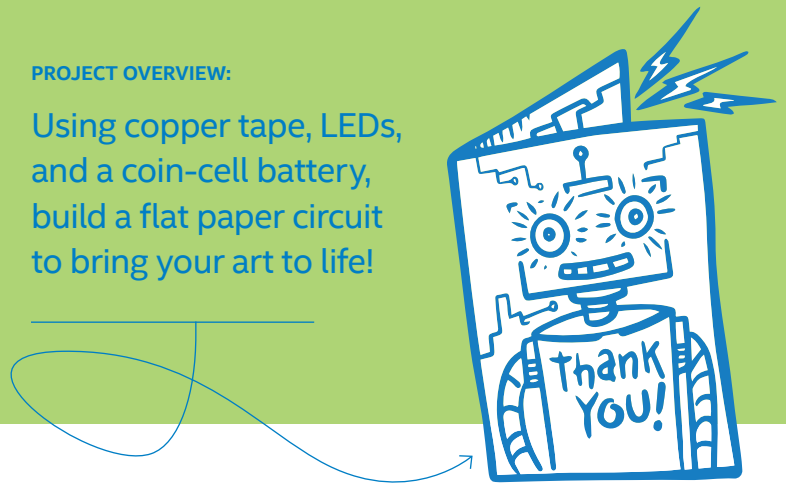
Paper Circuits Project Guide

intel FUTURE SKILLS

PROJECT OVERVIEW:

Using copper tape, LEDs, and a coin-cell battery, build a flat paper circuit to bring your art to life!



Project Intro Video: Paper Circuits

Inspirational Video: Interactive Light Painting

PROJECT CATEGORY:
Skill-Up

DIFFICULTY LEVEL:
Beginner

TIME RANGE:
45 - 180 minutes

ESSENTIAL SKILLS/ MINDSETS THAT YOU MAY LEARN:
Design Thinking
Circuitry
Soldering
Business Acumen
Collaboration
Communication
Resiliency
Failure Leading to Success

TOOLS AND MATERIALS:
- One paper circuit kit:
  - LEDs in various colors (or use sticker LEDs)
  - 3.3V coin-cell battery (CR2032 are typical
  - one roll of 1/8 inch (3mm) copper tape or conductive nylon tape
  - one roll of clear tape
  - one metal binder clip
- Paper in assorted colors and weights
- Colorful markers, crayons, felt pens or pencils, etc.
- Assorted papers: blank, colored, graph
- Scissors
- Stapler

AT HOME SUBSTITUTIONS:
- If you don't have copper tape, you can use tinfoil and glue, or thin wire scavenged from old DC electronics.

MATERIAL PURCHASE LINK:
http://tiny.cc/Intelbuylist

Project Steps

Dream it!

Your mission is to create interactive art. It could even be functional in some way. Think Christmas or birthday cards, table decorations, wall hangings, or mobiles—you name it! Be as creative as your mind and team allow.

1 Watch the Introduction and Inspire To Videos [:05]

2 Pick a theme for your project. [:05]

What will your theme be and how will you light it up? Will it be a light-up card, a kids book with back-lit stars, or some other flat light-up object?

Draw It!

3 Sketch your paper circuit ideas. [:05]

4 Dig deeper into paper circuitry and learn expert tips. [:10]

Build It!

5 Gather the tools and ingredients you'll need to create your paper circuit. [:05]

6 Design and build a fun, blinky creation. [:15]

7 Test, troubleshoot, and iterate. [:15]

Share It!

8 Light up somebody's day by sharing your new paper circuit artwork. [:10]

9 Clean up, share, and reflect on the exercise. [:05]

Expand it!

Here are some ideas for taking this activity to the next level:

- Add soldering to your copper circuits by soldering right on top of the copper tape.
- Can you incorporate microcontrollers into your paper designs?
- What if you want to make your project responsive to motion, sound, or light?

Write down what you'd like to do next. What ideas do you have to use paper circuits in other projects that you could make in the future. Think big, draw a sketch, or jot down some notes.

THINK ABOUT IT:

- Will your design use any switches? If so, what type of circuit will you use?
- Will your LEDs be wired in parallel or in series?
- How many LEDs will you use?
- Will you need more than one battery to power the LEDs?

Paper circuit greeting cards make for great gifts. Decorations, art pieces, and sculptures look fantastic displayed in your classroom, office, or home for everyone to see.

DASH OF DESIGN:
Watch this video to learn more about Intel's Design Thinking process:

STILL NEED SOME MORE HELP WITH CIRCUITS?

Take a look at this helpful video for some real practical ideas on making your circuits shine!
https://goo.gl/pWDqEh

PRO-TIPS:

If your project isn't working well, use the pro-tips, troubleshooting and the following questions to help you get unstuck.

- Are all the connections solid?
- Are all the LEDs oriented with the positive side connected to the positive terminal of the battery?
- Can the circuit be temporarily simplified to test just one portion at a time?
- Fail fast! Learn from your failures and try try again until it is just the way you like it! This is called, "iteration" and is super helpful so try to fail more.

HELPFUL RESOURCES:

- Strategies for working with copper tape in your circuits: **youtube.com/watch?v=nKMhuQ2hq9E**
- Explanation of series and parallel circuits, including the math that explains what happens in each design: **youtube.com/watch?v=8lMO7VAyEkY**
- Detailed tutorials explaining electronic circuit design: **learn.sparkfun.com/tutorials/series-and-parallel-circuits/all**

NEED MORE HELP AND INFORMATION?

Contact us at: **intelfutureskills@intel.com**