Spreading the Joy of Science

CURIOSITY KIT USER'S GUIDE

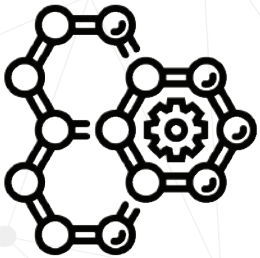
www.twinscience.com

CONTENTS

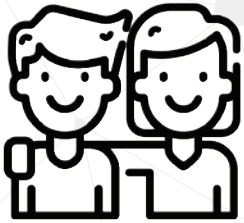
WHAT IS TWIN?

+

FREE MINDS



UNIQUE EXPERIMENTS



CONFIDENT INDIVIDUALS

Twin is a robotics kit that develops creativity in a **fun** and **instructive** way.

It feeds the curiosity in our nature, shows how simple and easy-to-understand science is and encourages us to do more.

“Science is to apply science; science is to know thyself.” Yunus Emre

Twin consists of electronic modules that can be attached with magnets. It requires no risky process of welding. We aim to make the science and technology popular and develop the sense of know-how for the public.

With Twin kits, children and teenagers are able to develop the latest technology of robotics and autonomous cars by simple attachments. With the projects we provide, they will be able to develop their own unique projects to provide solutions to world problems. At advanced stages, we shall provide the kids with the scientific knowledge of the projects they have performed to complement the “learning by doing” concept.

The kids that play with Twin;

- **Have creativity,**
- **Have dexterity,**
- **Have their best dreams realized!**

Kids can also enjoy playing with their LEGO® bricks to the fullest because Twin is compatible with LEGO® bricks!

TWIN AS A SOCIAL PROGRAM: Latest Technology to the Remotest Rural Areas

We believe that the human knowledge and love grow by sharing. Twin not only presents the most advanced technology to the kids, but it also delivers it to those in the most disadvantaged echelons of the society.

Twin implies being two-winged by heart and mind. We dream of spreading the Twin concept of creating and sharing to the world. Twin as a social program works within the scope of a global Science Movement campaign of YGA (Young Guru Academy) worldwide, in partnership with universities, education and training centers as well.

By purchasing this kit, you’ve contributed to the Science Movement Campaign extending to the remotest villages.

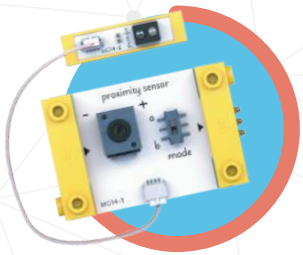
Twin is a start-up founded by YGA graduates. It has been developed with the guidance of Turkey’s first science Nobel laureate **Prof. Aziz Sancar**, Harvard & MIT **Prof. Mehmet Toner** and **Prof. Doğan Cüceloğlu.**

WHAT IS INSIDE THE

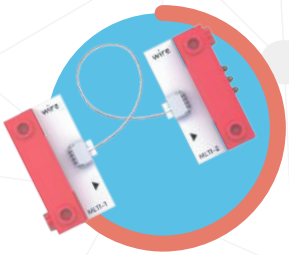
CURIOSITY KIT

Twin Modules

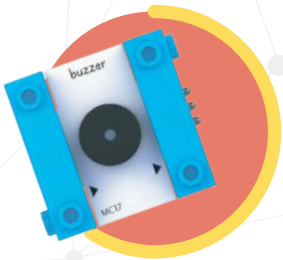
Power



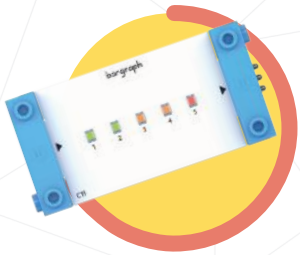
Proximity Sensor



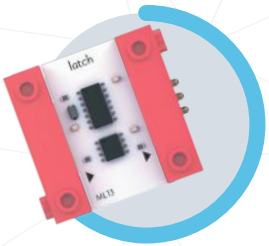
Wire



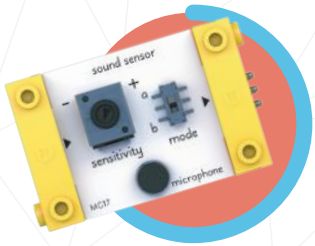
Buzzer



Bargraph



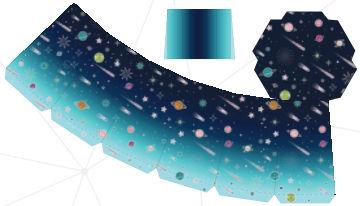
Latch



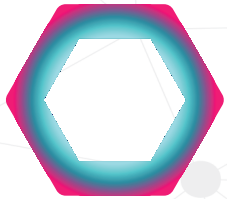
Sound Sensor

Bonus Materials

Flashlight Cardboard

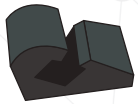


Smart Hat Body Cardboard

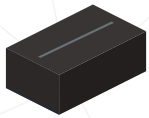


Smart Hat Base Cardboard

Projection Cards



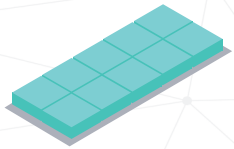
Morse Code Foam



RectangleFoam

Straw

Popsicle Sticks

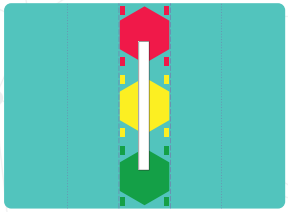


Sticky Putty

Bonus Materials

Smart Pet Feeder Cardboard

Smart Security Cardboard

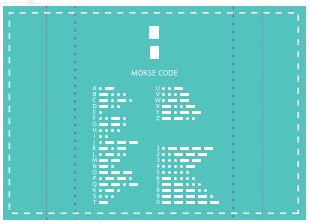


Foam Slot

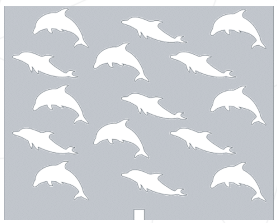
Door Alarm Cardboard

Visitor at the Door Cardboard

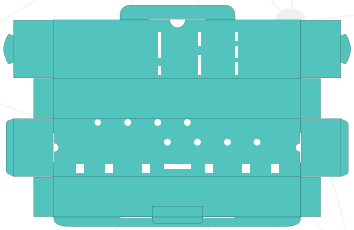
Smart Lock Cards



Morse Code Cardboard



Dolphin Patterned Lambshade



Smart Lock Box

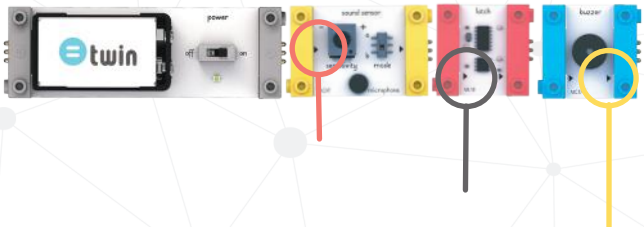
MEET THE TWIN MODULES

Place the modules next to each other to connect them

Modules connect to each other with the magnets in them .

If you try to connect the modules in reverse direction, the magnets repel each other.

Try it out!



Energy moves in the direction of arrows.
When connecting the modules, make sure the arrows point towards the same direction.

Color Codes of Twin Modules

Twin modules are divided to **four different colors** depending on their function in the circuit.

power

Power modules come first and provide power for the circuit to work.

input

Input modules send signals to the module that comes afterwards.

logic / transmission

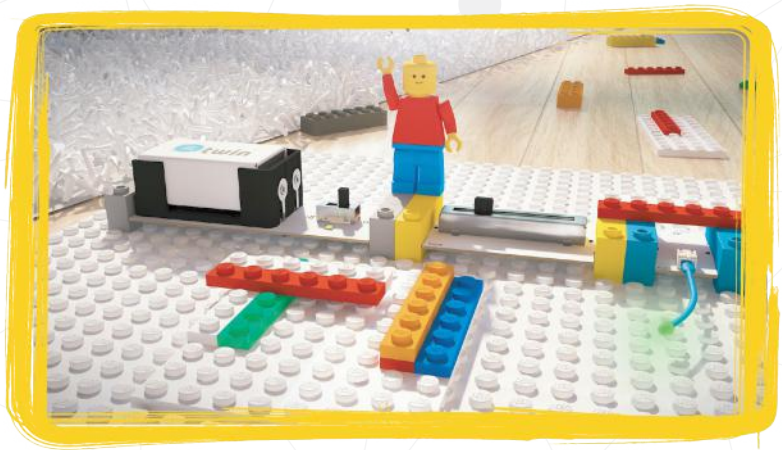
These modules allow you to expand and change the direction of your circuits, as well as controlling modules.

output

Output modules produce output such as sound, motion, and light

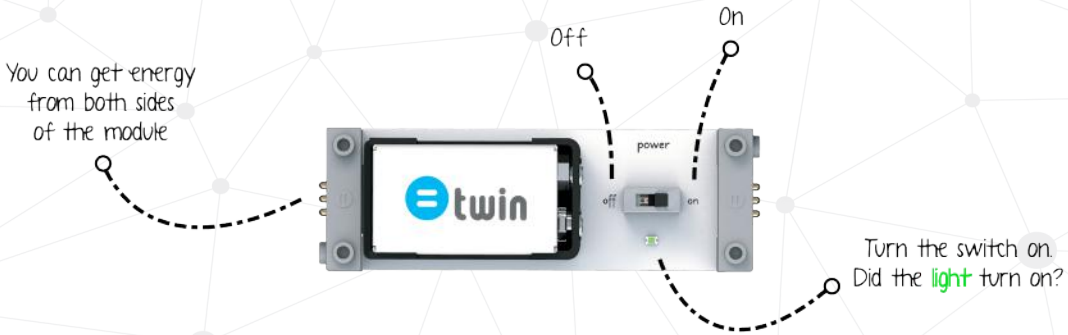
Bring Your Toys to Life

Twin modules have been designed to be compatible with LEGO® bricks.
You can prepare your circuit and combine it with LEGO® bricks as you wish.



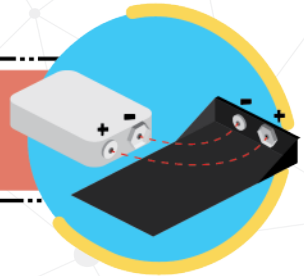
POWER

The Power transfers the energy from the battery to the circuit.
The switch on it allows for the energy flow to be turned on and off.



WARNING!

Make sure the circle tip of the battery aligns with the hexagonal slot on the module.
Make sure the "+" and "-" connections are done correctly as shown in the image.
Incorrect connections may damage the circuit.



How It Works?

The battery you use produces 9 volts of electricity. Twin modules work with 5 volts. What does the power module do, then? It converts the voltage of the battery to 5 volts and makes it compatible with the modules.

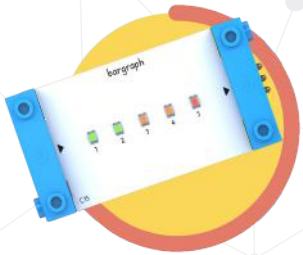
For the Curious

Alkaline batteries create electricity through a chemical reaction between zinc and manganese. The chemical energy is converted into electrical energy

REAL LIFE EXAMPLES

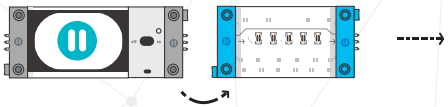
BARGRAPH

The Bargraph changes the number of LEDs depending on the strength of the electrical signal.

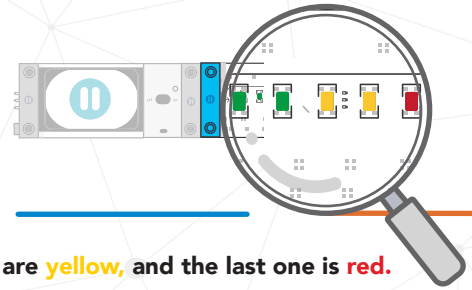


LET'S TRY!

Connect the **Bargraph** to the **Power** module.



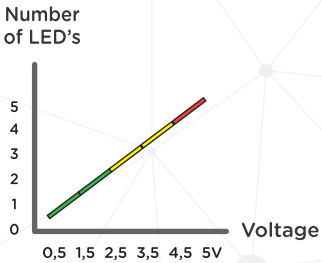
Lights will turn on when the power is on.



The first two LEDs are green, the next two are yellow, and the last one is red.

How It Works?

The electrical signal that changes between 0-5 volts, determines how many LED's will turn on. The first LED will turn on at 0.5V, with the other LED's turning on at 1V intervals. The final LED turns on at 4.5V.

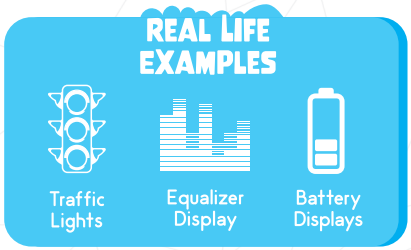


For the Curious

Do you know what LED stands for? It means **"Light Emitting Diode"** What is a diode? Diodes are special systems that are built with semiconductors.

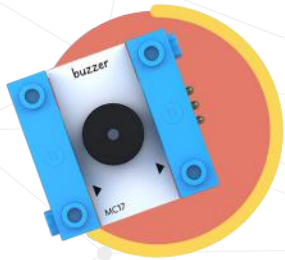
The primary property of diodes is that their electrical resistances are very high in one direction and very low in the other. This causes electricity to flow in only one direction. For more interesting facts about diodes, check out the **experiments** in the booklet.

Due to their low energy losses, LED's are highly efficient.
Who knows, maybe you will invent an even more efficient version.



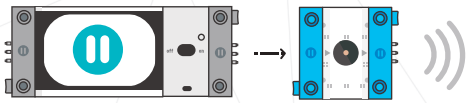
BUZZER

The Buzzer converts electrical signals to vibration and sound. You can use the Twin Coding Module to code the Buzzer to play different songs.



LET'S TRY!

Connect the **Buzzer** to **Power.** The **Buzzer** will produce a sound.



How It Works?

The piezoelectric crystal inside the buzzer converts electricity to vibrations and produces sound. The vibrating piezoelectric crystals vibrate the air molecules around it and air transfers the sound.

For the Curious

How loud is the Buzzer module? What is it's frequency?

Decibel is a unit used to measure how loud a sound is. The quietest sound a person can hear is 0 dB. The Buzzer module produces a maximum of 80 dB. An increase of 10 dB means that the sound is ten times louder. You don't need to worry, sounds under 85 dB are mostly considered safe.

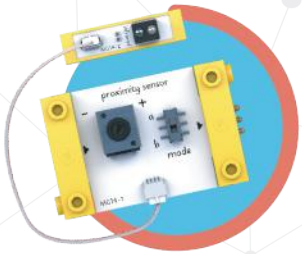
Frequency is the number of vibrations in a second. The unit of frequency is Hertz and its symbol is Hz. The frequency of the Buzzer is 2500 Hz, meaning that the piezoelectric crystal vibrates 2500 times every second.

REAL LIFE EXAMPLES

Digital Clocks

Alarms

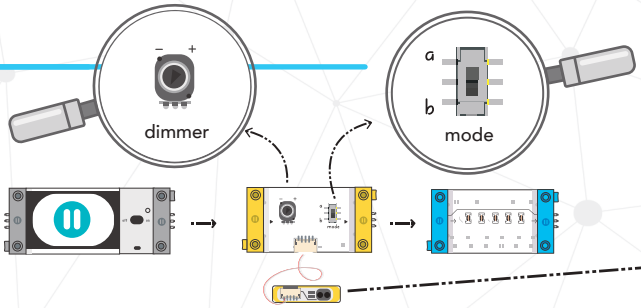
PROXIMITY SENSOR



The Proximity Sensor measures the distance of the obstacles in front of it. The dimmer controls the sensitivity of the sensor. When the sensitivity is higher, it detects objects at a greater distance.

In mode "a" the module stops the signal when it detects an object,
In mode "b" the module transmits the signal when it detects an object.

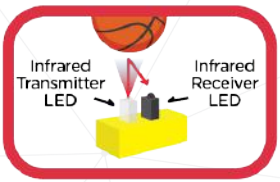
LET'S TRY!



Connect the **Proximity Sensor** and **Bargraph** modules to **Power**.
Control the lights by moving your hand closer to sensor.

Change the mode, try it again

How It Works?



The transmitter LED on the sensor sends infrared light, and the receiver collects the reflected light. The angle in which the receiver receives the light is used to calculate the distance.

For the Curious

Can we see infrared light?
Even though you can't see infrared light with your bare eyes, you can use a camera to see it. Look at the sensor with your camera.

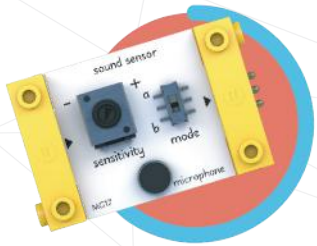
Figure out how!
Different animals can see lights of different colors. For example, some birds can see ultraviolet lights that humans can't see.

REAL LIFE EXAMPLES

Automatic Faucet

Automatic Door

SOUND SENSOR

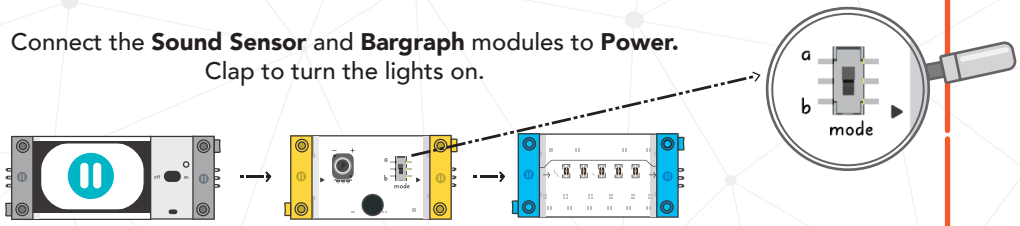


The Sound Sensor sends an electrical signal when the sound reaches a certain threshold. You can increase the sensitivity using the dimmer. When the sensitivity increases, it can detect quieter sounds.

In mode "a" the module sends analog signal and work as equalizer.
In mode "b" the module sens digital signal.

LET'S TRY!

Connect the **Sound Sensor** and **Bargraph** modules to **Power.**
Clap to turn the lights on.



Change the sensitivity using the dimmer, try it again.
Change the mode to "a" and play a song.

WARNING!

The Sound Sensor transmits the signal for 5 seconds after hearing a sound, meaning that it can't hear anything during that period.

How It Works?

The Sound Sensor works the opposite way as the Buzzer. The piezoelectric crystals in the sensor convert the sound vibrations to electric signals.

For the Curious

The unit decibel gets its name from the inventor **Alexander Graham Bell's** surname. The deci-prefix means one tenth.

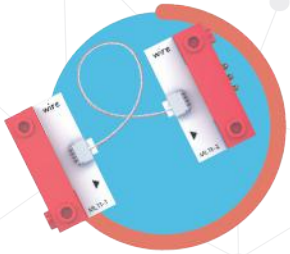
REAL LIFE EXAMPLES

Ear

Microphone

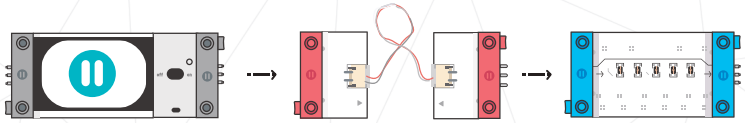
WIRE

Wire allows modules to be connected from a distance.



LET'S TRY!

Connect the **Wire** and **Bargraph** to **Power.**
Move the modules as you like as the lights are on.



How It Works?

The Wire module contains a conductive copper cable. It transmits the electric signal to great distances.

For the Curious

How is electricity transmitted?

Electricity is transmitted via free moving electrons. Some materials transmit electricity well. Some of these conductors are silver, copper, and gold.

Even though silver is a better conductor, copper is used more since it is cheaper than silver.

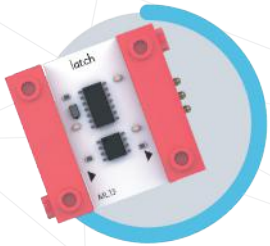
REAL LIFE EXAMPLES

High Voltage Line

Cable

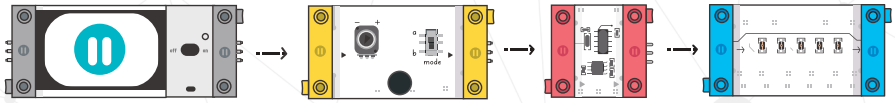
LATCH

Latch holds the input signal and transmits it to the output.
Use the Latch after the yellow input modules.



LET'S TRY!

Connect the **Sound Sensor, Latch,** and **Bargraph** modules to **Power.** Lights will turn on when you clap your hands and will turn off when you clap your hands 5 seconds later.



Remove the Latch and try again. Can you see the difference?

How It Works?

By saving the data! The module records the signal it receives and passes it on. The module only records the on or off state, or 0 or 1. Since it can only record one 0/1 state, it has a storage of one bit.

For the Curious

The Latch can store 1 bit of data to control the signal. To store 1 GB, you will need 8 billion latches.

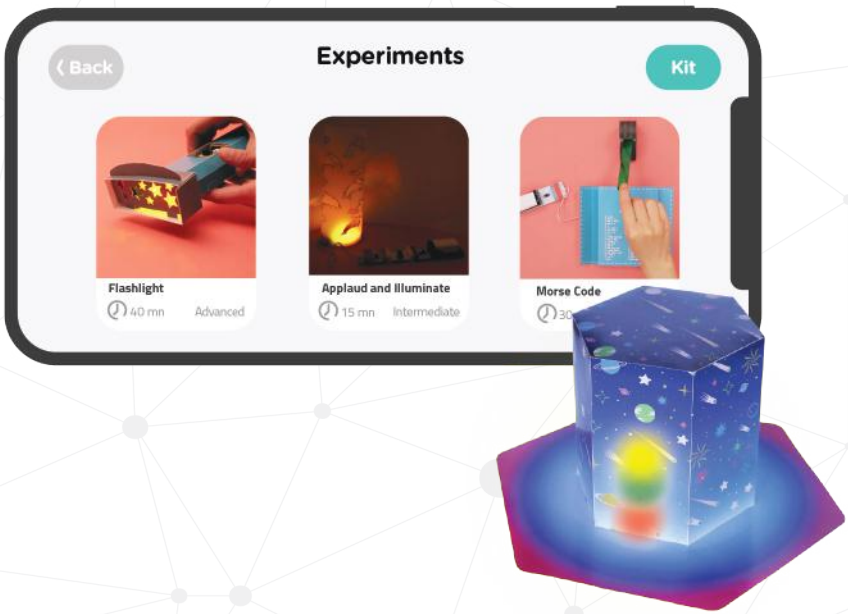
REAL LIFE EXAMPLES

USB Drive

Hard Disk

DISCOVER TWINNER

Find more projects
in the Twinner mobile app!



You can download the **Twinner** Mobile app
from **Google Play** or the **App Store**

Download on the App Store

GET IT ON Google Play

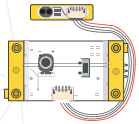

PROJECT
TIME

SMART SECURITY SYSTEM

10 MN Duration | Beginner Level

Necessary Modules

Power



Proximity Sensor

Bargraph

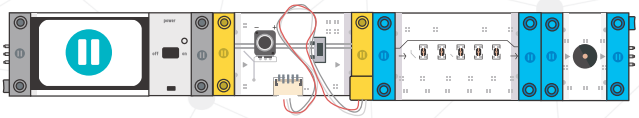
Buzzer

Craft Materials

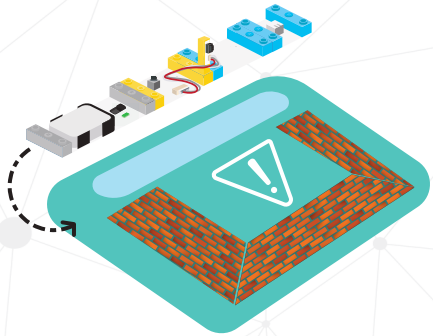
Sticky Putty

Smart Security Cardboard

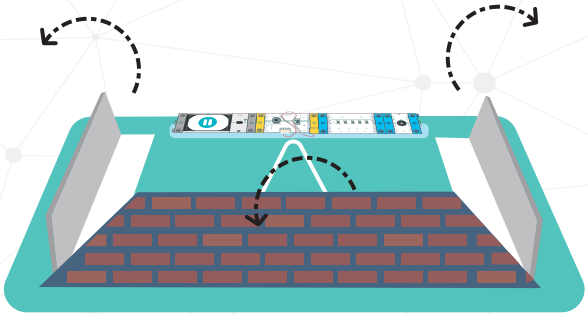
Project Steps



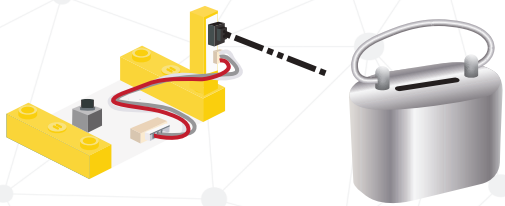
1 Connect the Power, Proximity Sensor, Bargraph, and Buzzer modules.



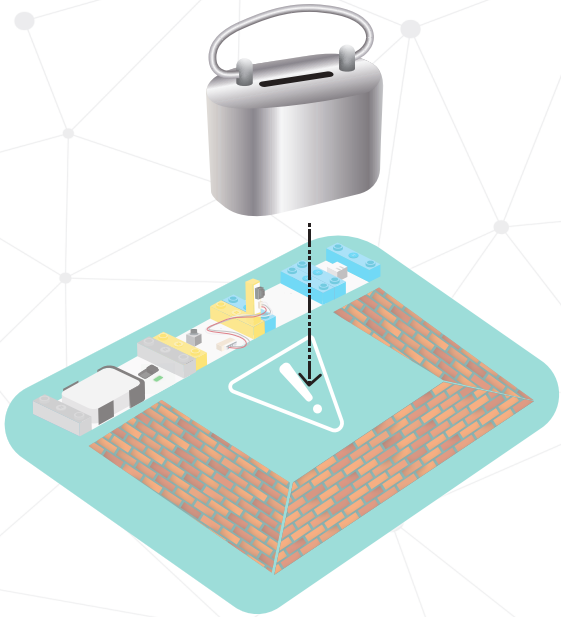
2 Place the modules on the light-colored area using **sticky putty.**



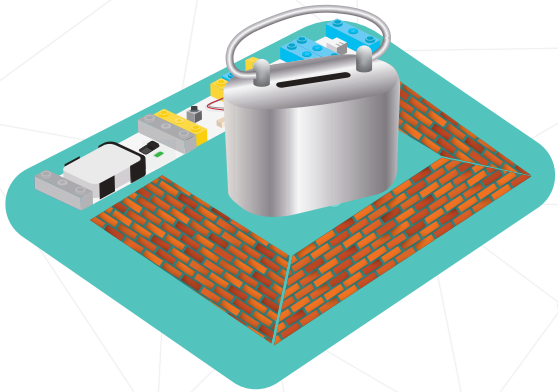
3 Raise the brick-patterned flaps on the cardboard.



4 Position the sensor to see your personal item. **Set the module's mode to "a"**



5 Place your personal item over the exclamation mark. Turn the Power module on.



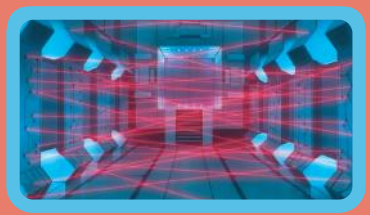
6 Your item is now safe.

You can protect anything you want!

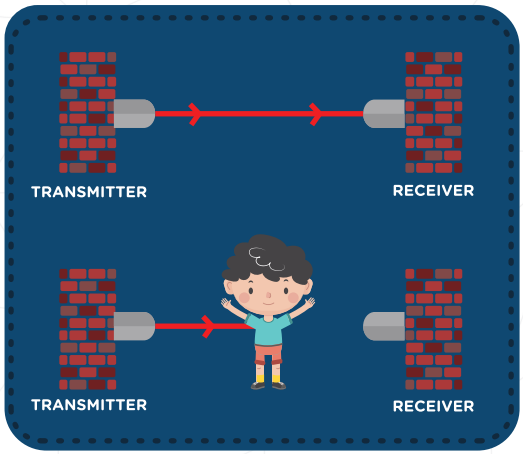
FOR THE CURIOUS

Have you ever wondered how laser alarm systems in movies work?

In the Proximity Sensor module, the transmitter and receiver are next to each other. It detects the object by detecting the reflected light.



Some alarm systems have receivers and transmitters placed opposite to each other. The transmitted light is expected to reach the receiver. If there is an obstacle in between, light cannot reach the receiver and the alarm will go on.

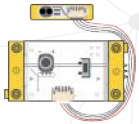


SMART PET FEEDER

10 MN Duration | Beginner Level

Necessary Modules

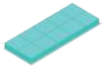
Power



Proximity Sensor

Buzzer

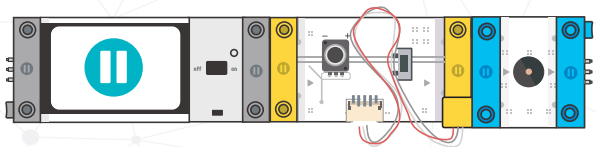
Craft Materials



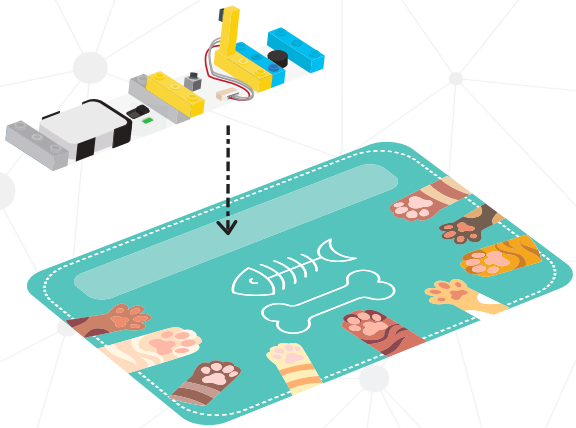
Sticky Putty

Smart Pet Feeder Cardboard

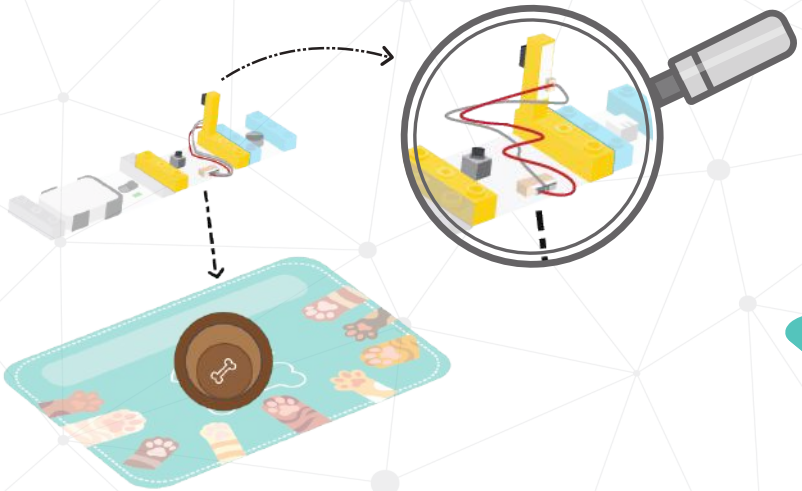
Project Steps



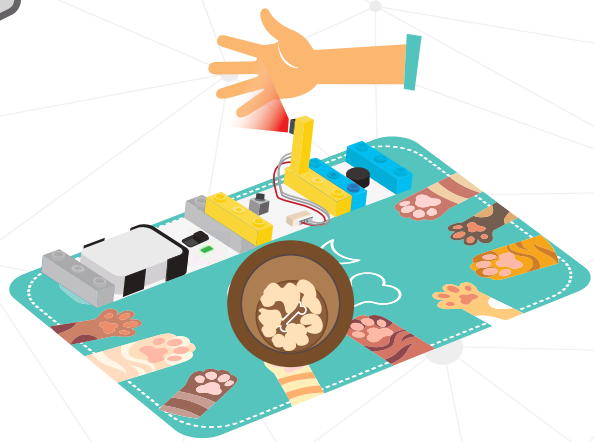
1 Connect the Power, Proximity Sensor, and Buzzer modules.



2 Place the modules on the light-colored area using sticky putty.



3 Place the sensor so that it faces away from the pet bowl. Switch the Proximity Sensor to **mode b.**



4 Ring the buzzer by shaking your hand in front of the sensor, and place pet food into the bowl.

5 By making the Buzzer ring every time you are ready to feed your pet, you can train your pet to connect the sound and meal times.

Your pet can easily understand that it's time to eat.

FOR THE CURIOUS

Have you ever thought of training your pet using Twin?

Giving food to your pet while making a sound is similar to Pavlov's famous conditioning experiment. During this experiment, Pavlov rang a bell every time he fed his dog to teach a connection between the sound and food.

After continuing this experiment for a while, he started ringing the bell without giving any food. This ringing watered the dog's mouth and the expectation of food led the dog to his bowl.

APPLAUD AND ILLUMINATE

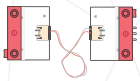
15 MN Duration | Intermediate Level

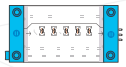
Necessary Modules


Power

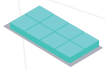

Sound Sensor


Latch


Wire

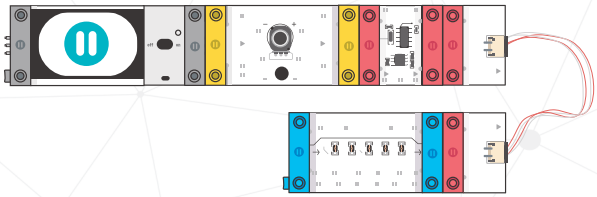

Bargraph

Craft Materials


Sticky Putty

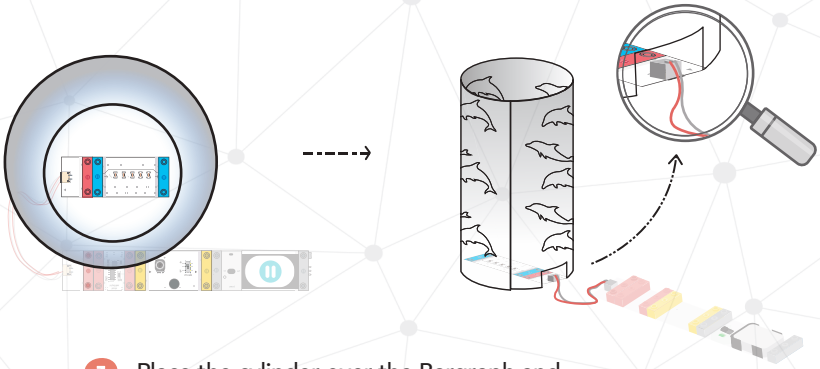

Dolphin Patterned Lambshade

Project Steps

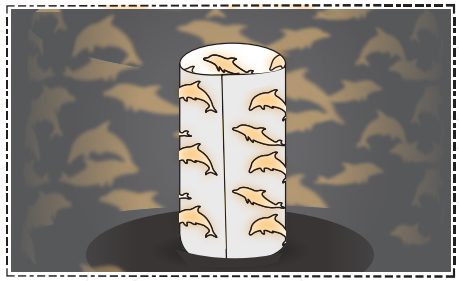


1 Connect the Power, Proximity Sensor, Latch, Wire and Bargraph modules.

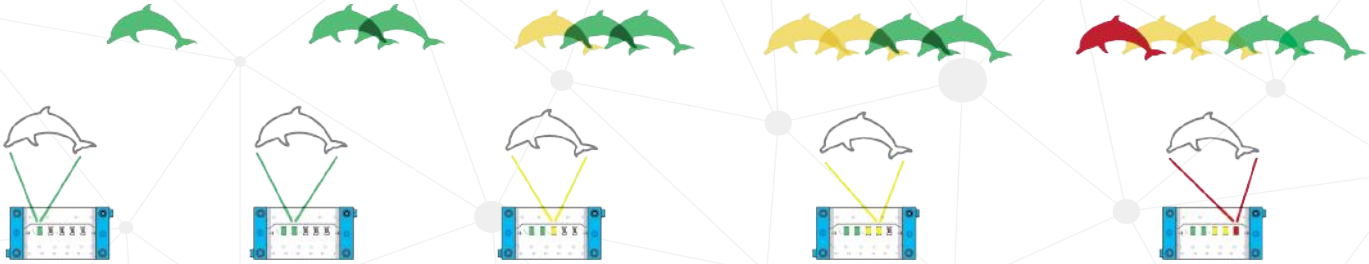
2 Remove the paper layer from the tape on the lambshade. Make a cylinder by sticking the two sides together.



3 Place the cylinder over the Bargraph and Wire module as shown.
Make sure the hole on the lambshade matches with the wire.



4 Clap and bring this light show to your room.



FOR THE CURIOUS

Each dolphin cutout produces 5 dolphins on your walls: **2 green, 2 yellow and 1 red.**

Light travels in straight lines as rays. The LEDs on the Bargraph module are placed in different positions. Therefore, every LED's light reaches the dolphin at different angles. These produce 5 dolphins at 5 different points. The order of the LEDs on the module are green, yellow, and red whereas the dolphins are in the opposite order.

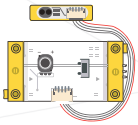
Do you know, why? Make a video with your answer and share it on **YouTube** and **Instagram** with **#twinscience.**

VISITOR AT THE DOOR

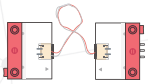
20 MN Duration | Intermediate Level

Necessary Modules

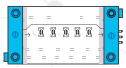
Power



Proximity Sensor



Wire



Bargraph

Craft Materials

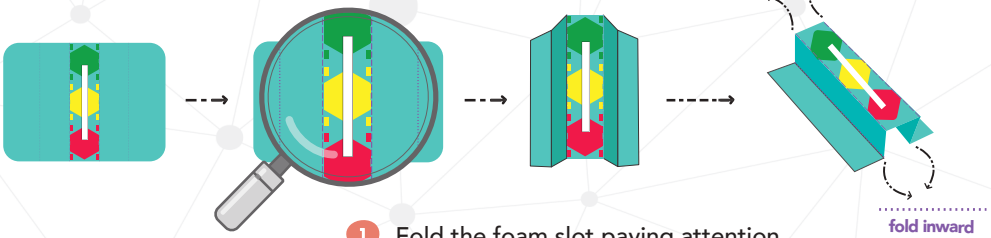
Sticky Putty

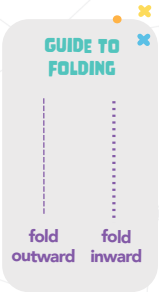
Visitor at the Door Cardboard and Foam Slot

Rectangle Foam

Popsicle Stick

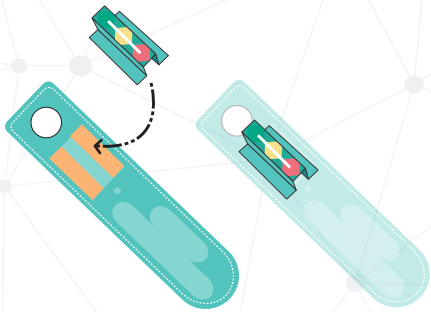
Project Steps



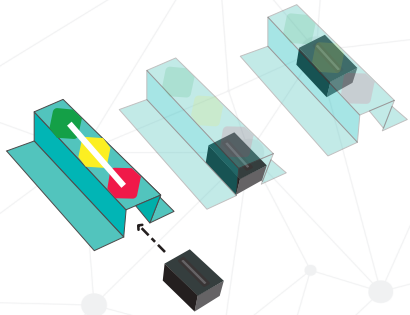


1 Fold the foam slot paying attention to the directions.

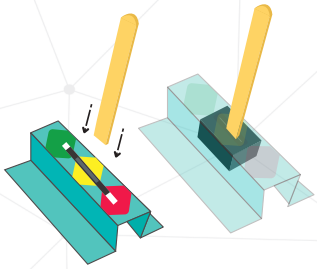
2 Remove the paper layer from the tapes.



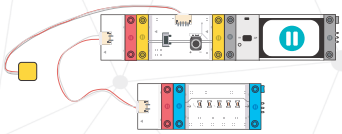
3 Place the foam slot cardboard on the visitor at the door cardboard.



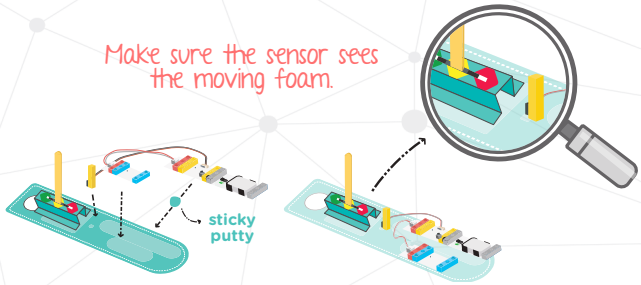
4 Place the rectangle foam in the foam slot.



5 Place the popsicle stick in the foam.



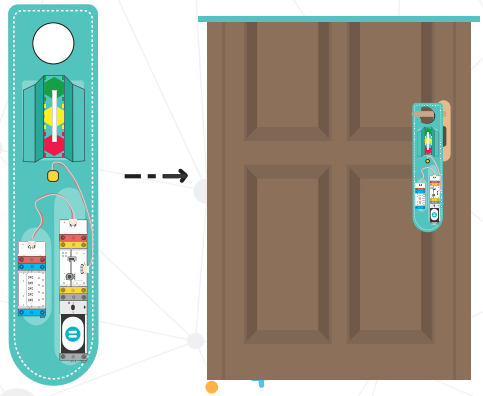
6 Connect the Power, Proximity Sensor, Wire, and Bargraph modules.



7 Use the sticky putty to position the modules on the cardboard

8 Move the popsicle stick to the red area if you don't want to be disturbed

Change sensivity of Proximity Sensor to see red light on Bargraph module when you move to red area.

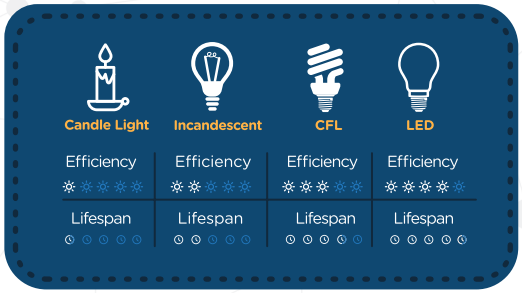


No one will disturb you in your room from now on.

FOR THE CURIOUS

You know that LED stands for light emitting diode. Diodes emit light when electricity passes through them. Russian inventor Oleg Losev was the first person to think of using diodes to produce light and has invented LEDs.

Only some of the light that LEDs emit can be seen by the human eye. Even though he was not the first person to notice this, he researched about this using his curiosity and how it can be used. His efforts allowed him to develop a technology that can benefit the world and humanity.

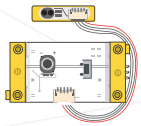


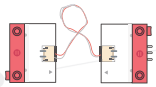
FLASHLIGHT

40 MN Duration | Advanced Level

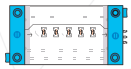
Necessary Modules


Power


Proximity Sensor


Wire


Latch


Bargraph

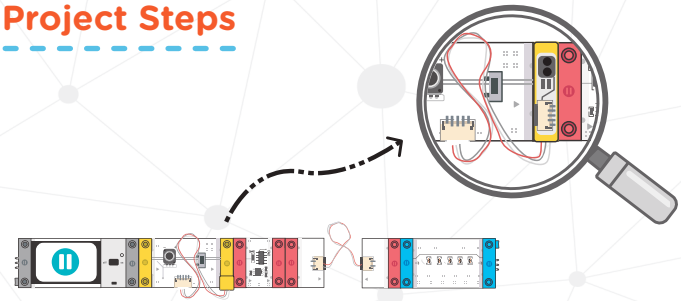
Craft Materials


Sticky Putty

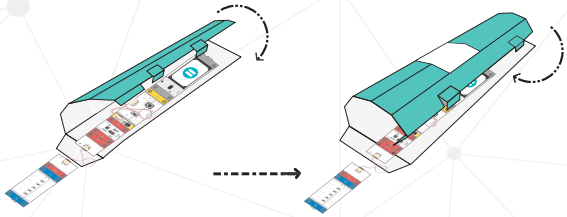

Flashlight Cardboard


Projection Cards

Project Steps

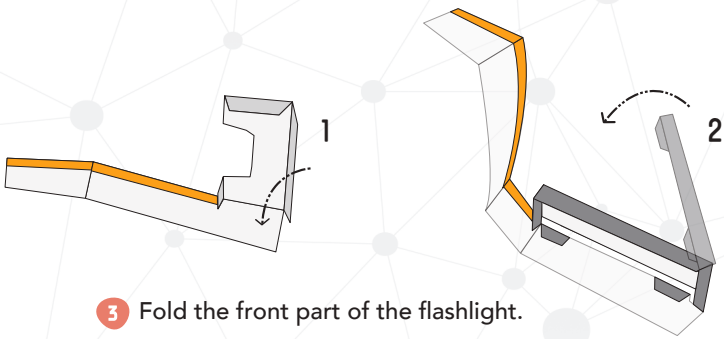


1 Connect the Power, Proximity Sensor, Latch, Wire, and Bargraph modules.

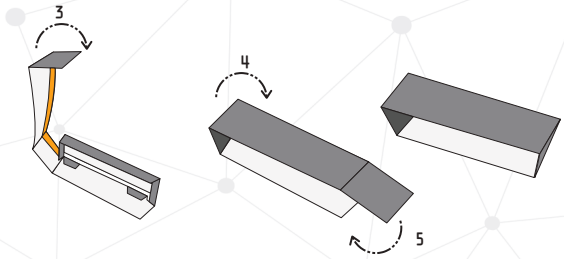


2 Place the modules inside the cardboard using the **sticky putty.**

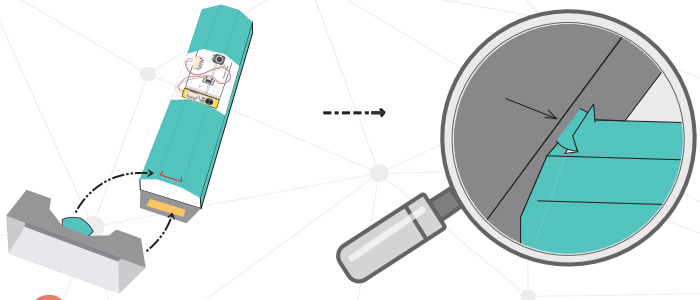
✱ **Don't forget to close the flaps**



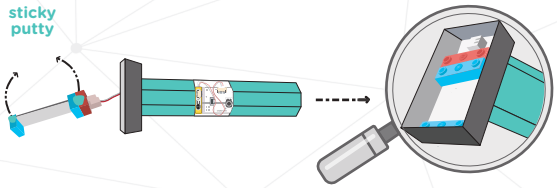
3 Fold the front part of the flashlight.



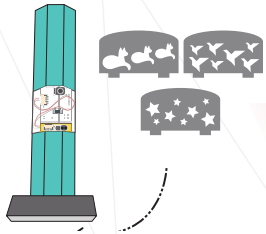
4 Remove the layer from the tape on the flaps to fold them.



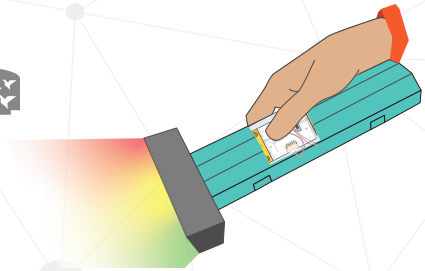
5 Poke the flap at the front of the flashlight through the slot in the middle to fix its place.



6 Stick the Bargraph and Wire to the front of the flashlight using the **sticky putty.**



7 Insert a projection card in front of the flashlight.



8 Make sure the Proximity Sensor is at mode b and put your finger on the sensor.

Turn the light on and reflect the patterns on the wall.

WARNING!

After using the flashlight, you can open the flap in the front to remove the body of the flashlight. This allows for the modules to be removed without damaging the cardboard.

Aren't the patterns amazing?
It's time to use your imagination to create different patterns. Make your own projection cards and share them on social media using **#twinscience**

FOR THE CURIOUS

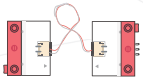
Where does the name flashlight come from? When first flashlights were made, the bulbs and batteries that were portable were highly inefficient. Since they could only be used for short duration, users had to turn it off after a very short duration. Since it was on for a short amount of time, it only produced a flash of light.
That's why the name flashlight was given.

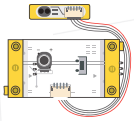
MORSE CODE

30 MN Duration | Advanced Level

Necessary Modules


Power


Wire


Proximity Sensor


Buzzer

Craft Materials


Sticky Putty


Morse Code Cardboard

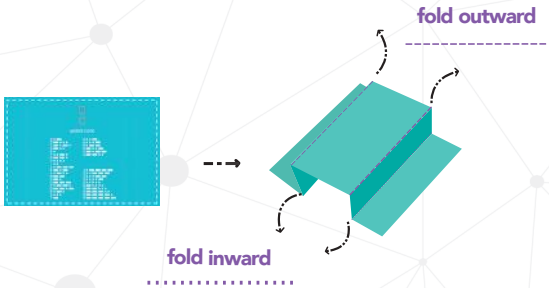

Morse Code Foam


Rectangle Foam

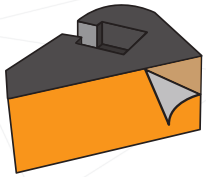

Popsicle Stick

Project Steps

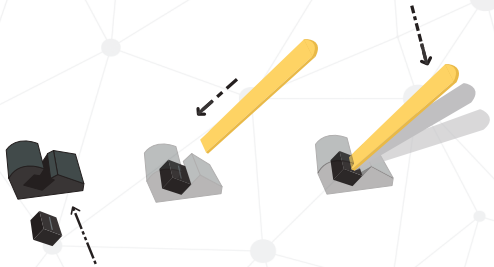
1. Connect the Power, Wire, Proximity Sensor, and Buzzer modules.



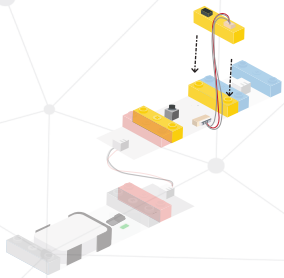
2. Fold the morse code cardboard as shown.

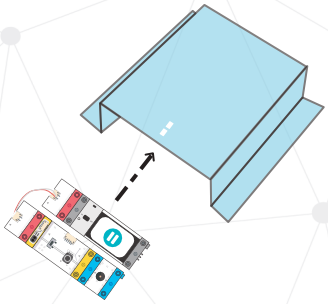


3. Remove the paper layer from the bottom of the morse code foam and place it on the surface.

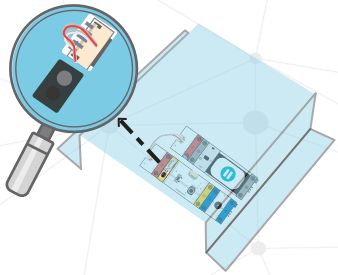


4. Place the rectangle foam in the morse code foam. Put the popsicle stick through the foam.





5 Poke the sensor of the Proximity Sensor through the hole on the morse code cardboard. Make sure the Proximity Sensor is in **mode b.**

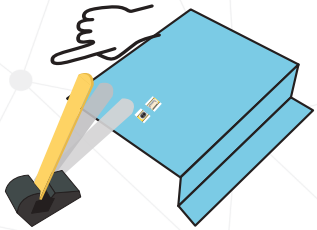


✱ Make sure to align the Proximity Sensor's sensors with the holes on Morse Code Cardboard.

6 Move the popsicle stick towards the sensor and send your secret message. You can use the cardboard to help you.

Hold the stick over the sensor for a short time for dots, and a long time for dashes.

- **Short Time** (0,5 second)
- **Long Time** (1,5 second)



Find the Secret Message

We left a special secret message on the kit's box for you. Would you like to solve this secret message?

Record a video while solving the message and share it on YouTube and Instagram with #twinscience

FOR THE CURIOUS

How was the Morse Code invented?

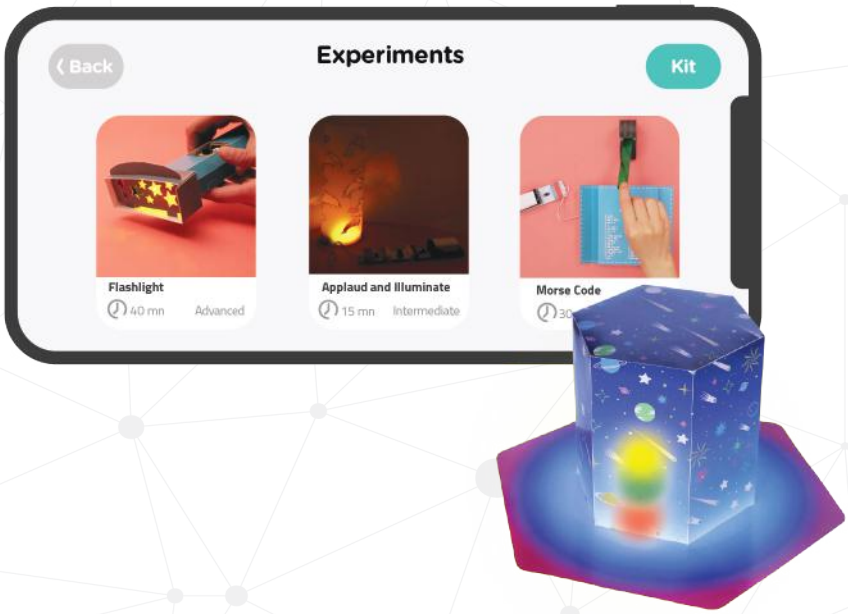
Samuel Morse, who invented the Morse Code and the telegraph, was an artist. One day as he was working on a painting, he received a letter saying that his wife was very ill. He quickly left what he was doing to go to his wife. When he finally reached their home, he learned that she had passed away. The letter reached him too late. He was very sad that he couldn't see his wife for the last time. Therefore, he developed the telegraph to make long-distance communication very quick.

He later developed the Morse Code to transfer texts using the telegraph.

DISCOVER TWINNER

Finished booklet?

Find more projects in the Twinner mobile app!



You can download the **Twinner** Mobile app
from **Google Play** or the **App Store**

Download on the App Store

GET IT ON Google Play

Warnings

- This set contains chemicals and/or pieces that may be harmful in misuse. For proper use, please read the warnings inside the box and the entire booklet carefully.
- The box and the booklet contain important information and warnings. For proper use, keep the box and the booklet for future reference.
- This product contains small magnet(s). Swallowed magnets can stick together across intestines causing serious infections and death. Seek immediate medical attention if magnets are swallowed or inhaled.
- Twin modules contain small parts. DO NOT allow children under 3 years old to play with or near this product. - Choking Hazard
- Some of the Twin modules contain long cords. -Risk of suffocation.
- Do not connect Twin modules to an electrical socket or to a source of alternative current.
- Keep conductive materials away from sockets and the circuit.
- Turn the circuit off when not in use.
- Do not use Twin modules near water or other liquids. Do not use the modules inside a liquid and avoid spilling liquids on the modules.
- Do not use the modules in extreme conditions. Do not use the modules in very hot, very cold, very humid, dusty or sandy places.
- Make sure the modules are clean before using them. The magnets can stick to small metallic pieces and prevent modules from connecting.
- Make sure the connectors of the modules are clean if there are issues with modules' connections.
- Some modules may heat up due to how they are used. If the modules reach extreme temperatures reassess the circuit and stop using the overheated parts.
- Remove any broken or damaged modules from the circuit and stop using those modules.

Important Note: **Several projects in this kit involve the use of a scissors. These tools should be used ONLY under direct adult supervision and ONLY by children capable of using them safely.**

Electronic Waste

Warning! Pieces that have been marked with this symbol contain components which are harmful to nature and to people and should not be discarded alongside other waste. If discarded improperly, the process might cause harm and will be subject to legal punishment. These components should not be used incorrectly. It is forbidden to remove these electrical and electronic components from the toy or using a damaged product. These actions may be harmful.

Electrical and electronic waste must be collected separately and should be passed to designated waste collection sites. Alternatively, you can get in contact with your place of purchase and ask for return the product for disposal back to the shop when a similar product is purchased. Users of the product play a vital role in the collection and discarding of those which have completed their life cycle. For further information, contact your local authorities.

Battery Warnings 

The symbol on the right means that the battery should not be discarded alongside home waste due to its harmful and/or toxic contents. Batteries should be taken to the nearest recycling or waste collection station to be discarded. Dispose of all batteries in accordance with current regulations, by using the appropriate containers at an authorized recycling center or by returning them to the shop where they were purchased. Penalties are applied for incorrect disposal. For further information, contact your local authorities.

- Batteries are dangerous if swallowed; keep away from children.
- Pay attention to the battery's + and - poles when using
- The insertion and removal of batteries should be done with an adult's supervision.
- Do not short circuit the battery by connecting the ends.
- Remove batteries once they have run out
- Do not attempt to recharge non-rechargeable batteries
- Rechargeable batteries should be removed before being charged.
- Rechargeable batteries should be recharged with adult supervision
- Do not try to open the batteries
- Do not expose the batteries to high temperatures and fire. They may explode or leak
- Remove the batteries if the device will not be used for a long time
- Only use recommended batteries
- Discard used batteries carefully at designated disposals.
- Different types of batteries or new and used batteries are not to be mixed.

Cleaning the Modules

Only clean the Twin modules when they are not connected to electricity and only with a dry or slightly damp towel with isopropyl alcohol.

Frequently Asked Questions

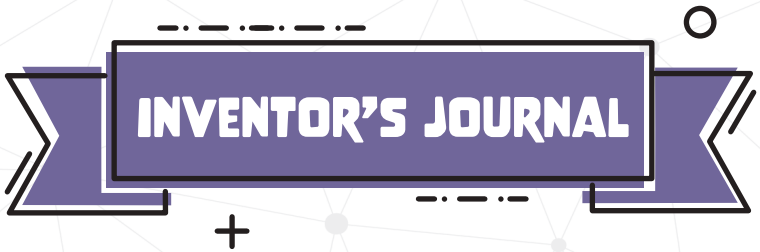
- **One of the modules isn't working. What should I do?**
  Check if the module has been connected correctly. Clean the connectors as instructed in the guide.
  If it still isn't working, you can send an e-mail to **support@twinscience.com**
- **What is the recommended age for the Robotic Art Kit?**
  Because of the electronical and magnetic parts, 8+ age is recommended.
- **I have finished the sample projects in the booklet. Where can I find more sample projects?**
  You can access all project instructions, videos, and codes from the Twinner mobile app.
  Do not forget to check website, YouTube channel and social media account for more projects..
- **I am having trouble with sample projects in the booklet. How can I get support for the projects?**
  Check Twinner mobile app. You can find all projects' detailed videos and instructions in the app.
- **Where can I download the mobile app?**
  You can download it from App Store or Google Play Store.
  Do not forget to create an account to use the application fully.
- **Can I connect my Twin modules with LEGO® bricks?**
  Twin is fully compatible with LEGO® bricks. You can use them to create as many projects as you wish.
- **Which batteries are recommended?**
  9V alkaline batteries are recommended. Make sure your batteries' quality is good.
- **What should I do if I run out of materials?**
  Take a look at "Don't Get Sad if You Run Out" part.

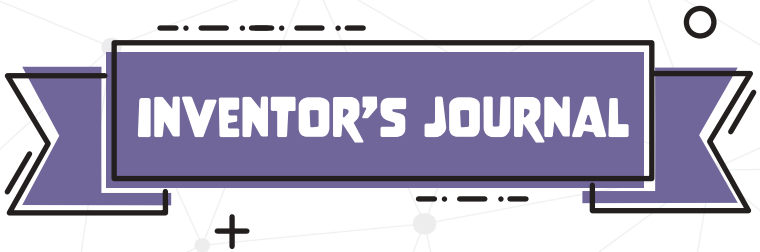
Contact Us

Feel free to reach us for your all questions, feedbacks and demands.
Reach us via e-mail: **support@twinscience.com**

33 Queen St, Office 2102,
London, EC4R 1AP, UK

Twin Yazılım Mühendislik Sanayi ve Ticaret A.Ş.
Reşit Paşa Mah. Katar Cad. ARI 4 Binası
No:2/50/6, 34467 Sarıyer / İSTANBUL


INVENTOR'S JOURNAL


INVENTOR'S JOURNAL

twin

Spreading the Joy of Science

twinscience.com

/twinscience

Download on the App Store

ANDROID APP ON Google play