Detect and avoid with Edison

Let's get the Edison robot to detect objects and avoid crashing in to them.
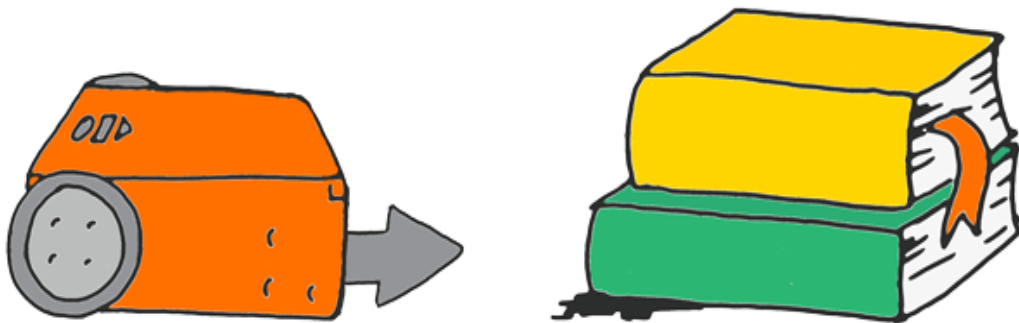
To do this, there are a few things we need to learn:

☐   What is infrared light?
☐   What is a loop?
☐   Programming EdBlocks

Is this your first time using Edison robots or EdBlocks?
Start with the activity *Getting started with Edison* first!
Ask your teacher for a copy.

Let's detect obstacles

We can write a program that will stop Edison from running into objects. This program needs Edison's infrared light sensors to work.

What is infrared light?

There is a wide range of light. People can see some of this range, but not all. Infrared light (also called IR) is invisible to people.

Did you know you use IR a lot?

Infrared light is used in TV remote controls. It is how the remote tells the TV to change the channel or turn up the volume!

Infrared light and Edison

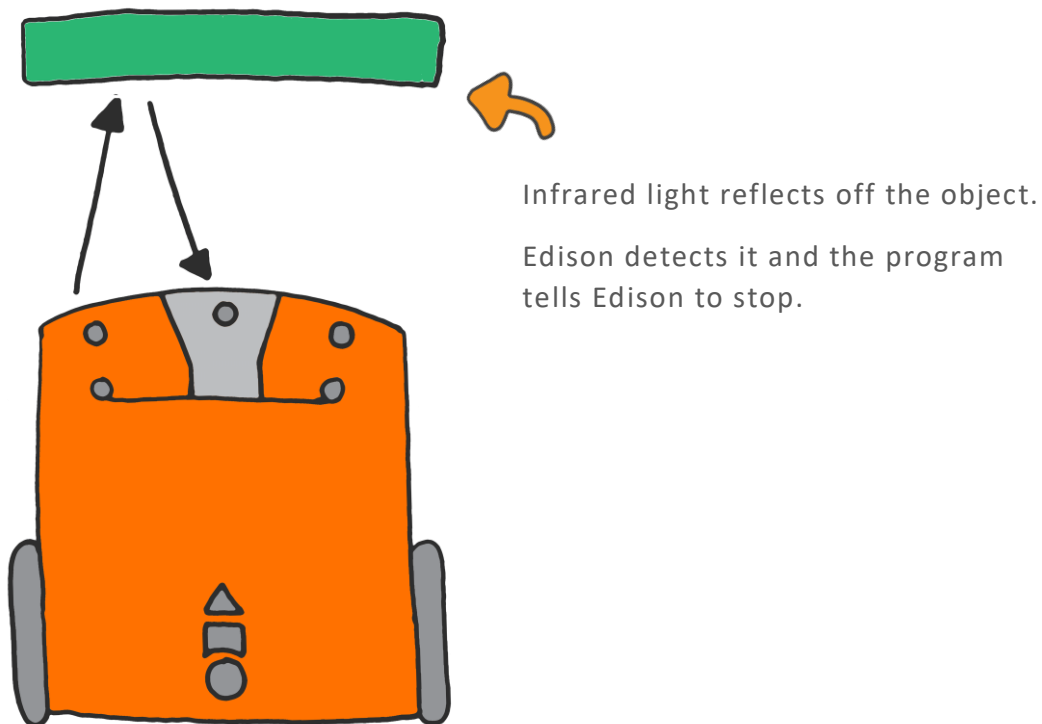Just like a TV remote, Edison can use infrared light.

Edison has two IR light emitter diodes (or LEDs) on the front, one on the left and one on the right. Edison also has an IR sensor on the front, right in the middle.

We can program Edison to use IR to find obstacles and avoid running into them.

Using EdBlocks, we can write a program that tells the IR LEDs to send out infrared light.
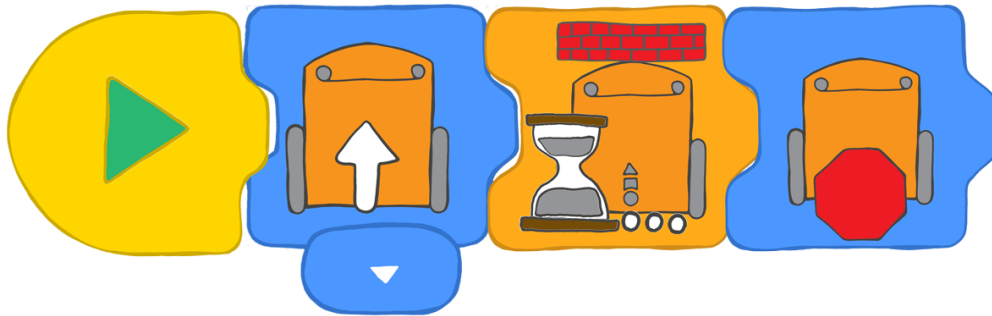
That light is reflected off any objects nearby and bounces back towards Edison. Edison can detect that light with the IR sensor.

Our program tells Edison not to run into any object it can detect.

Infrared light reflects off the object.

Edison detects it and the program tells Edison to stop.

What to do with EdBlocks

Using the EdBlocks app (www.edblocksapp.com), arrange the blocks into the program below.

What is this program telling Edison to do?

This program has Edison drive forward until it detects an obstacle is in the way. When Edison can 'see' the obstacle, it will stop.

What to do with Edison

Download the program to Edison. Put Edison on one side of your desk. Then place an object, like a pencil case, on the other side of the desk. Aim Edison at the object, then press the triangle button. Watch Edison drive forward towards the object.

Did Edison stop before hitting the object?

Find the answer

If an obstacle is too small or doesn't reflect enough infrared light, Edison cannot detect it.

Let's see what things Edison can and cannot detect. Try placing different objects in Edison's way and test what happens. Try things that are different shapes and colours. Record your results below.

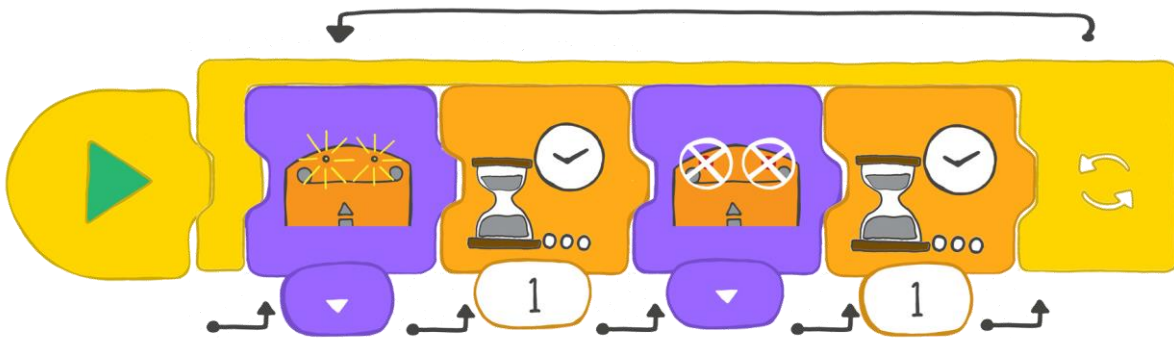| Object	Colour and shape	Did Edison stop? Why or why not?

What is a loop?

A loop is a special block in EdBlocks. We can put a loop around other blocks.

The loop will make any blocks inside the loop repeat.

Look at the program below.

This program tells Edison to turn the LED lights on, wait for one second, then turn off the LED lights and wait for one second. The loop then tells Edison to go back to the beginning of the program and start again.

Look at the program again. Imagine the program doesn't have a loop block. What would the program do if there was no loop?

_____

_____

_____

_____

Let's detect and avoid obstacles

Let's make a program that uses the infrared light sensors to tell Edison to detect obstacles, then turn away before running into them.
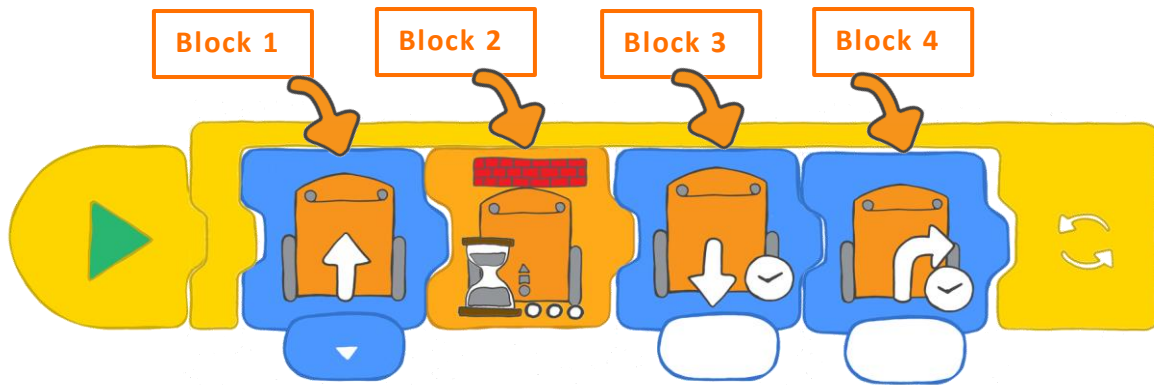
How to program EdBlocks to avoid obstacles

Using the EdBlocks app (www.edblocksapp.com), arrange the blocks into the program below.

Before running the program, what do you think the program might do?

_____

_____

_____

_____

_____

_____

Block 1   Block 2   Block 3   Block 4

Let's break down what the program above does.

The first block tells Edison to drive forward and the second block tells Edison to wait until an obstacle is detected. When an obstacle is detected, Edison moves to the third block, which tells Edison to back up or reverse. Then the fourth block turns Edison away from the obstacle.

The loop tells the program to then start back at the first block.

You'll need to experiment to work out how much time to put in the drive backwards and turn blocks.

Try it!

Download the program to your Edison robot. Put some obstacles you know Edison can detect around Edison. Run the program by pressing the play (triangle) button.

Watch as Edison uses the program to detect an object, then turn and drive away!

Find the answer

1. What time, in seconds, did you use in the 'drive backwards' block? Why did you use that time?

_____

_____

_____

2. What time, in seconds, did you use in the 'turn right' block? Why did you use that time?

_____

_____

_____

Your turn! What else could Edison do when it detects an object? Try making a program where Edison alerts you it has detected an object before driving away.

Draw your program below. Make sure you include a loop!

Try it!

Download the new program to your Edison robot. Put some obstacles you know Edison can detect around Edison. Run the program by pressing the play (triangle) button.

Why not try adding flashing lights, a horn or even a short song to alert you that an obstacle has been detected! What happens when you change the types of obstacles you use? Can Edison detect all those types of obstacles?