makeblock

Fairyland

Makeblock STEAM Education Research Center

Fairyland

(Student's Book)

Makeblock STEAM Education Research Center

CONTENT

1

Magic Land

Activity 1.1 Hello, Monsters!

You will be able to:

- identify different metal structural parts and mechanical tools
- design different shaped monster toys by using appropriate materials
- develop a narrative for your monster toys and act it out

In the world of monsters, monsters come in different types. Some of them are gentle, some short-tempered; some of them come from the Earth, some from the outer space; some can breathe fire, some are well-known for their unusual strength; some crawl on the ground, some can become invisible...

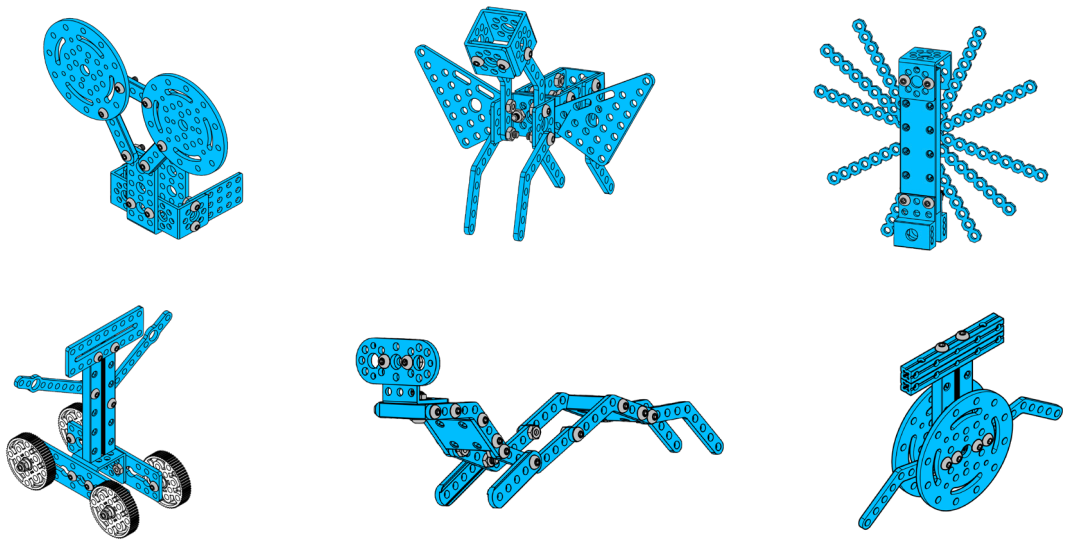
In this learning activity, expand the family of monsters!

To Do List

- Draw the draft of your monster toys ☐
- Create 3 monster toys to bring new monster members ☐
- Take a selfie together with your monsters ☐
- Self-review your performance and accomplishment ☐

Warm Up

Based on your observation, figure out the similarities and differences between the monster figures shown below



Similarities **Differences**

Material **Color** **Shape**

Design

Work in groups to add other 3 members to the family of monsters. Draw your draft in the space below.

Materials

Let's take a look at some materials needed in this activity.

Figure	Name	Features
	Hex & Cross Screwdriver	This screwdriver has two different heads: cross-shaped and hexagonal.
	Mechanical Parts	The mechanical parts come in different types, but most of them are blue. You can use them to build different shapes.

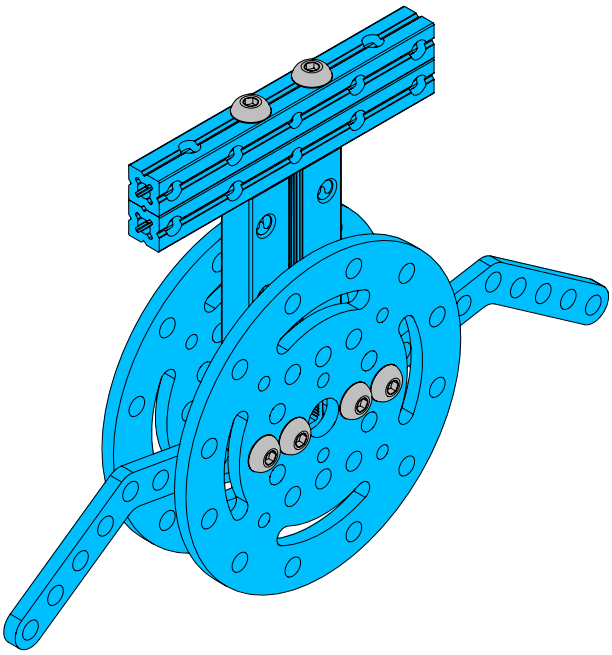
Hands-on

Bring your ideas to life and create your project!

Tips:

1. You can refer to the teacher's demo project when designing your own project. However, it will be better if you can create your own design.
2. Be careful when using the materials and tools.
3. If you have any problems, discuss with your partners in your group first. If the problems remain unsolved, turn to other groups or the teacher for help.

Demo:



Portfolio

Take a picture together with your project.

Extension

Imagine what these monsters would say if they could talk?

Reflection

In this activity, I can:

- understand what I've learned and create an innovative project ☆☆☆☆☆
- work with partners in the group and help each other ☆☆☆☆☆
- clearly express my opinions, listen to others, and see what's good about others' projects ☆☆☆☆☆
- engage in this learning activity and look forward for the next lesson ☆☆☆☆☆

Depending on your performance, color ☆

Excellent: ★★★★★

Good: ★★★★

Not so bad: ★★★

Need more effect: ★ or ★★

Activity 1.2 Magic Wand

You will be able to:

- recognize mCore, 4-Button Module, LED RGB Strip, RJ25 Adapter and other electronic modules
- design and create your own magic wand
- program your magic wand to give it magic energies
- work with partners to review each other's projects and offer advice form your own opinions

A magic wand is a witch or wizard's weapon in Harry Potter saga. It selects its master and is only royal to its master. It could also turn into a fairy wand or a magic pen... A magic wand just gives you the power to do anything you want.

To Do List

- [ ] Draw the draft of your magic wand
- [ ] Create your magic wand
- [ ] Take a selfie together with your magic wand
- [ ] Self-review your performance and accomplishment

Warm Up

Imagine that if you had a magic wand, what could it do?

Its Magic:

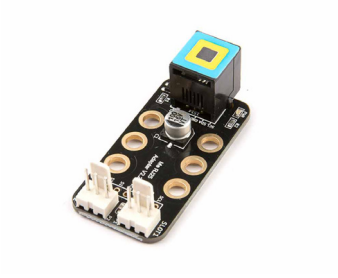
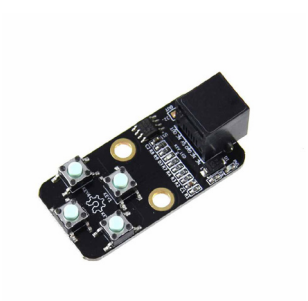
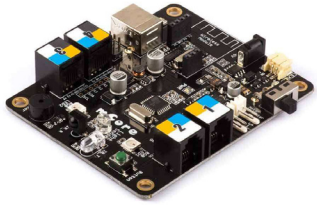
Its Magic:

Design

Work in groups to brainstorm and design your magic wand. Draw your draft in the space below.

Materials

Let's take a look at some materials needed in this activity.

Figure	Name	Features
	LED RGB Strip	The strip is made up of many RGB LED beads. Each bead can change its color. This strip must work with the RJ25 adapter to function.
	RJ25 Adapter	The adapter bridges the LED RGB Strip with mCore the mainboard.
	4-Button Module	This module works like a switch. Each button can be programmed to enable a specific light effect of the LED Strip.
	mCore	mCore works like a brain to control the 4-Button Module and LED RGB Strip.

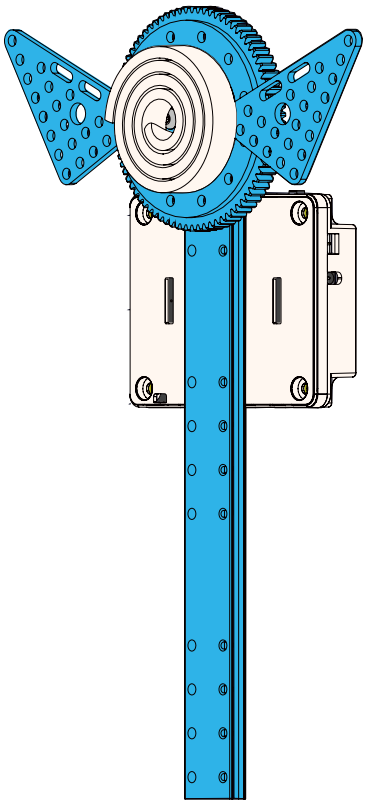
Hands-on

Bring your ideas to life and create your project!

Tips:

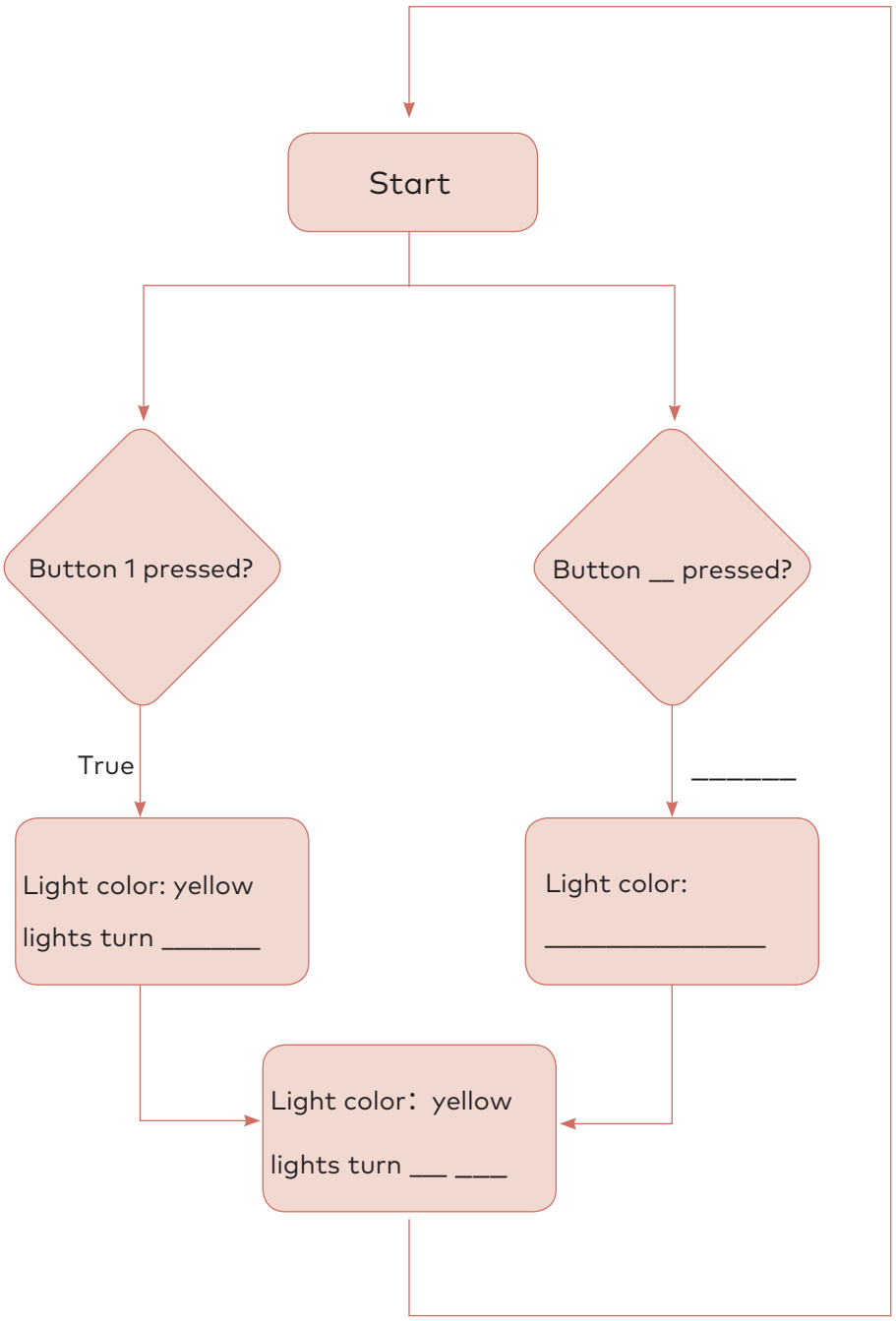
1. You can refer to the teacher's demo project when designing your own project. However, it will be better if you can create your own design.
2. Be careful when using the materials and tools.
3. If you have any problems, discuss with your partners in your group first. If the problems remain unsolved, turn to other groups or the teacher for help.

Demo:



Flow Chart

Complete the flowchart to explain the logic of your project.



Portfolio

Take a picture together with your project.

Extension

Apart from glowing lights, what other functions could your magic wand perform?

Reflection

In this activity, I can:

- understand what I've learned and create an innovative project ☆☆☆☆☆
- work with partners in the group and help each other ☆☆☆☆☆
- clearly express my opinions, listen to others, and see what's good about others' projects ☆☆☆☆☆
- engage in this learning activity and look forward for the next lesson ☆☆☆☆☆

Depending on your performance, color ☆

Excellent: ★★★★★

Good: ★★★★

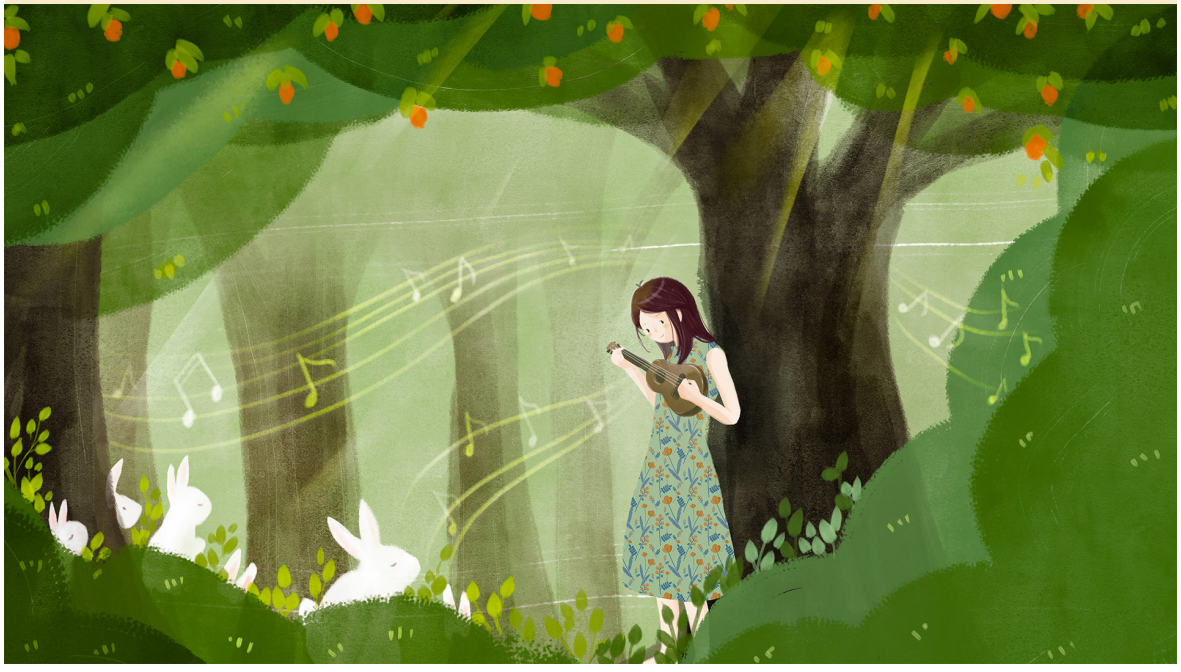
Not so bad: ★★★

Need more effect: ★ or ★★

Activity 1.3 Wonderful Musician

You will be able to:

- learn about different musical instruments and their features, and use metal structural materials to build a "magic instrument"
- program the buzzer on mCore to add rhythms and experience the beauty of music
- work with your classmates to compose a song or melody



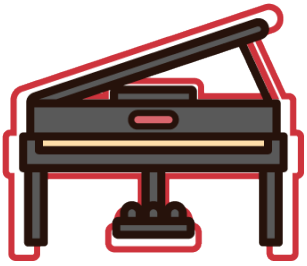
Here is the story: In a forest, a musician is playing music. Her music is as sweet as candies, and so powerful that it can bring life into objects. In spring, the snowman will soon disappear. So the musician is going to use her magic instrument to play some sweet music to warm up the snowman's heart. Finally, the snowman survives.

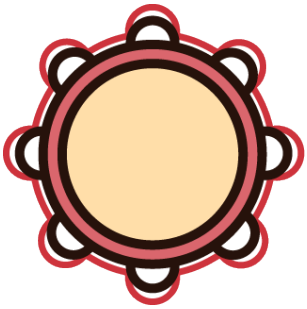
To Do List

- Draw the draft of your own magic instrument ☐
- Create your own magic instrument ☐
- Replace Touch Sensor with a new sensor to update the project ☐
- Take a selfie together with your magic instrument ☐
- Self-review your performance and accomplishment ☐

Extension

Match up the following instruments with their correct names





Piano

Drum

Guitar

Design

Work in groups to brainstorm and design your magic instrument. Draw your draft in the space below.

Materials

Let's take a look at some materials needed in this activity.

Figure	Name	Features
	Touch Sensor	The sensor works like a switch. It is activated when pressed or touched.

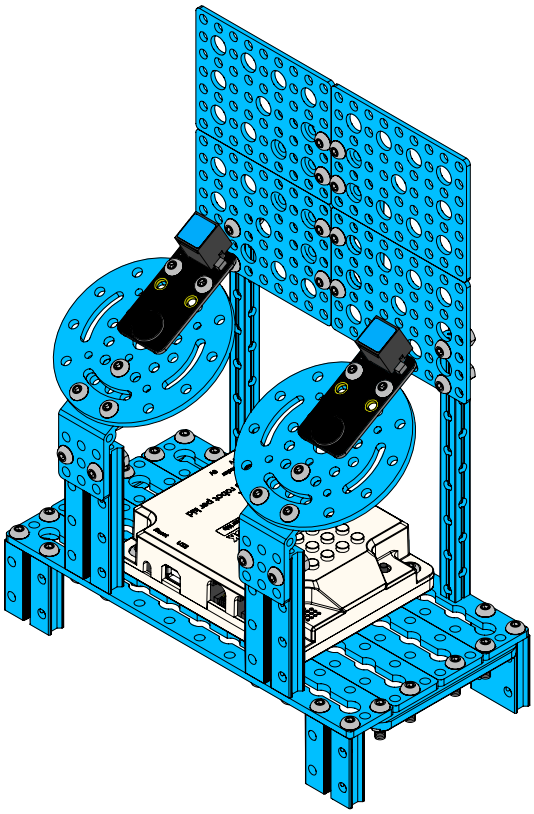
Hands-on

Bring your ideas to life and create your project!

Tips:

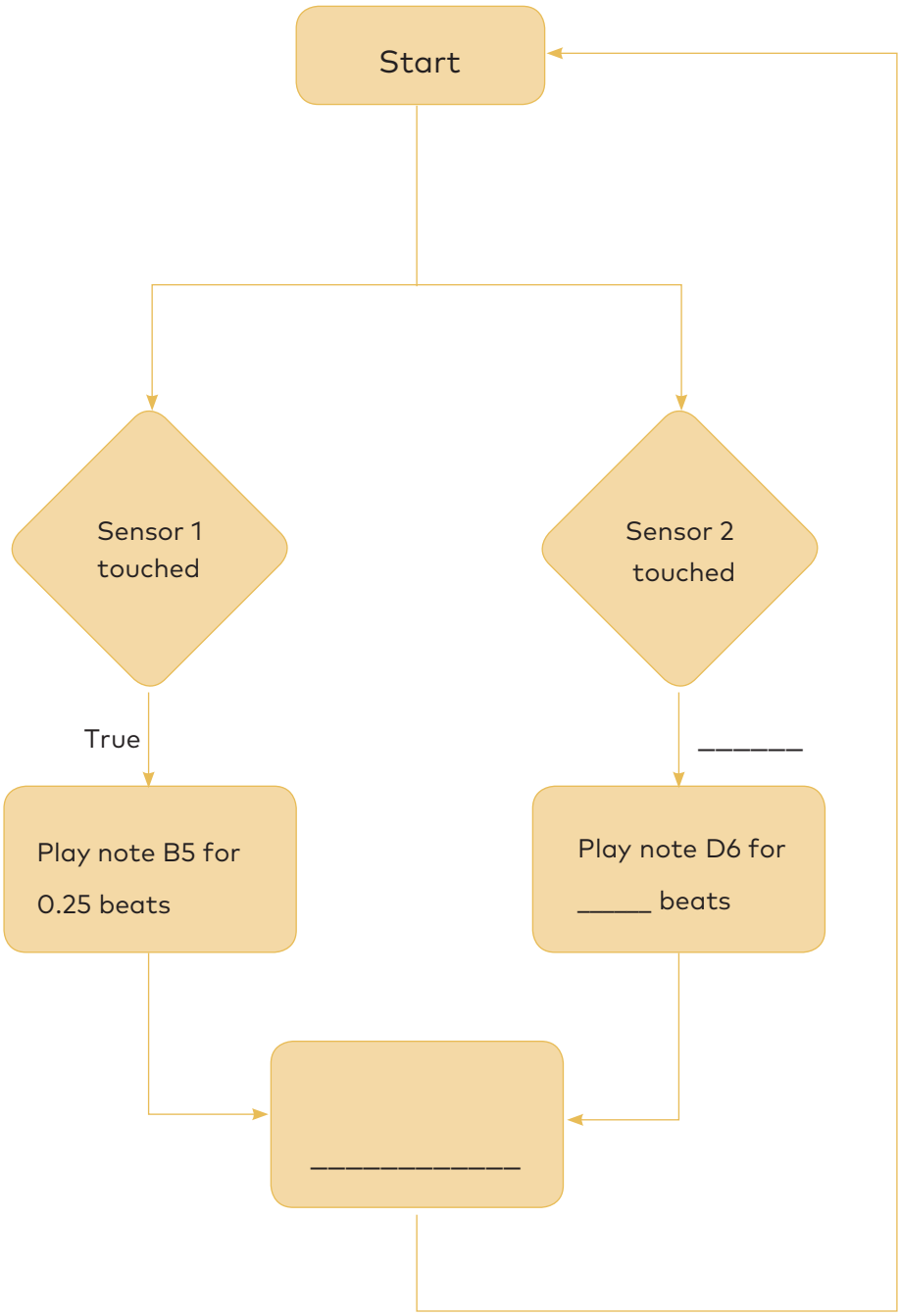
1. You can refer to the teacher's demo project when designing your own project. However, it will be better if you can create your own design.
2. Be careful when using the materials and tools.
3. If you have any problems, discuss with your partners in your group first. If the problems remain unsolved, turn to other groups or the teacher for help.

Demo:



Flow Chart

Complete the flowchart to explain the logic of your project.



Warm Up

Try to use your instrument to make music!

Note:

A note is represented by a pitch. A pitch is a sound created by the musical instrument. Sounds are higher or lower in pitch. The larger number means a higher pitch and the smaller number means a lower pitch.

When selecting pitch names for your song or melody, make sure the range in it (i.e. the distance between the lowest pitch and the highest pitch) is not too broad.

Scale	Pitch Name
1 do	C
2 re	D
3 mi	E
4 fa	F
5 sol	G
6 la	A
7 ti	B

Reference:

Twinkle Twinkle Little Star in key of C

(rh):	1	1	5	5	5	5	5	4	4	3	3	2	2	1
	C	C	G	G	A	A	G	F	F	E	E	D	D	C
(lh):	5	5	1	1	1	1	1	2	2	3	3	4	4	5
	Twin -	kle	twin -	kle	lit -	tle	star	how	I	won -	der	what	you	are
	5	5	4	4	3	3	2	5	5	4	4	3	3	2
	G	G	F	F	E	E	D	G	G	F	F	E	E	D
	1	1	2	2	3	3	4	1	1	2	2	3	3	4
	up	a -	bove	the	world	so	high	like	a	dia -	mond	in	the	sky
	1	1	5	5	5	5	5	4	4	3	3	2	2	1
	C	C	G	G	A	A	G	F	F	E	E	D	D	C
	5	5	1	1	1	1	1	2	2	3	3	4	4	5
	Twin –	kle	twin -	kle	lit -	tle	star	how	I	won -	der	what	you	are

Frère Jacques in key of C

1	2	3	1	1	2	3	1
C	D	E	C	C	D	E	C
5	4	3	5	5	4	3	5
Fre -	re	Jac -	ques	Fre -	re	Jac -	ques
3	4	5	3	4	5		
E	F	G	E	F	G		
3	2	1	3	2	1		
dor -	mez	vous	dor -	mez	vous		
4	5	4	3	2	1	4	5	4	3	2	1
G	A	G	F	E	C	G	A	G	F	E	C
1	2	1	2	3	5	1	2	1	2	3	5
son -	nez	les	ma -	ti -	nes	son -	nez	les	ma -	ti-	nes
4	1	4	4	1	4						
C	G	C	C	G	C						
2	5	2	2	5	2						
Din	din	don	din	din	don						

Portfolio

Take a picture together with your project.

Extension

Can you recycle useless tin and steel cans in your house and transform them into "magic musical instruments"?

Reflection

In this activity, I can:

- understand what I've learned and create an innovative project ☆☆☆☆☆
- work with partners in the group and help each other ☆☆☆☆☆
- clearly express my opinions, listen to others, and see what's good about others' projects ☆☆☆☆☆
- engage in this learning activity and look forward for the next lesson ☆☆☆☆☆

Depending on your performance, color ☆

Excellent: ★★★★★

Good: ★★★★

Not so bad: ★★★

Need more effect: ★ or ★★

Activity 1.4 Electronic Mask

You will be able to:

- appreciate a traditional Chinese drama — Sichuan Opera
- appreciate the art of Face Changing and design electronic masks
- perform Face Changing through the electronic mask you have created

In traditional Chinese operas, masks are an important costume for actors and actresses. Masks are regarded as an art of costumes that carries cultural and representational meanings. From patterns of the masks, we are able to soon know what kinds of characteristics of the roles represent.

To Do List

- Draw the draft of an electronic mask ☐
- Create your own electronic mask ☐
- Replace at least one new sensor to complete the mask ☐
- Take a selfie together with your electronic mask ☐
- Self-review your performance and accomplishment ☐

Extension

Match up the masks below with their characteristics.

Roughness

Loyalty

Suspiciousness

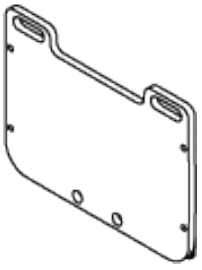
Design

Work in groups to design 3 to 4 digital facial expressions.

Draw your draft in the space below.

Materials

Let's take a look at some materials needed in this activity.

Figure	Name	Features
	LED Matrix	An LED Matrix is made up of many light emitting diodes. By turning on or off specific diodes, we can easily create images, texts, animations and videos on an LED Matrix. LED matrix screens are widely used in many places, such as billboards

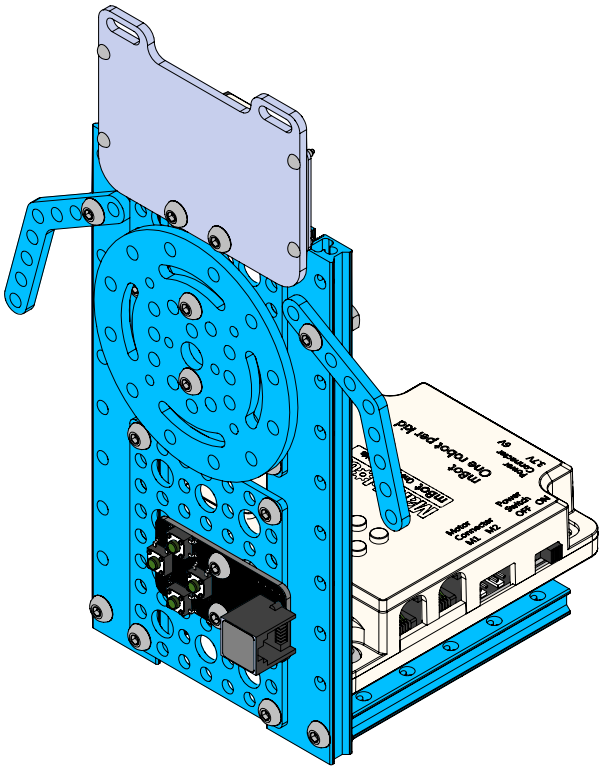
Hands-on

Bring your ideas to life and create your project!

Tips:

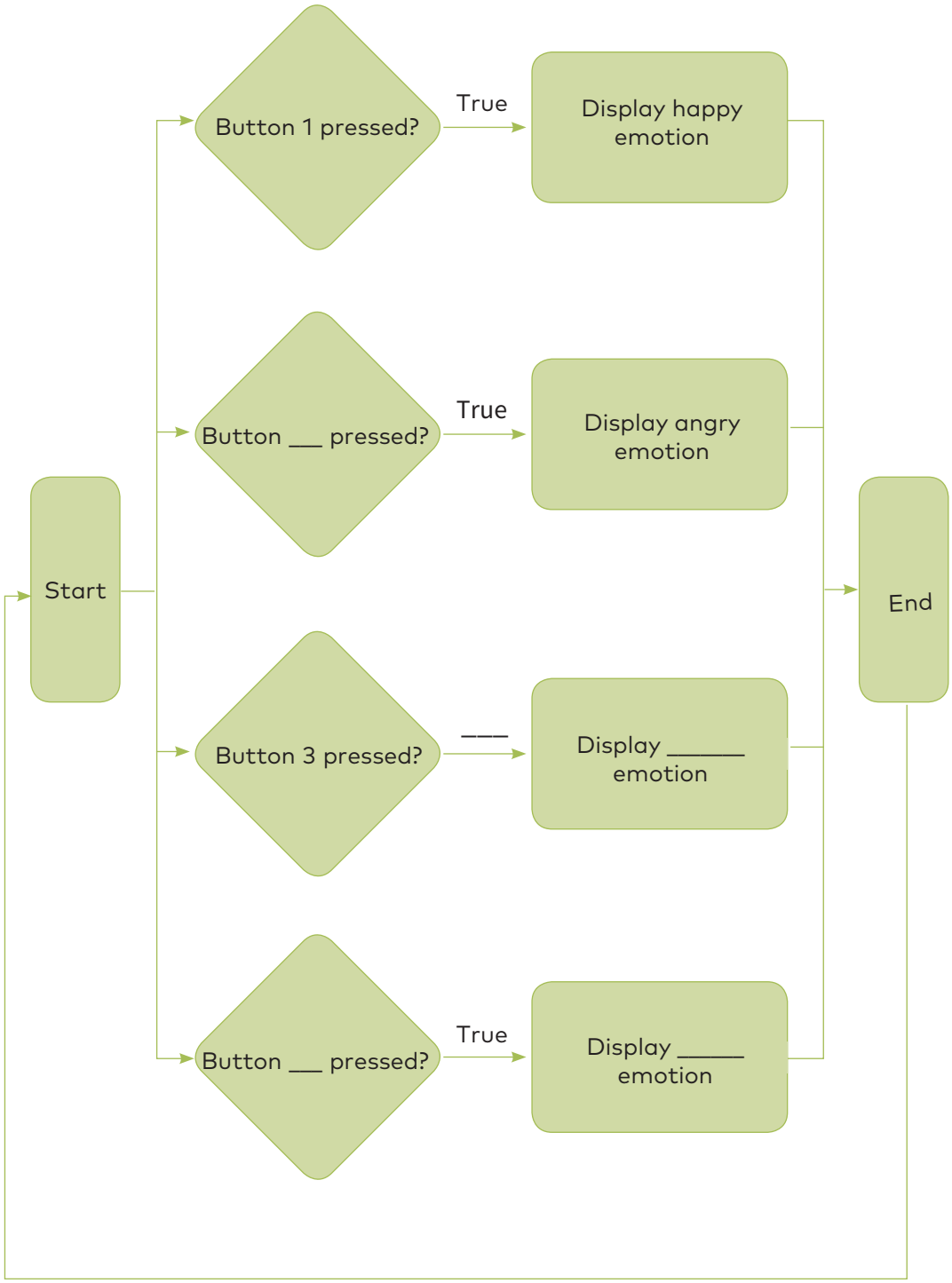
1. You can refer to the teacher's demo project when designing your own project. However, it will be better if you can create your own design.
2. Be careful when using the materials and tools.
3. If you have any problems, discuss with your partners in your group first. If the problems remain unsolved, turn to other groups or the teacher for help.

Demo:



Flow Chart

Complete the flowchart to explain the logic of your project.



Portfolio

Take a picture together with your project.

Extension

Use colored paper and pens to decorate your electronic mask, making it more real. Try to perform Face Changing with your electronic mask.

Reflection

In this activity, I can:

- understand what I've learned and create an innovative project ☆☆☆☆☆
- work with partners in the group and help each other ☆☆☆☆☆
- clearly express my opinions, listen to others, and see what's good about others' projects ☆☆☆☆☆
- engage in this learning activity and look forward for the next lesson ☆☆☆☆☆

Depending on your performance, color ☆

Excellent: ★★★★★

Good: ★★★★

Not so bad: ★★★

Need more effect: ★ or ★★

2

Habitat of Fun

Activity 2.1 Bird Palace

You will be able to:

- recognize different structures of bird nests
- identify different metal structural parts and mechanical tools
- create a bird palace with the materials you have selected

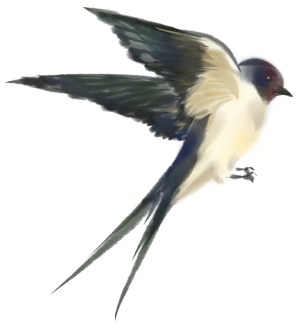
Birds are famous house designers in the animal kingdom. Some of them have better skills while others need more practice. Birds can use any things they get to build their home, from mud to tree leaves, from saliva to twigs. You may find their home on the ground, in a tree hole, under a house eave and even places you can't imagine. A nest seems simple but is full of miracles.

To Do List

- [ ] Draw the draft of a bird palace
- [ ] Create a bird palace
- [ ] Take a selfie together with your monsters
- [ ] Self-review your performance and accomplishment

Warm Up

Besides the birds below, name two more types of birds.



I also know:

Type 1

Type 2

Design

Work in groups to design a new home for birds living in your community. Draw your draft in the space below.

Materials

Let's take a look at some materials needed in this activity.

Figure	Name	Features
	Hex & Cross Screwdriver	This screwdriver has two different heads: cross-shaped and hexagonal.
	Mechanical Parts	The mechanical parts come in different types, but most of them are blue. You can use them to build different shapes.

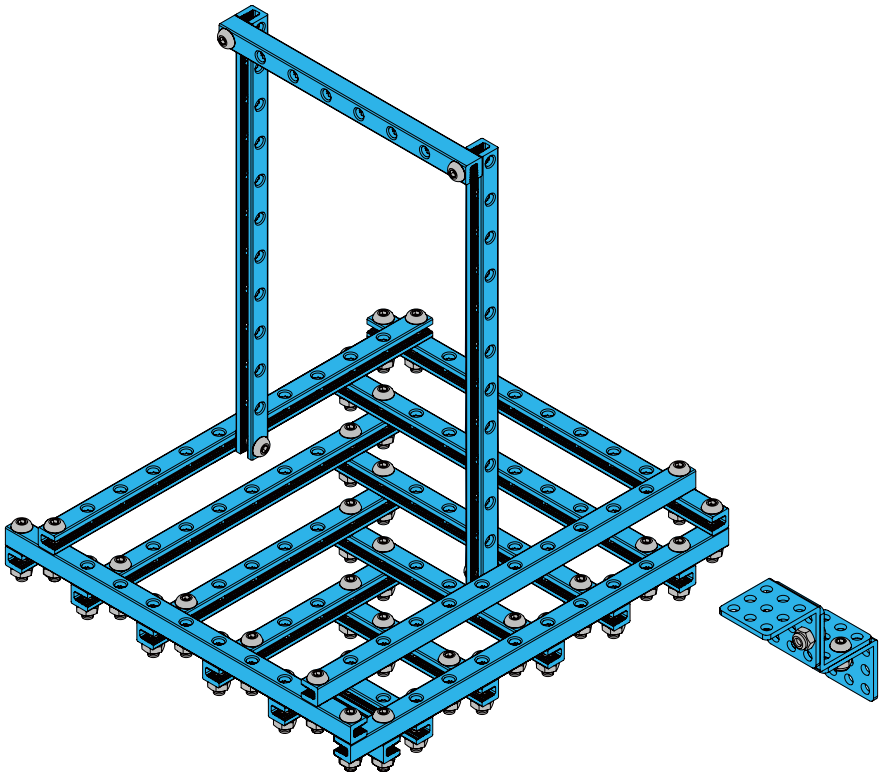
Hands-on

Bring your ideas to life and create your project!

Tips:

1. You can refer to the teacher's demo project when designing your own project. However, it will be better if you can create your own design.
2. Be careful when using the materials and tools.
3. If you have any problems, discuss with your partners in your group first. If the problems remain unsolved, turn to other groups or the teacher for help.

Demo:



Portfolio

Take a picture together with your project.

Extension

Observe bird nests and think about what you can do to protect birds.

Reflection

In this activity, I can:

- understand what I've learned and create an innovative project ☆☆☆☆☆
- work with partners in the group and help each other ☆☆☆☆☆
- clearly express my opinions, listen to others, and see what's good about others' projects ☆☆☆☆☆
- engage in this learning activity and look forward for the next lesson ☆☆☆☆☆

Depending on your performance, color ☆

Excellent: ★★★★★

Good: ★★★★

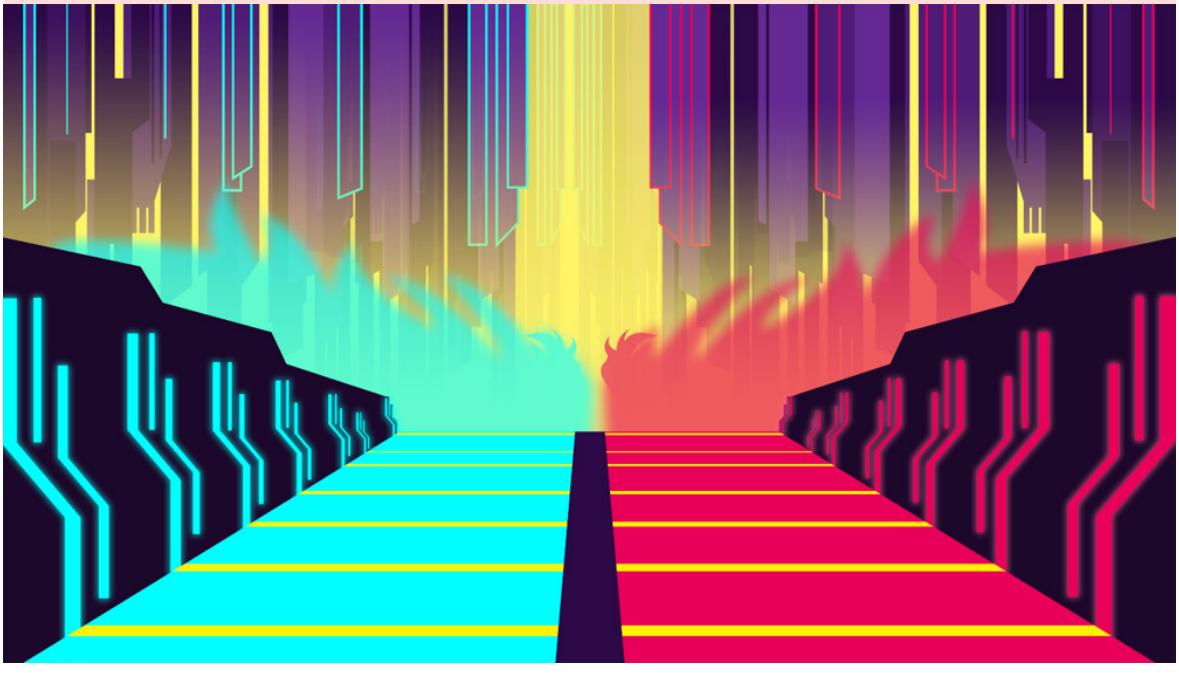
Not so bad: ★★★

Need more effect: ★ or ★★

Activity 2.2 Time Tunnel

You will be able to:

- execute mCore, LED RGB Strip, RJ25 Adaptor and other relevant electronic parts
- design and create a time tunnel for time travel
- program the time tunnel based on your logic of project design
- work with partners to review each other's projects and offer advice form your own opinions



In the Makeblock Fairyland, there's a landmark — Time Tunnel. And there's a magic about it: if you go through the Tunnel, you could travel to the past and meet yourself.

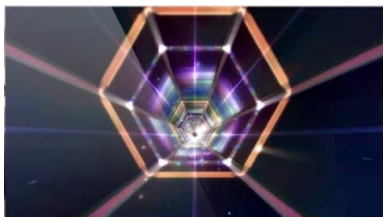
To Do List

- [ ] Draw the draft of your Time Tunnel model
- [ ] Program the strip to light up various colors when it's on
- [ ] Construct your own Time Tunnel
- [ ] Self-review your performance and accomplishment

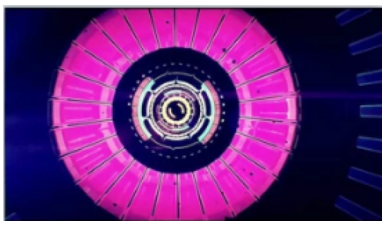
Warm Up

Take a look at the time tunnels below and describe the differences among them.

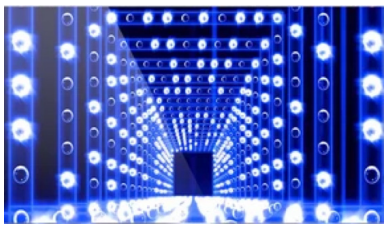
Triangular



Hexangonal



Circular



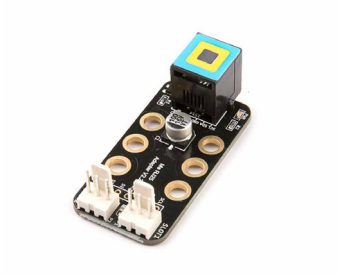
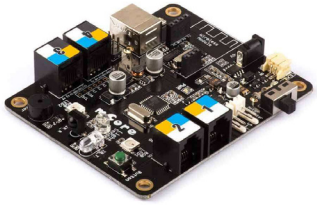
Square

Design

Work in groups to design a time tunnel.
Draw your draft in the space below.

Materials

Let's take a look at some materials needed in this activity.

Figure	Name	Features
	LED RGB Strip	The strip is made up of many RGB LED beads. Each bead can change its color. This strip must work with the RJ25 adapter to function.
	RJ25 Adapter	The adapter bridges the LED RGB Strip with mCore the mainboard.
	mCore	mCore works like a brain to control the 4-Button Modu and LED RGB Strip.

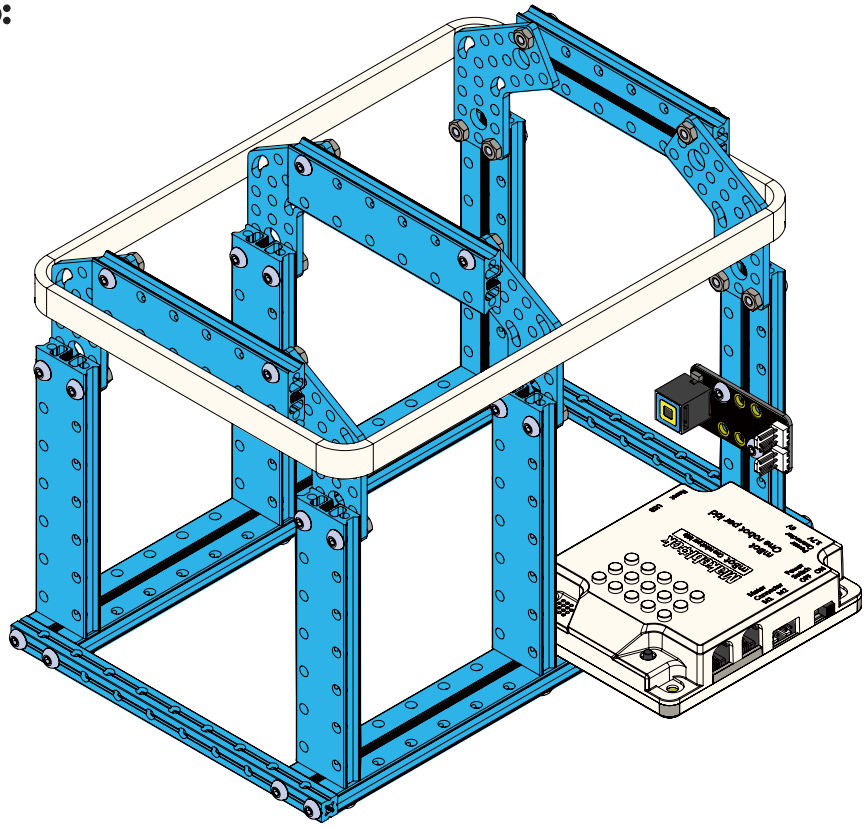
Hands-on

Bring your ideas to life and create your project!

Tips:

1. You can refer to the teacher's demo project when designing your own project. However, it will be better if you can create your own design.
2. Be careful when using the materials and tools.
3. If you have any problems, discuss with your partners in your group first. If the problems remain unsolved, turn to other groups or the teacher for help.

Demo:



Flow Chart

Complete the flowchart to explain the logic of your project.

Portfolio

Take a picture together with your project.

Extension

Make a time tunnel with recycling materials you can find at home.

Invite family members to share childhood memories.

Reflection

In this activity, I can:

- understand what I've learned and create an innovative project ☆☆☆☆☆
- work with partners in the group and help each other ☆☆☆☆☆
- clearly express my opinions, listen to others, and see what's good about others' projects ☆☆☆☆☆
- engage in this learning activity and look forward for the next lesson ☆☆☆☆☆

Depending on your performance, color ☆

Excellent: ★★★★★

Good: ★★★★

Not so bad: ★★★

Need more effect: ★ or ★★

Activity 2.3 Puppy's Tail

You will be able to:

- explain how a puppy might express itself and create a demonstration to model the puppy's expression
- apply mCore, Touch Sensor, and Servo into the project, modeling how a puppy might use its tail to express something
- program your puppy model to communicate with you and your peers
- work with partners to review each other's projects and offer advice form your own opinions

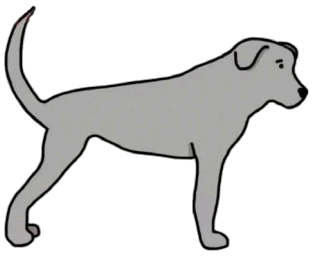
Besides verbal languages, we can also use gestures and body movements to express thoughts and feelings. Similarly, a puppy can use its tail as a kind of language to communicate with each other as well as humans. The change of a puppy's tail direction and wagging speed expresses different feelings.

To Do List

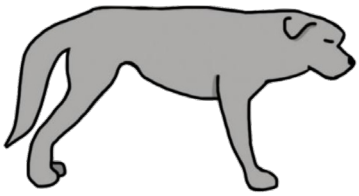
- Draw the draft of a metal puppy toy ☐
- Use Touch Sensor to make the puppy toy wag its tail ☐
- Create your own interactive puppy toy ☐
- Use a different sensor to replace the Touch Sensor ☐
- Self-review your performance and accomplishment ☐

Warm Up

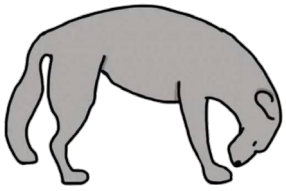
What does the puppy's tail want to tell you? Guess and discuss with your partners.



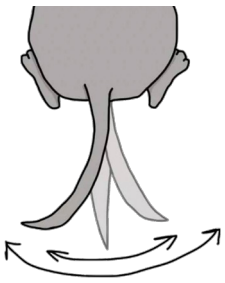
(Happy)



(Threatened)



(Anxious or Alert)



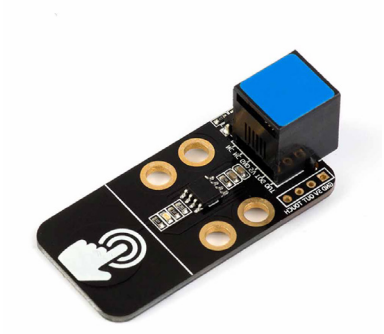
(Friendly)

Design

Work in groups to design a tail-wagging puppy toy.
Draw your draft in the space below.

Materials

Let's take a look at some materials needed in this activity.

Figure	Name	Features
	9g Micro Servo Robot Pack	The rotation angle of 9g Micro Servo range from 0 to 180 degrees. It can be mounted on mechanical parts to make a transmission mechanism.
	Touch Sensor	The sensor works like a switch. It is activated when pressed or touched.

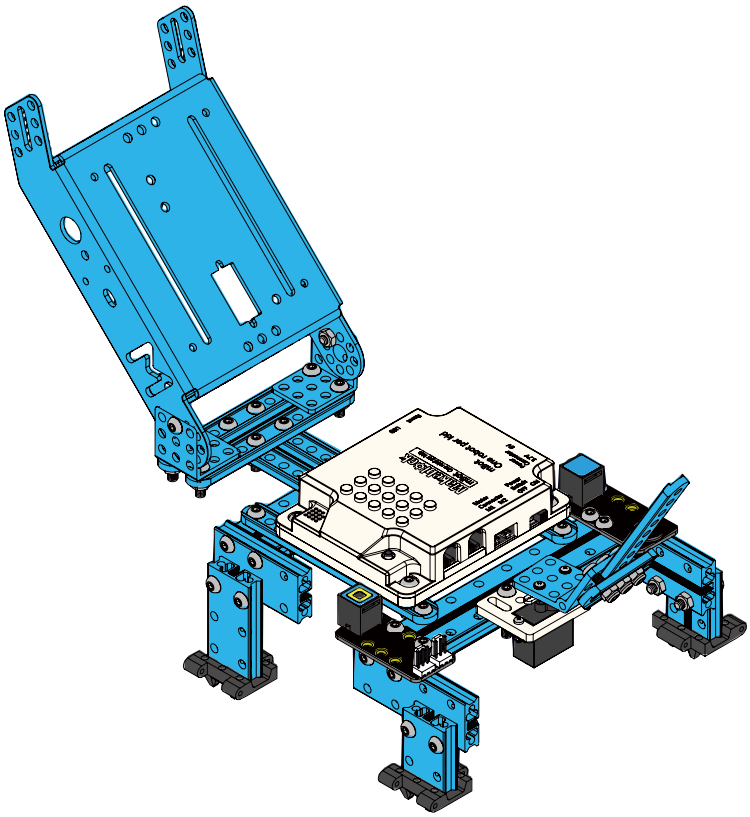
Hands-on

Bring your ideas to life and create your project!

Tips:

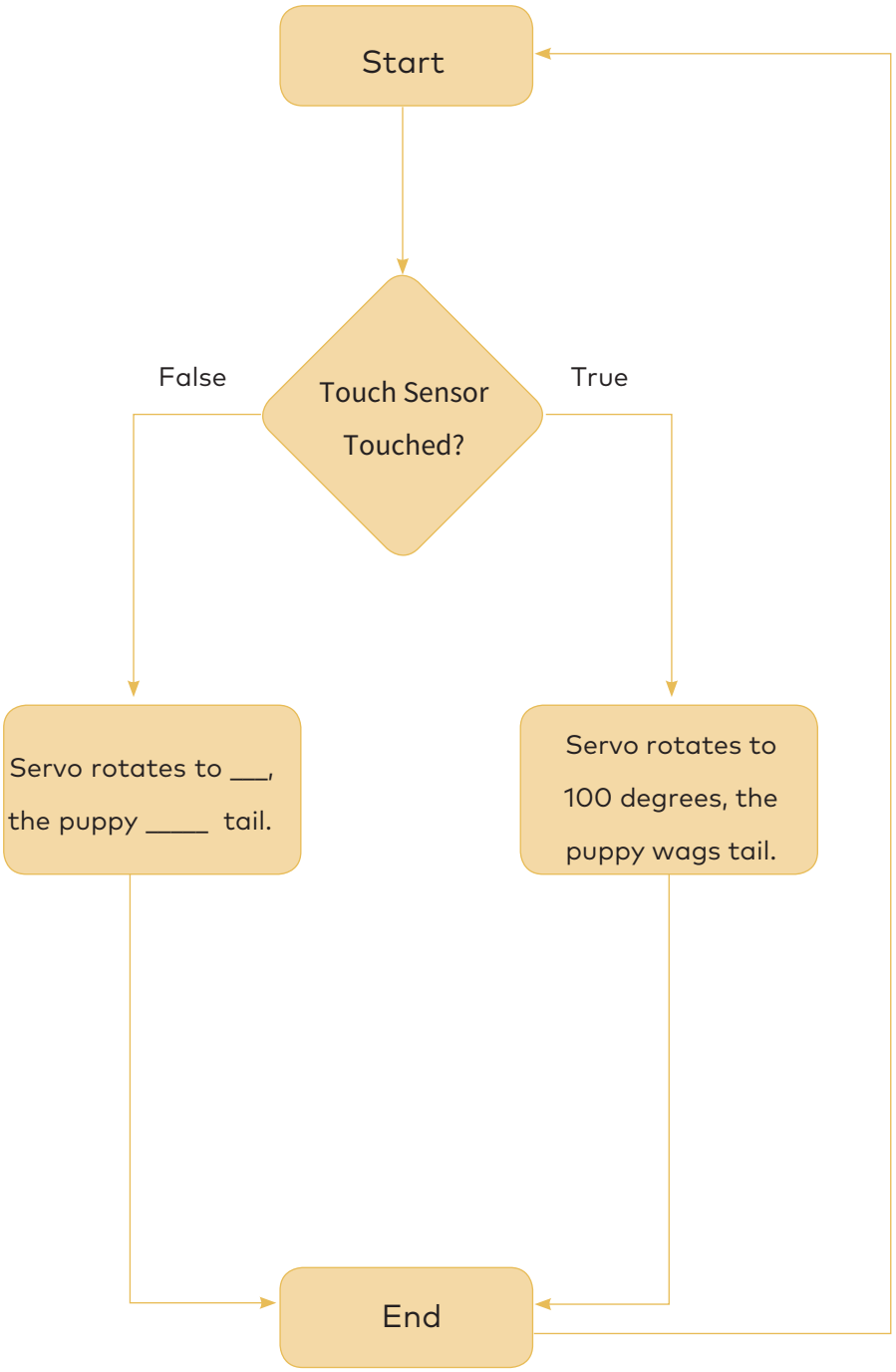
1. You can refer to the teacher's demo project when designing your own project. However, it will be better if you can create your own design.
2. Be careful when using the materials and tools.
3. If you have any problems, discuss with your partners in your group first. If the problems remain unsolved, turn to other groups or the teacher for help.

Demo:



Flow Chart

Complete the flowchart to explain the logic of your project.



Portfolio

Take a picture together with your project.

Extension

What do horses, rabbits, and giraffes mean when they wag their tails?

Reflection

In this activity, I can:

- understand what I've learned and create an innovative project ☆☆☆☆☆
- work with partners in the group and help each other ☆☆☆☆☆
- clearly express my opinions, listen to others, and see what's good about others' projects ☆☆☆☆☆
- engage in this learning activity and look forward for the next lesson ☆☆☆☆☆

Depending on your performance, color ☆

Excellent: ★★★★★

Good: ★★★★

Not so bad: ★★★

Need more effect: ★ or ★★

Activity 2.4 Dancing Peacock

You will be able to:

- describe what peacocks look like and how they "dance"
- recognize peacock dance and make a dancing peacock demonstration
- use Me Auriga to control Touch Sensor, Servo, Audio Player , and other electronic parts ;
- program your dancing peacock to perform its dancing show
- work with partners to review each other's projects and offer advice form your own opinions

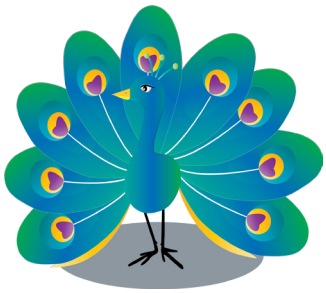
The peacock dance is an Asian folk dance. Dancers imitate the movement of peacocks: flying out of the nest, wandering around the forest, playing at the river bank, combing feathers, stretching wings, and more.

To Do List

- Draw the draft of a peacock toy ☐
- Create your own dancing peacock toy ☐
- Program the peacock toy to sing and dance ☐
- Replace at least one new sensor to expand the functions ☐
- Self-review your performance and accomplishment ☐

Warm Up

Let's take a look at these peacocks!



Design

Work in groups to design a peacock toy.
Draw your draft in the space below.

Materials

Let's take a look at some materials needed in this activity.

Figure	Name	Features
	Me Auriga	Me Auriga has more ports than mCore, and greater driving ability. The MEDS150 Servo Motor used in this lesson requires more power so Me Auriga is a better choice.
	Audio Player	An SD card for storing audio files is on the back. You can choose a peacock sound, store it in the Audio Player, and then connect the module to a mainboard to play the sound.

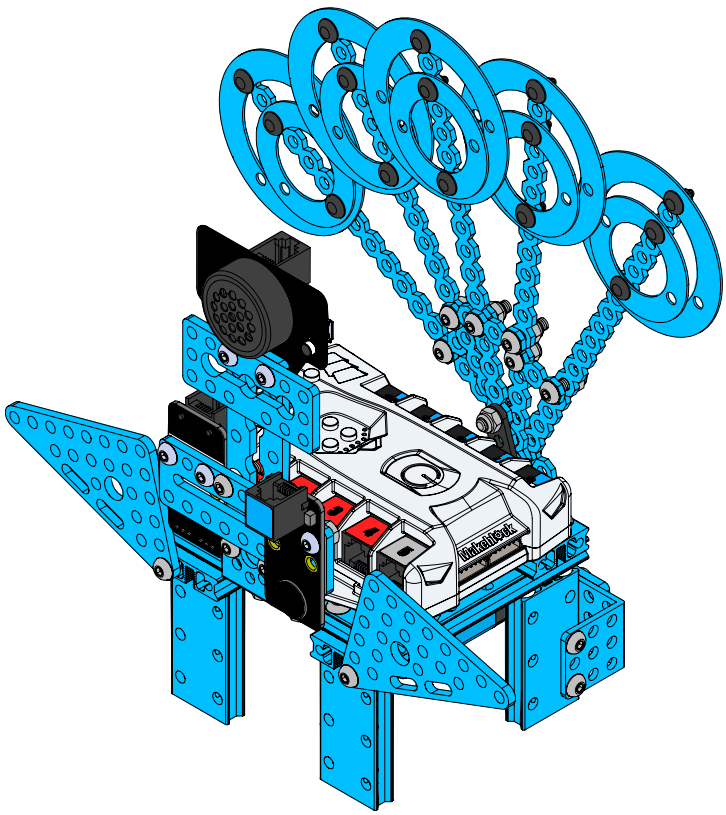
Hands-on

Bring your ideas to life and create your project!

Tips:

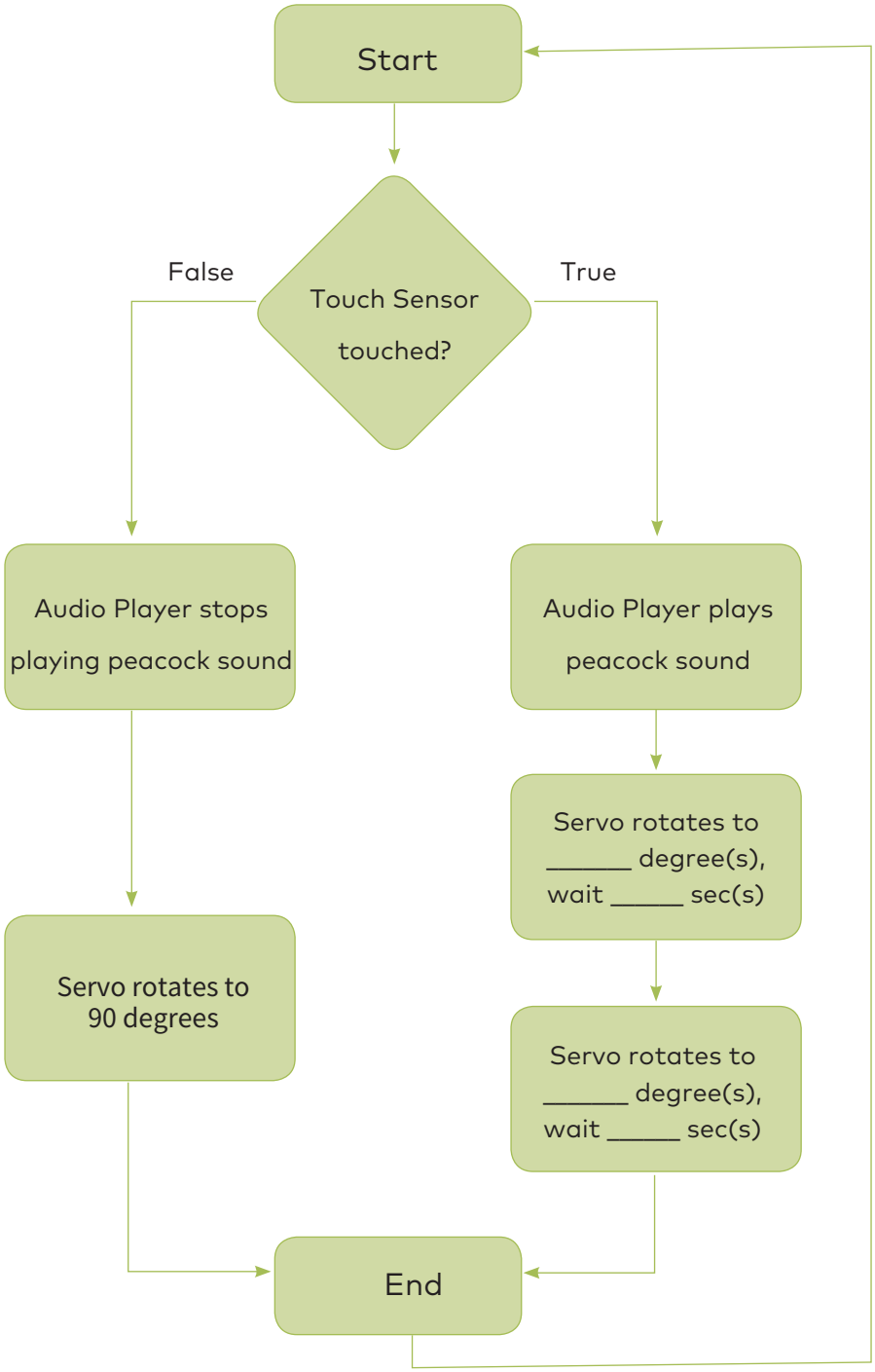
1. You can refer to the teacher's demo project when designing your own project. However, it will be better if you can create your own design.
2. Be careful when using the materials and tools.
3. If you have any problems, discuss with your partners in your group first. If the problems remain unsolved, turn to other groups or the teacher for help.

Demo:



Flow Chart

Complete the flowchart to explain the logic of your project.



Portfolio

Take a picture together with your project.

Extension

Do some research about how to tell female peacocks from male peacocks.

Reflection

In this activity, I can:

- understand what I've learned and create an innovative project ☆☆☆☆☆
- work with partners in the group and help each other ☆☆☆☆☆
- clearly express my opinions, listen to others, and see what's good about others' projects ☆☆☆☆☆
- engage in this learning activity and look forward for the next lesson ☆☆☆☆☆

Depending on your performance, color ☆

Excellent: ★★★★★

Good: ★★★★

Not so bad: ★★★

Need more effect: ★ or ★★

3

Thrills Kingdom

Activity 3.1 Balancing Spaceship

You will be able to:

- understand the relationship between balance and the Center of Gravity
- understand the law of the lever
- classify metal structural members and how they connect to each other
- use what you have to create your own spaceship gravity toy

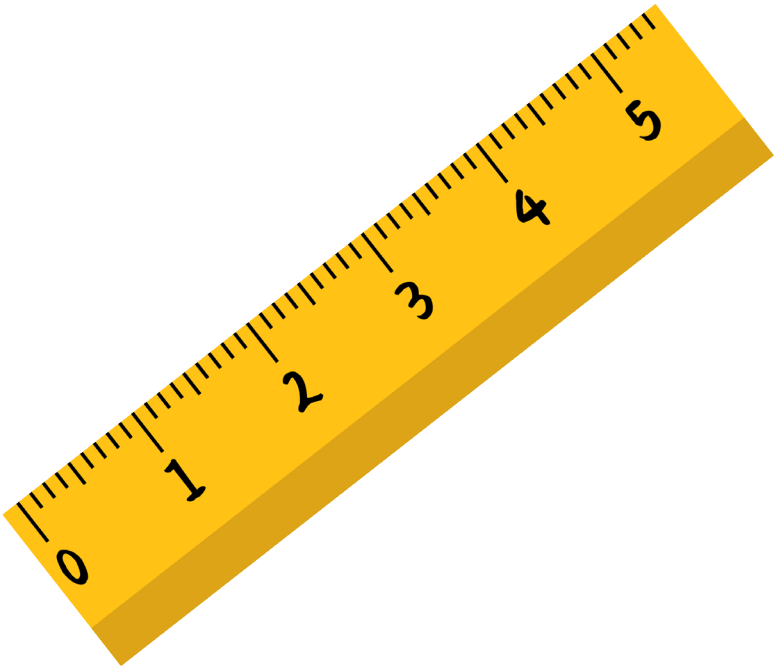
The relationship between the Center of Gravity (CG) and balance is applied in many situations. Boxers bend their bodies to lower the CG of their bodies so as to keep stable and avoid attacks. Trucks have a lower CG to prevent rollovers when they are making turns. When hiking downhill, people lower their bodies to keep stable. Acrobats must adjust their poses to keep a good balance when walking on tightropes.

To Do List

- [ ] Draw the draft of your spaceship gravity toy
- [ ] Create your spaceship gravity toy
- [ ] Take a selfie together with your monsters
- [ ] Self-review your performance and accomplishment

Warm Up

Try balancing the ruler on your fingertip.



Design

Work in groups to design a balancing spaceship.
Draw your draft in the space below.

Materials

Let's take a look at some materials needed in this activity.

Figure	Name	Features
	Hex & Cross Screwdriver	This screwdriver has two different heads: cross-shaped and hexagonal.
	Mechanical Parts	The mechanical parts come in different types, but most of them are blue. You can use them to build different shapes.

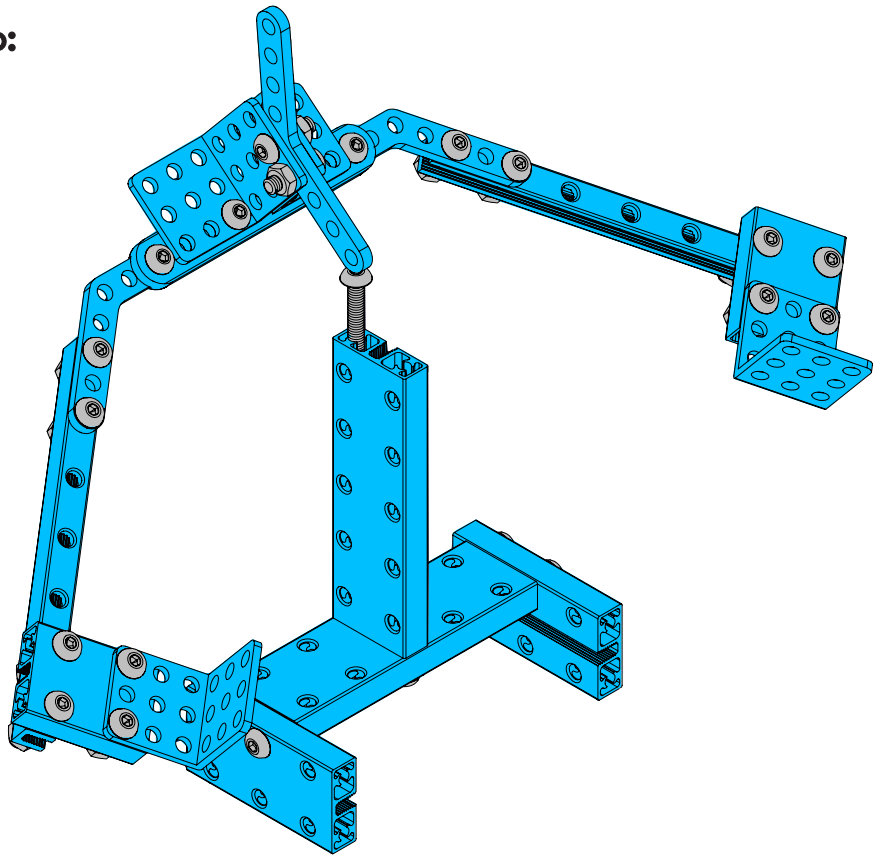
Hands-on

Bring your ideas to life and create your project!

Tips:

1. You can refer to the teacher's demo project when designing your own project. However, it will be better if you can create your own design.
2. Be careful when using the materials and tools.
3. If you have any problems, discuss with your partners in your group first. If the problems remain unsolved, turn to other groups or the teacher for help.

Demo:



Portfolio

Take a picture together with your project.

Extension

Use everyday materials to make a roly-poly toy. Discuss with your classmates to figure out how the roly-poly can return to its standing position whenever being pushed.

Reflection

In this activity, I can:

- understand what I've learned and create an innovative project ☆☆☆☆☆
- work with partners in the group and help each other ☆☆☆☆☆
- clearly express my opinions, listen to others, and see what's good about others' projects ☆☆☆☆☆
- engage in this learning activity and look forward for the next lesson ☆☆☆☆☆

Depending on your performance, color ☆

Excellent: ★★★★★

Good: ★★★★

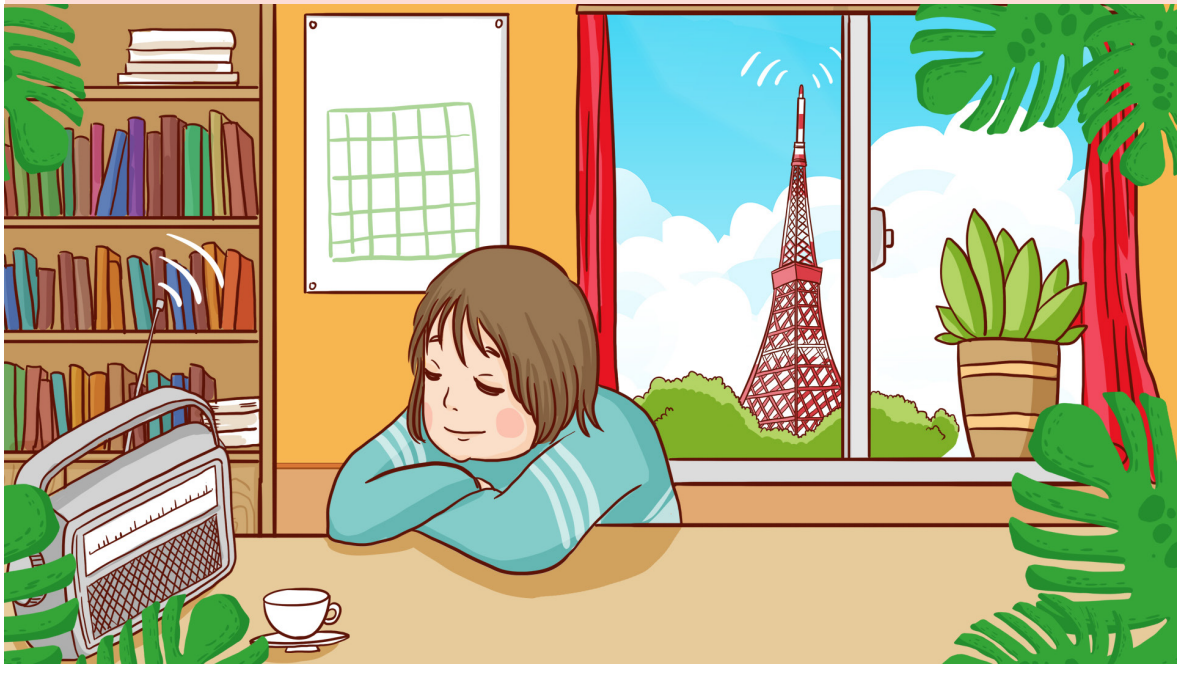
Not so bad: ★★★

Need more effect: ★ or ★★

Activity 3.2 Sound Meter

You will be able to:

- explore what Sound Sensor can do and how to use it
- use the Sound Sensor to turn on/off the LED RGB Strip
- create a sound meter and program its interactive light-sound effects
- work with partners to review each other's projects and offer advice form your own opinions



We hear sounds now and then, here and there. From sounds, we can know other people's emotions. Sounds could also be music that we enjoy listening to. Some nature sounds let us feel relaxed...

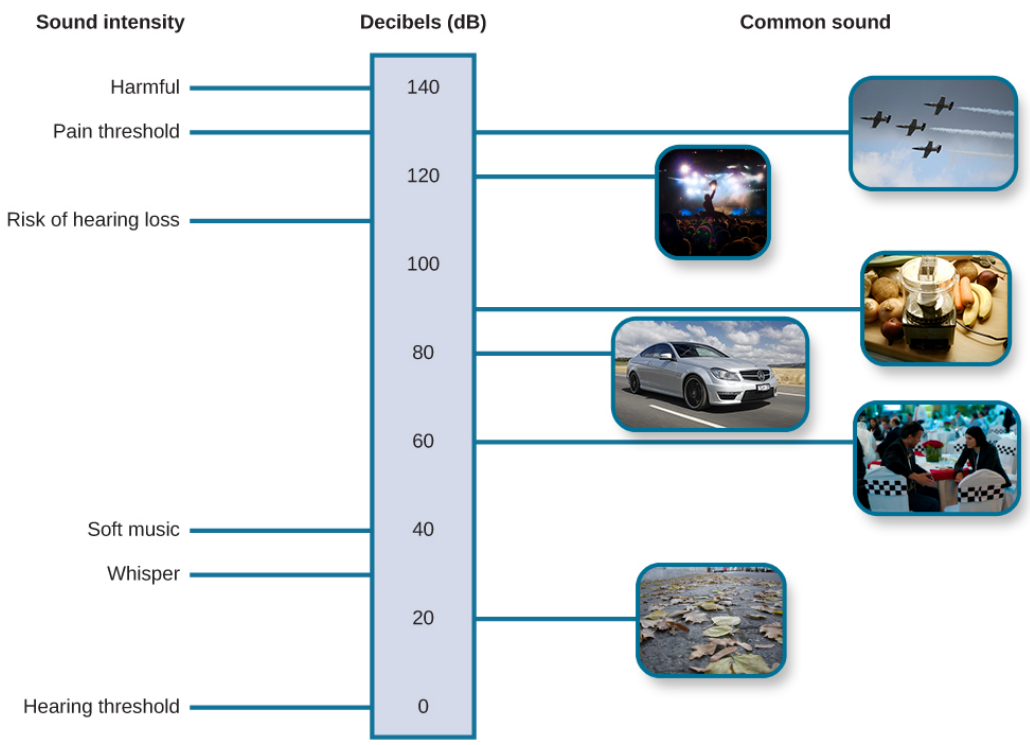
There are more about sounds: they can even break glass and put out fires. Moreover, they can increase the production of crops and heal wounds...

To Do List

- Draw the draft of your sound meter ☐
- Program the Sound Sensor to control the light-sound effects ☐
- Create a sound meter ☐
- Take a selfie together with your monsters ☐
- Self-review your performance and accomplishment ☐

Warm Up

Evaluate your surrounding sounds based on the chart below.



Loudness of common sounds, source: https://commons.wikimedia.org/wiki/File:Loudness_of_common_sounds.jpg
available from: https://courses.lumenlearning.com/wsu-sandbox/chapter/waves-and-wavelengths/

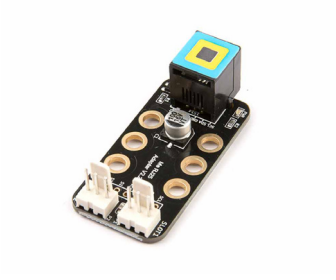
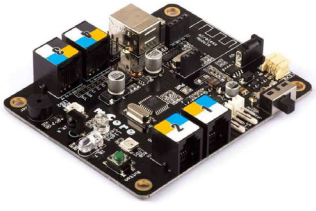
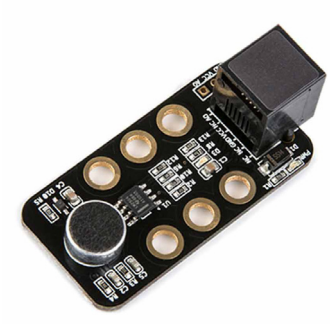
Design

Work in groups to design a sound meter.

Draw your draft in the space below.

Materials

Let's take a look at some materials needed in this activity.

Figure	Name	Features
	LED RGB Strip	The strip is made up of many RGB LED beads. Each bead can change its color. This strip must work with the RJ25 adapter to function.
	RJ25 Adapter	The adapter bridges the LED RGB Strip with mCore the mainboard.
	mCore	mCore works like a brain to control the 4-Button Modu and LED RGB Strip.
	Sound Sensor	The sensor can measure the sound intensity of the environment with a range of 0~980dB.

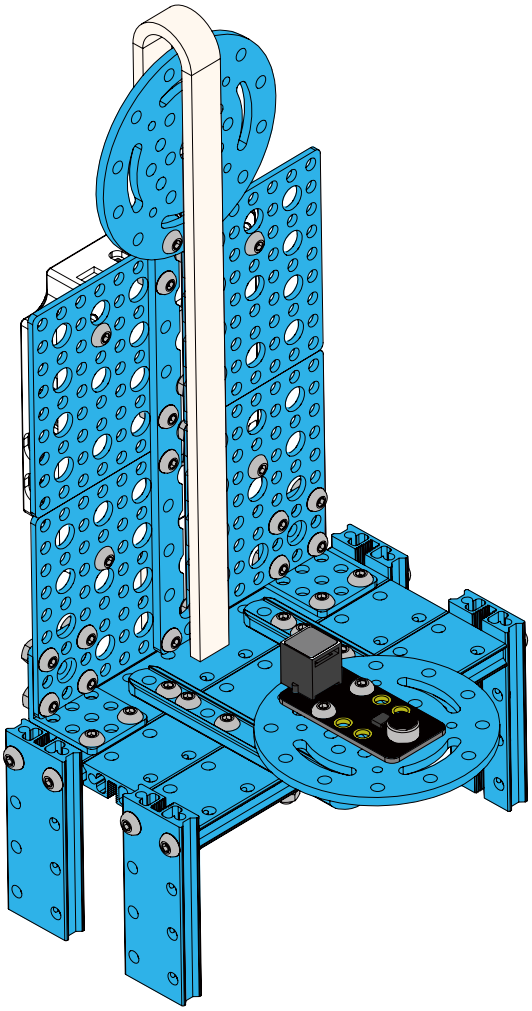
Hands-on

Bring your ideas to life and create your project!

Tips:

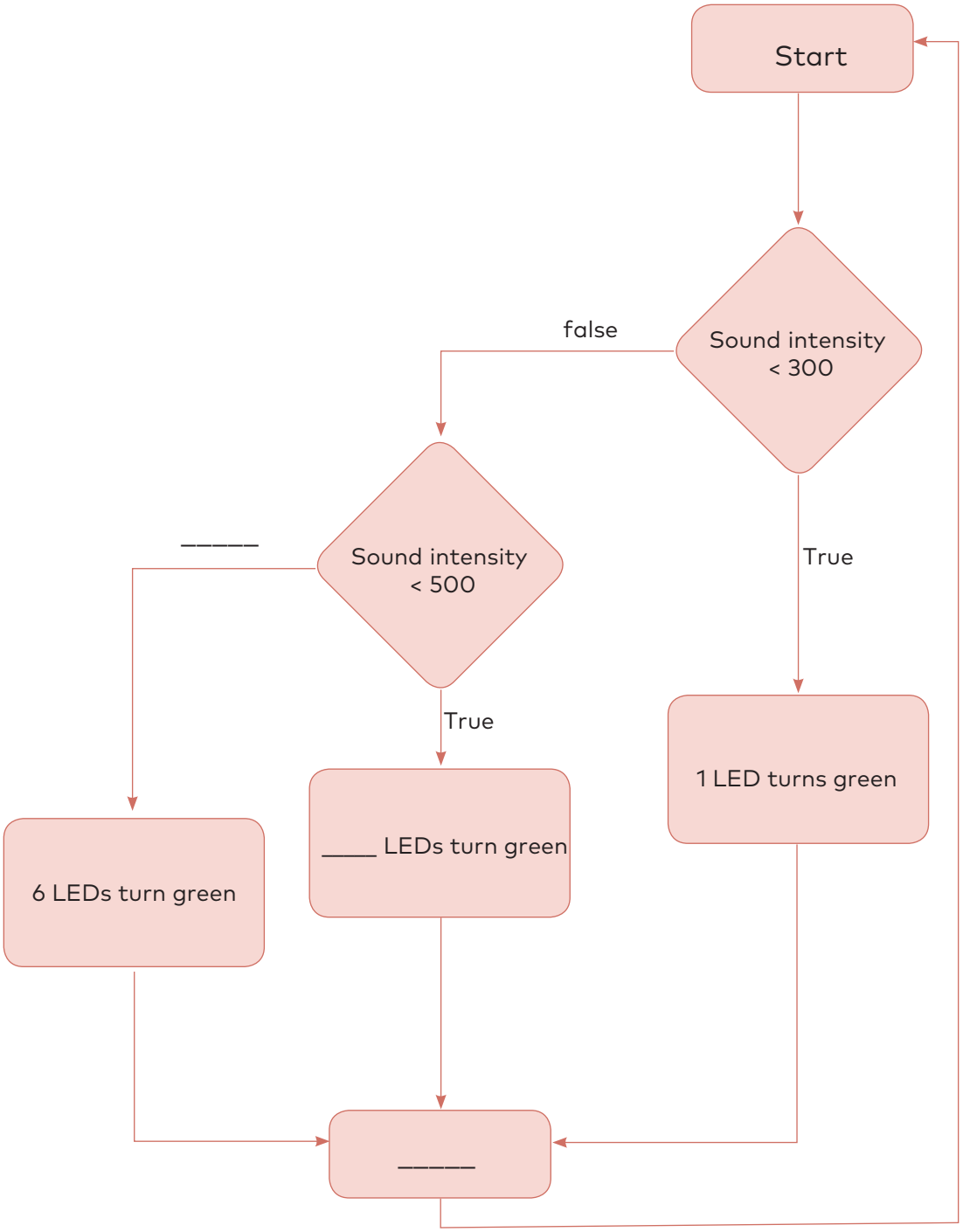
1. You can refer to the teacher's demo project when designing your own project. However, it will be better if you can create your own design.
2. Be careful when using the materials and tools.
3. If you have any problems, discuss with your partners in your group first. If the problems remain unsolved, turn to other groups or the teacher for help.

Demo:



Flow Chart

Complete the flowchart to explain the logic of your project.



Portfolio

Take a picture together with your project.

Extension

Research and figure out how different sounds affect our life.

Reflection

In this activity, I can:

- understand what I've learned and create an innovative project ☆☆☆☆☆
- work with partners in the group and help each other ☆☆☆☆☆
- clearly express my opinions, listen to others, and see what's good about others' projects ☆☆☆☆☆
- engage in this learning activity and look forward for the next lesson ☆☆☆☆☆

Depending on your performance, color ☆

Excellent: ★★★★★

Good: ★★★★

Not so bad: ★★★

Need more effect: ★ or ★★

Activity 3.3 Sky Screamer

You will be able to:

- identify Me Auriga, Encoder Motor and other electronic modules
- differentiate between Me Auriga and mCore
- understand how Sky Screamer works and how to build it
- work with classmates to review each other's projects, and form your own opinions

Sky Screamer attracts many visitors with its thrilling features. Sitting on a swing-like chair, we feel like we were flying in the sky. The Sky Screamer will circle slowly sometimes and go wild suddenly. People are thrilled because the random movement creates the moment of reaching one's highest happiness.

To Do List

- Draw the draft of your Sky Screamer ☐
- Program the Sky Screamer to make it keep rotating ☐
- Create your interactive Sky Screamer model ☐
- Take a selfie together with your monsters ☐
- Self-review your performance and accomplishment ☐

Warm Up

Match up each material with its function.

Frame

Power

Decoration

Switch

Design

Work in groups to design a Sky Screamer.
Draw your draft in the space below.

Materials

Let's take a look at some materials needed in this activity.

Figure	Name	Features
	Encoder Motor	Encoder Motor is used for precise control over the speed of Sky Screamer.
	Me Auriga	Me Auriga has more ports than mCore, and greater driving ability. The MEDS150 Servo Motor used in this lesson requires more power so Me Auriga is a better choice.

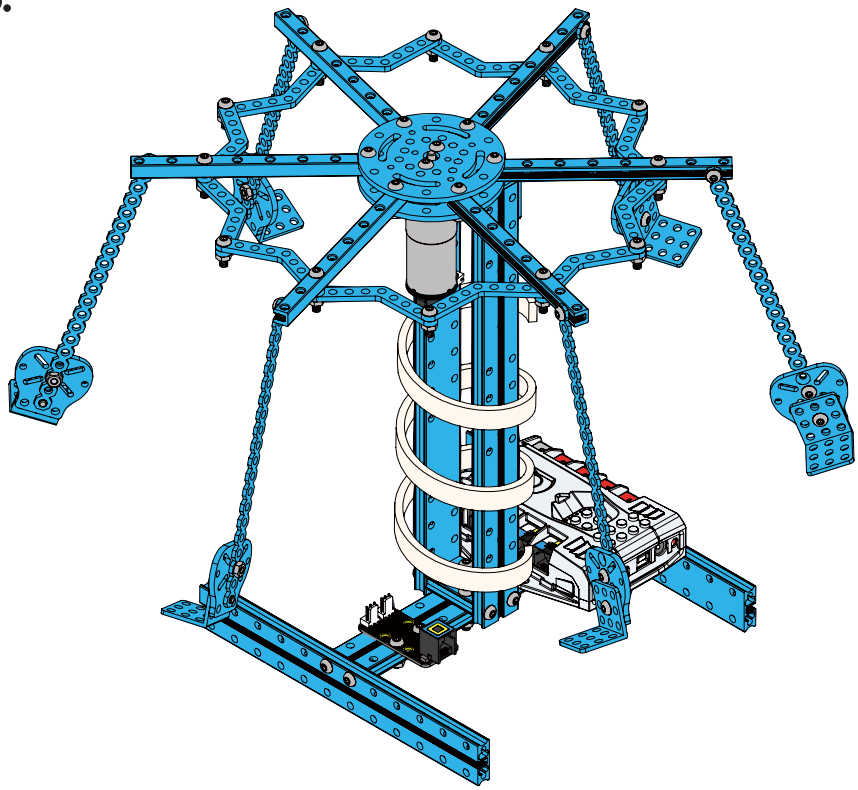
Hands-on

Bring your ideas to life and create your project!

Tips:

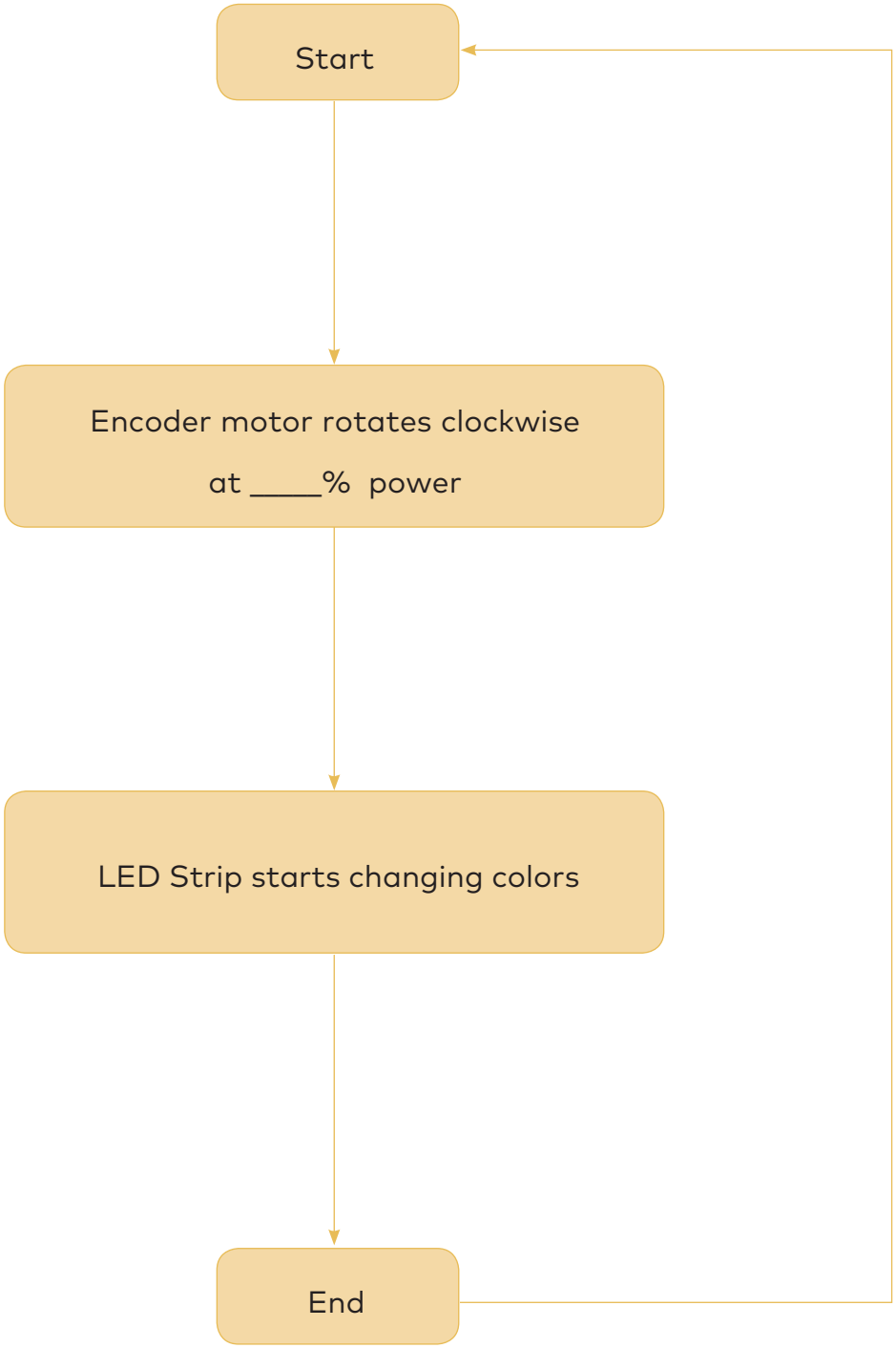
1. You can refer to the teacher's demo project when designing your own project. However, it will be better if you can create your own design.
2. Be careful when using the materials and tools.
3. If you have any problems, discuss with your partners in your group first. If the problems remain unsolved, turn to other groups or the teacher for help.

Demo:



Flow Chart

Complete the flowchart to explain the logic of your project.



Portfolio

Take a picture together with your project.

Extension

Program the Sky Screamer to make it rotate up and down.

Reflection

In this activity, I can:

- understand what I've learned and create an innovative project ☆☆☆☆☆
- work with partners in the group and help each other ☆☆☆☆☆
- clearly express my opinions, listen to others, and see what's good about others' projects ☆☆☆☆☆
- engage in this learning activity and look forward for the next lesson ☆☆☆☆☆

Depending on your performance, color ☆

Excellent: ★★★★★

Good: ★★★★

Not so bad: ★★★

Need more effect: ★ or ★★

Activity 3.4 Live Music Show

You will be able to:

- create your own stage for a concert which can generate various stage effects
- understand what a Potentiometer can do and how it works
- program your stage to generate interactive effects
- work with partners to review each other's projects and offer advice form your own opinions

Stage lighting and effects are both important to a live concert. Organizing a concert is not an easy job. Each detail needs to be carefully considered, from stage design, stage building to lighting setup. Everything matters.

To Do List

- Outline a blueprint for your light and music show stage ☐
- Program the stage to make the lighting and music come alive ☐
- Design your own light and music show ☐
- Take a selfie together with your monsters ☐
- Self-review your performance and accomplishment ☐

Warm Up

Multiple Choice: The stage lighting and sound effects on a concert are controlled by ( )

A Console

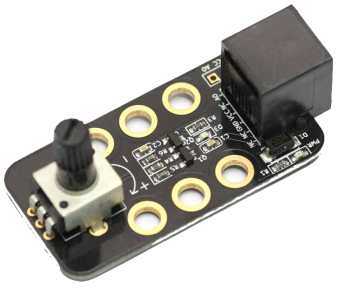
B Microphone

Design

Work in groups to design the stage for a live concert.
Draw your draft in the space below.

Materials

Let's take a look at some materials needed in this activity.

Figure	Name	Features
	Potentiometer	The Potentiometer is used to change the brightness of lights on your stage and the volume of sounds output by the Audio Player. It has a range of 0-980.
	Audio Player	Audio Player stores and plays audio files. An SD card for storing audio files is on the back. Name your audio files using English letters or numbers, for example, Ameng, T001.

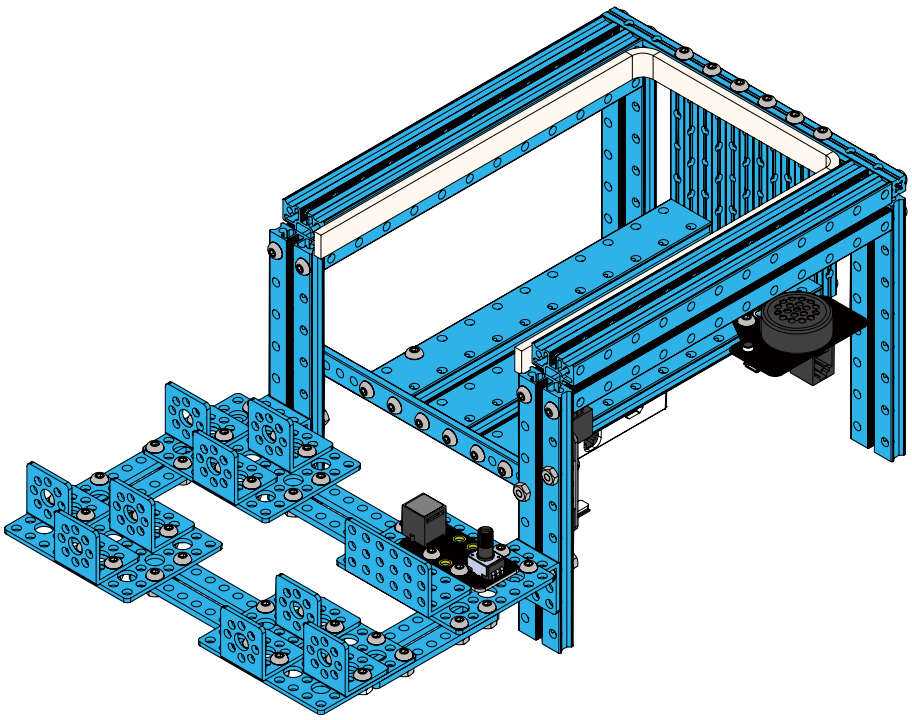
Hands-on

Bring your ideas to life and create your project!

Tips:

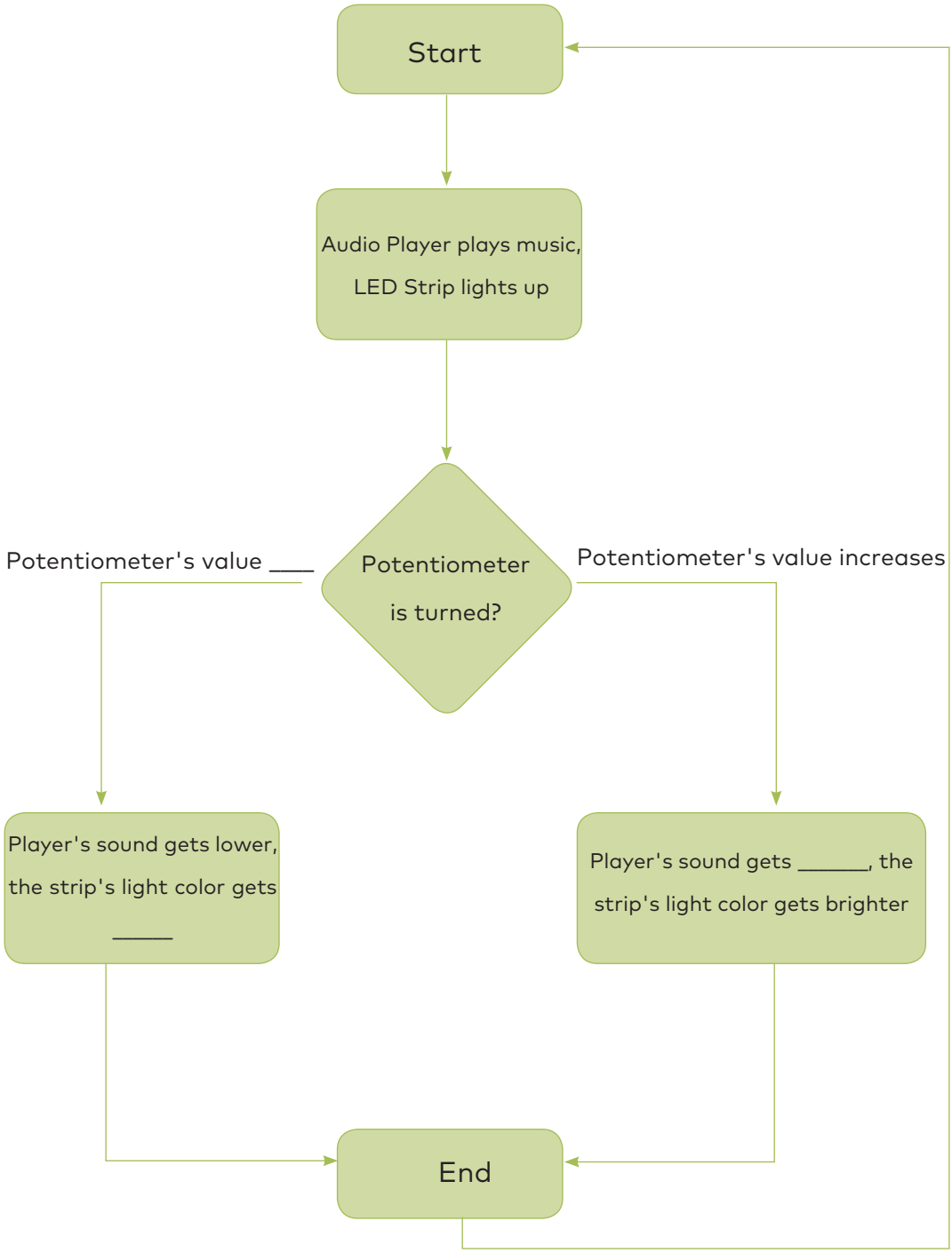
1. You can refer to the teacher's demo project when designing your own project. However, it will be better if you can create your own design.
2. Be careful when using the materials and tools.
3. If you have any problems, discuss with your partners in your group first. If the problems remain unsolved, turn to other groups or the teacher for help.

Demo:



Flow Chart

Complete the flowchart to explain the logic of your project.



Portfolio

Take a picture together with your project.

Extension

Think about how to handle some harsh weather conditions. Wind, rain, and lightning... How would you strengthen your stage effects and equipments?

Reflection

In this activity, I can:

- understand what I've learned and create an innovative project ☆☆☆☆☆
- work with partners in the group and help each other ☆☆☆☆☆
- clearly express my opinions, listen to others, and see what's good about others' projects ☆☆☆☆☆
- engage in this learning activity and look forward for the next lesson ☆☆☆☆☆

Depending on your performance, color ☆

Excellent: ★★★★★

Good: ★★★★

Not so bad: ★★★

Need more effect: ★ or ★★

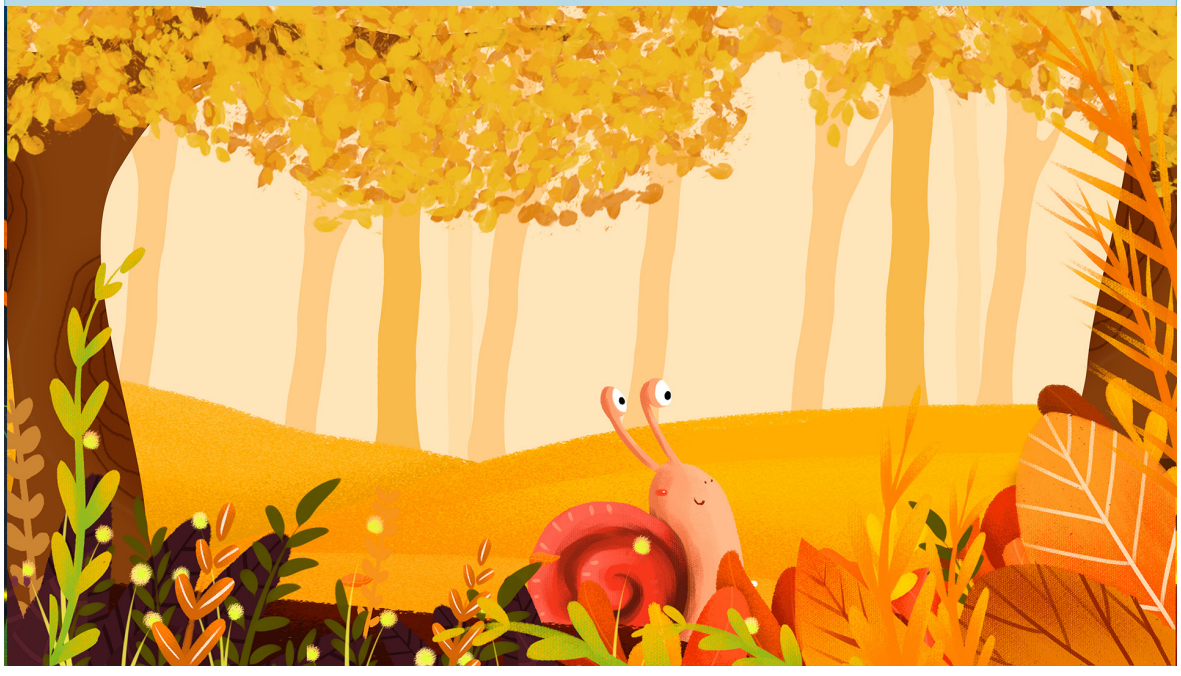
4

Lasersville

Activity 4.1 Color-changer

You will be able to:

- identify the Neuron Color Sensor, LED Strip, and Power blocks
- use Laserbox software to design a snail and the cutter to make a snail
- make the snail change its color with the help of Neuron blocks
- describe colorful snails and color-changing snails and their habitats



Some animals can change their color to protect themselves from predators. Chameleons, for example, are well-known color changing masters. Flounders, octopuses, certain species of snakes on Madagascar, some frogs inhabiting North America, beetles, etc., are all excellent on color changing. They can also change their color to survive when sensing danger.

To Do List

- Correctly connect the Power, LED Strip, and Color Sensor blocks ☐
- Draw the draft of your color-changing snail ☐
- Add the Neuron blocks to the snail and decorate it ☐
- Self-review your performance and accomplishment ☐

Warm Up

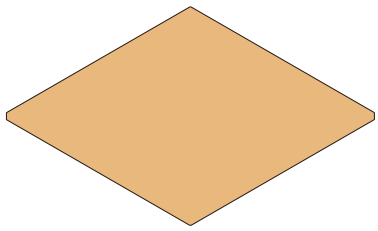
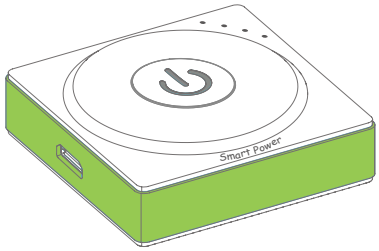
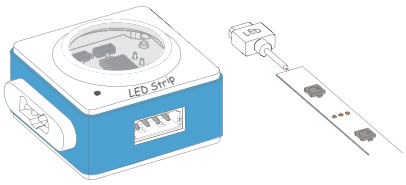
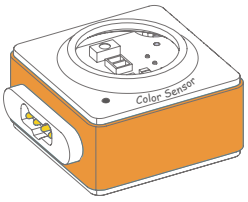
Take a look at different snails shown below.

Design

Work in groups to design a color-changing snail.
Draw your draft in the space below.

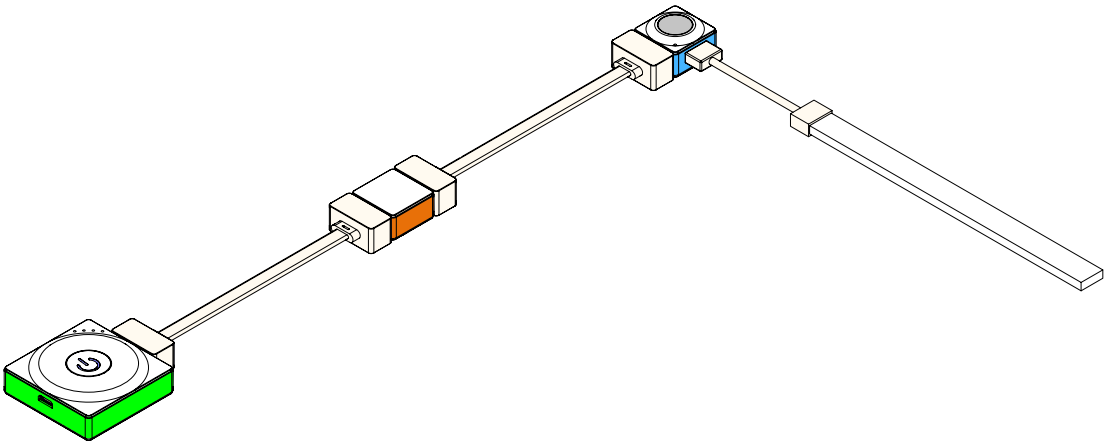
Materials

Let's take a look at some materials needed in this activity.

Figure	Name	Features
	Basswood Board	3mm thick basswood boards are used in laser cutting and engraving.
	Power	The Power block provides power to other blocks.
	LED Strip Driver + LED Strip	The LED Strip contains 15 RGB LEDs, and can change various colors. The LED strip should be plugged into the slot of the LED Strip Driver.
	Color Sensor	The Color Sensor can detect different colors. The LED Strip can be programmed to light up the color that is detected by the Color Sensor.

Warm Up

Snap the Neuron blocks together as shown below.



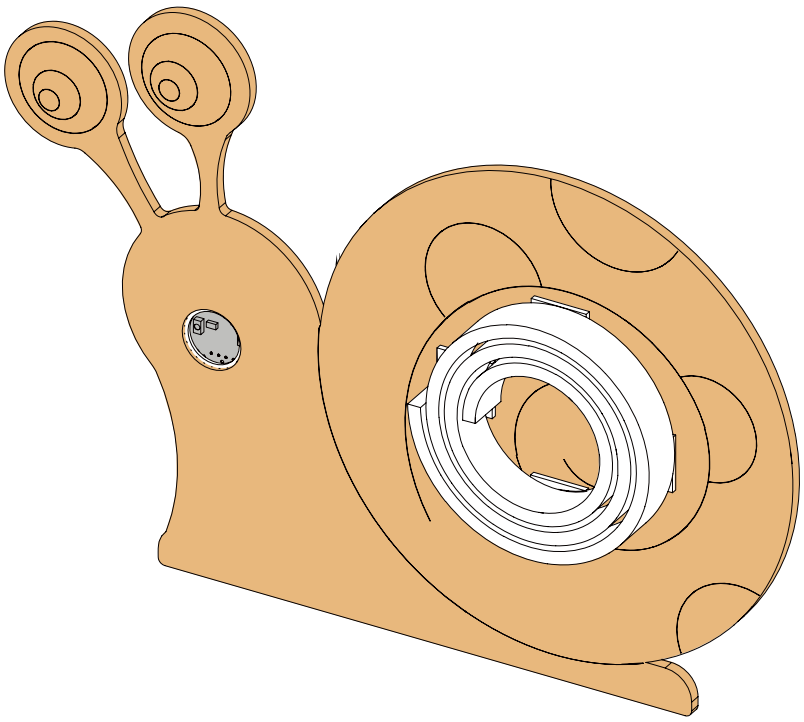
Hands-on

Bring your ideas to life and create your project!

Tips:

1. Laserbox software: The software specially designed for the laser cutter allows you to design and draw everything you like.
2. Laserbox: A device is developed for laser cutting and engraving. Send the pattern you draw in the software to Laserbox, place in an engraving material and then let the smart laser cutter do its job.
3. Keep your drawing simple.
4. Be careful when using the materials and tools.
5. If you have any problems, discuss with your partners in your group first. If the problems remain unsolved, turn to other groups or the teacher for help.

Demo:



Portfolio

Take a picture together with your project.

Extension

There are other animals that can change their skin color to imitate their surroundings. Research one of the color-changing masters and model it with Laserbox.

Reflection

In this activity, I can:

- understand what I've learned and create an innovative project ☆☆☆☆☆
- work with partners in the group and help each other ☆☆☆☆☆
- clearly express my opinions, listen to others, and see what's good about others' projects ☆☆☆☆☆
- engage in this learning activity and look forward for the next lesson ☆☆☆☆☆

Depending on your performance, color ☆

Excellent: ★★★★★

Good: ★★★★

Not so bad: ★★★

Need more effect: ★ or ★★

Activity 4.2 Piranha

You will be able to:

- recognize Neuron Button and Servo blocks and connect them correctly
- use Laserbox and its software to design and make a piranha
- program Neuron blocks to make the piranha alive
- understand the importance of harmony between humans and the nature, and environment protection

Piranhas inhabit South America. Most piranhas grow to between 15 to 25 cm, but a few may grow longer, reaching up to 40cm. Piranhas have razor-sharp teeth, which people believe can bite off steel hooks and human fingers. They are shockingly ferocious species concerned as the most dangerous fish.

To Do List

- Correctly connect the Power, Servo and Button blocks ☐
- Draw the draft of a piranha ☐
- Add Neuron blocks to the piranha and decorate it ☐
- Self-review your performance and accomplishment ☐

Warm Up

Some people argue that hunting piranhas is an act of cruelty to animals because they are also a kind of fish. What's your opinion? ( )

A. Agree B. Disagree C. It depends

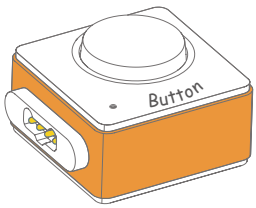
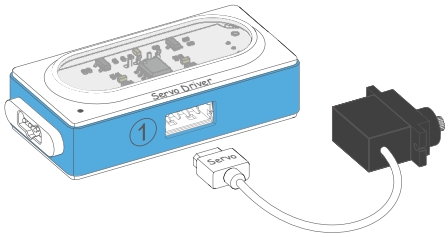
Design

Work in groups to design a piranha.

Draw your draft in the space below.

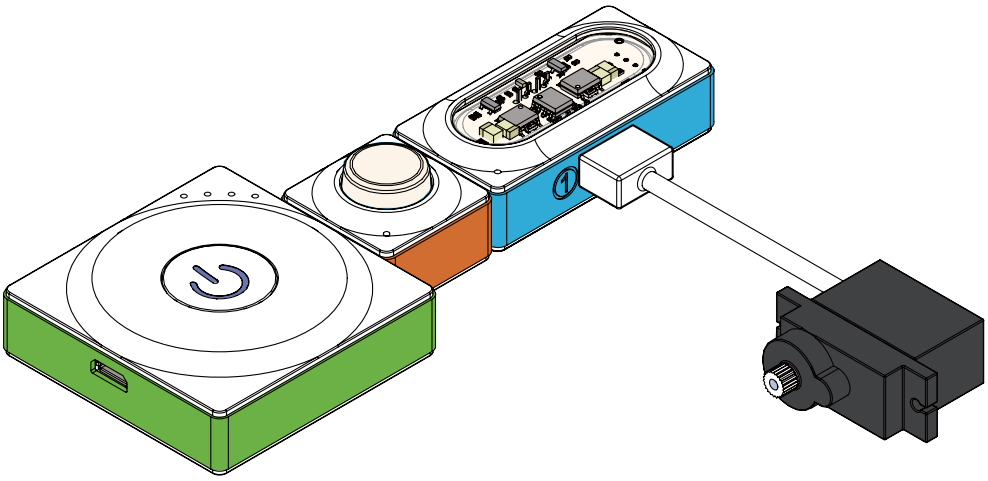
Materials

Let's take a look at some materials needed in this activity.

Figure	Name	Features
	Button	When pressed, the Button block activates something.
	Servo Driver + Servo	The Servo can rotate 180 degrees, allowing the piranha to swag its tail.

Warm Up

Snap the Neuron blocks together as shown below.



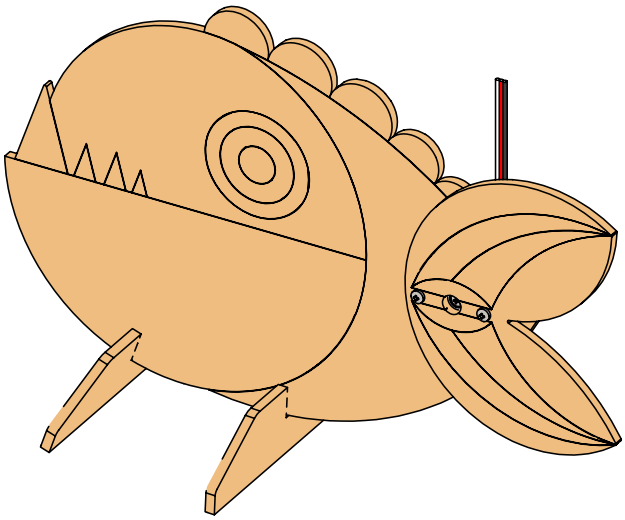
Hands-on

Bring your ideas to life and create your project!

Tips:

1. Open the Laserbox software.
2. Draw your piranha with the software.
3. Remember to include a slot for the Servo and holes to fix the servo disc in your piranha model.
4. Be careful when using the materials and tools.
5. If you have any problems, discuss with your partners in your group first. If the problems remain unsolved, turn to other groups or the teacher for help.

Demo:



Portfolio

Take a picture together with your project.

Extension

Are there any alien species in your homeland? Think about what impacts alien species might bring to the local ecosystem.

Reflection

In this activity, I can:

- understand what I've learned and create an innovative project ☆☆☆☆☆
- work with partners in the group and help each other ☆☆☆☆☆
- clearly express my opinions, listen to others, and see what's good about others' projects ☆☆☆☆☆
- engage in this learning activity and look forward for the next lesson ☆☆☆☆☆

Depending on your performance, color ☆

Excellent: ★★★★★

Good: ★★★★

Not so bad: ★★★

Need more effect: ★ or ★★

Activity 4.3 Animal the Musician

You will be able to:

- identify the Funny Touch and Buzzer blocks and how to make a closed circuit
- use the "Bring Sketch to Life" feature of the Laserbox to make an animal figure
- program Neuron blocks to make an animal perform music show

Lasersville is a place full of surprises and wonders. Each resident is a great musician — Ms. Koala and Mr. Ox are saxophone players, Ms. Elephant and Ms. Piggie drummers, Mr. Zebra is a cymbalist, Mr. Lion a trumpeter, Ms. Bear a clarinetist...Flowers and trees in town shake their bodies along with melodious rhythm. If you have a chance to stay here, you will wake up in beautiful music every morning, and drift off to dreamland with soothing lullabies every night.

To Do List

- Correctly connect the Power, Funny Switch, Buzzer and GND wire ☐
- Design and outline an animal performer ☐
- Add Neuron blocks to your animal performer and decorate it ☐
- Self-review your performance and accomplishment ☐

Warm Up

Here are some animal musicians. Let's see what kinds of instruments they are playing!





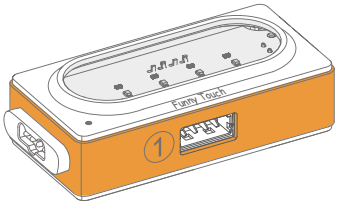
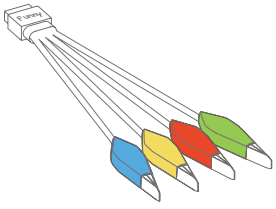
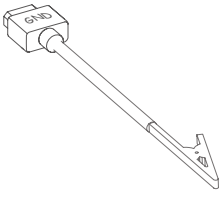
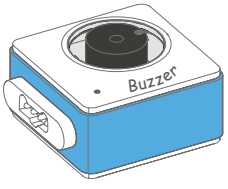

Design

Work in groups to design an animal performer.

Draw your draft in the space below.

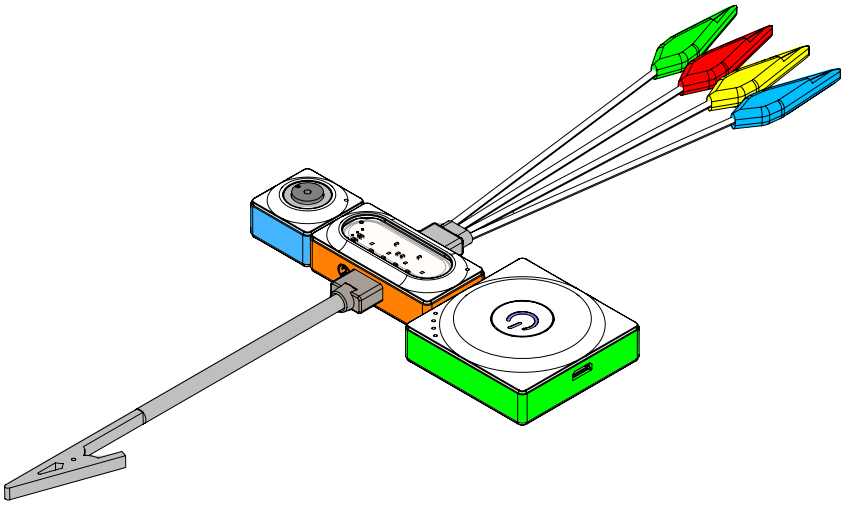
Materials

Let's take a look at some materials needed in this activity.

Figure	Name	Features
	Funny Touch	When connected to conductive materials, the Funny Touch turns into a touch sensor. It should work with Funny Switch and a GND wire.
	Funny Switch	The Funny Switch includes 4 alligator clips and should be plugged into the slot 1 of the Funny Touch.
	GND Wire	The GND Wire should go into the slot 2 of the Funny Touch.
	Buzzer	The buzzer makes a sound when it receives a triggering signal.

Warm Up

Snap the Neuron blocks together as shown below.

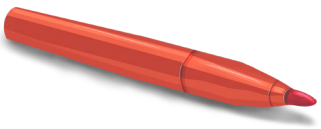


Materials

Match the red and the black mark pens to their functions when sketching your project draft and using the "Bring Sketch to Life" function.

Engrave the details

Cut the details



Draw the outline

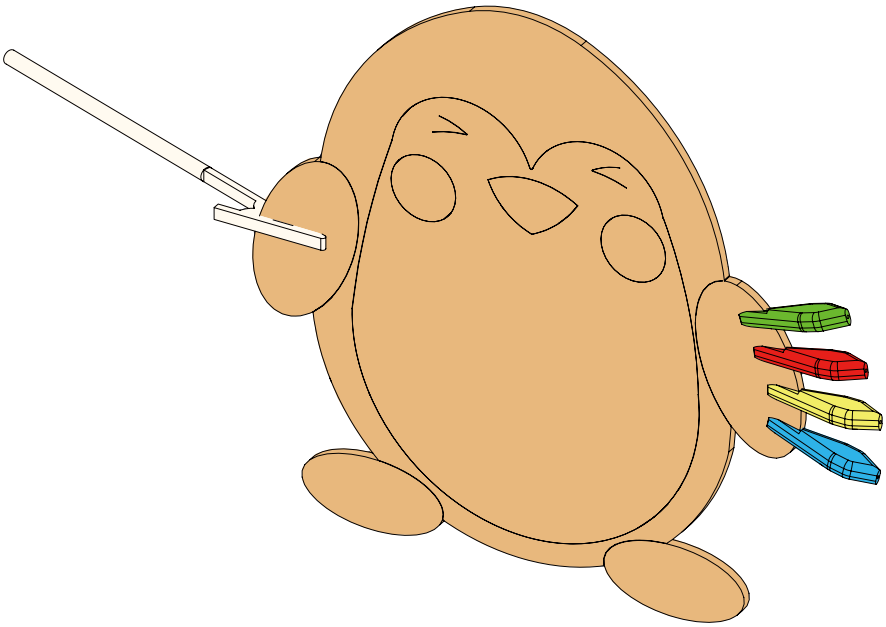
Hands-on

Bring your ideas to life and create your project!

Tips:

1. Keep your drawing simple and clear.
2. Draft your design with a pencil first, and then cover the pencil marks with a mark pen when you are satisfied with the design.
3. Be careful when using the materials and tools.
4. If you have any problems, discuss with your partners in your group first. If the problems remain unsolved, turn to other groups or the teacher for help.

Demo:



Portfolio

Take a picture together with your project.

Extension

What are the similarities and differences between a project designed with the "Bring Sketch to Life" function and the one with Laserbox software's drawing function?

Reflection

In this activity, I can:

- understand what I've learned and create an innovative project ☆☆☆☆☆
- work with partners in the group and help each other ☆☆☆☆☆
- clearly express my opinions, listen to others, and see what's good about others' projects ☆☆☆☆☆
- engage in this learning activity and look forward for the next lesson ☆☆☆☆☆

Depending on your performance, color ☆

Excellent: ★★★★★

Good: ★★★★

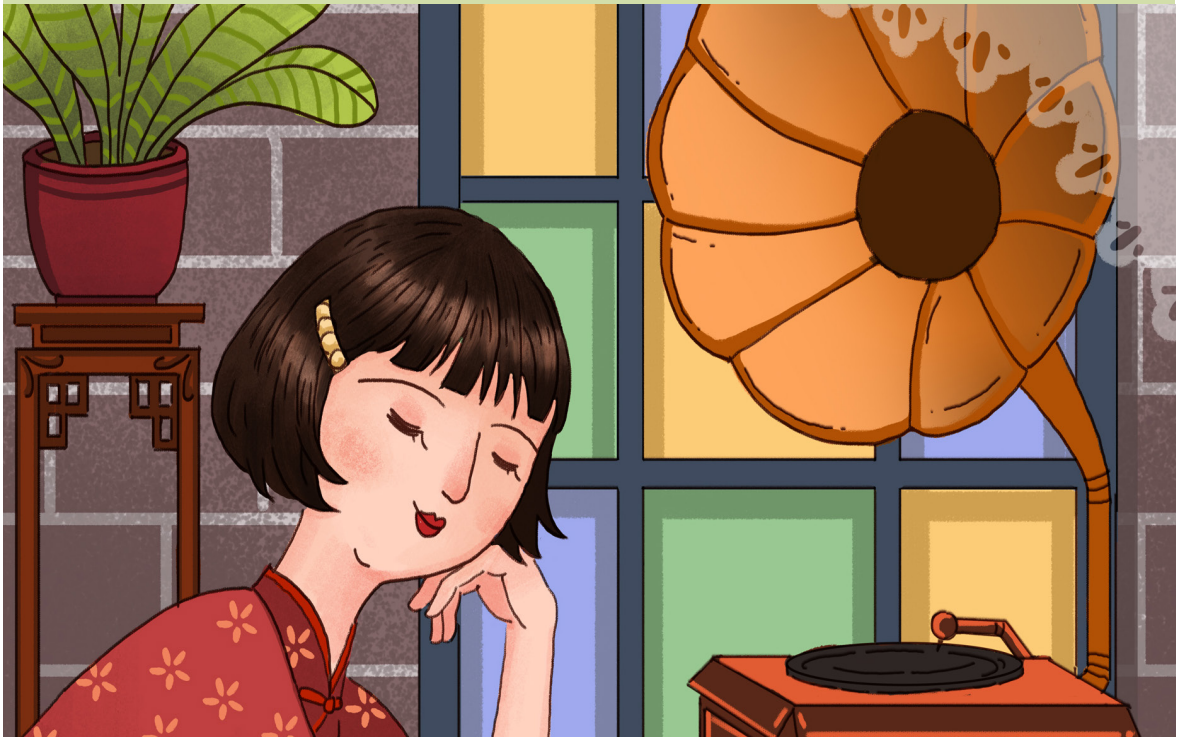
Not so bad: ★★★

Need more effect: ★ or ★★

Activity 4.4 Spinning Music Box

You will be able to:

- recognize Sound Sensor Motor blocks and connect them correctly
- use the "Bring Sketch to Life" function of Laserbox to produce a spinning music box model
- program Neuron blocks to develop the functions of your spinning music box



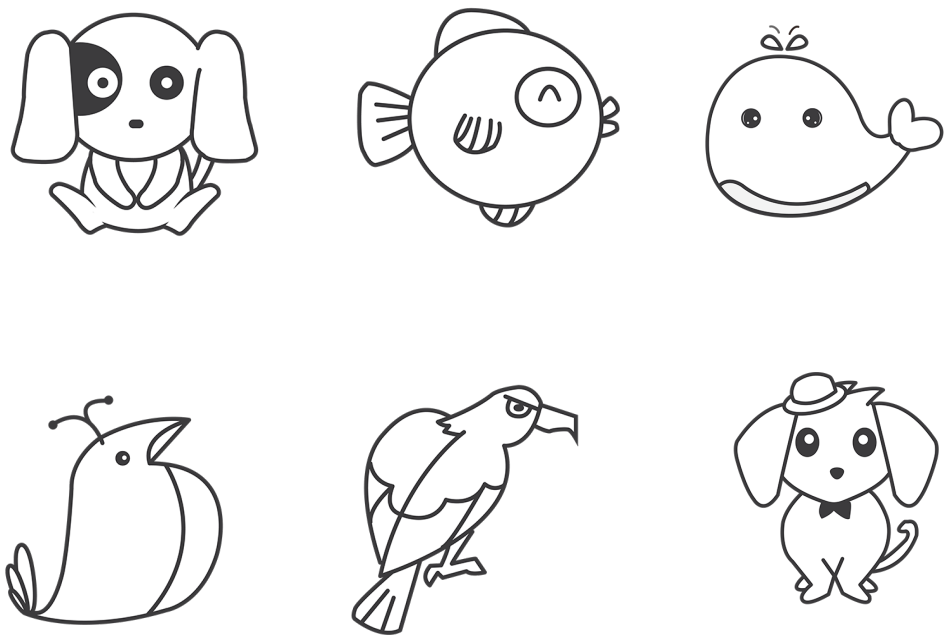
It is believed that the original form of music boxes was a carillon placed in a large clock tower during the Middle Ages in Europe. The music box can produce musical notes when its metal teeth vibrates.

To Do List

- Correctly connect the Power, Sound Sensor and Motor blocks ☐
- Design and make a music box with an animal figure dancing on it ☐
- Add Neuron blocks to the music box ☐
- Self-review your performance and accomplishment ☐

Warm Up

Look at the animal designs below. What animal would you place on the music box?



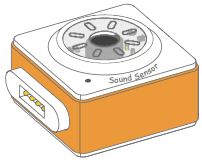
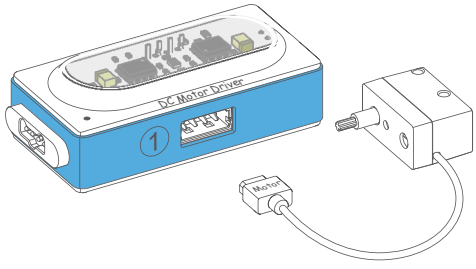
Design

Work in groups to design a spinning music box.

Draw your draft in the space below.

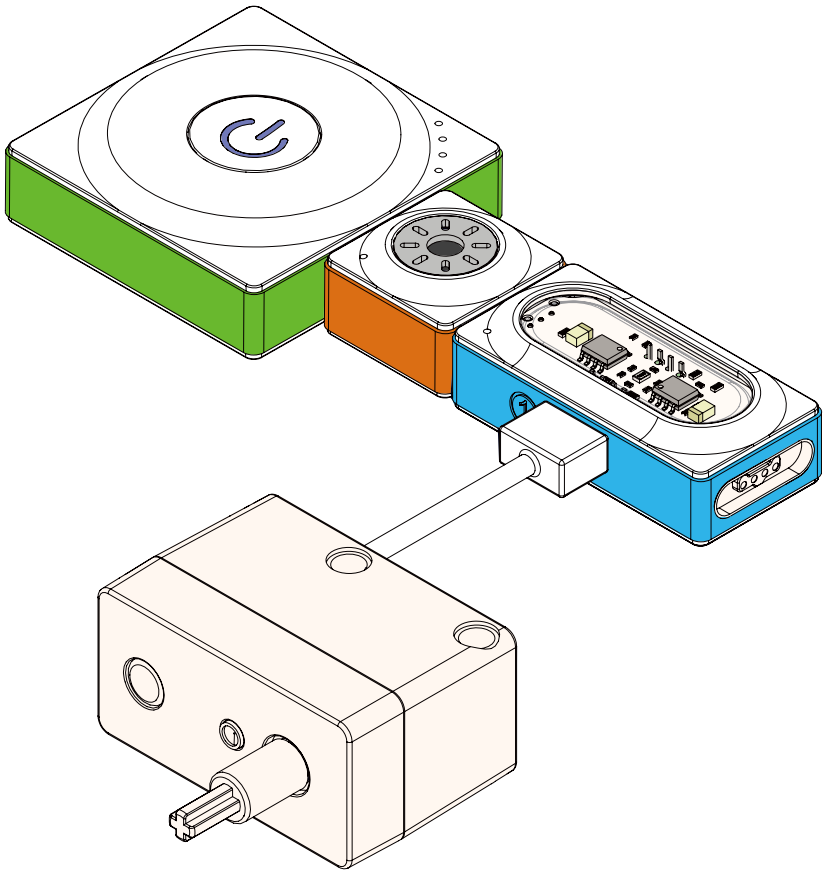
Materials

Let's take a look at some materials needed in this activity.

Figure	Name	Features
	Sound Sensor	The Sound Sensor can detect the intensity of the sound in the surrounding area. The louder sound it detects, the stronger signal it sends out.
	Dual Motor Driver + Motor	The rotation angle ranges from 0 to 360 degrees. The Dual Motor Driver and Motor can be used to make toy cars, windmills, etc.

Warm Up

Snap the Neuron blocks together as shown below.



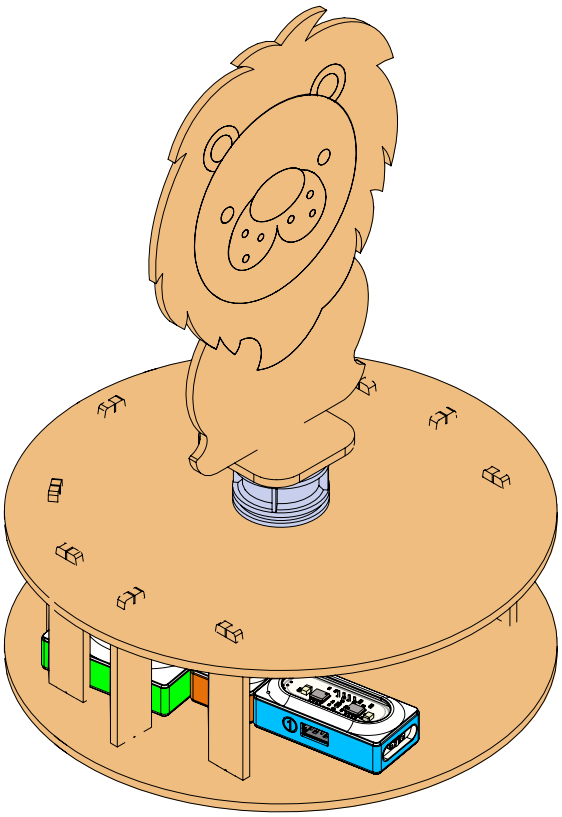
Hands-on

Bring your ideas to life and create your project!

Tips:

1. Recall how to use the "Bring Sketch to Life" of Laserbox.
2. Keep your drawing simple and clear.
3. Draft your design with a pencil first and cover the pencil marks with a mark pen when you are happy with the design.
4. Be careful when using the materials and tools.
5. If you have any problems, discuss with your partners in your group first. If the problems remain unsolved, turn to other groups or the teacher for help.

Demo:



Portfolio

Take a picture together with your project.

Extension

Try different materials to make another music box. Can you recycle useless tin and steel cans and add Neuron blocks to them?

Reflection

In this activity, I can:

- understand what I've learned and create an innovative project ☆☆☆☆☆
- work with partners in the group and help each other ☆☆☆☆☆
- clearly express my opinions, listen to others, and see what's good about others' projects ☆☆☆☆☆
- engage in this learning activity ☆☆☆☆☆

Depending on your performance, color ☆

Excellent: ★★★★★

Good: ★★★★

Not so bad: ★★★

Need more effect: ★ or ★★

makeblock education

D1.1.2 KD010199000