MAKEngineering Kit Instructions:

Toy Hack (Give Toys a New Life)

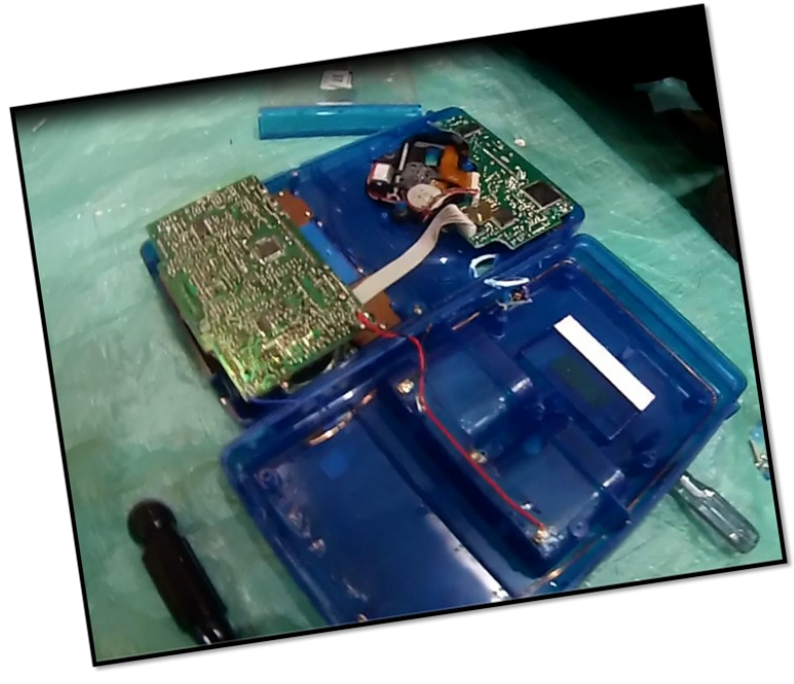
ENGINEERING TASK

You have been asked by a toy refurbish shop to brainstorm ways to give old toys a second life using electronic parts. Make a prototype that renovates, redesigns, and/or remixes an old toy. The prototype should change the look and feel of the toy, or the toy's role in our life, using new materials.

WHICH OF THESE TOYS ARE YOU FAMILIAR WITH?

MATERIALS IN KIT

- 2 AA batteries
- 1 battery holder
- 5 LED lights
- 1 motor
- 1 buzzer
- 2 wires (~12 inches)
- Tape
- ~10 Velcro dots
- Scissors
- Hot glue gun & sticks
- Phillips head screwdriver
- Assorted craft materials



PROTOTYPE

Prototype is a term we will use often, so what does it mean? One way to think of a prototype is a rough draft on a paper. Here are two videos that explain a prototype in engineering.

https://youtu.be/_1bOaNSy5XY
https://youtu.be/k_9Q-KDSb9o

STEP 1—RESEARCH

How have others hacked and repurposed toys? Let's watch a video to find out.

https://youtu.be/FP6R_YW2VPk

Engineers take notes to use in their design thinking. You can organize your notes into two columns.

I NOTICED…	I WONDER ABOUT...

STEP 2—PLAN

Let's start with one toy. This can be the toy we provided or an old toy you no longer play with.

Explore the toy using your four senses (vision, smell, touch, hearing). What can you do to change the look, feel, smell, or sound of the toy?

We have questions on the next page for you to discuss and brainstorm together as a family. Keep taking notes!!!! And feel free to ask someone else to take notes for you.

STEP 2—PLAN

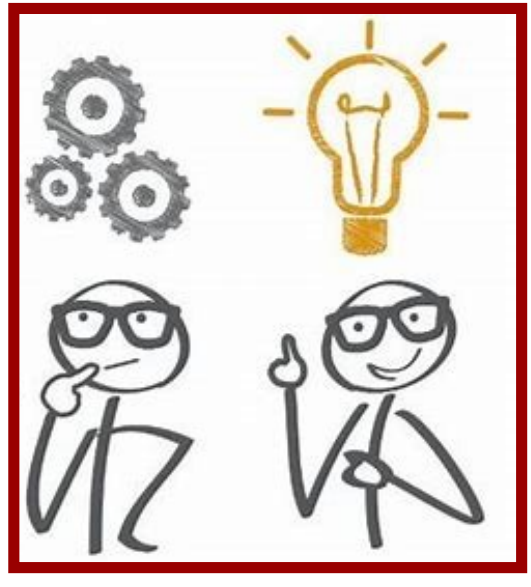
1. What does the toy do? What role does it play in your life? What can you do to give it a new role?
2. Who is this toy designed for? What can you do to make it useful for other people?
3. What context does the toy belong? What can you do to make the toy appropriate for another context? For example, think about a setting for a dinosaur. How might your hack the dinosaur to be something used in the bathroom? (Psst. A toothbrush holder.)
4. Can you take apart or disassemble the toy (with the permission of your caregiver)? How might this be done?

STEP 2—PLAN

Hum? How will you give the old toy a second life using electronic parts? How might you use the LED lights, the motor, or the buzzer (beyond making your family crazy)? Let’s explore! Place the AA batteries in the battery pack. How does the motor need to be connected to work? What about the buzzer? And the LED lights?

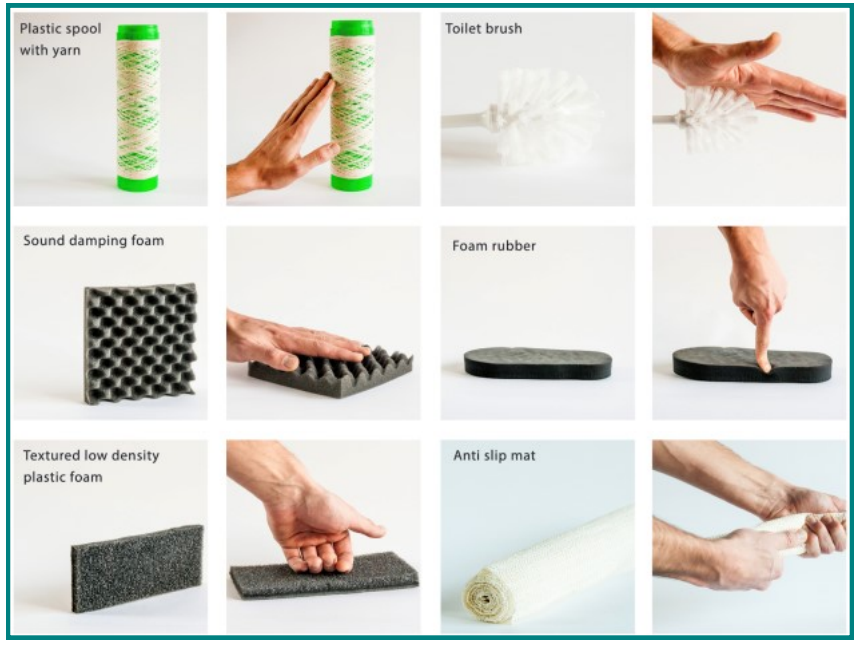
STEP 2—PLAN

One more thing...take some time to think about and discuss ALL your notes, explorations, and ideas. Write down and/or draw out your final plan for how you will give the toy a new life. What materials will you use? You can use materials in the kit or in your home.



DID YOU KNOW…?

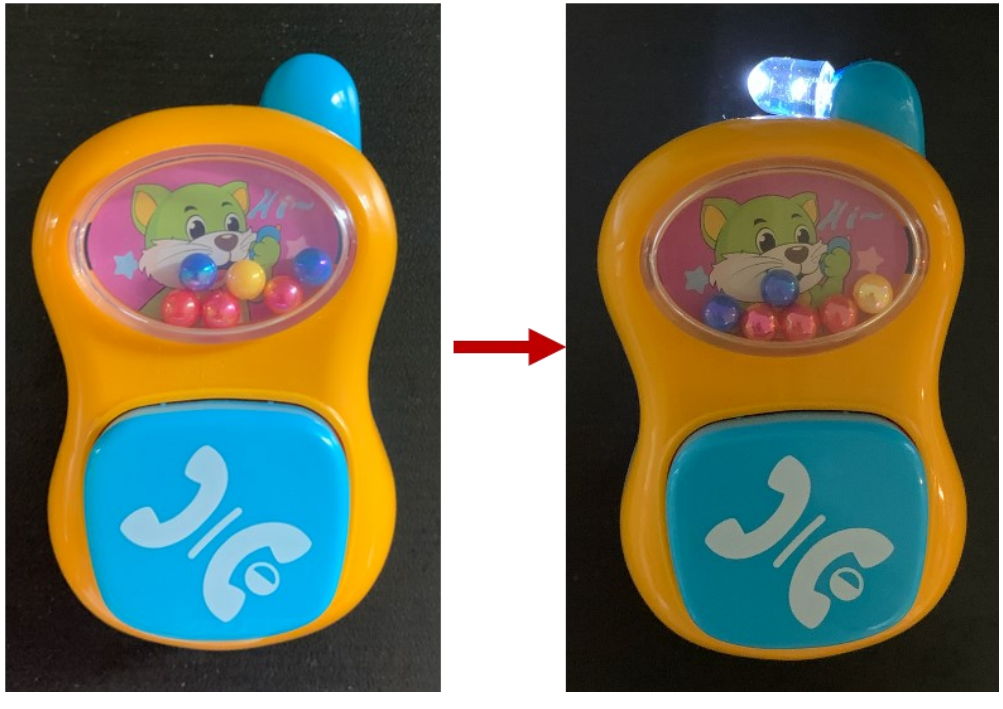
People who design products explore many materials to get insights into its possible use— its properties, how it can be manipulated (e.g., twisted), and how it feels.



Karana, Giaccardi, Stamhuis, & Goossensen (2016)

STEP 3—CREATE

It is time to refurbish the toy—give it a new and different use for others to enjoy.



The transformation of a baby toy to a lantern.

STEP 3—TEST

Interview 2-3 people about your new toy.

1. How might you use this toy? What do you think the toy does?
2. Where and when would we use it?
3. What kind of emotion does this toy spark? Why?

STEP 4—IMPROVE

- What were other people's reactions towards your new toy?
- Were their responses in agreement with your design intentions? Why or why not?
- What changes can you make to the new toy based on what you learned from the interviews?

Continue to re-create and re-mix the new toy based on the feedback.

DID YOU KNOW…?

You just acted like as a product engineer. Product designers and engineers use usability testing to collect data and determine the participant's satisfaction with the product. Did you not put your product in front of potential users, walk them through your product, and collect feedback from them to improve your product? The shop keeper thinks so!!!

https://youtu.be/BrVnBdW6_rE

STEP 6—PARALLEL PROTOTYPING

Given the same toy, are there any other ways you can build a prototype?

What are other electronic parts that could be added to your toy?

Can you prototype this toy to spark a different emotion in others?

What about a different toy? Is there another toy you would want to give a new life?

WHAT TYPE OF ENGINEER ARE YOU?

Add a sticker to your Engineering Passport that identifies the type of engineer you were most like in bringing new life to an old toy. Don't forget to write why you chose the type of engineer.

This engineering kit would not have been possible without funding and support from the National Science Foundation.