

Paper Engineering Project Guide

PROJECT OVERVIEW:

Make a pop-up paper creation while learning about paper mechanics, design, and engineering.



Project Intro Video:
Paper Engineering



Inspirational Video:
Mind Blowing Pop-ups



PROJECT CATEGORY:

Skill-Up

DIFFICULTY LEVEL:

Intermediate

TIME RANGE:

45 - 90 minutes

ESSENTIAL SKILLS/ MINDSETS THAT YOU MAY LEARN:

Design Thinking

Iteration

Prototyping

Simple Machines

Collaboration

Embracing Your

Mistakes

TOOLS AND MATERIALS:

- Paper (various colors)
- Construction (or thicker style) paper
- Quick dry glue such as stick glue or rubber cement
- Scissor
- Ruler or straight edge
- Clear tape
- Pencils, pens, or makers

AT HOME SUBSTITUTIONS:

- If you don't have a quick dry glue you can use a very thin layer of white glue but it will take longer to do each step as you'll need to let it dry first. Another option is to use tape to hold down your pop-up features, just make sure you tape as close to the crease as possible to help you pop-up features work well.

MATERIAL PURCHASE LINK:

<http://tiny.cc/Intelbuylist>

Project Steps

Dream it!

Did you know that you can learn about mechanics and engineering by designing a pop-up card? Indeed you can! Pop-up cards aren't just for kids, they take some serious design and engineering skills to create. So, start to dream, to iterate, to test, to make a creation that really, well - pops!

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Watch the Project Intro and Inspire-To videos to learn about the project as well as learn some basic pop-up folding techniques. [02]

Draw it!

- 2 Sketch out some ideas of what you might like to create. Use the “Think About It” section to help you pick a theme, art direction, or functional design. [05]

Build it!

- 3 Gather your supplies and start to build your first experimental pop-up card prototypes. [15]
- 4 Try at least 3 different types of pop-up mechanics using different folds. See the pro-tip section for links to videos, and then start on your final design. [05]
- 5 Continue to test, build, and iterate to make your paper engineered card or contraption the best that it can be. [20]
- 6 Once you get the function working well, add in a theme, (colors, design, etc.) to make your final book or card, literally and figuratively, pop. [15]

Share It!

- 7 Show off your pop-up and paper mechanics creation to a friend, group, or family member to get feedback. [05]
- 8 Clean up and keep thinking of new ideas. How could you use paper engineering and pop-up book mechanics in a future project? [05]

Expand It!

Like paper engineering? Then you might like Automata as well. Watch the videos below and you will be well on your way to becoming a paper engineering master.

- Great video on what automata is and what can be created: <https://youtu.be/9OqEze9JTU0>
- Automata with everyday objects: <https://youtu.be/l2Aa10PafyU>
- Or, look up your own “how to make cardboard Automata” videos if you need more help.

THINK ABOUT IT:

What type of engineered paper pop-up would you like to build?

- Do you want to concentrate on the form (design, artistic side) or on the functional aspect of your design?
- Do you want to experiment first and then add the artistic side later?
- Maybe try a few styles of pop-up cards and then create your final masterpiece.
- Whatever you do, learn from your mistakes so that your iterative versions will keep getting better and better.

PRO-TIPS:

Pop-up cards work by being perfectly aligned in a way that allows forces to be transferred. Use these tips and video links to get you going fast:

- Make your creases tight and straight.
- Glue your tabs right up to the edge, this will give you the most leverage for your pop-up creation.
- If you learn best from a video, take a look at this master video series from Duncan Birmingham (the author of Pop-up Design and Paper Mechanics). You'll be a master in no time!
- Pop-up How To Playlist: <http://tiny.cc/popuphowto>



DASH OF DESIGN:

Design thinking is a system that helps to solve problems using iteration and prototyping. Watch our video to learn how you can use design thinking as you start to build your new paper engineering and pop-up creation.



HELPFUL RESOURCES:

- Duncan Birmingham's book, *Pop-Up Design & Paper Mechanics: 18 Shapes to Make* is a great resource to help get you going fast.
- Also, Duncan's video series has 65+ pop-up book video tutorials for free! (see link in Pro-tips section).

NEED MORE HELP AND INFORMATION?

Contact us at: intelfutureskills@intel.com