Neighborhood Models

TCIPG
TRUSTWORTHY CYBER INFRASTRUCTURE FOR THE POWER GRID

Investigate electrical systems using a model of a neighborhood! Using a variety of power sources, LEDs, and copper tape—light up your neighborhood!
How many LEDs can you light in your neighborhood? Can you make a larger power grid by joining your model with a partner's model?

MATERIALS

1 coin batteries (CR2032)

1 solar panel

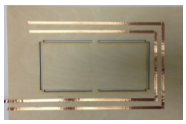
4 Buildings and Base

LEDs (various colors)

Copper Tape

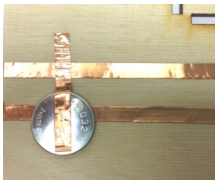
Scissors

Getting Started: Add copper tape to the base of your model such that it forms what looks like a two-lane road around three sides



How to Put a Coin Cell Battery in the Circuit

To put a battery into a circuit, both sides of the battery need to be a part of the conducting path. To do this, follow these steps:



- Place the battery on one side of the "two-lane" road so that it does not touch the other side.
- Cut at strip of copper tape approximately two inches in length and fold one end under itself, covering up the adhesive for about a half inch. This is your *battery switch*.
- Press the sticky side of your battery switch to the second side of the two-lane road.
- Press the non-sticky side of your switch to the top of the battery.

Now your battery is touching both sides of the road. One side is the *positive trace* and one side is the *negative trace.* You can use a binder clip or a piece of transparent tape to keep the switch closed if you do not wish to hold it down.

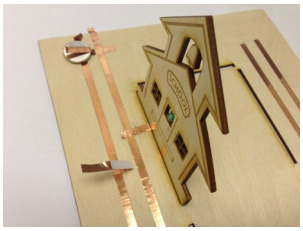
Using the Copper Tape

When tracing the circuit templates with tape, or creating your own circuit, be sure that the tape overlaps at each corner. Press the pieces firmly with your fingernail to ensure the best connection.

Taping A House

Add two pieces of copper tape vertically to the back of the building. Ensure that the tape is long enough to wrap under the front of the house to make a connection to the tape on the base. Using more copper tape, secure an LED such that each lead is touching one of the strips of tape.

How to Put a House in the Circuit



Use copper tape to connect your buildings to the circuit on the base. To do this, add a strip of tape from both the negative and positive traces on the base to the building slots. Each piece of tape should be long enough to tuck into the slot to ensure a good connection with the building. Whenever one piece of tape must cross another, keep the nonconductive backing on so that you do not create a *short circuit*.

TROUBLESHOOTING

LEDs blink or don't stay lit

This is a connection issue! Be sure that the tape on your buildings is touching the tape on the base. Firmly press down any corners where two pieces of tape meet. Double check that your battery is secured and that any switches in the circuit are closed. Add some transparent tape to your battery or to a switch to help keep it secure.

LEDs won't light

The most likely cause is that the LED is in the circuit in the wrong direction. Try reversing the direction of the LED in the circuit. If this still doesn't work, check the connections as described in the paragraph above.