Detect and avoid with Edison

Teacher's notes

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Go ahead – show off!

We love seeing how classrooms use Edison! If you and your students want to share your Hour of Code Edison EdVenture, be sure to tag us into the fun!

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About this lesson and guide

This guide offers teachers and instructors overview information, facilitation recommendations and other supporting information for the *Detect and avoid with Edison* lesson available at Detect and avoid with Edison.

Do you need to read this whole guide to run the lesson? **Absolutely not!**

As long as the robots and programming devices are set up, you can start learning along with your students! The student sheets for this lesson have been designed to allow students to work through the stages of the lesson independently, learning key computer science concepts and practicing skills along the way. This guide simply offers further information for teachers and instructors to help make using this lesson easy and fun.

Each section of the lesson is included in this guide along with any relevant supporting information for that section. Supporting information is divided into the following sections:

How it works

Information about the technology and computer science concepts being highlighted in that section.

Delivery recommendations

Suggestions for how you can cover the lesson section if you want to run the lesson in a more facilitator-led capacity.

Tips and tricks

Helpful hints and ways to overcome common issues students may encounter.

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The *Detect and avoid with Edison* lesson set is comprised of the student sheets and this guide. This set was developed using resources from the EdBlocks Lesson Activities Collection[1] and the EdScratch Lesson Plans Set[2] and is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License[3].

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Original illustrations by: Emma Dewar

[1] https://meetedison.com/robot-programming-software/edblocks/#edblocks-resources
[2] https://meetedison.com/robot-programming-software/edscratch/#EdScratch-resources
[3] http://creativecommons.org/licenses/by-sa/4.0/

Lesson overview

Introduce the key computational concepts of loops and infrared light using Edison robots and the EdBlocks programming language[4]. This lesson utilises the Edison robot's drive and obstacle detection functions through a set of progressive programming tasks.

Students learn about how Edison's infrared light sensors work and program Edison to detect obstacles, avoid obstacles and utilise loops.

Grade levels	Difficulty	Prerequisites	Duration
Year 2 – Year 6	Beginner	None[5]	40-50 minutes

Computer science and computational thinking topics	☐ Sequential programming ☐ Loops ☐ Pattern recognition ☐ Decomposition and problem solving

Supplies you need

- Full set of Edison robots
- Full set of prepared programming devices (computers or tablets)
- Print-outs or digital copies of the student sheets
- Pen or pencil for students to complete the written activities (if printed)

Some great advice from the Hour of Code team

It's okay not to know! Respond to student questions and struggles with phrases like:

- "I don't know. Let's figure this out together."
- "Technology doesn't always work out the way we want."
- "Learning to program is like learning a new language; you won't be fluent right away."

***And don't forget to have fun!* (^_^)**

[4] https://meetedison.com/robot-programming-software/edblocks/

[5] You and your students should be familiar with Edison and EdBlocks already, however. The *Getting started with Edison and EdBlocks* set available at Detect and avoid with Edison has a step-by-step activity for introducing Edison and EdBlocks. If this is your first-time using Edison or EdBlocks, start with that guide and activity.

Section 1 – Let's detect obstacles

In this activity, students learn about how Edison's infrared light sensors work and program Edison to detect obstacles.

How it works

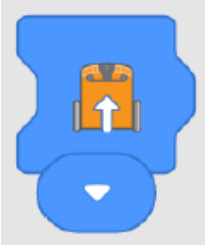
In this activity, students create a program which has Edison avoid driving into obstacles by using the robot's infrared (IR) light LEDs and IR sensor to detect objects directly in front of the robot. This activity further explores how the infrared light sensors work in Edison and gets students to test what obstacles can and cannot be detected.

Delivery recommendations

- Recommended time: 15 minutes

Tips and tricks

- It may help to review Edison's components, emphasising on the location of Edison's infrared light LEDs and sensor before students begin the activity.
- The obstacles need to be opaque but not too dark (e.g. not black) and at least as tall as Edison for the robot to detect them.
- This program will work best using the 'drive forward' block in EdBlocks. This block sets Edison's motors to 'forward' until a condition or another drive block tell the motors to do something else. Ensure students are using the correct block:



Answer key

Please note: this table is an example answer. Student results will depend on their experiences.

Object	Colour and Shape	Did Edison stop? Why or why not?
Water bottle	*Clear, tall cylinder*	*No. The bottle is tall but does not reflect the infrared light.*
Stapler	*Dark yellow, long, medium-tall*	*Yes. The stapler was taller than Edison and must reflect enough light.*
Textbook	*Black with white stripes, large box shaped*	*No. The book was taller than Edison, but the black colour absorbs the light.*

Section 2 – What is a loop?

Students learn the basics of a loop so that they are able to move on with section 3 of the activity, which incorporates a loop in the program.

How it works

This activity introduces students to the loops group of blocks in EdBlocks. Loops allow users to create iteration (or repetition) in their programs. In EdBlocks, any blocks inside a loop will repeat in left-to-right order for as long as the loop conditions are met.

Delivery recommendations

- Recommended time: 5 minutes

Tips and tricks

- There are several different 'loop' blocks in EdBlocks. For this example we are talking about the infinite loop.
- You can put many EdBlocks into a single loop. The loop blocks will stretch to fit over several blocks already linked together when you drag the loop over an existing string of blocks. Alternatively, you can put down the loop block first and then drop blocks inside the loop block.

Section 3 – Let's detect and avoid obstacles

In this activity, students explore more ways to create programs in EdBlocks which use Edison's infrared light sensors.

How it works

This activity reinforces students' understanding of Edison's obstacle detection abilities. In this activity, students create a program to have Edison avoid an obstacle once the robot detects the obstacle. The activity also challenges students to begin to use programming for creative problem-solving.

Delivery recommendations

- Recommended time: 20-30 minutes

Tips and tricks

- It may help to review Edison's components, emphasising the location of Edison's infrared light LEDs and sensor before students begin the activity.
- The obstacles need to be opaque but not too dark (e.g. not black) and at least as tall as Edison for the robot to detect them.
- Encourage students to build on their prior learning by looking up which obstacles Edison was able to detect in section 1.

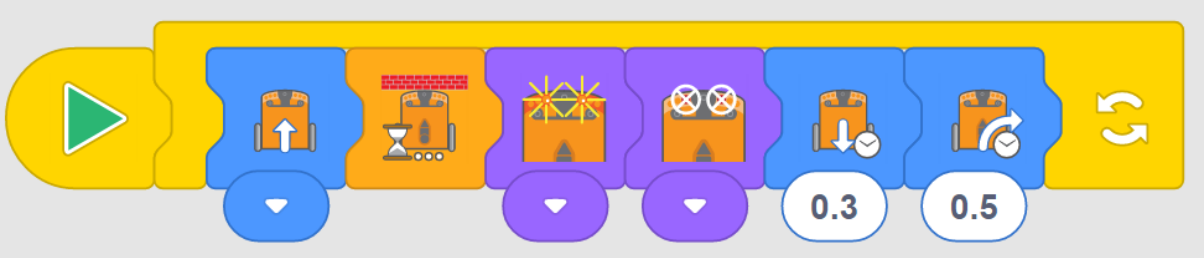
Answer key

Please note: different Edison robots will travel at slightly different speeds, which may cause students to get slightly different results for answers 1 and 2. The explanations in answers 1 and 2 and all of answer 3 are example answers. Student results will depend on their experiences.

1. 0.3 seconds. This time was enough for Edison to back up away from the object and have enough space to turn.

2. 0.5 seconds. This was enough time for Edison to turn far enough away from the object to not run into it again.

3.



What should I do if a student finishes the lesson early?

- Encourage students to write another program for Edison in EdBlocks. What do the other blocks do? What can they get their Edison robot to do using code in EdBlocks?
- Design a maze with different classroom obstacles and see if Edison can make it through.
- Or, ask students who finish early to help classmates who are having trouble with the activity.