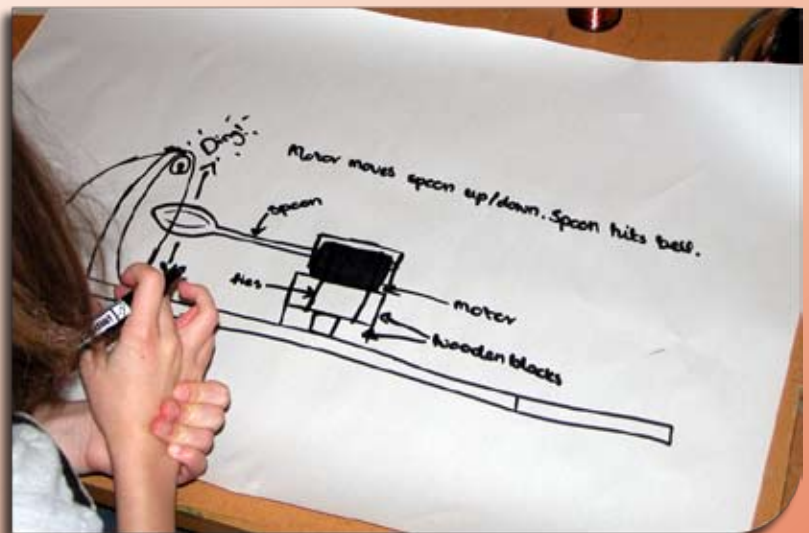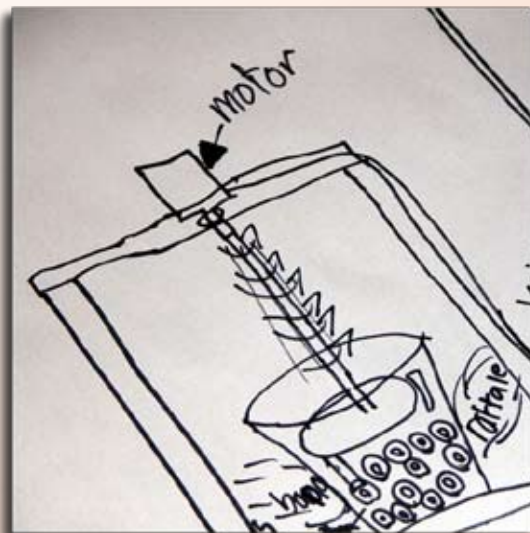
Tip: Pay close attention to the motion, rhythm, direction, and force of your hands.

Tip: Look at examples to get ideas for motion. You can find a few mechanical ideas in the Cardboard Automata PDF.
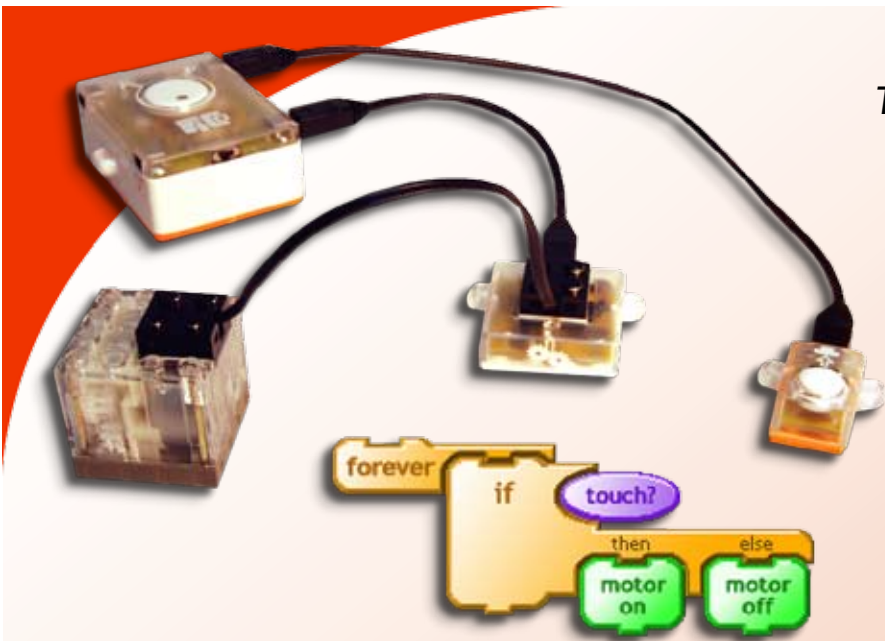Download it here

Tip: Sometimes it is helpful to make a drawing once you have an idea of what you might build.
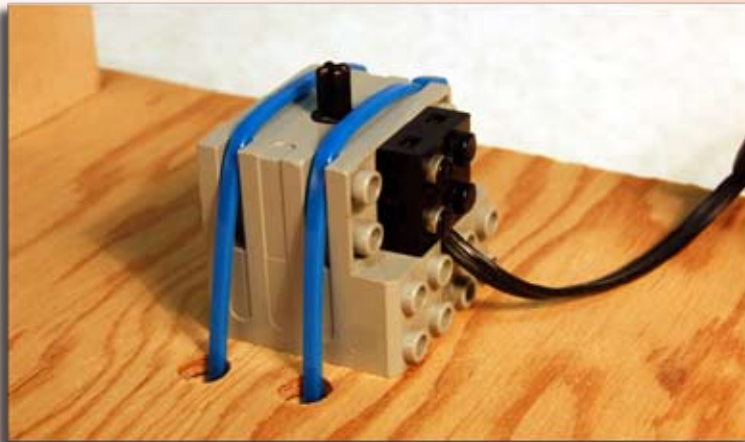
MAKE YOUR MACHINE

Build your sound automata through trial and error.

Tip: Attach a Pico touch switch and a LEGO motor to a PicoCricket. Program the cricket so the motor will turn on when the switch is depressed, and turn off when it is released. You can use this to test your contraption as you build.

forever
if touch?
then motor on else motor off

Tip: There are several ways of attaching your LEGO motor to your sound automata.

Tip: Skewer sticks fit nicely into the motor opening.
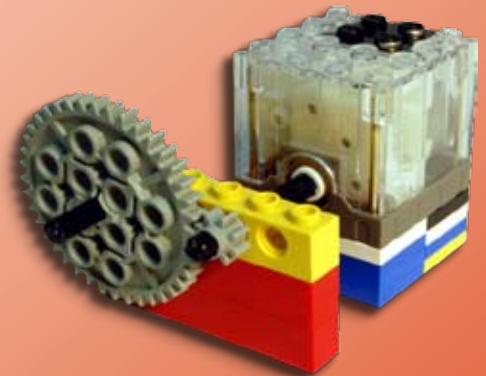
Tip: You might "gear down" your motor to slow it down and make it stronger.

Tip: For secure connections, we like to glue the axle connector or LEGO axles to our cams and attach the motors with less permanent things like zip ties.

Tip: You might program your PicoCricket to change direction while the motor is running.

ADD A NEW INPUT

Replace the Pico touch switch with a Pico light sensor - attach it to your sound automata.

PROGRAM THE PICOCRICKET IN TWO STEPS

First, connect a display and darken the room to find the light sensor reading when the flashlight shines on the sensor.

Second, program your PicoCricket to activate the motor on your sound automata when the light sensor is being lit by the flashlight, and off when it is not (or vice versa).
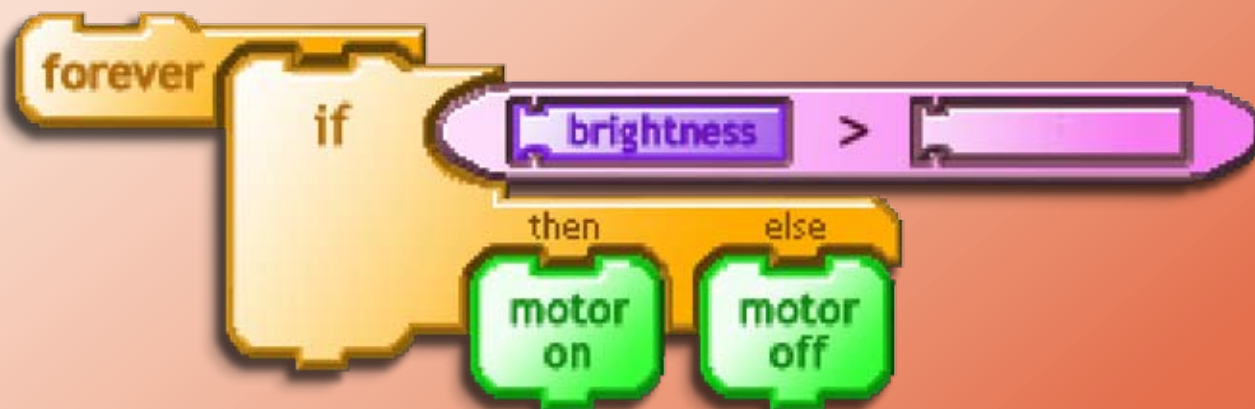
TRY IT OUT! SEE HOW YOUR NEW SOUND AUTOMATA RESPONDS TO LIGHT

TAKING IT FURTHER

Make a scratch film to project onto your sound automata. This will create a playful and inventive mechanical soundtrack to your scratch film.

For more on
Sound Automata
visit the PIE website

WHY IS THIS A PLAYFUL AND INVENTIVE EXPLORATION?
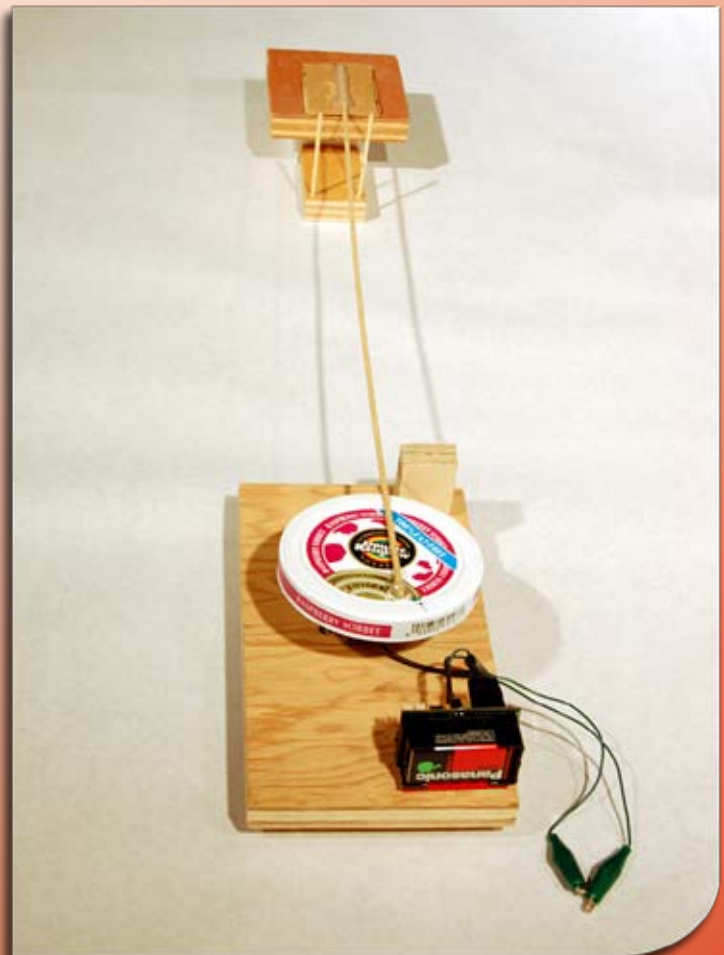
Turning an idea into reality

This activity is a good way to practice building real contraptions from ideas.
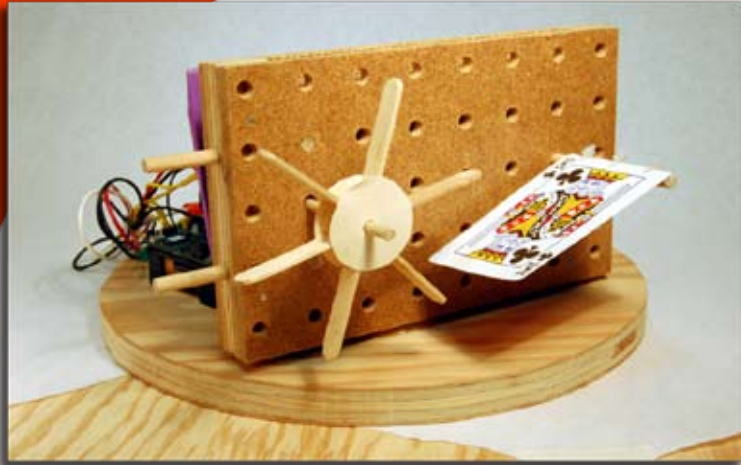
Somewhat challenging

Building sound automata is not easy. While the activity is challenging in many ways, participants will be able to complete a project that expresses their ideas.

**Digital technology
is a tool, not the focus**

Making a contraption that produces a sound is the main focus of the activity. The PicoCricket is just another tool or material for exploration.

Diverse solutions to a shared theme

When this activity is done as a part of a workshop there are several different solutions for the design of the sound automata.

Collaborative opportunities

Sharing everyone's sound automata at the end of the activity, especially when done in a group, or as part of a scratch film activity, is a good way for each individual to contribute to a collaborative performance.

RELATED IDEAS

Arcade shooting galleries use light sensors as triggers for their targets.

Try This: Sneak a flash picture of a shooting gallery the next time you are near one, all of the targets may be triggered at once!

The Musée de Mécanique at Pier 45 in San Francisco has a number of antique music-making devices on display.
www.museemecanique.org