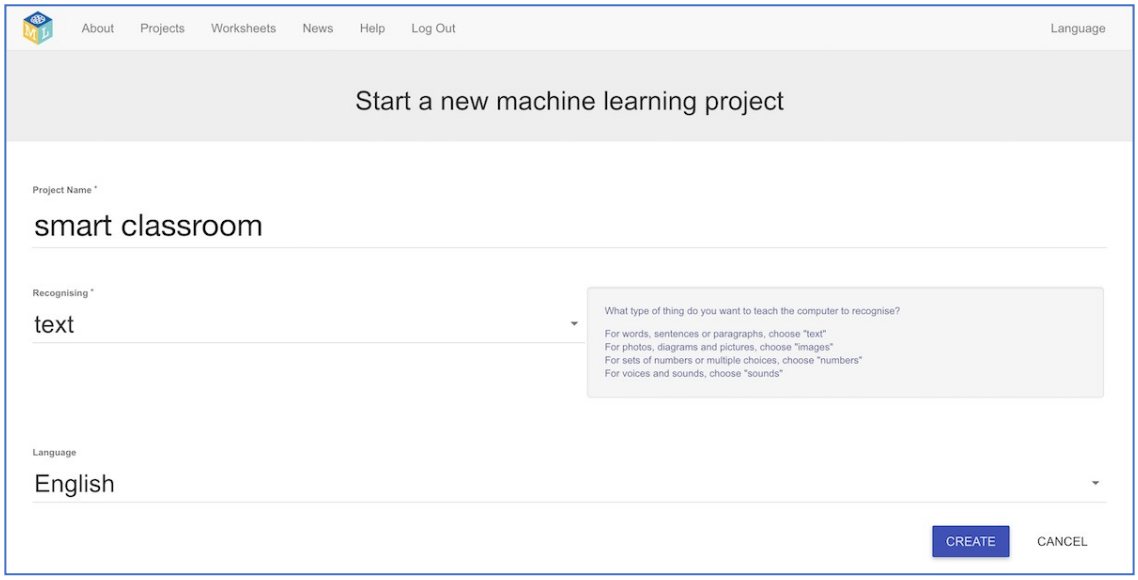
In this assignment you will make a virtual classroom that can react to what you say to it.

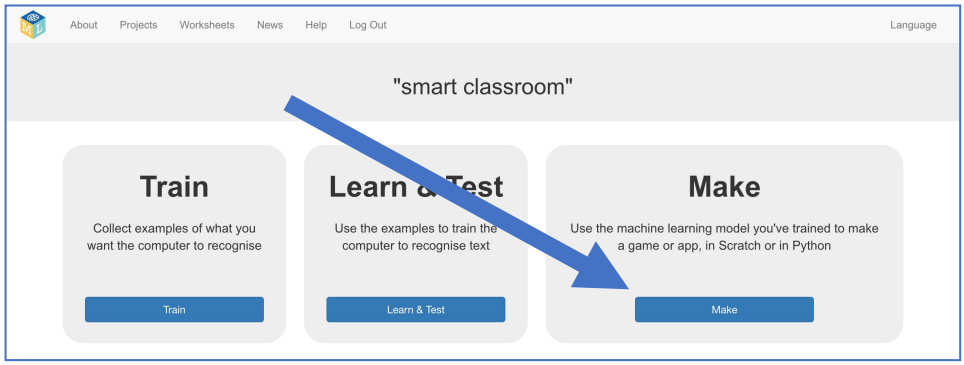
You'll be able to control the virtual devices in the classroom by saying what you want.

You will teach the computer to recognise commands for different devices by giving it examples of each.

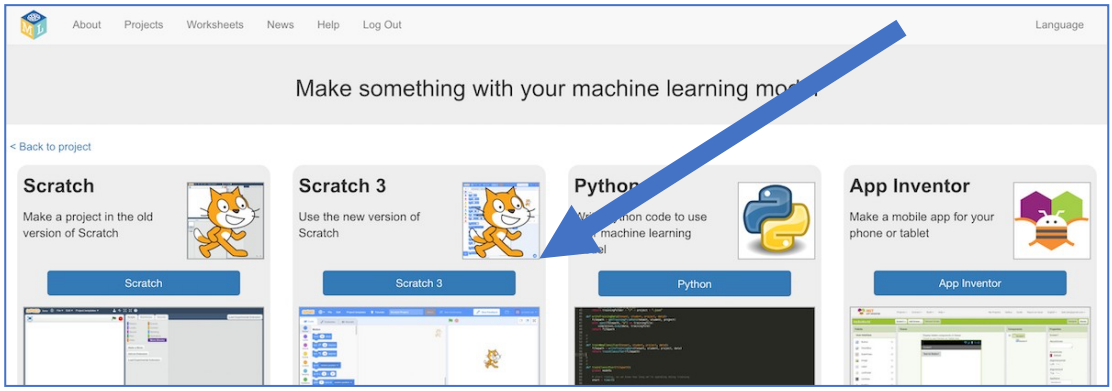
1. Go to https://machinelearningforkids.co.uk/#!/login
2. Click on "**Try it now**"
3. Click the **"+ Add a new project**" button.
4. Name your project "smart classroom" and set it to learn how to recognise "**text**". Click **Create**



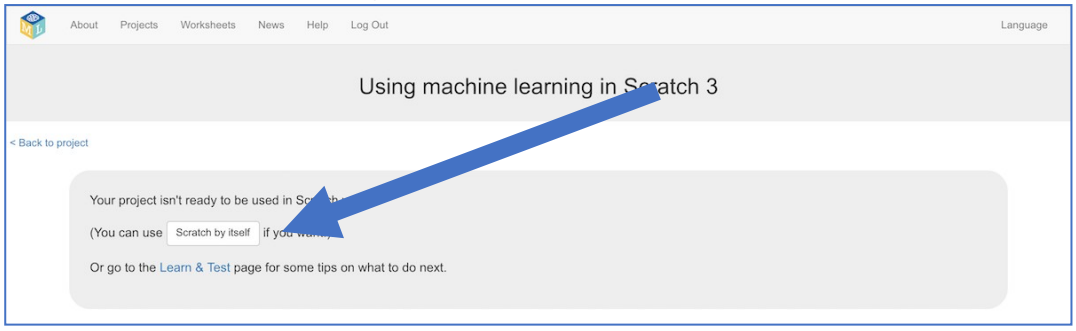
5. We'll start by getting a project ready in Scratch. Click "**Make**"



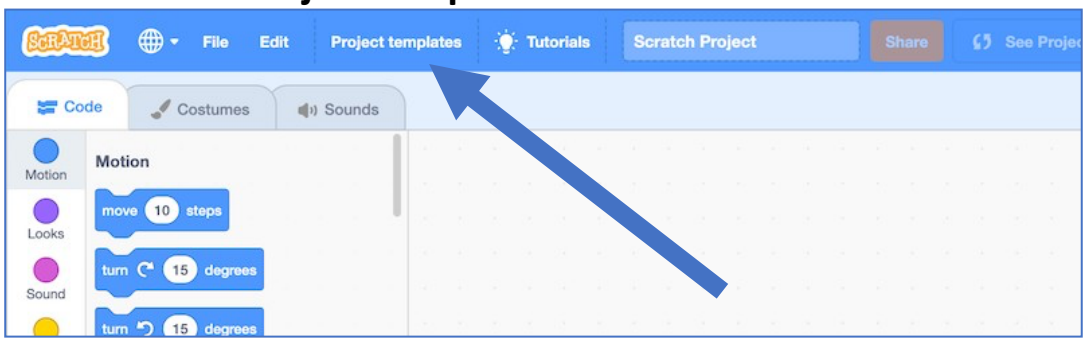
6. Click "**Scratch 3**"



7. Click “**Scratch by itself**”

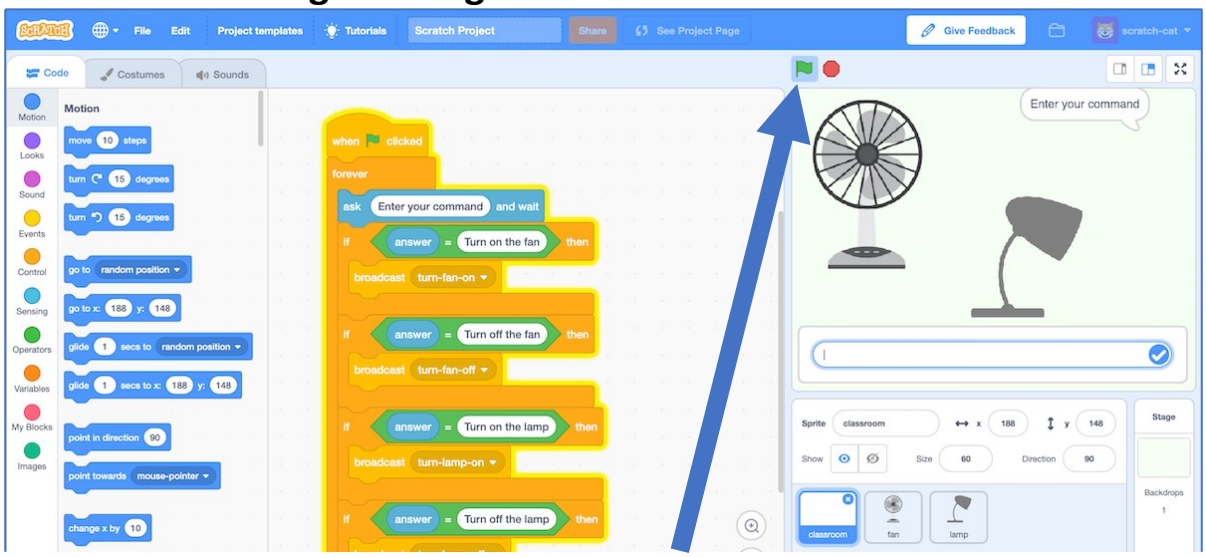


8. Click on **Project templates**



9. Click on the **Smart Classroom (easy)** template

10. Click on the **green flag** to test.



11. Type in a message and watch it react!

Try “Turn on the lamp”, “Turn off the lamp”, “Turn on the fan”, and “Turn off the fan”. They should all work.

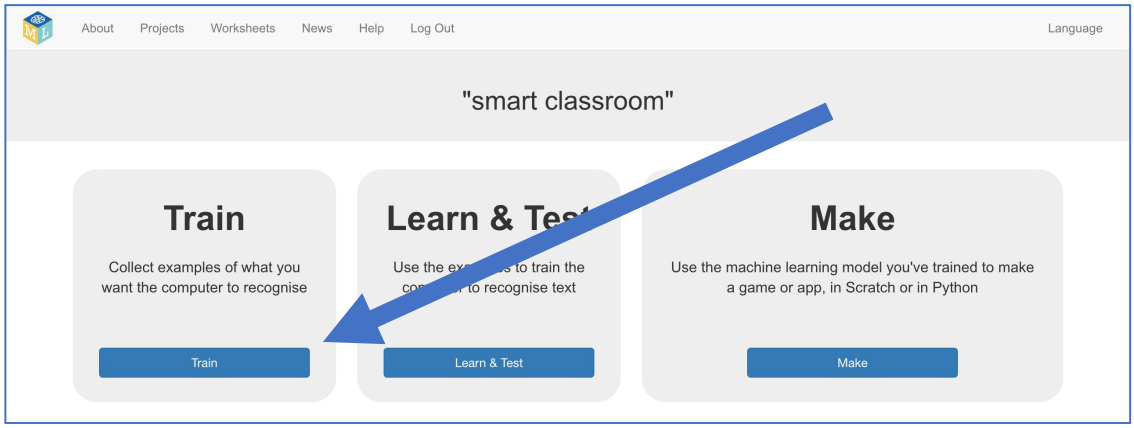
Type anything else, and nothing will happen!

12. Close the Scratch window and go back to the Training tool.

13. Click on the "**< Back to project**" link.

14. We need to collect some examples to train the computer.

*Click the **Train** button.*

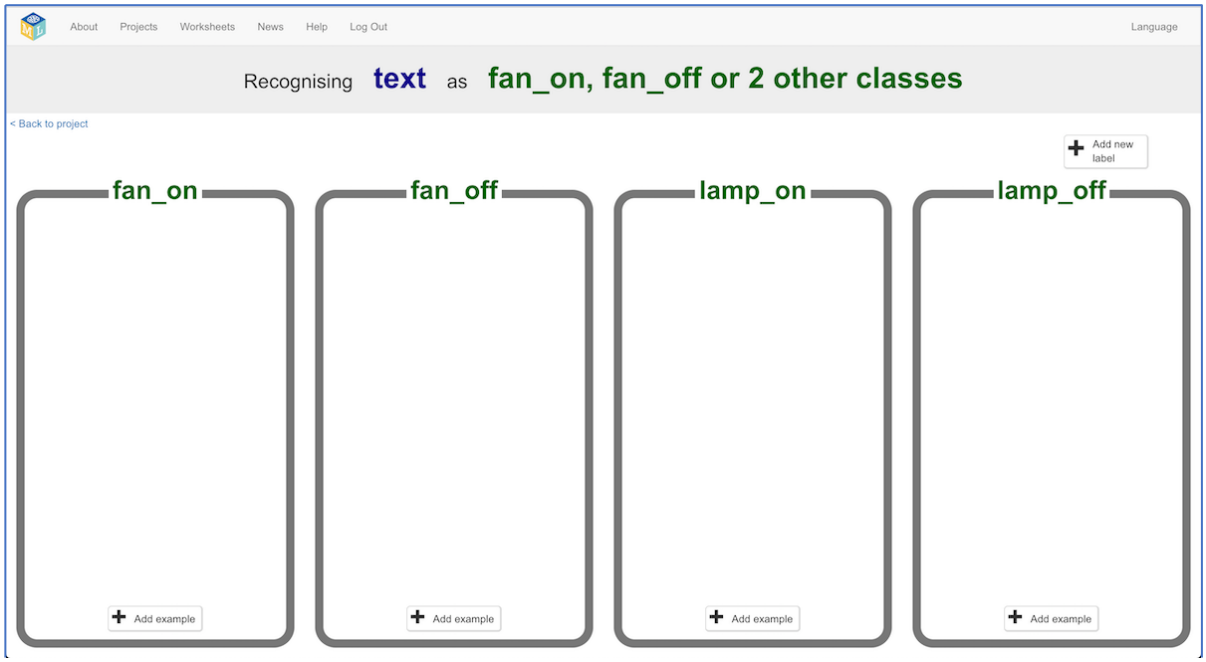


15. Click on **"+ Add new label**" and call it "fan on".

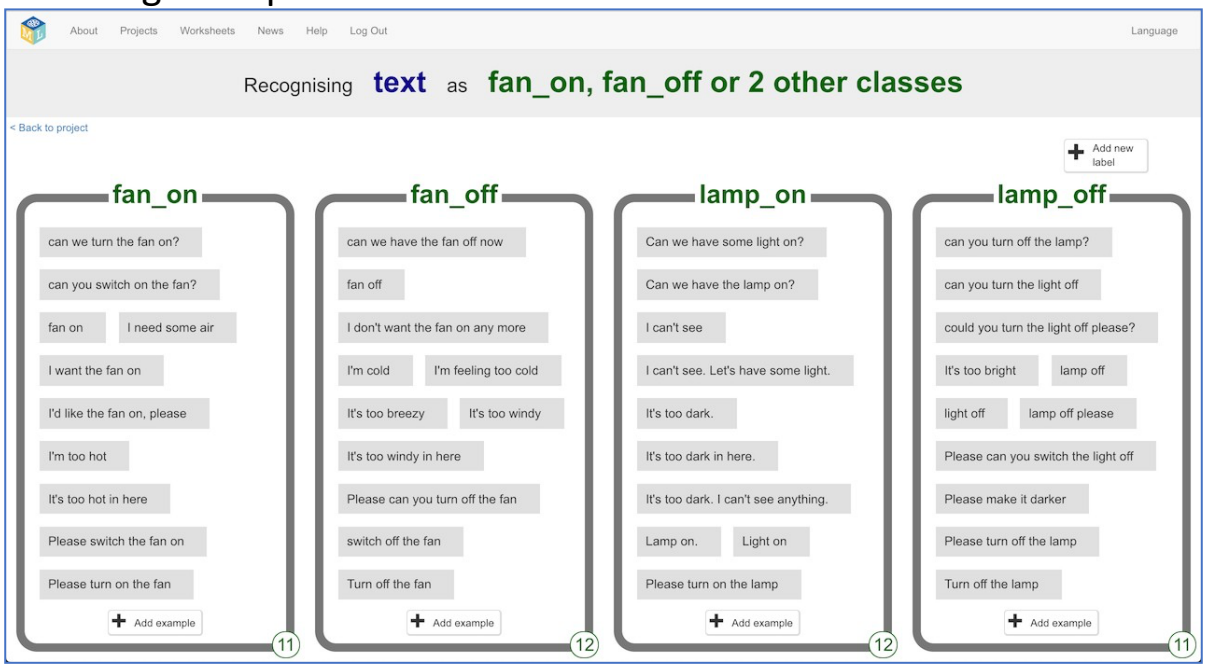
Do that again, and create a second bucket called "fan off".

Do that again, and create a third bucket called "lamp on".

Do that again, and create a fourth bucket called "lamp off".

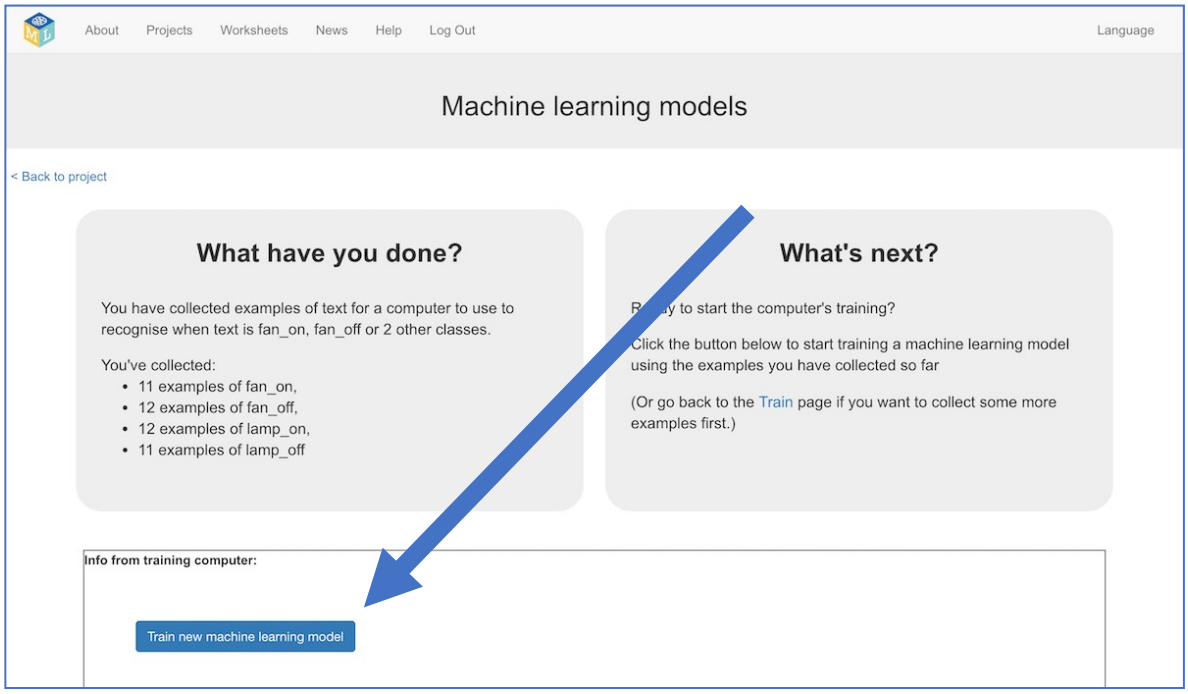


16. Click on the "**Add example**" for the four labels and put the following examples:

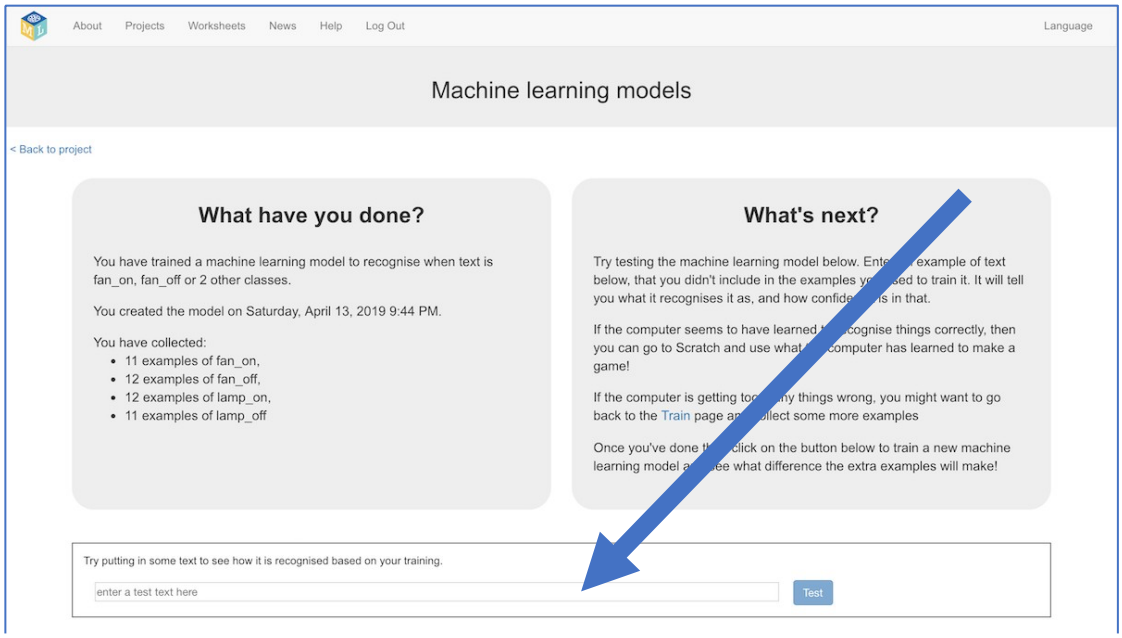


17. Click the "**< Back to project**" link, then click "**Learn & Test**".

18. Click on the "**Train new machine learning model**" button.



19. Wait for the training to complete. This might take a minute or two.



20. Once the training has completed, a Test box will be displayed. Try testing your machine learning model to see what it has learned. Type in a command, and press enter. *Test it with examples that you haven't shown the computer before.*

What have you done so far?

You've started to train a computer to recognise commands to control two classroom devices.

Instead of writing rules to do this, you are doing it by collecting examples. These examples are being used to train a machine learning "model".

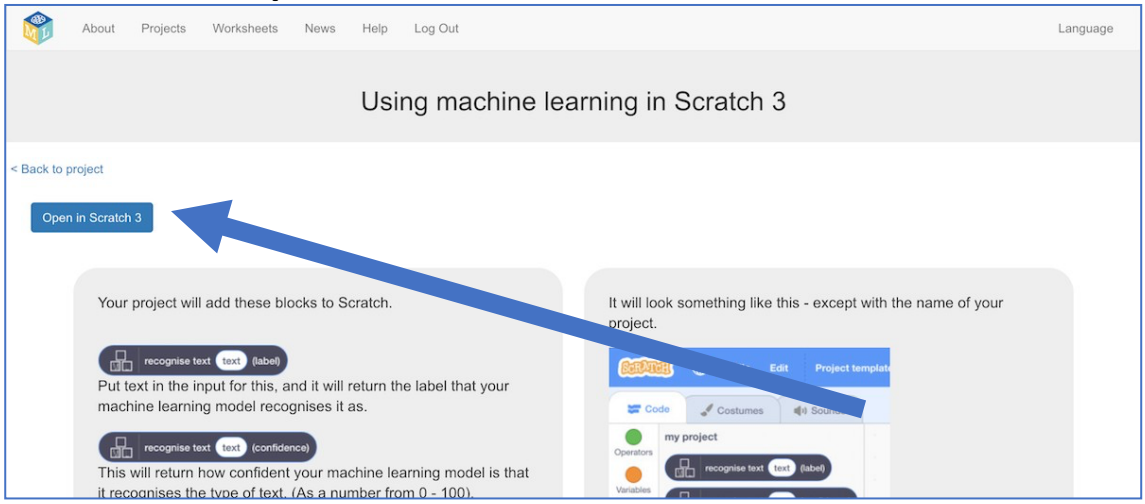
The computer will learn from patterns in the examples you've given it, such as the choice of words, and the way sentences are structured. These will be used to be able to recognise commands.

21. Click on the **"< Back to project"**

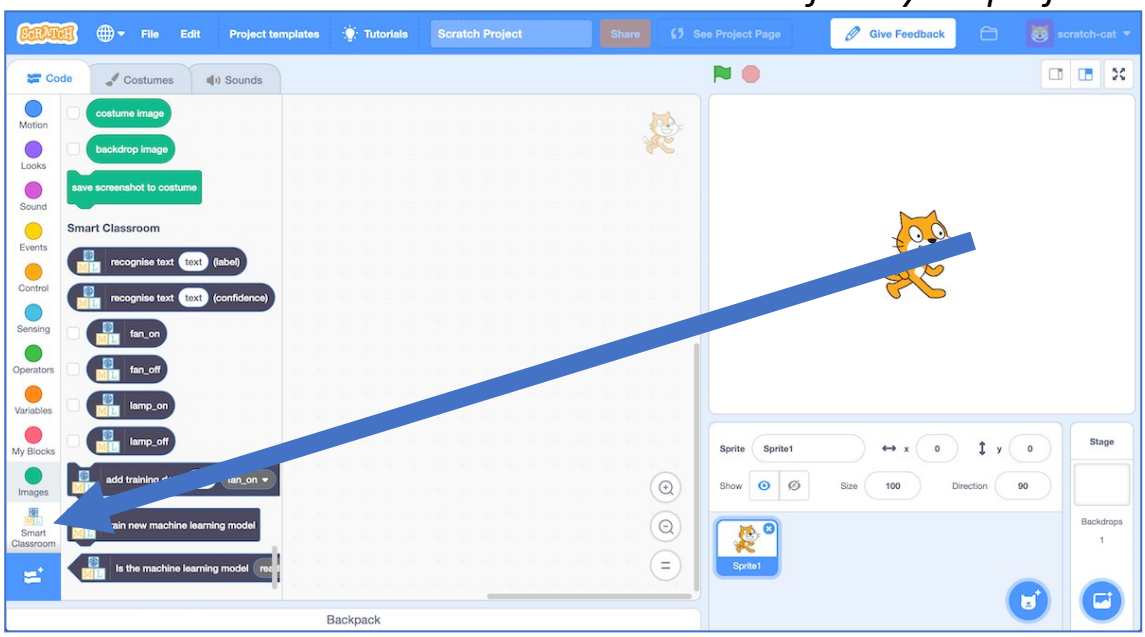
22. Click on **Make**

23. Click on **Scratch 3**

24. Click on **Open in Scratch 3**



25. *You should see new blocks in the toolbox from your project.*

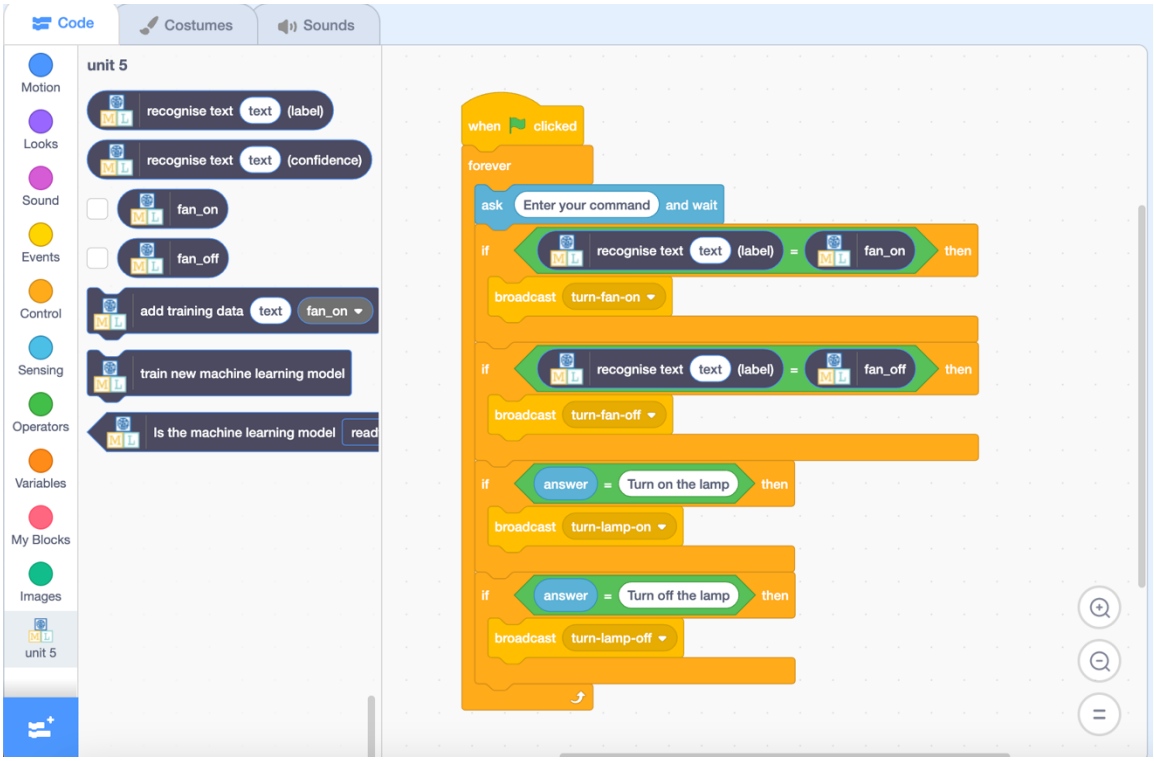


26. Load the same starter Scratch project you opened before.

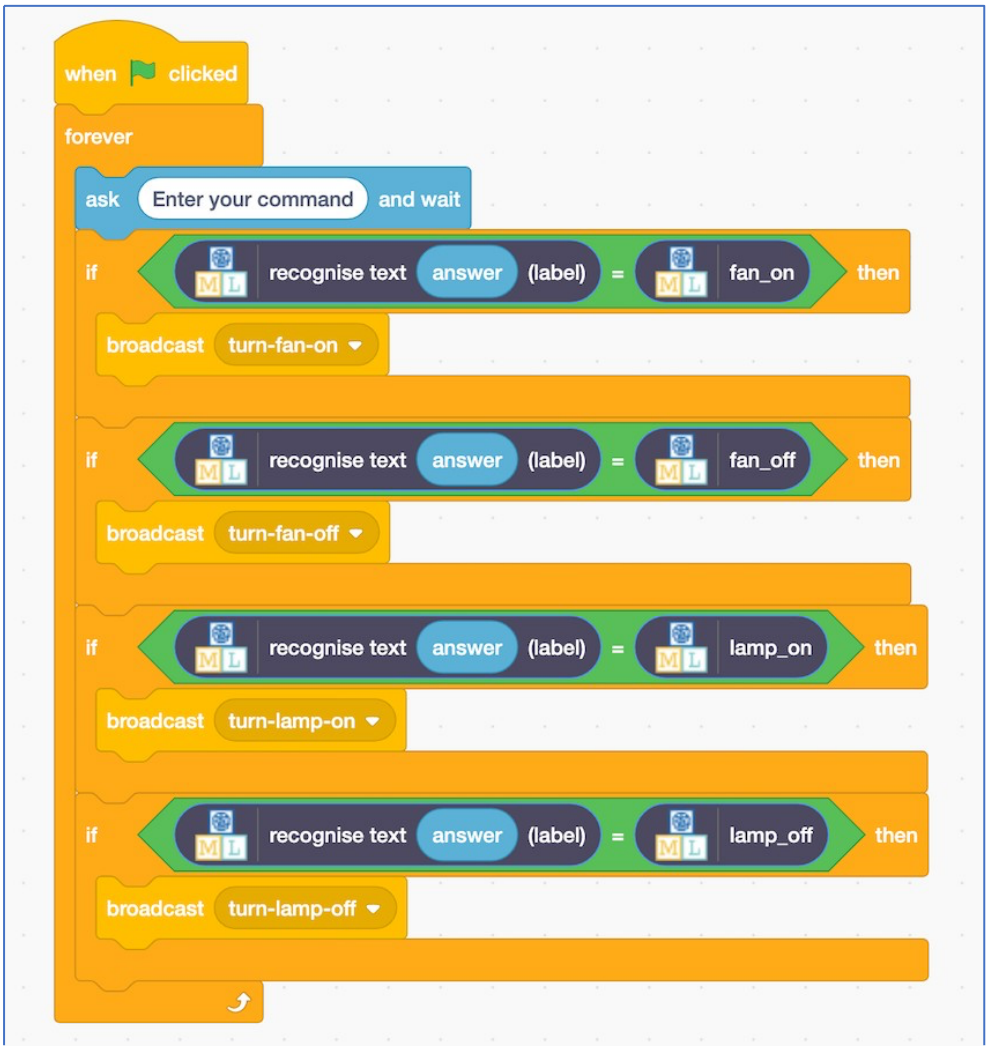
*Click on **Project templates***

*Click on **Smart Classroom (easy)***

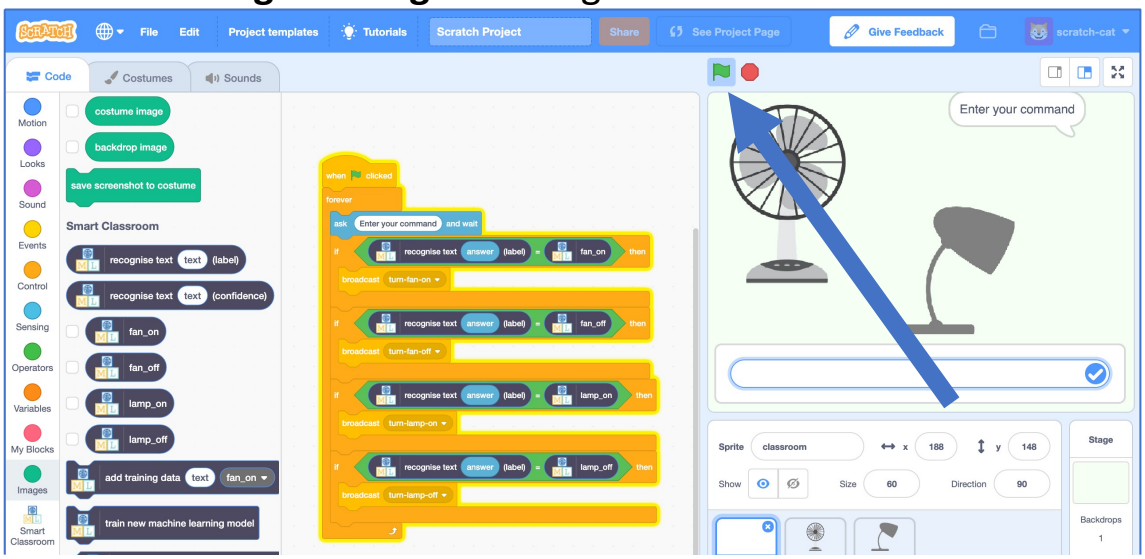
27. Click on "**Unit 5**" and drag and drop the rules from your machine learning model to the script.



28. Your script should look like this after you finish



29. Click the **green flag** to test again.



30. Test your project

Type a command and press enter. The fan or lamp should react to your instructions.

*Make sure you test that this works **even for messages that you didn't include in your training**.*

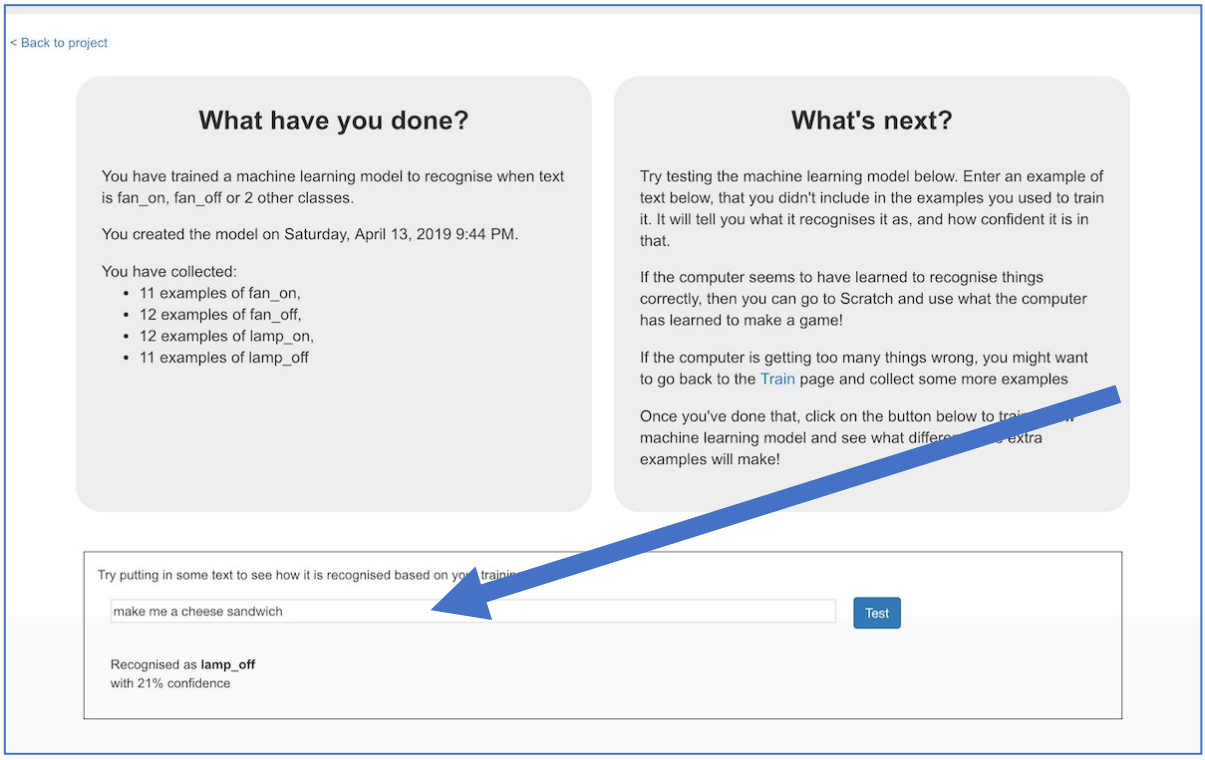
What have you done so far?

You've modified your Scratch smart classroom assistant to use machine learning instead of your earlier rules-based approach.

Training the computer to be able to recognise instructions for itself should be much quicker than trying to make a list of every possible command.

The more examples you give it, the better it should get at recognising instructions correctly.

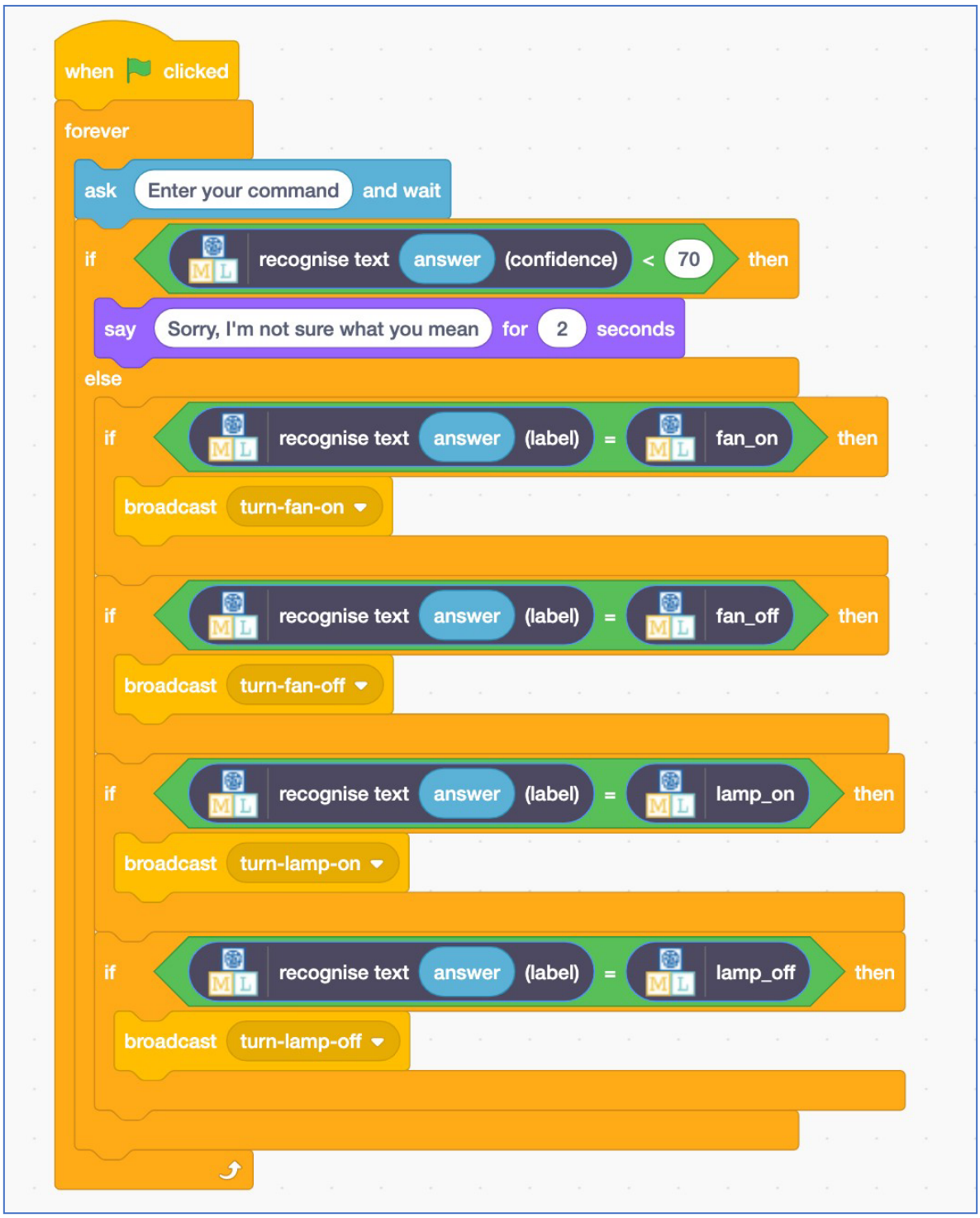
31. Leave Scratch open (we'll come back in a moment) but go back to the **Learn & Test** page in the Training tool.
Type something in the Test box that has nothing to do with lamps or fans.
For example, "make me a cheese sandwich"



32. Look at the confidence score, and check that it's very low. Compare this with the score you get from commands like "turn on the lamp".
This is the computer's way of telling you that it's not very certain it understands your command, because it doesn't look like what it learned from your examples.

33. Go back to Scratch.
You can open your saved project from before if you closed the window.

34. Modify the script for the “classroom” sprite so that it uses this confidence score.



35. Click the **green flag** and test again

Try typing commands that have nothing to do with the fan or lamp.
Try asking for something to be turned on or off.
Check that your classroom reacts in the right way.

What have you done?

You've trained a smart assistant – like a simple version of the assistants you can get on modern smartphones (like Apple's Siri or Google's Assistant) or virtual assistant devices (like Amazon's Alexa or Google's Home).

You've used it to create a smart classroom assistant in Scratch, using machine learning instead of your earlier rules-based approach.

Training the computer to be able to recognise instructions was hopefully much easier than trying to make a list of every possible command. And the more examples you give it, the better it gets at recognising instructions and the more confident it gets in doing that.

And now, if it's not sure what you mean, it will ask you to try again.