

# Code a guard dog

Let's get the Edison robot to patrol a room, like a guard dog, sounding an alarm if it detects a potential problem!

To do this, there are a few things we need to learn:

- What is infrared light?
- How does Edison use infrared light?
- What are loops?
- How can Edison patrol, detect and alert?

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.

## What is infrared light?

There is a wide range of light. People can see some of this range, but not all. **Visible light** is the portion of the light spectrum that people can see.

Another type of light is called **infrared light**. Infrared light (also called **IR**) is invisible to people.



Did you know you use IR a lot?

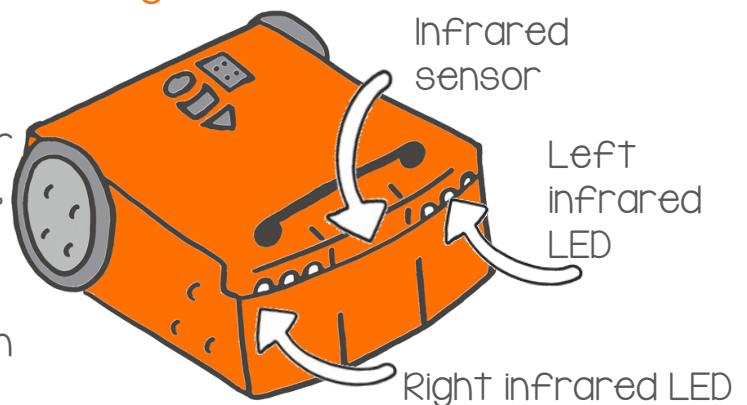
Infrared light is used in TV remote controls. It is how the remote tells the TV to change the channel or turn up the volume!

## How does Edison use infrared light?

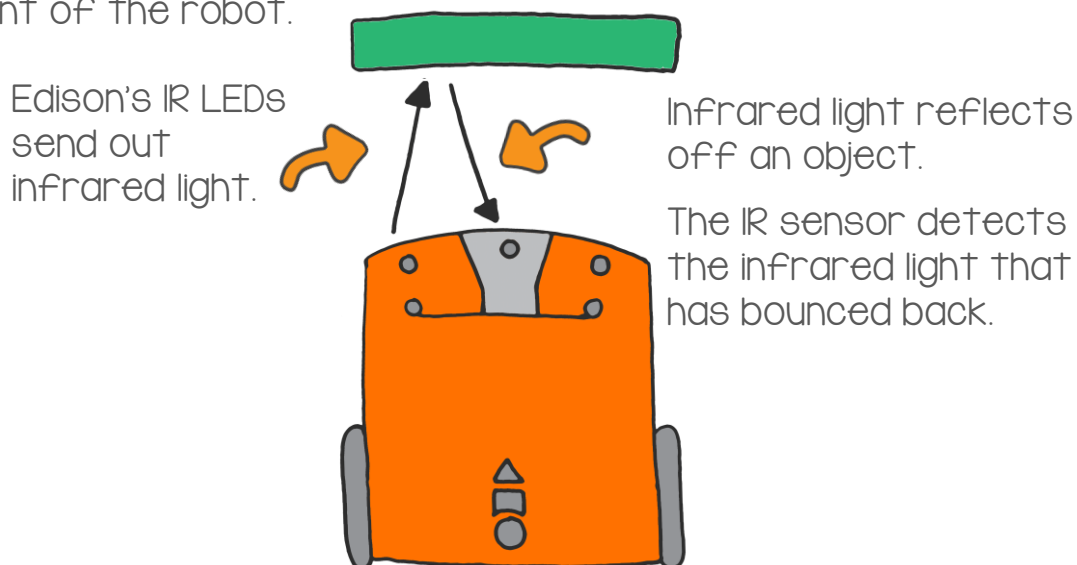
Just like a TV remote, Edison can use infrared light.

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.



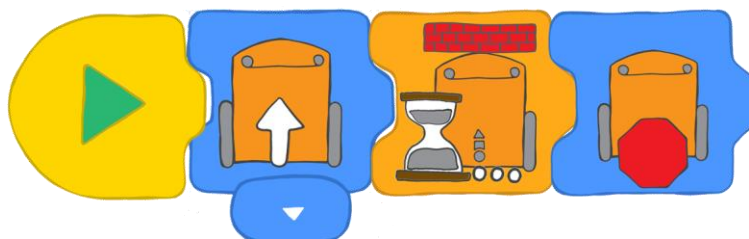
We can program Edison to use IR to find obstacles that are in front of the robot.



Using EdBlocks, we can write a program that tells the IR LEDs to send out infrared light. If any of that light is reflected off any objects nearby, it will bounce back towards Edison. Edison can detect that light with the IR sensor.

By using Edison's IR LEDs and sensor in a program, we can stop Edison from running into objects when the robot is driving!

Look at this EdBlocks program:



If you run this program in Edison, what happens?

### Try it!

Open the EdBlocks app at [www.edblocksapp.com](http://www.edblocksapp.com) and write this program.

Download the program to your Edison robot. 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?

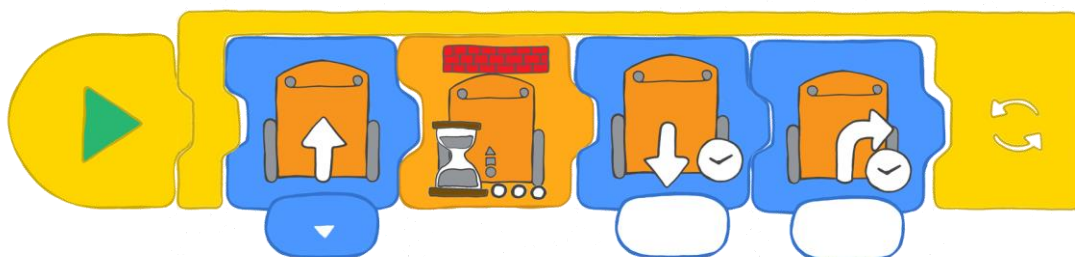
## What are loops?

A loop is a special type of code. Loops make any code blocks inside the loop repeat in **sequential order**. The program runs each block one at a time, then repeats them all from the start.

How many times will the code blocks repeat? That depends on the loop! Some loops tell code to repeat a certain number of times. Other loops tell the code to repeat until a specific event happens. There is even one type of loop called an infinite loop. This loop makes the code blocks repeat forever!

In EdBlocks, all the loops are in the **Control** category.

You can make a program that uses a loop and the infrared light sensors to tell Edison to detect obstacles, then turn away before running into them.



What does the program do?

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. Then the fourth block turns Edison away from the obstacle. The loop tells the program to then start back at the first block.

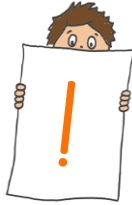
### Try it!

Write this program in EdBlocks. You will need to experiment to work out how much time to put in the drive backwards and turn blocks.

Download the program to your Edison robot. Put Edison on your desk or the floor. Then place some objects around Edison. Run the program by pressing the play (triangle) button.

## How can Edison patrol, detect and alert?

Let's try making a different program with different loops. This time, let's make a program that gets Edison to patrol a specific path by driving it over and over. If the robot detects something in its path, it should sound an alarm, just like a guard dog would!

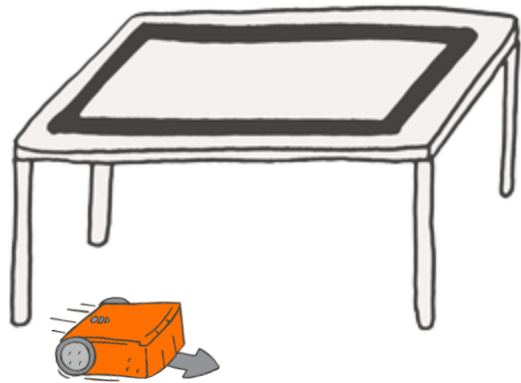


This program contains a few different parts. How can you get your program to do all of these things? Start by **decomposing** the problem down into smaller parts and tackling each bit one at a time.

### Part 1: Set up the patrol path

Patrols usually wander the same path over and over, looking for signs of trouble. These paths usually go around something, like the outside of a building. Where should Edison patrol?

Maybe Edison can patrol around your desk? Or maybe you want the robot to go around the whole room! Decide where Edison should drive.



Try making a program to get Edison to patrol your path.

(**Hint**: try using blue 'drive' blocks!)

Download the program to Edison and run it in the robot to test it. Adjust your program if you need, then test it again until you get Edison to drive the patrol path.

### Part 2: Keep patrolling until an obstacle is detected

As long as there is nothing in Edison's path, the robot should just keep patrolling over and over. If the robot does detect an obstacle in its pathway, however, it should stop driving.

Look at your program. How can you adjust your program so that Edison will keep patrolling until it detects an obstacle?

(**Hint**: is there a loop that can help?)

### Part 3: Sound the alarm

Once the robot detects something in its patrol path, it is time to sound the alarm!

How will your Edison robot alert you that it has encountered an issue? Will it make noise? Will it flash its lights? Both?

Design your alarm.

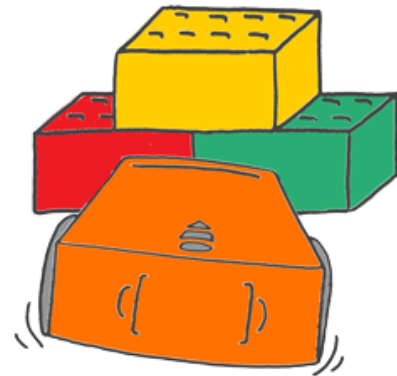
(**Hint:** you can use loops to get the robot to repeat your alarm actions more than once. You can even put loops inside of loops if you want!)

Add your alarm to your program so that your Edison guard dog will patrol until it detects an obstacle in its path, then alert you using the alarm.

### Part 4: Try it out!

Download your finished program into Edison, then press the play (triangle) button to run it in your robot.

Somewhere on the robot's patrol path, put an obstacle. Watch to see your robot guard dog in action!



(**Hint:** did something not work the way you expected? That's okay! Think about what went wrong when you played your program. Look at that part of your code. Can you find and fix the problem?)

### What did you make?

What did your program look like? Write down your program blocks. Use more space if you need.