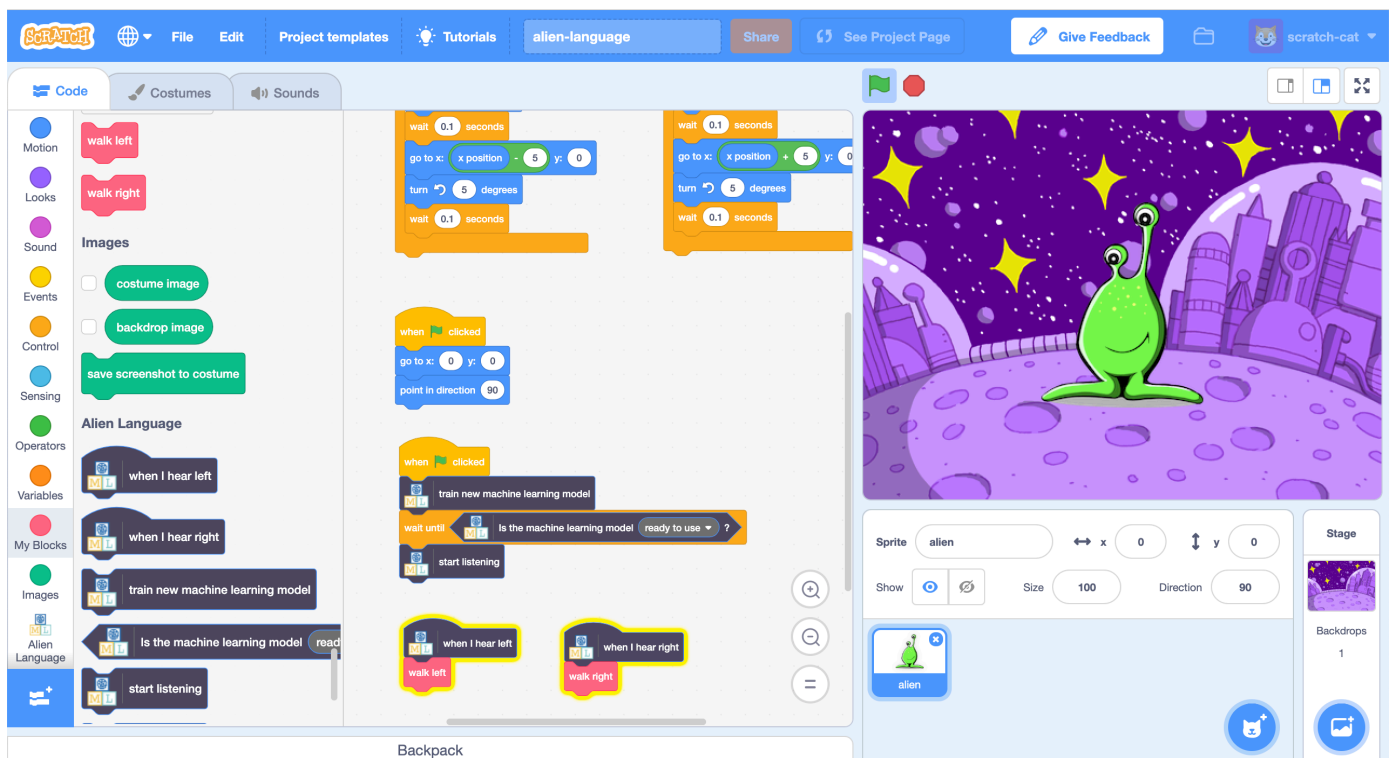




Alien Language

In this project you will train the computer to understand an alien language.

You'll use that to control an alien character so that it can understand what you tell it to do.



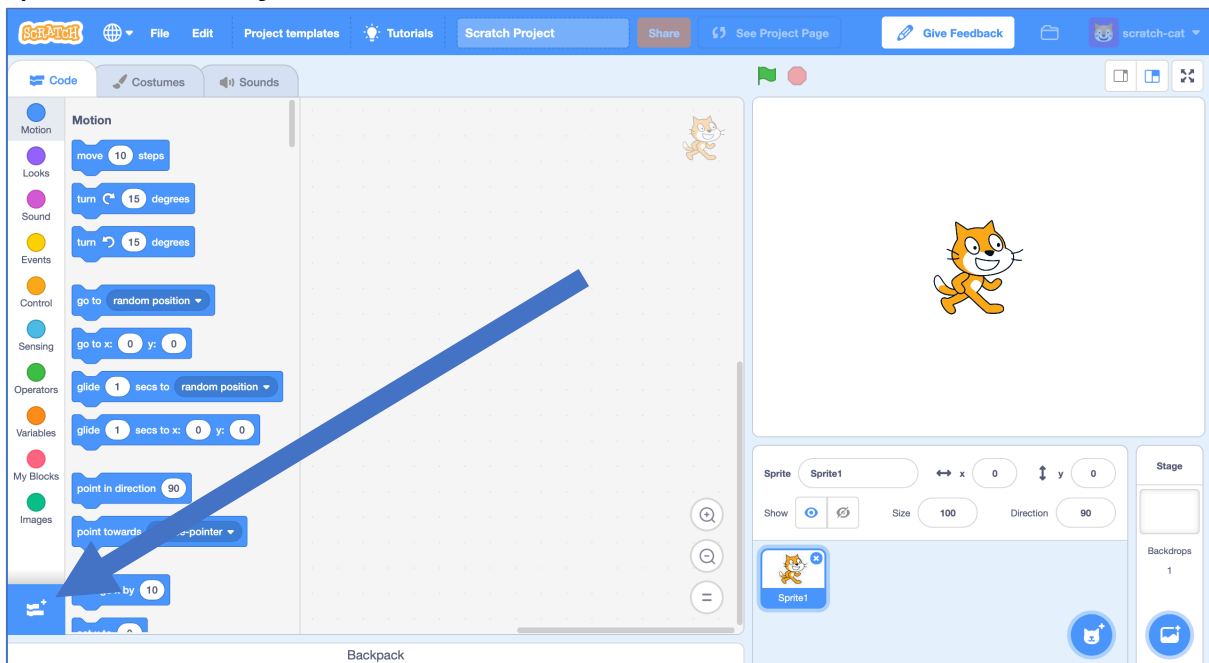
This project worksheet is licensed under a Creative Commons Attribution Non-Commercial Share-Alike License
<http://creativecommons.org/licenses/by-nc-sa/4.0/>

This project requires a **microphone**. If you don't have a computer with a microphone, you might prefer to try a different worksheet.

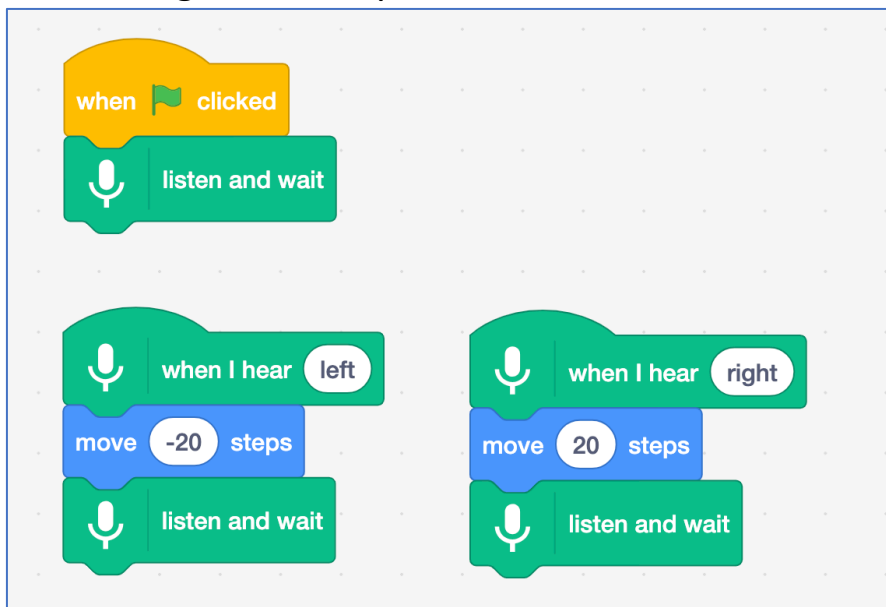
1. Go to <https://machinelearningforkids.co.uk/scratch3/>

2. Load the **Speech to Text** extension

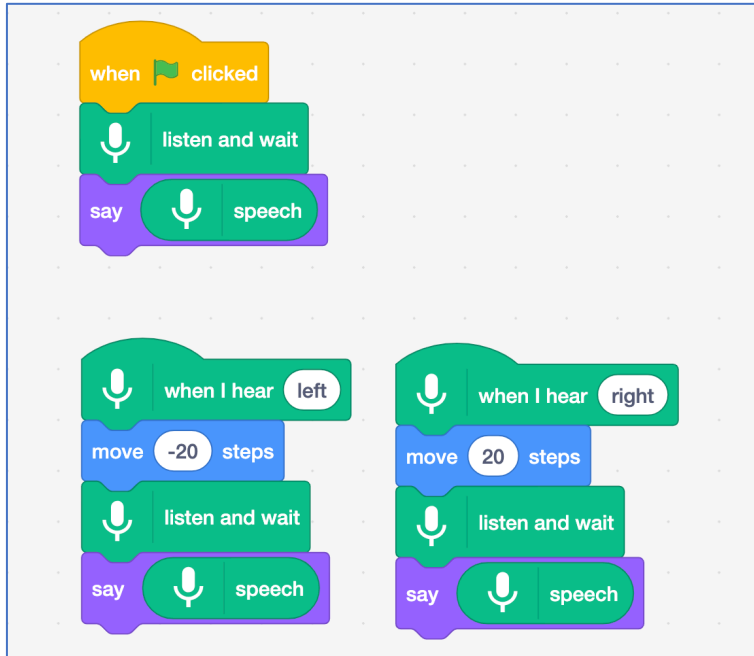
Click on the Extensions (plus) button in the bottom left, and then choose Speech to Text from the list.



3. Using the new Speech to Text blocks, create the following scripts.



4. Click on the **Green Flag** and give it a try
Say “left” or “right”. The cat should move in the direction that you tell it to. Try and move it back and forth across the screen using your voice. It can be difficult to get it to work. Try to speak calmly and clearly. If it doesn’t work, modify your script to show what it thinks you’re saying:



What have you done so far?

You’ve used **speech recognition** to control a character in Scratch. To get this working quickly, you’ve used a machine learning model that has already been trained for you. This is a general machine learning model that has been trained to recognize English dictionary words.

Next, you’ll train a machine learning model for yourself to see how it was done.

For the next part of the project, you’ll use your voice to control an alien character that doesn’t understand English! You’ll invent two new words, that wouldn’t be found in an English dictionary, to control your character and train a machine learning model to recognize them.

5. Invent your alien language!
You need two words – an alien word for “left” and an alien word for “right”. Invent new words that wouldn’t show up in an English dictionary. They can be random noises as long as you can repeat them in the same way every time and will be recognisably different from each other. If you don’t want to make weird noises with your voice, that’s okay - find other ways to make noises. You can click your fingers, clap your hands, squeeze a squeaky toy or do anything else you can think of!
6. Go to <https://machinelearningforkids.co.uk/>
7. Click on “**Log In**” and type in your username and password
If you don’t have a username, ask your teacher or group leader to create one for you.
If you can’t remember your username or password, ask your teacher or group leader to reset it for you.
8. Click on “**Projects**” on the top menu bar
9. Click the “**+ Add a new project**” button.
10. Name your project “Alien Language” and set it to learn how to recognise “**sounds**”.
Click the “**Create**” button

Start a new machine learning project

Project Name *

Alien Language

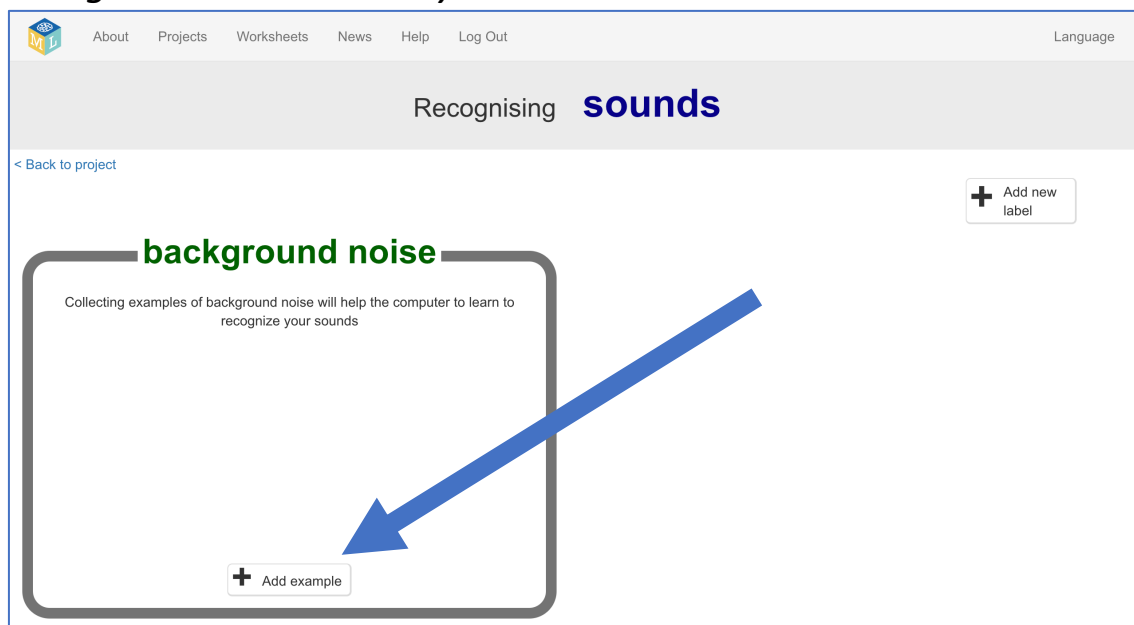
Recognising *

sounds

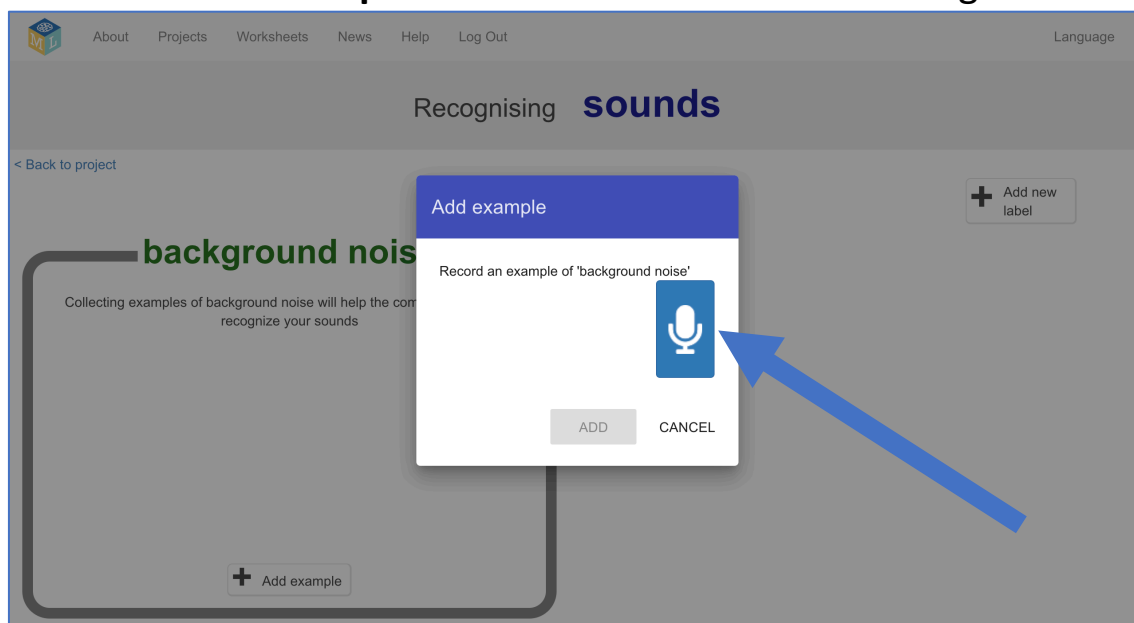
What type of thing do you want to teach the computer to recognise?
For words, sentences or paragraphs, choose "text"
For photos, diagrams and pictures, choose "images"
For sets of numbers or multiple choices, choose "numbers"
For voices and sounds, choose "sounds"

CREATE CANCEL

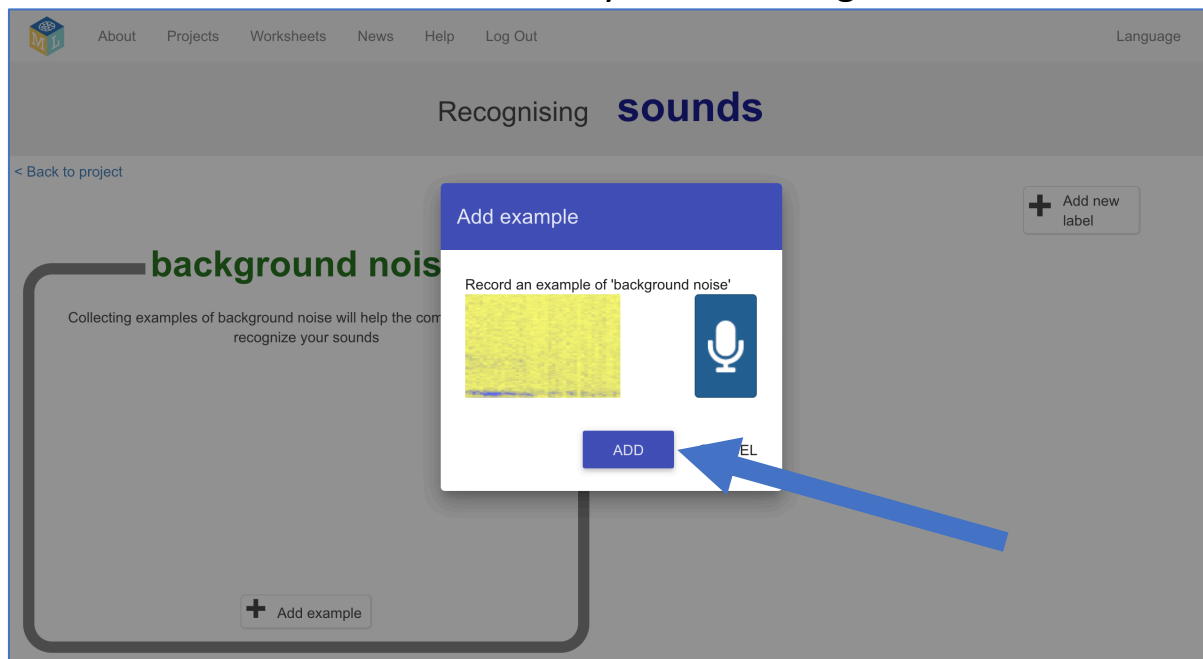
11. You should now see “**Alien Language**” in the list of your projects. Click on it.
12. Click on the **Train** button to start collecting examples.
13. Click on the **Add example** button in the **background noise** bucket *Recording background noise will help your machine learning model to tell the difference between the sounds you will train it to recognize, and the background noise where you are.*



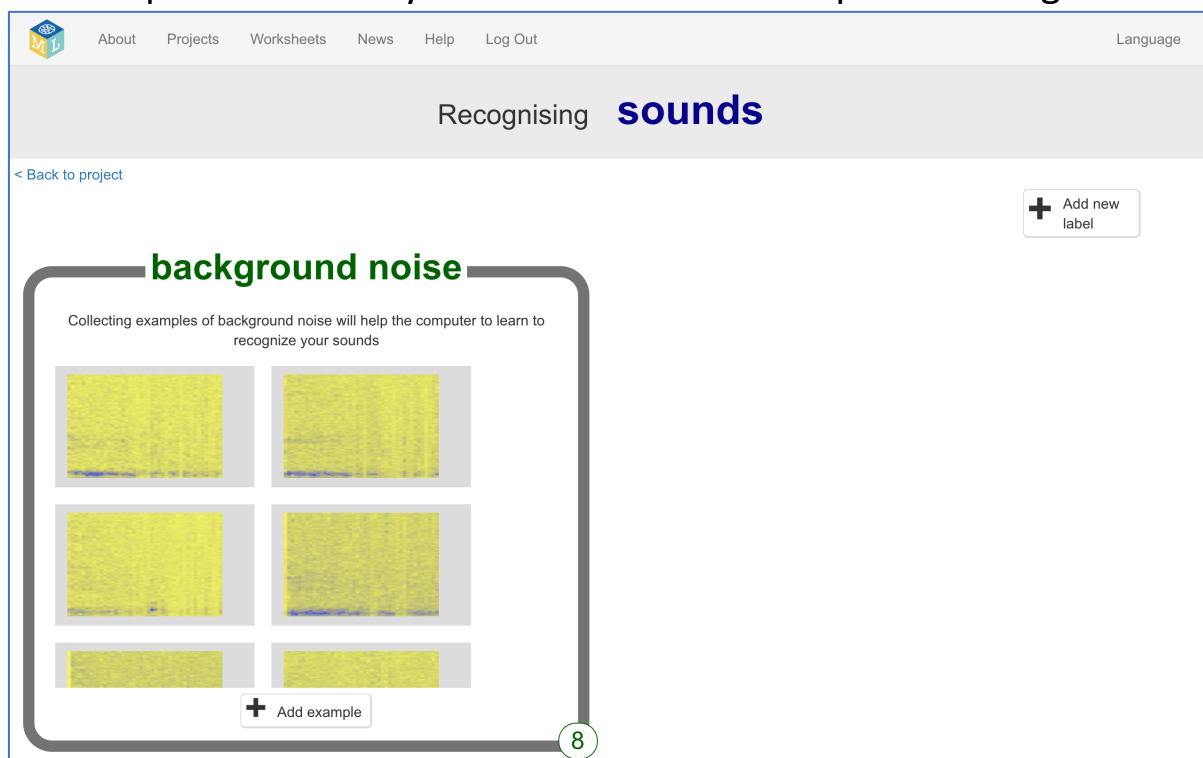
14. Click the **microphone** to record 2 seconds of background noise



15. Click the **Add** button to save your recording



16. Repeat that until you have **at least 8** examples of background noise



17. Click the **Add new label** button in the top right, and create a new training bucket called "left"

18. Click the **Add example** button in the new left bucket

The screenshot shows a web interface for training a sound recognition model. The title is "Recognising sounds as left". There are two buckets: "background noise" and "left". The "background noise" bucket contains four spectrograms and an "Add example" button. The "left" bucket is empty and has a blue arrow pointing to its "Add example" button. A "Back to project" link is in the top left, and an "Add new label" button is in the top right. A small "8" in a circle is at the bottom right of the "background noise" bucket.

19. Record **at least 8** examples of your alien noise for "left"

The screenshot shows the same web interface as in step 18, but now the "left" bucket contains eight spectrograms, representing the recorded examples. The "background noise" bucket remains the same. The "Add example" button in the "left" bucket is still visible. The "8" in a circle is now at the bottom right of the "left" bucket.

20. Click the **Add new label** button in the top right, and create a new training bucket called "right"

21. Record at least 8 examples of your alien noise for “right”

Recognising **sounds** as **left or right**

< Back to project

+ Add new label

background noise

Collecting examples of background noise will help the computer to learn to recognize your sounds

+ Add example

8

left

+ Add example

8

right

+ Add example

8

22. Click the “Back to project” link in the top left

23. Click the **Learn & Test** button

"Alien Language"

Train

Collect examples of what you want the computer to recognise

Train

Learn & Test

Use the examples to train the computer to recognise sounds

Learn & Test

Make

Use the machine learning model you've trained to make a game or app, in Scratch or in Python

Make

24. Click “Train new machine learning model”

Machine learning models

< Back to project

What have you done?

You have collected examples of sounds for a computer to use to recognise when sounds are _background_noise_, left or right.

You've collected:

- 8 examples of _background_noise_
- 8 examples of left,
- 8 examples of right

What's next?

Ready to start the computer's training?

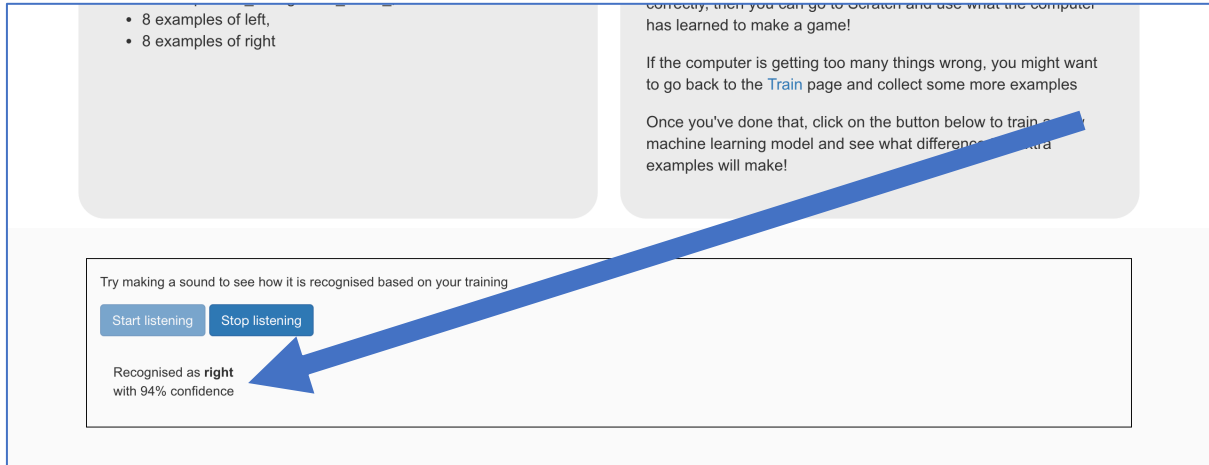
Click the button below to start training a machine learning model using the examples you have collected so far

(Or go back to the Train page if you want to collect some more examples first.)

Info from training computer:

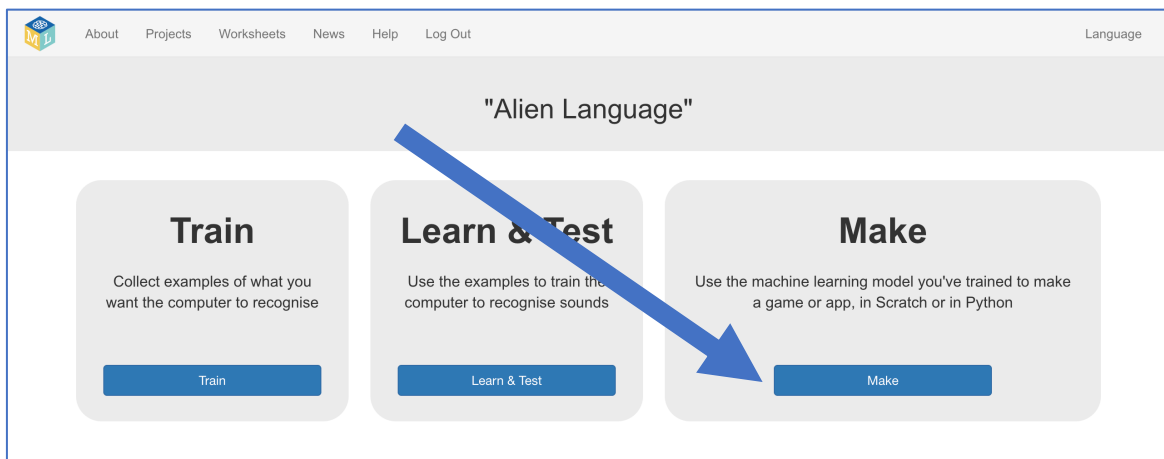
Train new machine learning model

- 25.** Once the training is finished, click the **Start listening** button to test your machine learning model
Make one of the sounds you've trained the computer to recognize as meaning "left" or "right". If your machine learning model recognizes it, it will display what it thinks you did.



- 26.** If you're not happy with how the model is working, go back to the **Train** page and add more examples to all three training buckets.

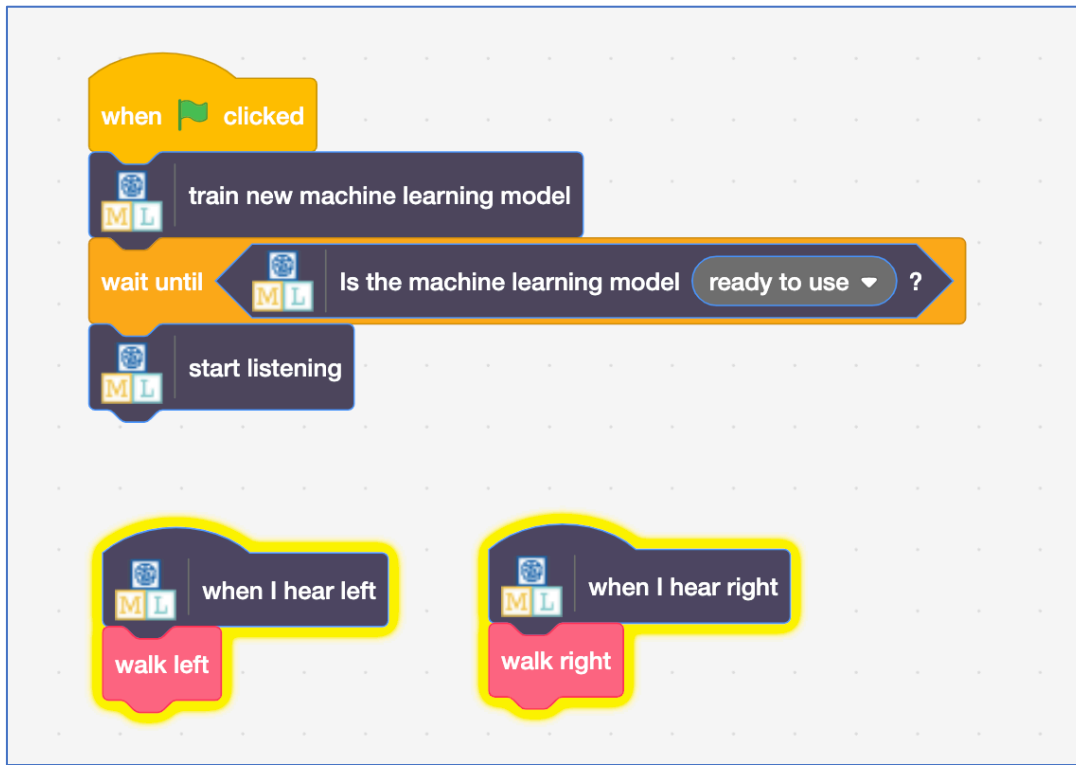
- 27.** When you're happy with your machine learning model, click on the **Make** button



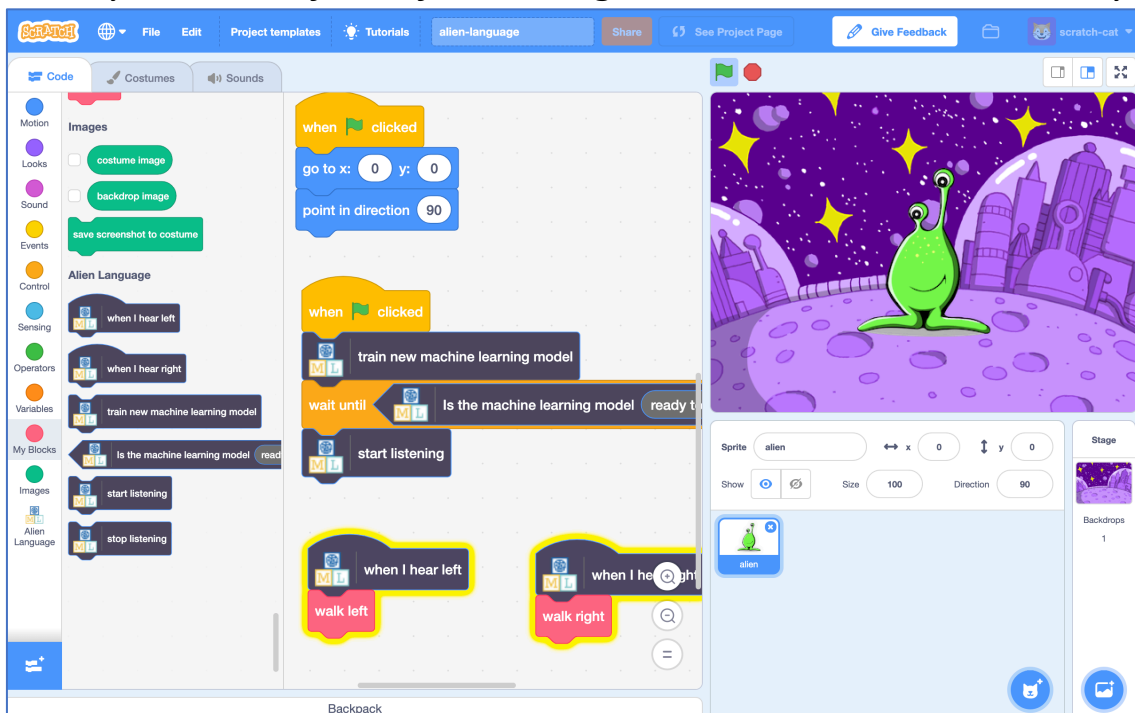
- 28.** Click on the **Scratch 3** button and then click **Open in Scratch 3**

- 29.** Click on the **Project templates** button at the top of the screen and open the "Alien Language" project template

- 30.** Add the following script to the **alien** sprite
*There are already some scripts in the alien sprite to put it in the right place at the start and animate how it walks. **Don't** delete these. You can add these scripts underneath them.*



- 31.** It's time to test! Click the **Green Flag**
Make your noises for "left" and "right" to tell the alien which way to walk.



What have you done?

You've trained your own machine learning model to do speech recognition. You used that to control a character in Scratch.

Unlike the pre-trained model you used before, which has been trained to recognize tens of thousands of words, you've only trained it to recognize two different words. But the principle is the same.

You've also seen the importance of training the machine learning model to work with a certain background noise.

Can you think of an example of a system like this you've seen used before? For example, some cars use speech recognition systems that have been trained to recognize the different commands you can give to the in-car computer. What other examples have you used?

Ideas and Extensions

Now that you've finished, why not give one of these ideas a try?

Or come up with one of your own?

Add new commands

Try adding two more training buckets for “up” and “down” so you can control the alien to move in all four directions.