

# Maker Challenge!

## By designer-maker Claire Ward Thornton



### Calling all Little Inventors!

Take the Maker Challenge set by designer-maker Claire Ward Thornton and try four different activities along the way to get your creativity flowing and help you build up to designing an ingenious invention.

Claire's inspiration is often taken from history or nature. In her challenge pack, we'll be looking at movement through the transformative qualities of wild animals and how their impressive survival skills could inform invention ideas to improve or enhance our own lives.

### Claire's invention challenge



Invent something that transforms using movement

Give these four activities a go to help guide you through the challenge!

- 1. Get your thinking caps!** Can you think of animals in the wild able to modify or alter their body?
- 2. Be an invention detective!** Hunt out objects or appliances which use movement to improve or convert something in your home.
- 3. Time to crank it up and get making!** Build your own automata, that's a mechanism with moving parts which can operate rotation and up and down movement.
- 4. Lets get creative!** Materials in motion, what different materials can be applied to the rotation and up and down motion on your automata?

### INVENTION SHEET.

Create an invention that transforms using movement



Claire WT is a visual artist based in London who spends a lot of time making art with children in schools and families in public spaces through her organisation Art Hoppers.

Claire works across several visual art disciplines. She is a mural painter and loves making 3D models and sculptural forms. Materials that Claire uses ranges from willow, cardboard, paper, recycled plastic waste and even biscuit dough!

Here are some pictures of her work!



Willow structure of a moving parrot



Theatre made from a cardboard box inspired by Shakespeare.



Mural painting of a giant wolf



Automata made from recycled materials, inspired by Greek Mythology



Mask made from milk bottles inspired by a lion.

# Animal Transformations

Some animals have an incredible ability to change their appearance as a way to camouflage, trick prey or defend themselves. Others use hidden beauty and special moves to attract a mate or stand out.

Can you think of animals in the wild able to modify or alter their body? Some use colour, some mimic textures, others are spectacular shape shifters.

- Make a list of animals which embody the skills to transform.
- What movement does the animal use to make the change?
- What purpose does the change have?



## Get Moving and Model Nature

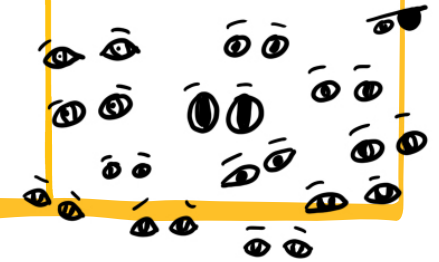
Taking inspiration from your animal list, have a go at mimicking physical transformation using your own body. Experiment with up and down movement and rotation.

### Here's some wild examples:

The **Crocodile Flathead** is a fish which lies motionless on the sea bed. It uses an ambush strategy to trap prey in its mouth which speedily snaps open and shut when least expected.

The **Armadillidiidae**, a type of woodlice is known for its ability to curl into a ball to protect itself from predators. Can you do the roly poly like this creature is well known for?

Animal	Transformation	Purpose
Porcupine	Quills stand up	Defend / Attack



# Nature Inspires Invention

There's many tools and gadgets in the home which help us with various tasks using up and down motion or rotation.

**Be an invention detective:** Hunt out objects or appliances which use movement to improve or convert something in your home.

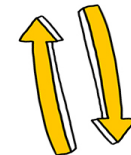
- Make before and after drawings of up to 3 found inventions illustrating the change.
- Use arrows to describe the movement which creates the transformation.

1. Before	2. Movement	3. After
-----------	-------------	----------

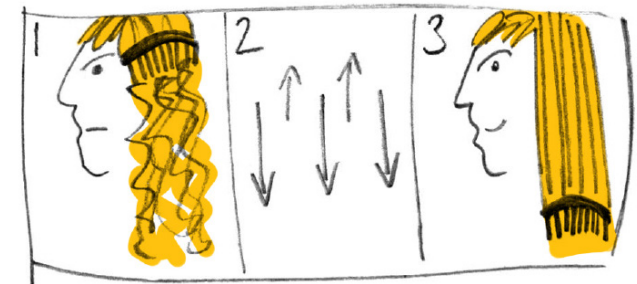
1. Before	2. Movement	3. After
-----------	-------------	----------

The **Comb Star-Fish** has small spines along the length of it's arms which remove debris from the body surface and help with burying into the sand.

Maybe the shape and function of the tooth comb was inspired by this sea creature.



Up & Down



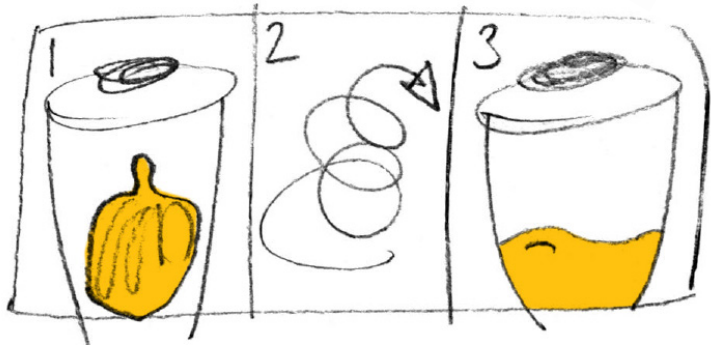
# Nature Inspires Invention cont.

The desert dwelling **Wheel Spider** is known for its ability to cartwheel away from predators at a speed of 44 revolutions per second.

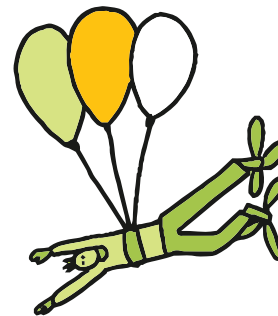
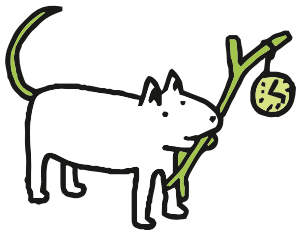
That's quite a spin!

Could this have inspired the action of a blender?

Rotation



1. Before	2. Movement	3. After



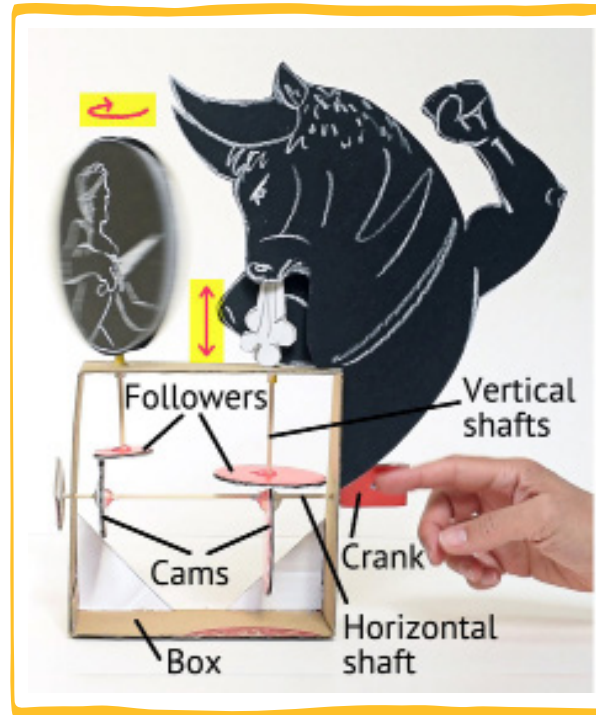
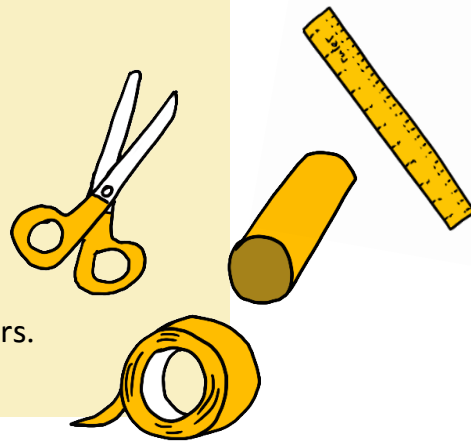
# Let's build an automata!

Time to crank it up and get making! Build your automata - that's a mechanism with moving parts which can operate rotation and up and down movement. You can make use of one or both of these movements to explore ideas for your invention.

**To make your own automata follow the how to guide on the next page!**

## You will need:

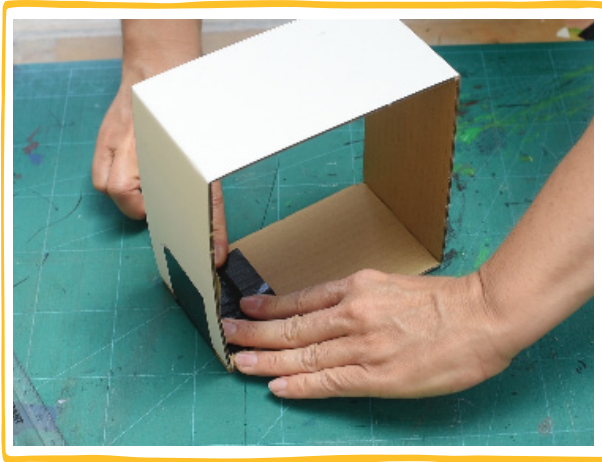
- Cardboard
- Card
- 3 x bamboo skewers
- 1 x straw
- Blu-tack
- UHU glue (optional: hot glue & gun)
- Plus drawing / colouring materials, ruler, pencil and scissors.



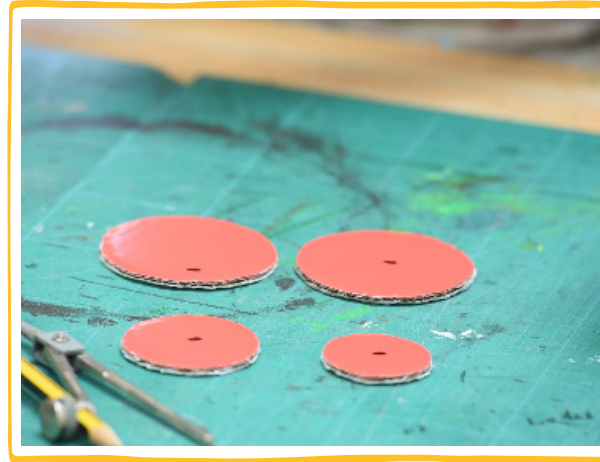
In this example, Theseus darts around the angry Minotaur whose blowing hot air down from his nostrils

You can watch this example being made at [arthoppers.co.uk/mmm](http://arthoppers.co.uk/mmm)





**1.** Cut a piece of cardboard measuring 64cm x 8cm. Mark 4 x 15cm sections down the length. Fold and tape in place. Position overlap at the bottom.



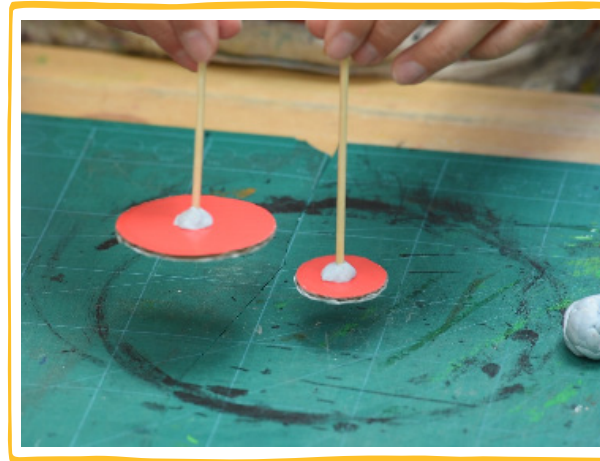
**2.** Cut out 4 circles of cardboard measuring approx 5cm in diameter. These will be the cams (on the horizontal shaft) and followers (vertical shaft).



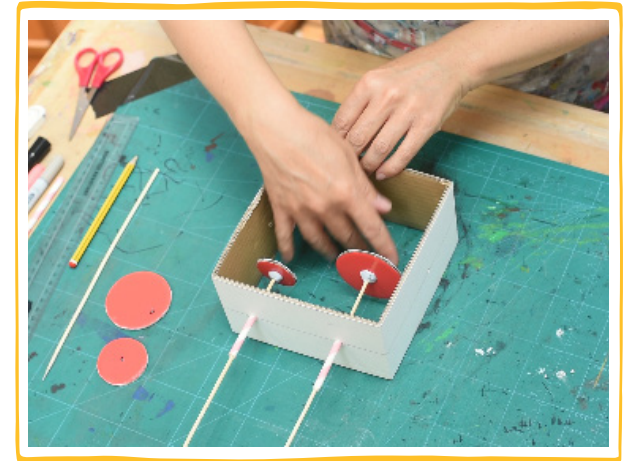
**3.** Push the point of a skewer through the top of your box to create the holes for your vertical shafts. Make large enough for the width of a straw.



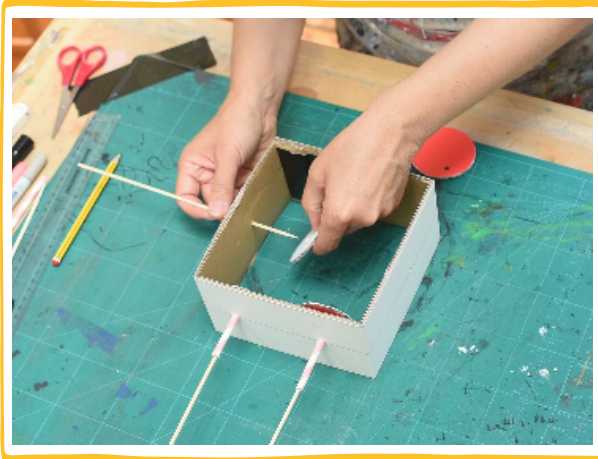
**4.** Cut 2 x 5cm lengths of a straw. Carefully push down through the holes until it just emerges below. Glue or Blu-tack around the top to hold firmly in place.



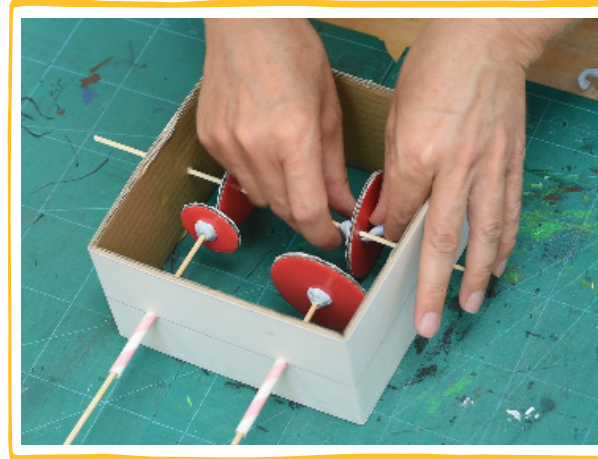
**5.** Press the flat end of a skewer into the middle of a follower. (don't puncture through). Put a ball of Blu-tack on the mark and firmly press the skewer down.



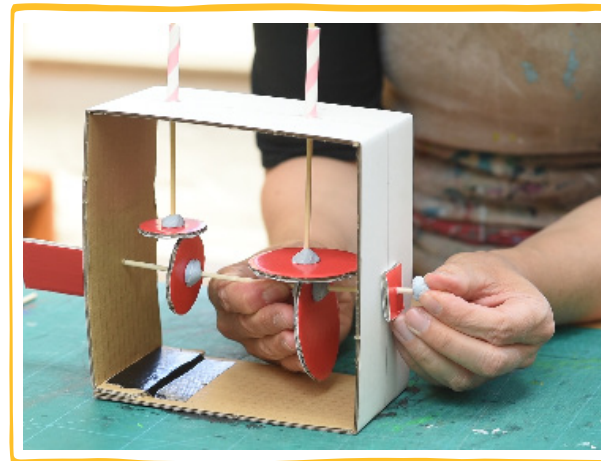
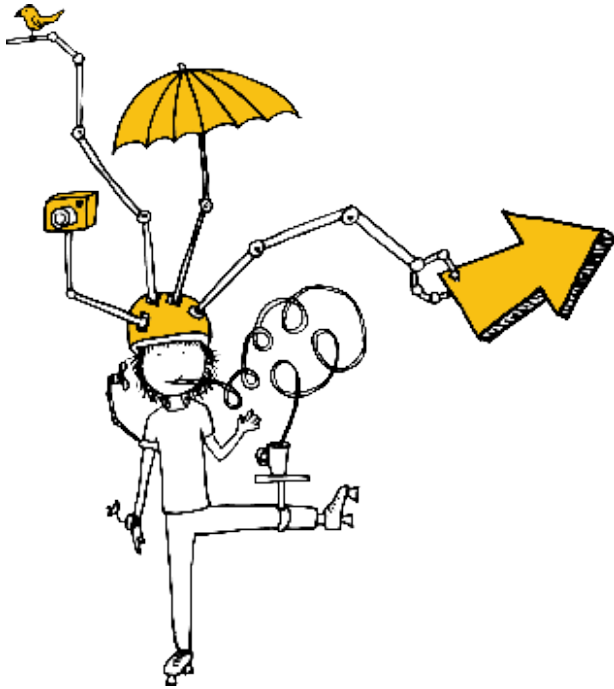
**6.** Slide the followers on their vertical shafts up through the bottom of each straw. Place the box down on it's face. Gently push the followers to the top.



**7.** Push a third skewer through the middle of one side of the box. Pierce one cam in the middle, the other off centre, then push out through the side of the box.



**8.** Line up the cams below the followers. Firmly wrap blu-tack around both sides of each cam against the shaft to fix them in place. Test / adjust as needed.



**9.** Glue a rectangle of cardboard to one end of the horizontal shaft to make a crank or handle. Add a stopper to the other end to prevent the shaft sliding out.



**10.** You're now ready to add your invention idea to the top of the automata. Get creative, have fun and enjoy experimenting with your moving machine!



# Materials in Motion

Now get creative and explore how different materials can be applied to the rotation and up and down motion on your automata. Grab some crafty materials or recycling and add some moves!

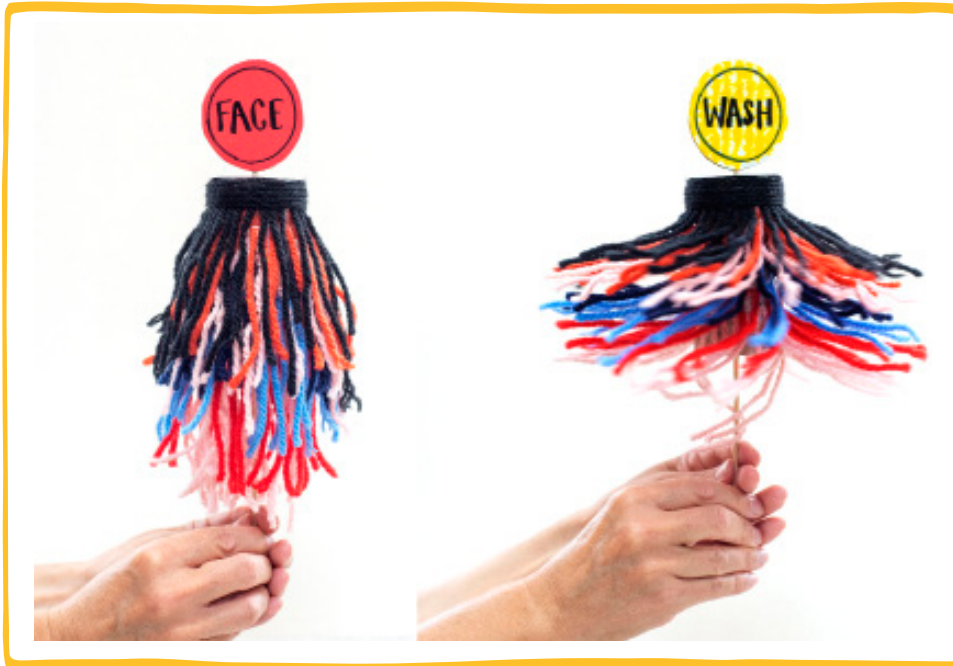
Here's a few ideas inspired by wild animal actions.

## Rotation



### Puffer Fish Face Wash

Strands of wool taped to a toilet roll magically lift up and puff out when spun on a stick. Could this be a face pampering devise or the beginnings of a new eye catching costume?

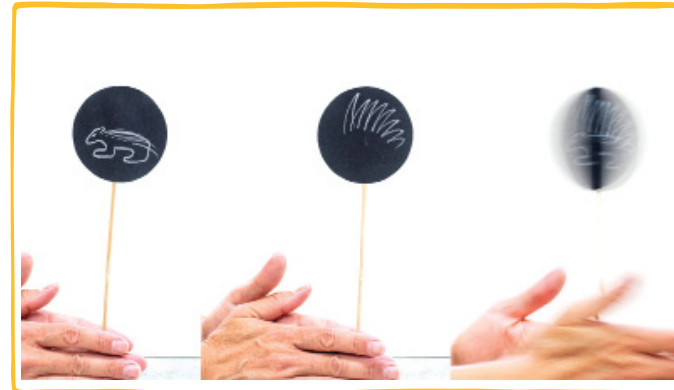


What could you invent that expands with rotation?

### Watch out - Defence / Attack!

#### The Porcupine -

Check this clever optical illusion similar to the Victorian thaumatrope



If spun slower, two images appear to animate moving from one position to another, like this guy with a sword.



Could this movement inspire your invention idea?

# Materials in Motion cont.

Up & Down →

## Chameleon Spectacles!

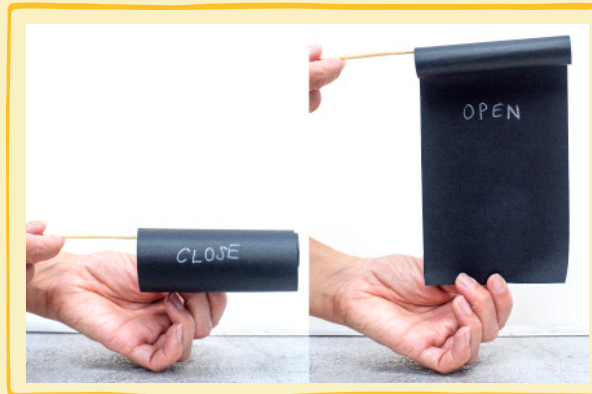
Overlap layers of transparent colour. The inside lenses move up and down. The outside ones stay still. A vision of changing chameleon colour makes every day a spectacle!



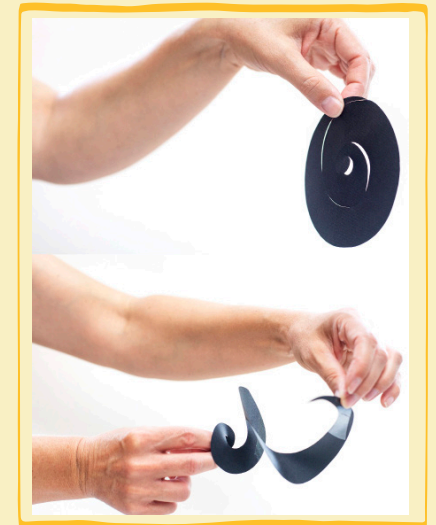
## Super Shape-Shifters

Get inspired with rolling, cutting or folding:

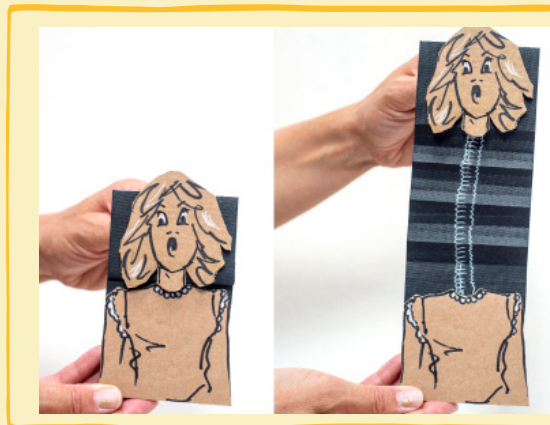
### The Armadillo - Roll > Straighten



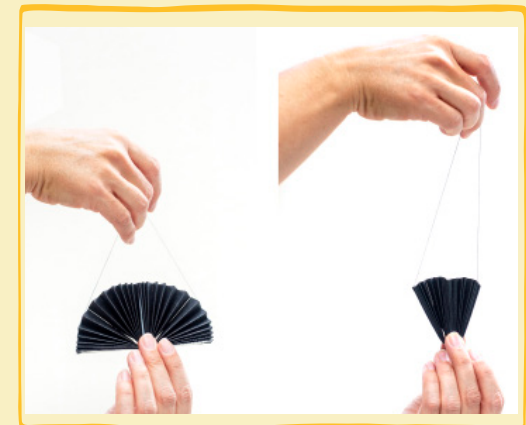
### The Serpent - Coil > Stretch



### The Caterpillar - Contract > Extend



### The Peacock - Display > Hide



# My moving invention

Create an invention that transforms using movement

.....  
.....

First name .....

Age .....

School .....

Town/city .....

## Tell us more!

(who your invention is for, what it does, how it works!)

.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....

Draw your invention here! *Use a black pen, add colours and labels*

Name it!  
↙



Upload your idea at [littleinventors.org](http://littleinventors.org) to get feedback and who knows, it could be chosen to be made real!