The Tech Interactive at Home

Who says all the fun has to happen at The Tech Interactive? This DIY engineering activity can be done with inexpensive supplies and things you find around your home!

Introduction

Have you heard the joke, "Why did the chicken cross the road?" The funny and obvious answer is, "to get to the other side!" But in real life, this is an important question that wildlife conservationists ask. Animals cross busy roads to find food, have babies, and find new safe places to live. If animals can't cross roads, dams and other human structures as they move about, their survival can be threatened, they can get isolated and die out.

What can you do to solve this problem? Like conservationists and engineers, you can design and test a wildlife crossing for your favorite animal. Wildlife crossings help animals to cross human barriers and do the things they need to do to survive. Underpass tunnels, green bridges, amphibian tunnels and fish ladders are examples of crossings designed to meet the needs of specific animals. Use your creativity and imagination to help your favorite animal cross safely.

Design Challenge

Build a structure (bridge, tunnel, etc.) to get an animal safely across a road.
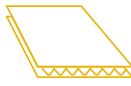
Subject:
Biodiversity

Age:
6+

Time:
20+ minutes

Key Concepts:
Biodiversity, design challenges, problem-solving, iteration

Materials

Find a couple items from each category. Don't limit yourself to the items on this list. Use whatever you have on hand — be creative!

Structural Items	Connectors	Other
Small: • Balsa wood • Cardboard • Printer paper • Construction paper Large: • Towels • Pillows • Blankets • Boxes • Extra chairs	• Hair bands • Paper fasteners • Rubber bands • String • Twist ties • Masking tape	• Wildlife Cards • (*Optional*) Paper and something to draw with Variety of testing materials: • Water bottle • Book • A toy animal • (*Optional*) Arduino Science Journal App

STEM Storytime

Before you build, read *Faraway Fox* by Jolene Thompson. In this picture book, a young fox wanders the suburbs, looking for a way back to the forest and his family.

Instructions

Define the Problem

1. Review the Wildlife Cards and choose an animal to design a wildlife crossing for.
2. Read the animal's fun facts and think about what the animal would need to cross a road.
   - Does it travel in a group or alone?
   - Does it travel at night or during the day? Does it prefer light or dark areas?
   - Does the animal need to hide from a predator?
   - What else does your animal need during the crossing?
3. Pick a type of crossing to experiment with.
   - Check out the images below of some different crossings for ideas.

Bridge **Tunnel** **Undercrossing** **Fish Ladder** **Green Roof**

Design and Create

1. Build your wildlife crossing using simple materials from around your home.
2. Use the materials list for inspiration.
   - *For example:* You can make a small structure with cardboard and paper or build a large crossing using chairs and blankets.

Why should we help animals cross roads?

By helping animals travel safely, we make our environment healthy and strong by supporting biodiversity. A healthy environment provides us with important things we need like clean water, food, medicine, and jobs.

solve for EARTH

The Solve for Earth exhibition at The Tech Interactive explores how we can live in balance with our environment, including animals. As humanity continues to demand more than the Earth can provide, it is crucial to include the promise of technology to address environmental challenges.

Test and Reflect

1. What does the animal you are designing for need to feel and be safe? How can you test that you met those needs?
   - Maybe your animal is afraid of human noise, so they need a quiet crossing.
   - Perhaps instead they need to be able to hear friends or predators.
2. Check out the **Testing Methods** for some ideas of how to test your wildlife crossing.
   - Begin first with the Strength or Stability tests. Then, try out another test or invent your own.
3. Take notes as you test and reflect on what happened.
   - What did and didn't work?
   - How can you improve your design for your animal?
4. Use what you learned through your tests to iterate and redesign. See if you can make your crossing better for your animal.

Testing Methods

Strength	Stability
Will it stay up if you put something on top? How much more weight can it hold?	Will it stay up if you jump up and down nearby? What happens if you shake it?
Sound	**Light**
Is your crossing quiet or loud? How can you adjust it to fit your animal's needs?	Is your crossing light or dark? How can you adjust it to fit your animal's needs?

- **Reminder:** Don't test the crossing with your own body. Use an unbreakable object such as a water bottle, book or a toy animal.
- **Get some data:** Download Arduino Science Journal on your smartphone. Use the app's sensors to measure sound/light inside and outside your crossing as you iterate.

Explore More

- **Fancy Features:** What are some other features you might want to add? *For example*: Places to eat? Water to stay wet and cool?
- **Busy Crossing:** Choose a second animal card or your favorite animal. Design a new crossing for this animal. Or change your design to help both animals cross safely together. *For example*: How can bobcats and deer use the same crossing?
- **Super Size:** Build a different size for your animal crossing. If you built a full size model before, build a table-top version now. How will your testing change with this change in size?

In the Wild

Find out more about the animals that live in your area, whether you are in a city or out in the country!

The Tech Interactive's Backyard:
- Open Space Authority: Learn more about some of the animals in the San Francisco Bay area.
- Peninsula Open Space Trust (POST): Watch crossings in action and learn about the animals' behavior.
  - A coyote and badger cross together. Check out the skunk, racoons and deer too!
  - Five coyote pups play as they come through a tunnel.

Banff National Park: Take a look at one of the world's most famous wildlife crossings in Canada.
- A Wild Way to Move - Banff National Park
- Banff National Park - Survival on the Move

The Tech Interactive at Home

thetech.org/athome

Wildlife Cards

Choose one of these animals from California (or think of your own) and design a way for them to cross a road.

TULE ELK

FUN FACTS
Tule elk are only found in California and there are only about 5,000 left. They eat woody plants and grasses. They can weigh up to 700 pounds! They are afraid of humans.

ASK YOURSELF
- Can you make the design strong enough for a pack of Tule Elk to cross together?
- What does your crossing need to help them feel safe from humans?

TARANTULA

FUN FACTS
These furry looking spiders can grow to be about 5 inches long. They spend most of their time underground and are mainly active at night. They might look a little scary but they aren't dangerous to people. A female tarantula can live up to 30 years old!

ASK YOURSELF
- How can you make your crossing dark enough for the tarantula?
- How can you keep your crossing from shaking and scaring the spider?

BADGER

FUN FACTS
Badgers spend most of their time underground and are nocturnal (active at night). This makes them hard to find. They weigh about 10-20 pounds and tend to be solitary.

ASK YOURSELF
- Can you make your crossing dark enough for the badger?
- How can you make your crossing safe enough for the badger to cross alone?

BOBCAT

FUN FACTS
Bobcats are solitary animals and mostly nocturnal. Bobcats can live in a variety of different habitats. They are carnivorous and eat small animals like rabbits, mice, and birds. Bobcat tails can reach up to 6 inches in length.

ASK YOURSELF
- How can you keep your design stable when the bobcat jumps or pounces?
- How can you help the bobcat feel safe and isolated while crossing?

COYOTE

FUN FACTS
Coyotes are members of the canine family and resemble small German Shepherds. Unlike wolves, coyotes hunt individually or in pairs. Most of a coyote's diet is small mammals, but they will eat almost anything! You'll see coyotes usually at dawn or at dusk. You can hear a coyote's high pitched yipping upto 3 miles away.

ASK YOURSELF
- Does your crossing have the right amount of light for a coyote?
- Is your structure strong enough to hold two coyotes crossing together?

CALIFORNIA TIGER SALAMANDER

FUN FACTS
During dry months, the California tiger salamander lives underground in burrows. The salamander is endangered largely due to the loss and fragmentation of habitat from development and farming. Once a year, the salamanders travel up to a mile to find a pond to use for breeding.

ASK YOURSELF
- How would your crossing keep the salamander moist while traveling a long distance?
- Can you make a crossing that keeps the salamander safe from larger predators?