



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.

The image shows a Scratch project titled "alien-language". The stage features a green alien with one eye and a single antenna, standing on a purple planet with a city skyline in the background. The script area contains the following blocks:

- A "when green flag clicked" hat block with a "go to x: 0 y: 0" and "point in direction 90" block.
- A "when green flag clicked" hat block with a "train new machine learning model" block.
- A "when green flag clicked" hat block with a "wait until [Is the machine learning model ready to use?]" block.
- A "start listening" block.
- Two "when I hear [left/right]" sound blocks with "walk left/right" blocks attached.
- Two "when I hear [left/right]" sound blocks with "train new machine learning model" blocks attached.
- Two "when I hear [left/right]" sound blocks with "start listening" blocks attached.

The script palette on the left lists the following categories: Motion, Looks, Sound, Events, Control, Sensing, Operators, Variables, My Blocks, Images, and Alien Language. The Alien Language category contains blocks for "when I hear left", "when I hear right", "train new machine learning model", "Is the machine learning model ready?", and "start listening".



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

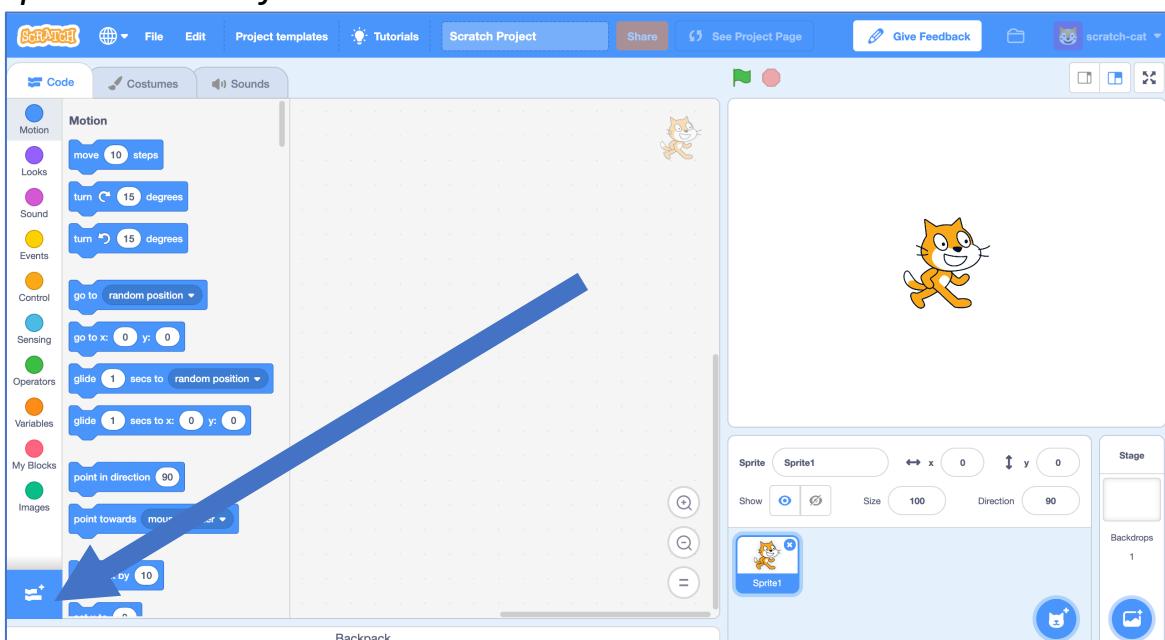
1. Go to <https://scratch.machinelearningforkids.co.uk/>

The next few steps only work with **Google Chrome**.

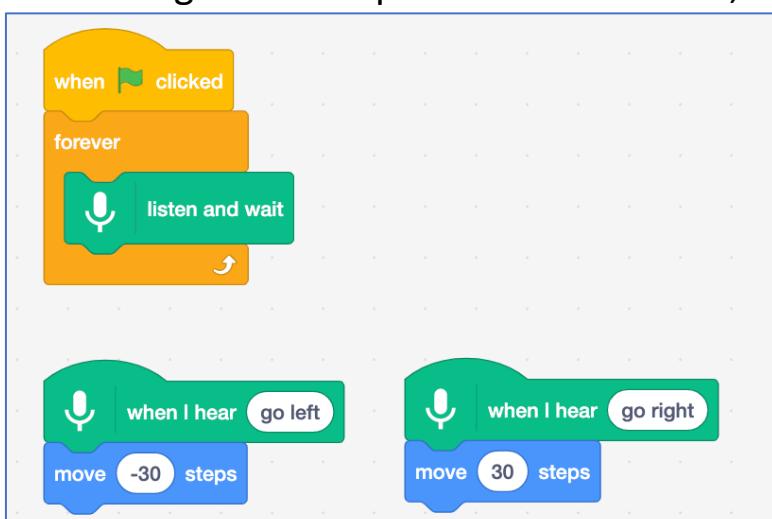
If you don't have access to Google Chrome, skip to **step 5** and start from there.

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.

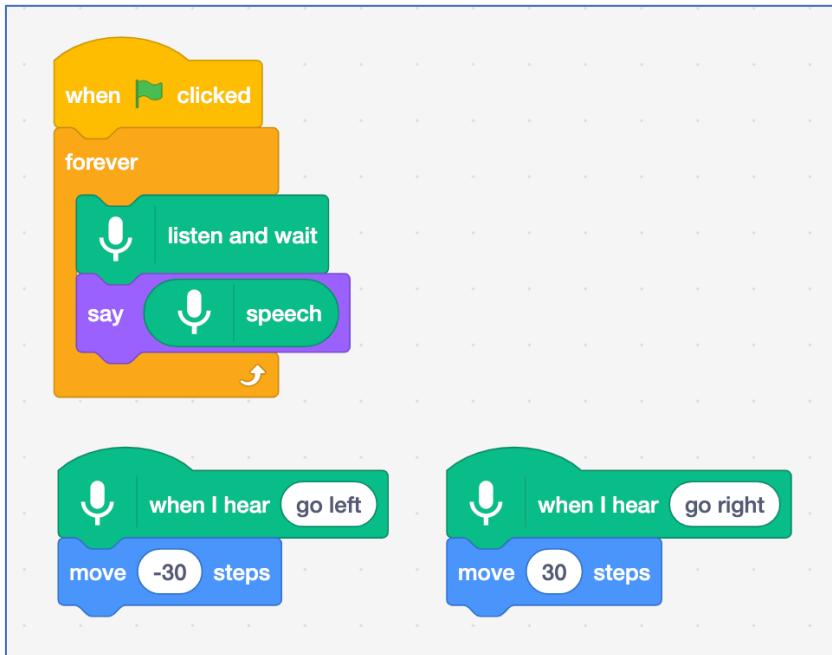


3. Using the new Speech to Text blocks, create the following scripts.



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”

8. Click on “Try it now”

9. Click on “Projects” on the top menu bar

10. Click the “+ Add a new project” button.

11. Name your project “Alien Language” and set it to learn how to recognise “**sounds**”.

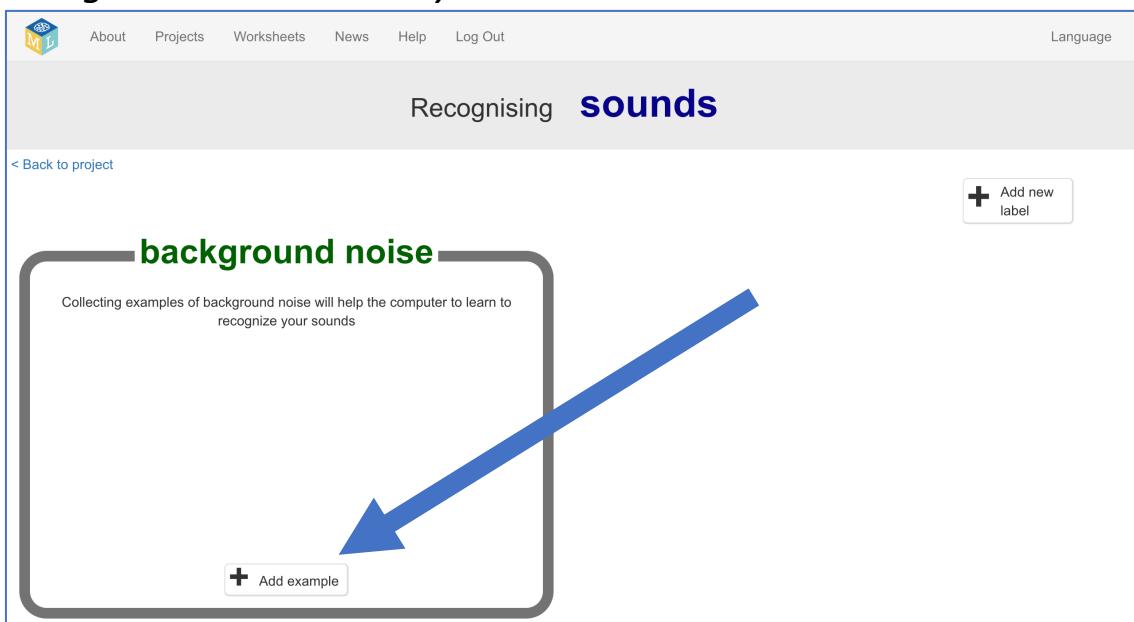
Click the “Create” button

The screenshot shows a web interface for creating a machine learning project. At the top, there's a navigation bar with links for About, Projects, Worksheets, News, Help, Log Out, and Language. Below the navigation, a large button says "Start a new machine learning project". The main form area has a "Project Name *" field containing "Alien Language". Under the "Recognising *" section, the word "sounds" is selected. A tooltip box provides information about what type of thing can be recognised: "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".". At the bottom right of the form are "CREATE" and "CANCEL" buttons.

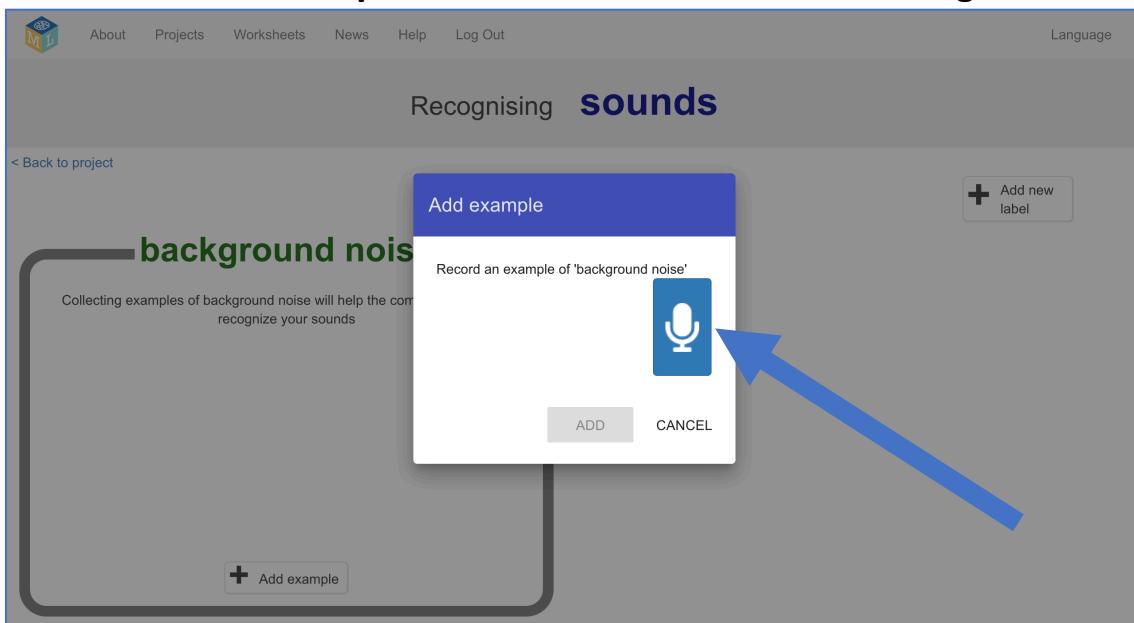
12. You should now see “**Alien Language**” in the list of your projects.
Click on it.

13. Click on the **Train** button to start collecting examples.

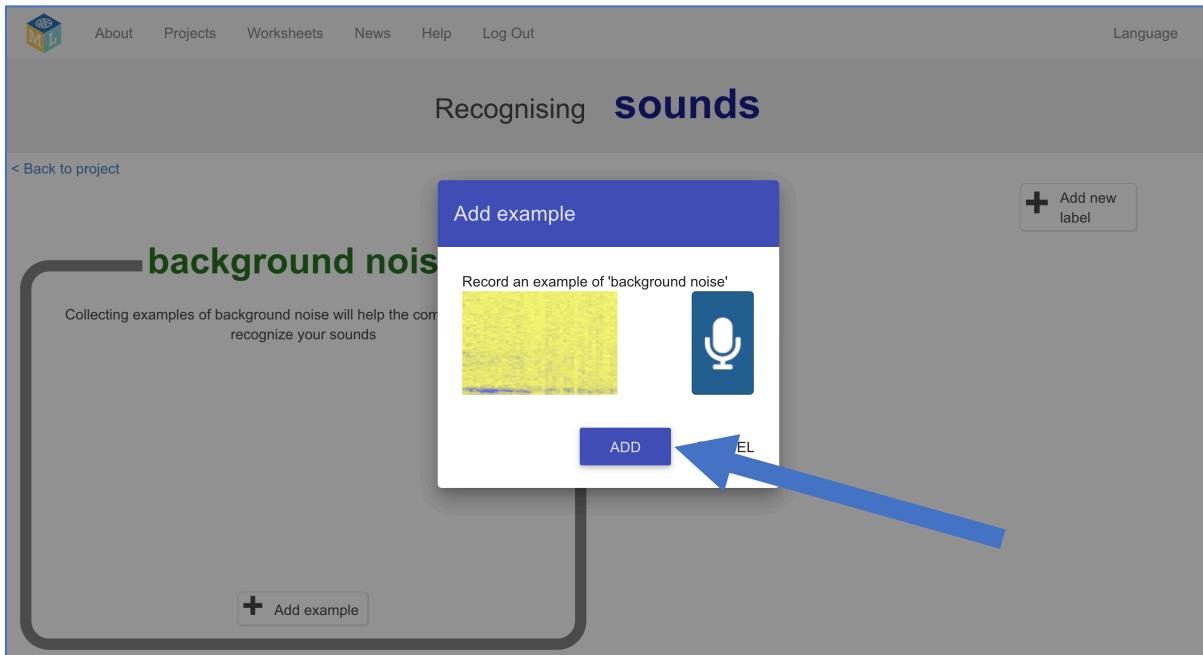
14. Click on the **Add example** button in the **background noise** bucket
Recording background noise will help your machine learning model to tell the difference between the sounds you will train it to recognize, and the background noise where you are.



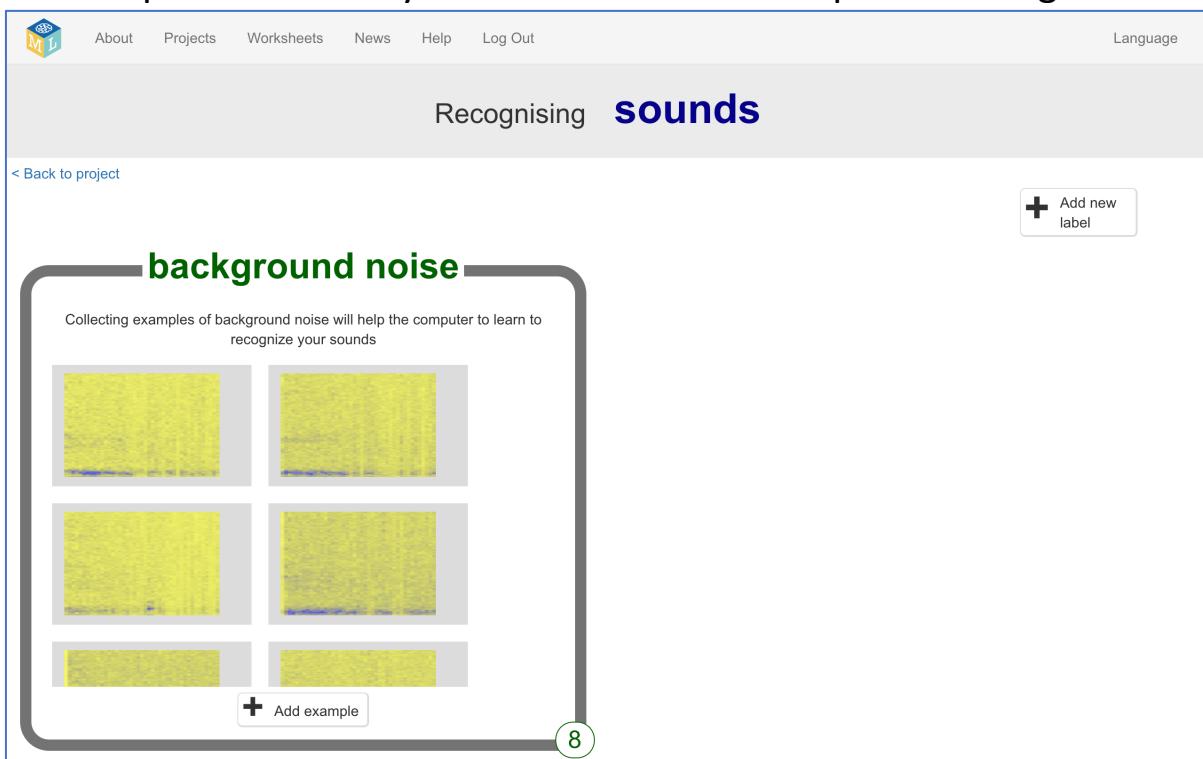
15. Click the **microphone** to record 2 seconds of background noise



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

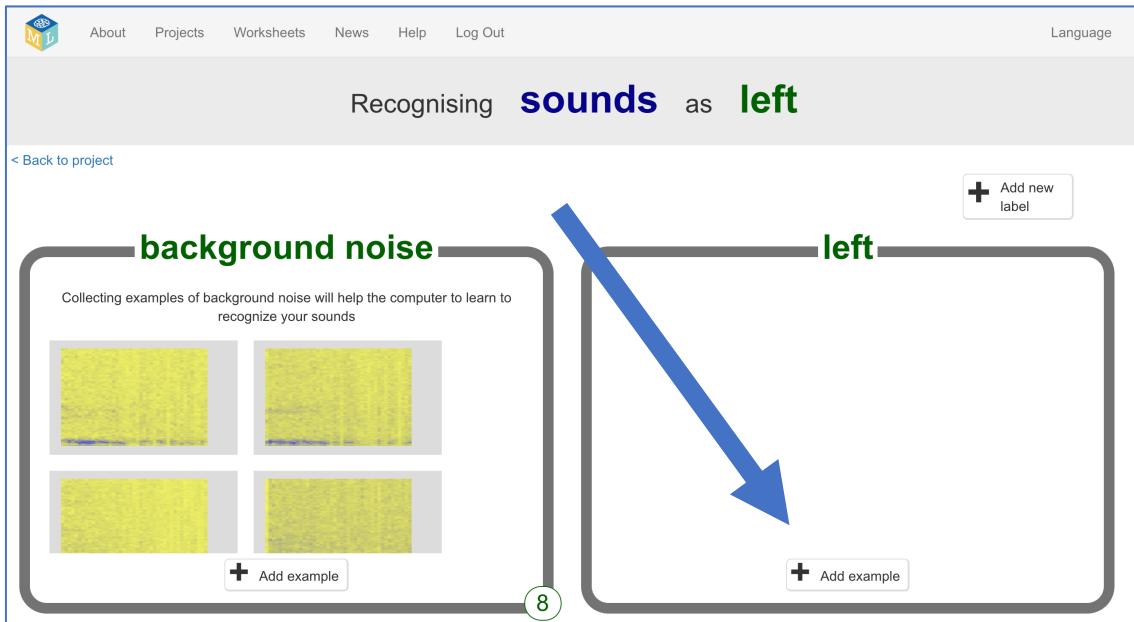


17. Repeat that until you have **at least 8** examples of background noise

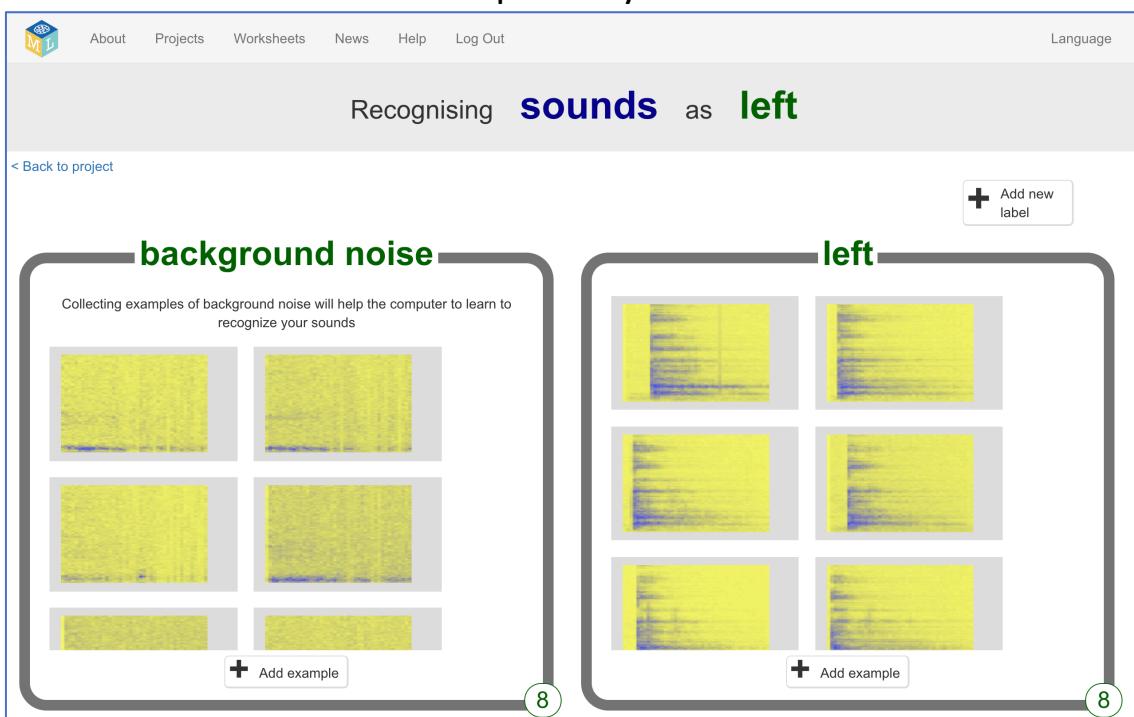


18. Click the **Add new label** button in the top right, and create a new training bucket called “left”

19. Click the Add example button in the new left bucket



20. Record at least 8 examples of your alien noise for “left”



21. Click the Add new label button in the top right, and create a new training bucket called “right”

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

The screenshot shows a web-based application for training a machine learning model. At the top, there's a navigation bar with links for About, Projects, Worksheets, News, Help, Log Out, and Language. Below the navigation is the title "Recognising sounds as left or right". A "Back to project" link is located just below the title. On the right side of the page is a "Add new label" button. The main area is divided into three sections: "background noise" (8 examples), "left" (8 examples), and "right" (8 examples). Each section contains a grid of spectrograms and a "Add example" button.

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

24. Click the Learn & Test button

The screenshot shows the "Alien Language" project page. It features three main buttons: "Train", "Learn & Test", and "Make". A large blue arrow points to the "Learn & Test" button. The "Train" button has the sub-instruction "Collect examples of what you want the computer to recognise". The "Learn & Test" button has the sub-instruction "Use the examples to train the computer to recognise sounds". The "Make" button has the sub-instruction "Use the machine learning model you've trained to make a game or app, in Scratch or in Python".

25. Click “Train new machine learning model”

The screenshot shows the "Machine learning models" page. It includes two boxes: "What have you done?" and "What's next?". The "What have you done?" box states: "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". The "What's next?" box states: "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.)". A blue arrow points to the "Train new machine learning model" button at the bottom of the "What's next?" box.

26. 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.

The screenshot shows a user interface for testing a machine learning model. At the top left, there are two buttons: 'Start listening' and 'Stop listening'. Below them, the text 'Recognised as right with 94% confidence' is displayed. A large blue arrow points from the text 'If the computer is getting too many things wrong, you might want to go back to the Train page and collect some more examples' towards the 'Recognised as right' text.

27. 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.

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

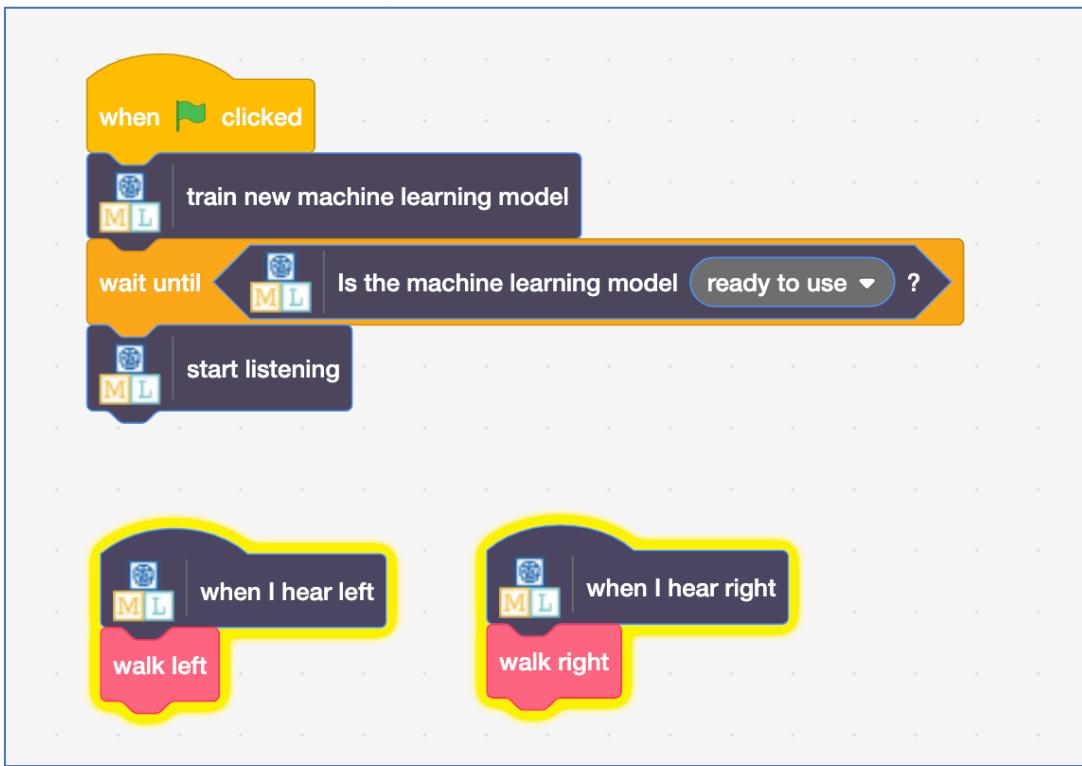
The screenshot shows the main project page with three main buttons: 'Train', 'Learn & Test', and 'Make'. A large blue arrow points from the 'Learn & Test' button towards the 'Make' button. The 'Train' button has the sub-instruction 'Collect examples of what you want the computer to recognise'. The 'Learn & Test' button has the sub-instruction 'Use the examples to train the computer to recognise sounds'. The 'Make' button has the sub-instruction 'Use the machine learning model you've trained to make a game or app, in Scratch or in Python'.

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

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

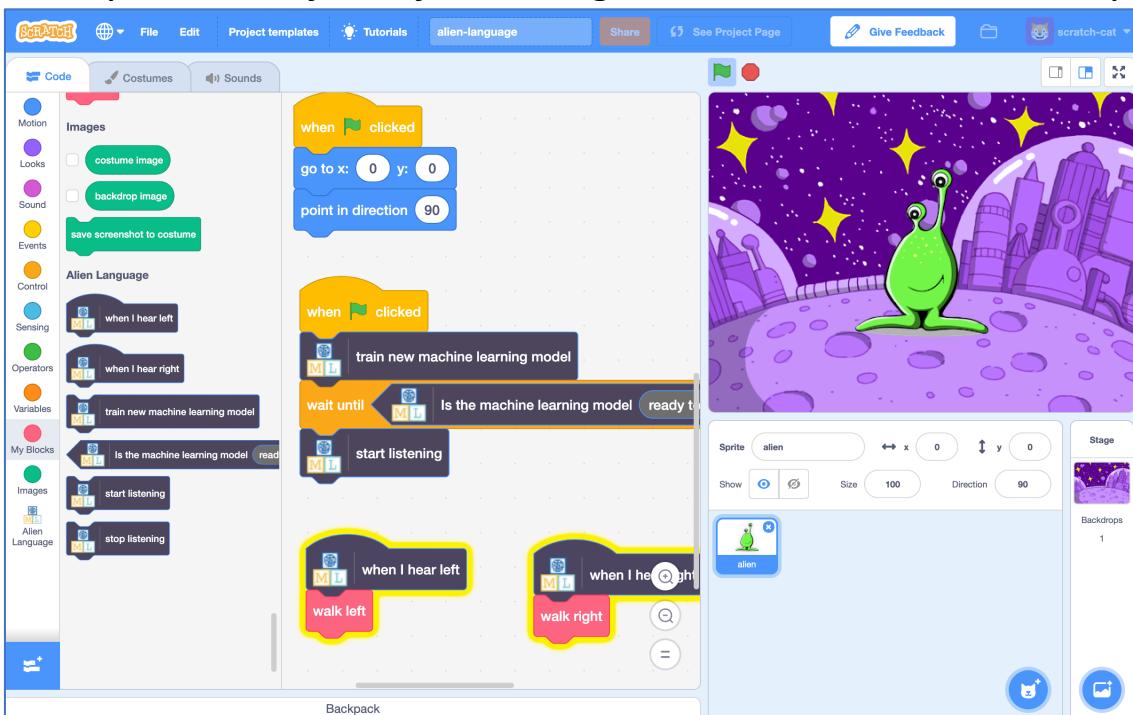
31. Add the following script to the alien sprite

*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.*



32. 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.