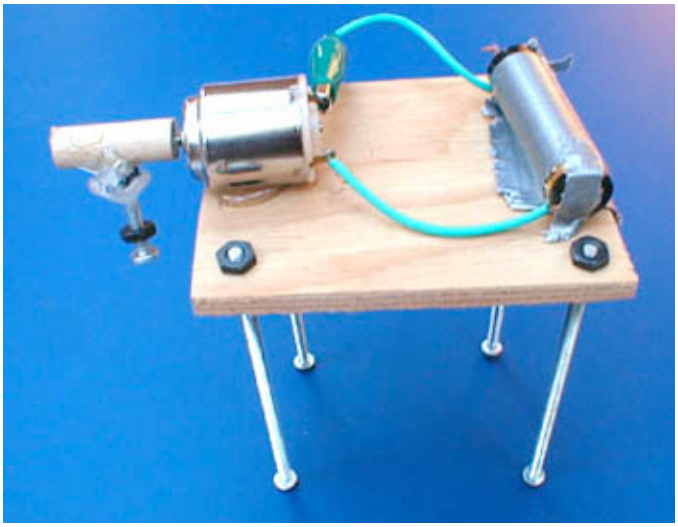
Skippy: An Eccentrically Vibrating Creature

The activity upon which this write-up is based was developed by Modesto Tamez, of the Exploratorium Teacher Institute. One version of Skippy is shown immediately below, and another on the following page. Both versions are the same in concept, but are built from different simple materials.

To operate Skippy, just stand it on its legs and connect the wires so that that the motor starts. The dowel with its eccentric attachment spins, the whole creature vibrates, and when you let go it will start "walking."



Notice that the version pictured on this page uses a plywood body, machine screws for legs, duct tape to hold the battery in place and hold the wires against battery terminals, and hot glue to fasten the tunable machine screw eccentric to the wooden dowel on the motor shaft. The version pictured on page 2 uses a foam core body, coat hanger wire for legs, hot glue to hold the battery and coat hanger wire legs in place, a rubber band to hold the wires against the battery terminals, and has the tunable eccentric screwed into a hole in the dowel (actually providing a second way to tune the eccentric).

The only materials common to both versions are the motor, the AA battery, and the assembly for the eccentric (wood dowel, machine screw and nut), and even the eccentric assembly could easily be redesigned with other materials. One of the significant features of Skippy is that it encourages creative design.

One of the beauties of this activity is that by changing different parts of the creature you can change the way it moves. For example, try shortening the legs on one side to get it to walk in a circle, like a dog chasing its tail. (On the machine screw version, you can do this by screwing two of the machine screws further into the board; on the coat hanger version, you can cut the legs shorter, or try bending them.) There are many other ways to modify the creature. Try “thinking outside the lines” to create the most interesting creature.

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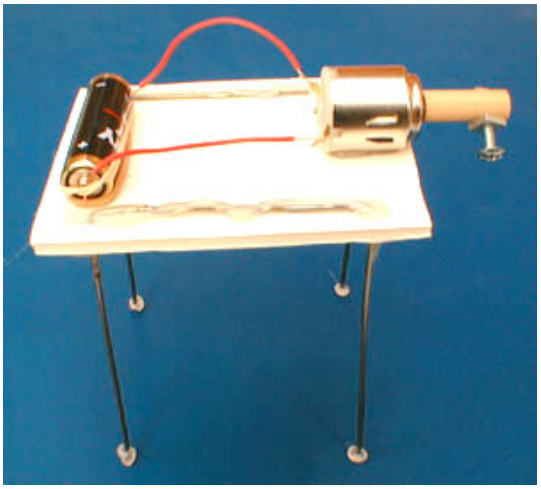

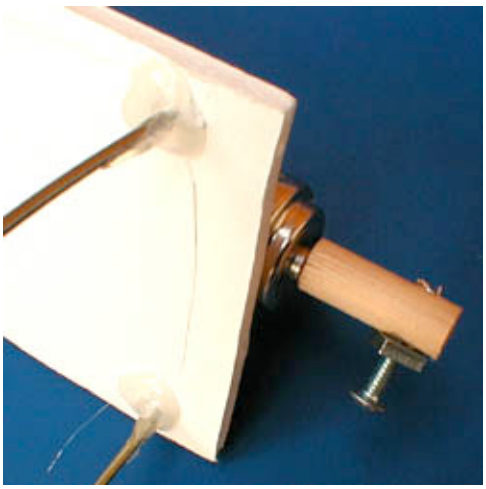

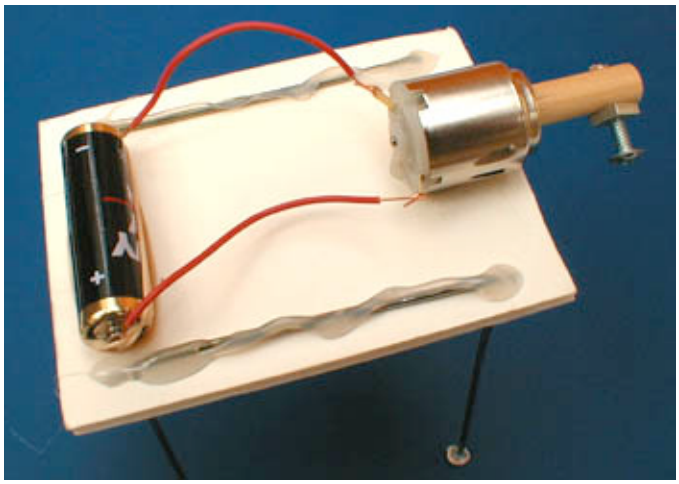

Here are some examples of further questions, investigations, and design challenges:

- devise and include a simple but convenient on-off switch for the battery/motor circuit that does not require an alligator clip (possibly consider using a paper clip in some way)
- design a creature with only one leg; what patterns of movement will it be capable of?
- design a creature with two legs; what patterns of movement will it be capable of?
- investigate performance in general (and resonance effects in particular) involving motor speed, length of legs, body mass, tuning of the eccentric, etc.
- does reversing the direction of spin of the motor affect performance?
- think of other materials that might be used, e.g. more flexible wire for the legs
- make the creature go in a straight line; hold races
- make the creature go in a circle or stand still
- bring some art into the picture by decorating the creature creatively
- Skippy has been said to resemble a bug; look up the definition of bug in several sources; does Skippy qualify as a bug? why or why not?
- Skippy has also been said to resemble a robot; look up the definition of robot in several sources; does Skippy qualify as a robot? why or why not?

Have fun, and good luck!

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