Toy Hacking Project Guide

intel FUTURE SKILLS

PROJECT OVERVIEW:

Create a new toy by taking apart a battery operated one, examining it, and then recombining its parts to make something completely new.

Project Intro Video:
Toy Hacking

Inspirational Video:
Inside of a Toy Remix

PROJECT CATEGORY:
Skill-Up

DIFFICULTY LEVEL:
Intermediate

TIME RANGE:
60 - 90 minutes

ESSENTIAL SKILLS/ MINDSETS THAT YOU MAY LEARN:
Design Thinking
Electricity/Electronics
Circuits
Simple Machines
Systems and Complexities
Mechanical interaction
Troubleshooting
Prototyping
Collaboration

TOOLS AND MATERIALS:
- Old battery-operated toys (and batteries)
- Craft materials: straws, fabric, paper, stick glue etc.
- Screwdrivers, plyers, and scissors
- Wire cutter/strippers
- Needle and thread
- Safety glasses

AT HOME SUBSTITUTIONS:
- For this project, you'll need some broken DC toys. With permission, get some old or nonworking toys from your cousins, nieces, nephews, kids, or Comic-Con-loving friends. If you strike out there, you'll likely find a load of toys at a local thrift store.

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

Project Steps

Safety First!

Make sure all toys are battery-operated so that they are relatively safe. In addition, make sure to use the same types of batteries throughout so that you don't give your toy too much juice and burn it out (i.e., if you used two AA batteries initially, keep using two AA batteries).

- Never work on an electronic device that is plugged in or has batteries in it.
- Wear safety glasses.
- Never cut or pry toward yourself.
- Use the proper tools (screwdrivers rather than plyers for screws, etc.).
- Read the following capacitor safety guide: **www.wikihow.com/Discharge-a-Capacitor**

DASH OF DESIGN:
Use design thinking to get your creative juices flowing! Watch our video to learn how you can use design thinking to make a better end product.

Dream it!

What is more fun than playing with toys? Taking them apart, of course! And even better than that? Redesigning them and putting them back together to make a new toy that is uniquely yours.

Can you make the head spin? What happens if you add a gear, or take one away? How can you combine parts to make your toy better or weirder? Time to get going so that you can hack your toy into an amazing and fun creation.

1 Find one or two battery-operated toys to take apart. [:02]

SEE SAFETY FIRST BOX BEFORE PROCEEDING

2 Using appropriate tools, take apart your toy. Simplify the object to its most basic parts. [:10]

Draw it!

3 Think about how you can recombine/remix the toy parts to create something entirely new. [:03]

4 Sketch what you plan to build. Label the parts and list ideas for how you will connect your parts to move in different ways. [:05]

Build it!

5 Gather your supplies and start to build your remixed toy creation. [:15]

6 Test, troubleshoot, and iterate as you reassemble your toy masterpiece. [:10]

7 Add batteries to your newly hacked toy and see how it works. Tweak, fix, and add components until it works to your liking. [:05]

Share it!

8 Show off your toy hack to others by posting pictures, videos, or showing it off to your family and friends. [:05]

9 Clean up your area, put away tools, and save extra gears or toy parts that you may want to use in future projects. [:05]

Expand it!

Write down what you learned and what you would do differently for your next iteration. If you plan to continue, use our list of suggestions to take your toy hack learning to the next level.

- Up your game by taking apart even more toys and adding to your creation.
- Try to add in a microcontroller like the Micro:bit and start to program your toy.
- Interested in making your toys sound different? Then try some, "circuit bending".
- Children's musical toys have simple circuits in them that create sounds, noise, or musical tones. You can take these circuits and "bend" them to create new interesting, and often eerie sounds.
- Give it a shot and in the process of bending you'll gain even more knowledge and understanding of electronic circuits.

TROUBLESHOOTING TIPS:

Troubleshooting starts with understanding how your device is supposed to work. The best way to do this is by examining your object to discover its parts, purposes, and complexities. Look at each of your parts and think about how they should work together.

Answer the following questions or use the downloadable .pdf to dig even deeper: What are the object's parts? What are its purposes? What are its complexities?

Downloadable PDF: *Parts, Purposes, and Complexities* from Harvard's Project Zero: **http://www.agencybydesign.org/wp-content/uploads/2014/10/AbD_PPC.pdf**

THINK ABOUT IT:

- What materials do you have and what can they do?
- What additional materials can you use to make the toy function differently?
- How will you connect the parts together? Hot glue? Soldering? Etc.?

NEED MORE HELP AND INFORMATION?
Contact us at: **intelfutureskills@ intel.com**

HELPFUL RESOURCES:

- Toy Take Apart by the Exploratorium: **https://www.exploratorium.edu/sites/default/ files/tinkering/files/Instructions/toy_take_apart_0.pdf**
- More creepy toy creature creations by Amanda Ward: **https://vimeo.com/19274402**
- Circuit Bending 101 video: **https://youtu.be/ovh-yCAJUYs**