It's hip to be a square....

Or a triangle... or even a hexagon! What sort of shapes can you get Edison to drive in and what specific instructions do you need to use? To get the Edison robot to do what you want it to do you need to write code that says exactly which actions you want to happen in exactly which order you want each action to happen.

Did you know?

When you write a program for your Edison robot in EdScratch, you are telling the robot what to do and in what order to do each thing. Each EdScratch block is one action you are telling the robot to take. The order you connect the blocks in your program tells the robot in what sequence to do each action. Edison will do the actions one at a time, starting with the top block.

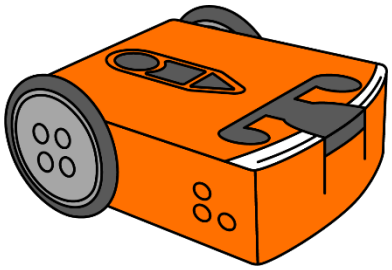
To program Edison to drive shapes, there are a few things we need to learn:

- ☐ Part 1: What is an Edison robot?
- ☐ Part 2: How do you use EdScratch with Edison?
- ☐ Part 3: Drive a square
- ☐ Part 4: Drive a triangle
- ☐ Part 5: Drive a hexagon
- ☐ Part 6: Challenge: Choose your shape

Have you used Edison robots and EdScratch before? Jump straight in at part 3!

Part 1: What is an Edison robot?

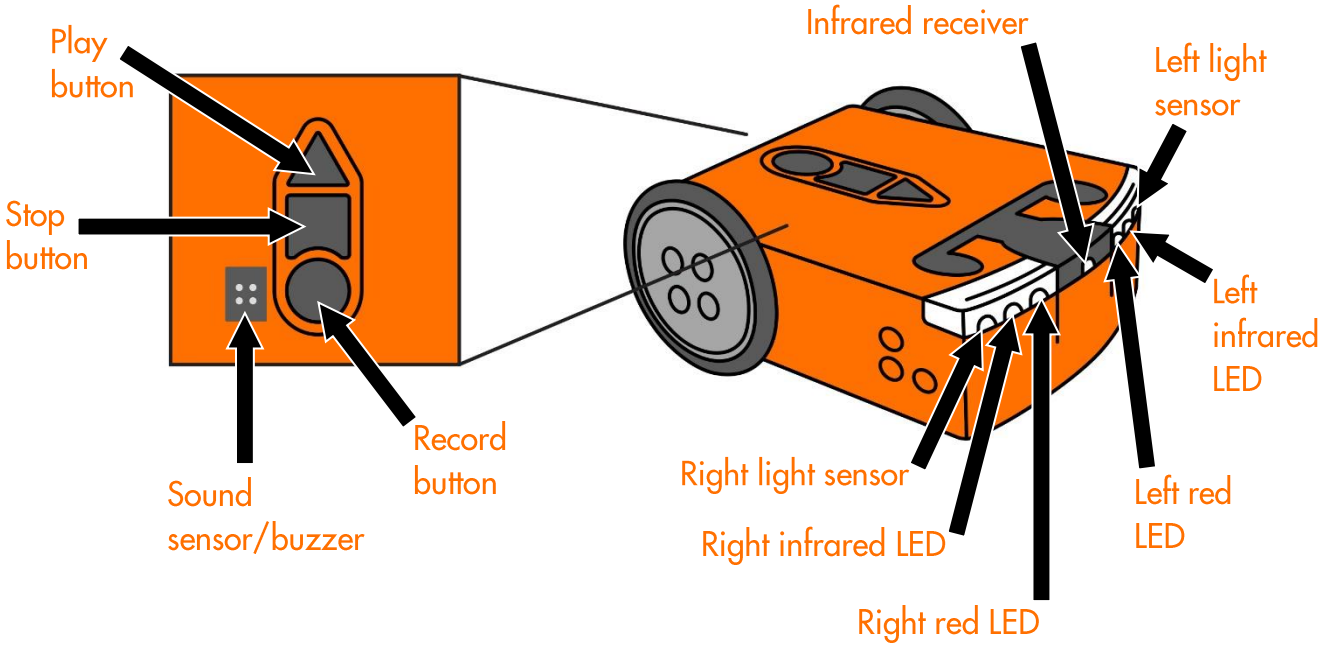
This is Edison, the programmable robot.



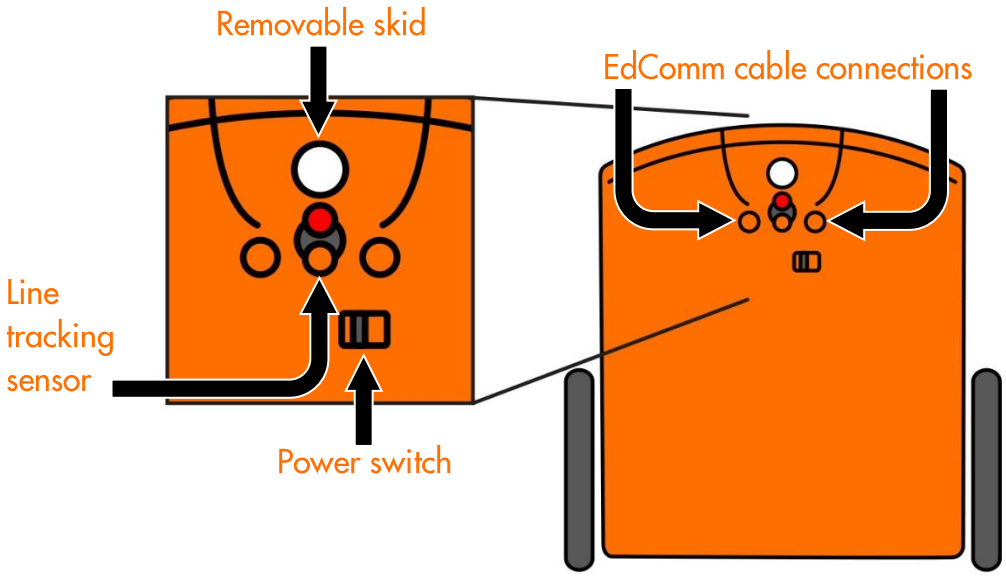
There's a lot we can do with our Edison robots. We can program the robot to do things like drive using its motors, flash its LED lights or make sounds. Edison also has different sensors which we can use to get the robot to behave in different ways.

Edison uses sensors and motors to interact with the world. The robot also has three buttons, a power switch and several removable parts. Knowing where Edison's parts are and what they do will help you use Edison.

Have a look at the top of your Edison robot. Try to find all of the parts labelled in the picture on your Edison robot.

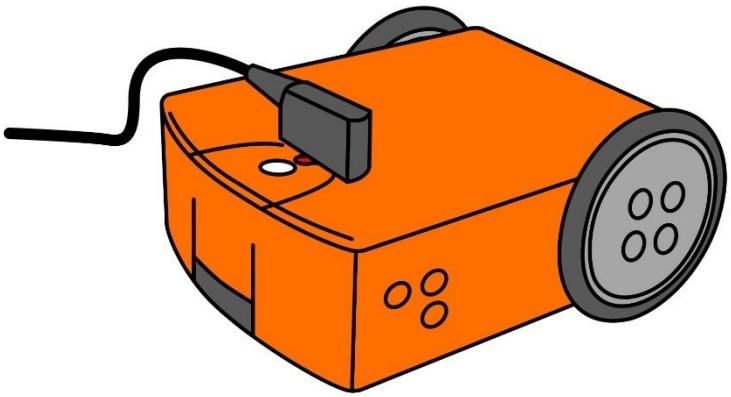


Flip Edison over. Look at the picture and try to find all of the parts labelled in the picture on the bottom of your Edison robot.



There is one other component which we will use a lot with the Edison robot called the EdComm cable.

You will use the EdComm cable to download your programs to Edison from your programming device, like your computer. The EdComm cable has a connection for Edison on one end, and the other end connects to the headphone socket on your computer.



For practice, try connecting the EdComm cable to Edison.

Why is that?

The top of Edison is made of clear plastic. This way you can see the electronic components that make Edison work. One of the most important parts is the black-coloured square that sits just above the tip of the 'play' (triangle) button. Can you see it?

This is the robot's microchip. The microchip is basically a tiny computer, which is sometimes called a micro-computer. It contains the central processing unit (CPU). That's basically Edison's brain!

Part 2: How do you use EdScratch with Edison?

One of the best things about Edison is that you can make your own programs for your robot! To write a program for Edison, we need to use some special **software**.

Jargon buster

All computers have two main parts: hardware and software.

Hardware is the physical parts of a computer (or robot).

Software is the set of programs and applications that make hardware, like a computer or a robot, run.

The software we will use with Edison is a robot **programming language**.

Jargon buster

A **programming language** is a set of rules and instructions used to write computer programs. EdScratch is a programming language specially designed for programming Edison robots.

The programming language we will use is called EdScratch. Let's learn a bit about the EdScratch programming language.

Check out EdScratch

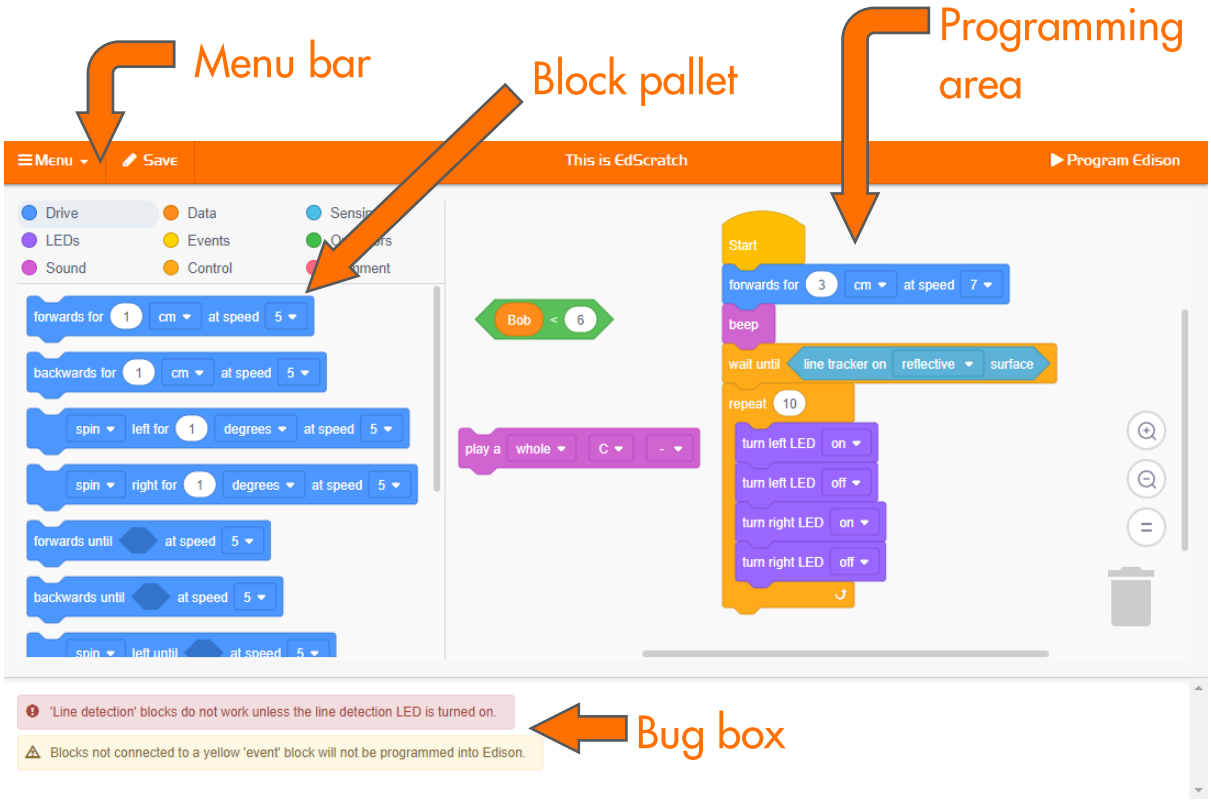
You can access EdScratch online.

Use this link

Go to www.edscratchapp.com

Whenever you want to program Edison using EdScratch, you will always need to go to the EdScratch app.

Here is what the EdScratch environment looks like:



The EdScratch programming environment has four main parts:

Block pallet

All of the blocks you can use are in the block pallet. To use a block, select it from the block pallet, and drag it into the programming area.

Programming area

The large area where you can connect blocks together into programs is called the programming area. Drag and drop blocks from the block pallet into this area to use them in your program.

Menu bar

Options such as 'Save' and 'Load' are accessed from the menu bar. The menu bar also has the 'Program Edison' button.

Bug box

Below the block pallet and programming area is the bug box. Warning messages will show up in the bug box.

Look at EdScratch on your computer. Find each of the four main parts of the EdScratch environment.

Part 3: Drive a square

Write a program for Edison using EdScratch so that your robot can drive in a square. Your program should only use blocks from the Drive category to control the motor outputs. Download your program and use the square activity sheet to test your program. Make sure your program has Edison end in the exact same spot it started.

1. How many blocks do you have in your program not counting the start block?

   _____

2. Look at the blocks in your program. What do you notice? Is there a pattern to the blocks?

_____

_____

_____

_____

To get Edison to drive a square, you need to program the robot to drive each side of the square and turn at each corner of the square. You might have noticed that this makes a pattern in the code: drive the side, turn, drive the side, turn, drive the side, turn, drive the side, and turn one last time, back to the starting position.

Lots of programs have repetition, where a bit of code is used over and over. Repeating stuff is one thing that computers are really good at doing. Unlike a person, a computer bored doing the same thing exactly the same way again and again.

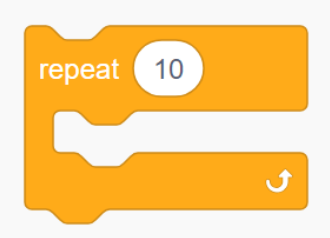
Imagine you wanted to get Edison to do the same thing 100 times. Would you want to write out that program using 100 repeating blocks? Would you find that boring to write? Do you think you would be able to write the whole program without making a mistake?

There is an easier and more efficient way to get a computer to repeat commands multiple times. You can get the code to repeat by using something called a loop.

Jargon buster

A **loop** is a special piece of code that tells a computer to repeat something multiple times. Loops are a type of **control structure** because loops control other bits of code in a program.

In coding, using loops lets us repeat other bits of code multiple times without having to write each command over and over. In EdScratch, loop blocks are in the Control category in the block pallet. One of the loop blocks in EdScratch is the repeat block:



There are different types of loops. The repeat block is a definite loop.

Jargon buster

A **definite loop** is a type of loop which will repeat for a set number of times. The **repeat** block in EdScratch is an example of a definite loop. You tell the loop how many times to repeat using this block's input parameter.

Like all loop blocks in EdScratch, the repeat block wraps around other blocks.

Why is that?

Look at the shape of the repeat block. See how it has a shape a bit like a mouth? Other blocks can sit inside the opening of this block's 'mouth.' Any block that sits inside the repeat block is inside this loop. All blocks inside the loop will be repeated.

Remember, Edison will follow each EdScratch block one at a time. The robot will see the loop block first and know that any blocks inside that loop need to be repeated as many times as the repeat block's input parameter says. The robot will then do that action of each block inside the loop in order. When it gets to the bottom of the blocks in the loop, it will move back to the top of the loop and start again!

Try using a repeat block to make a program for Edison to drive a square. You should be able to write a program for Edison which uses only three blocks after the start block, including one repeat block. Download your program and use the previous activity sheet to test your program. Make sure your program has Edison end in the exact same spot where it started.

1. What value do you need to have in the input parameter in the repeat block to get Edison to drive a square?

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2. Why do you need to have that be the value?

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Part 4: Drive a triangle

Write a program for Edison using EdScratch so that your robot can drive in a triangle. Your program needs to use a definite loop control structure, so be sure to include a repeat block. Your program should be as efficient as possible, so try to use as few blocks as you can while still completing the task.

Download your program to your robot and use the triangle activity sheet o test your program. Make sure your program has Edison end in the exact same spot where it started.

1. How many blocks did you need to use in order to write a successful program (not counting the start block)?

   _____

2. What value do you need to have in the input parameter in the repeat block to get Edison to drive a triangle? Why do you need to have that be the value?

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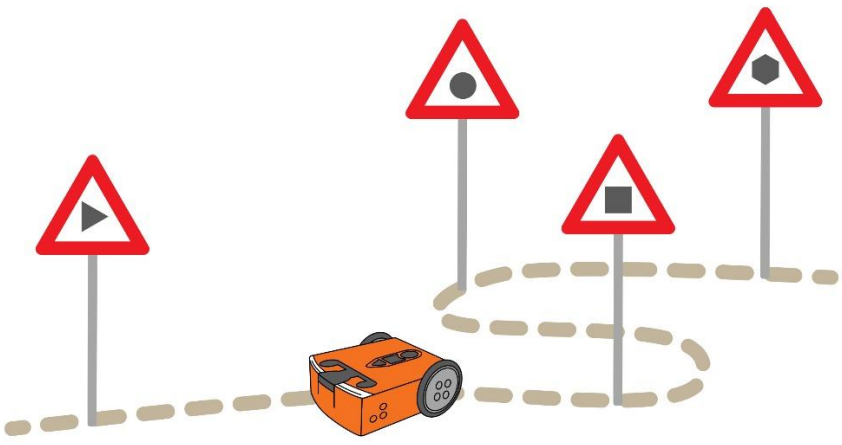

Part 5: Drive a hexagon

Write a program for Edison using EdScratch so that your robot can drive in a hexagon. Your program needs to use a definite loop control structure, so be sure to include a repeat block. Your program should be as efficient as possible, so try to use as few blocks as you can while still completing the task.

Download your program to your robot and use the hexagon activity sheet to test your program. Make sure your program has Edison end in the exact same spot where it started.

1. How many blocks did you need to use in order to write a successful program (not counting the start block)?

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2. What value do you need to have in the input parameter in the repeat block to get Edison to drive a hexagon? Why do you need to have that be the value?

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Part 6: Challenge: Choose your shape

Using a definite loop allows you to write a program to get Edison to drive a shape using only a few blocks of code. You can control how many times the program repeats the code commands inside the loop by changing the input of the repeat block.

What do you notice about the number of sides and angles a shape has compared with the input you need in your definite loop? Can you use this pattern to help you write a program to drive any shape?

Hint!

You might want to choose a regular shape for this challenge. A regular shape means a shape where all the sides are equal!

What to do

Choose a shape which has sides and angles to drive using your Edison robot.

Make a workspace to test your program by either drawing your shape on paper or marking it out on the floor or a desk with coloured tape.

Write a program for Edison using EdScratch so that your robot can drive your shape. Your program needs to use a definite loop control structure, so be sure to include a repeat block. Your program should be as efficient as possible, so try to use as few blocks as you can while still completing the task.

Download your program to your robot and test it out using your workspace.

Test your knowledge!

1. What value would you need to have in the input parameter in the repeat block to get Edison to drive a regular (meaning that all sides are equal) 12-sided shape?

   _____

2. There is a pattern between the number of sides and angles a shape has and the number of times you need a loop to repeat in order to drive that shape. Describe how you used this pattern to help you determine the input parameter you needed in the repeat block to get Edison to drive your shape.

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