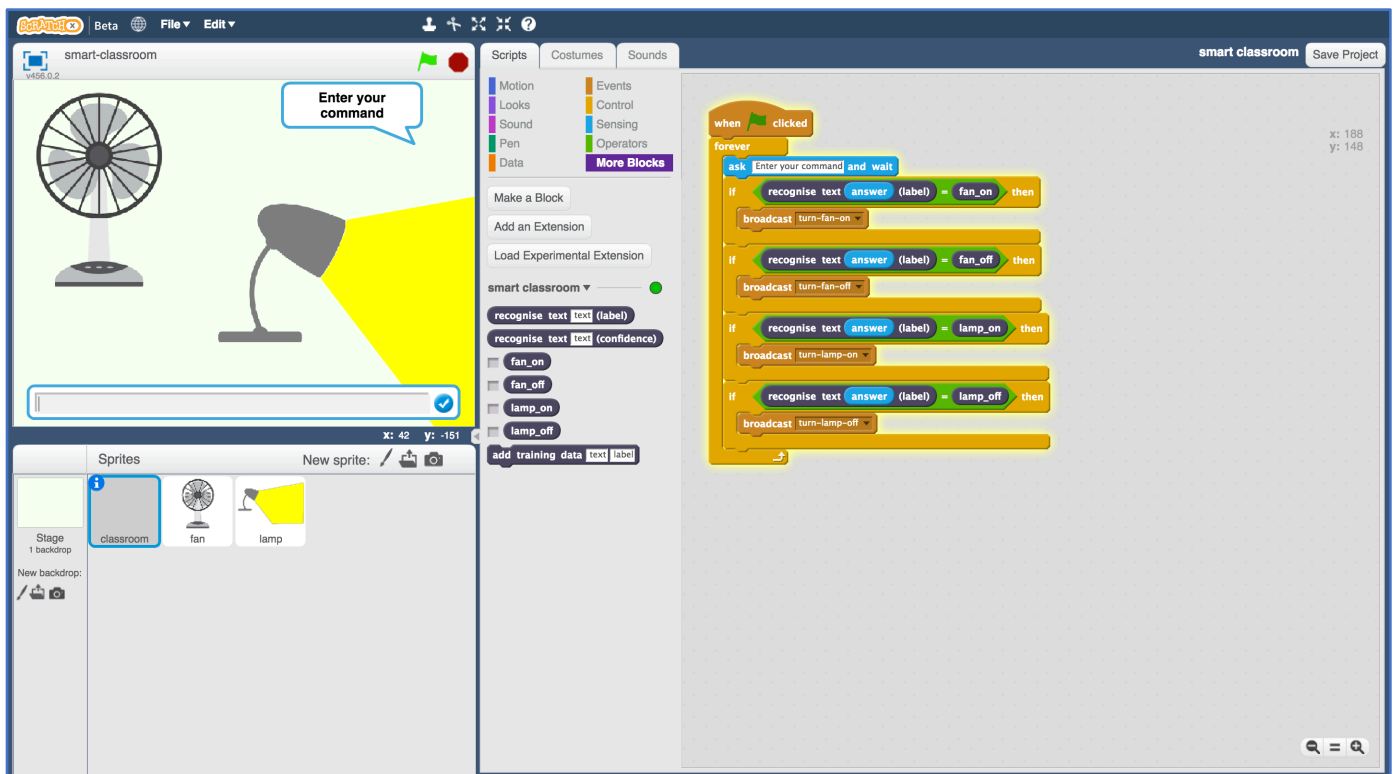


Smart Classroom

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

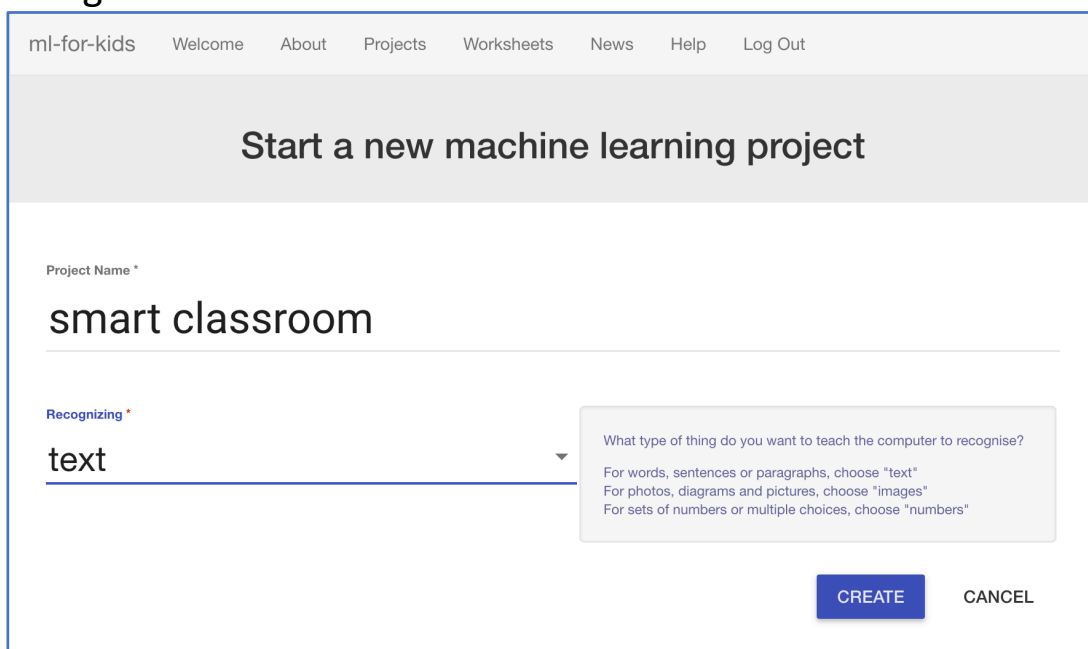
You'll be able to control the virtual devices in the classroom by saying what you want.

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



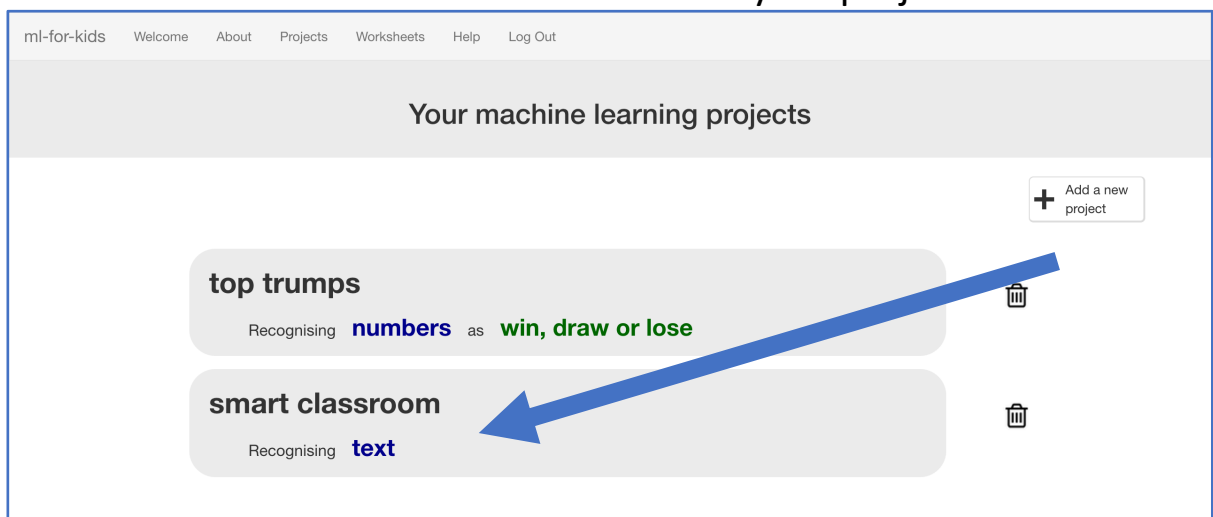
This project worksheet is licensed under a Creative Commons Attribution Non-Commercial Share-Alike License
<http://creativecommons.org/licenses/by-nc-sa/4.0/>

1. Go to <https://machinelearningforkids.co.uk/> in a web browser
2. Click on “Get started”
3. Click on “Try it now”
4. Click the “+ Add a new project” button.
5. Name your project “smart classroom” and set it to learn how to recognise “text”. Click **Create**

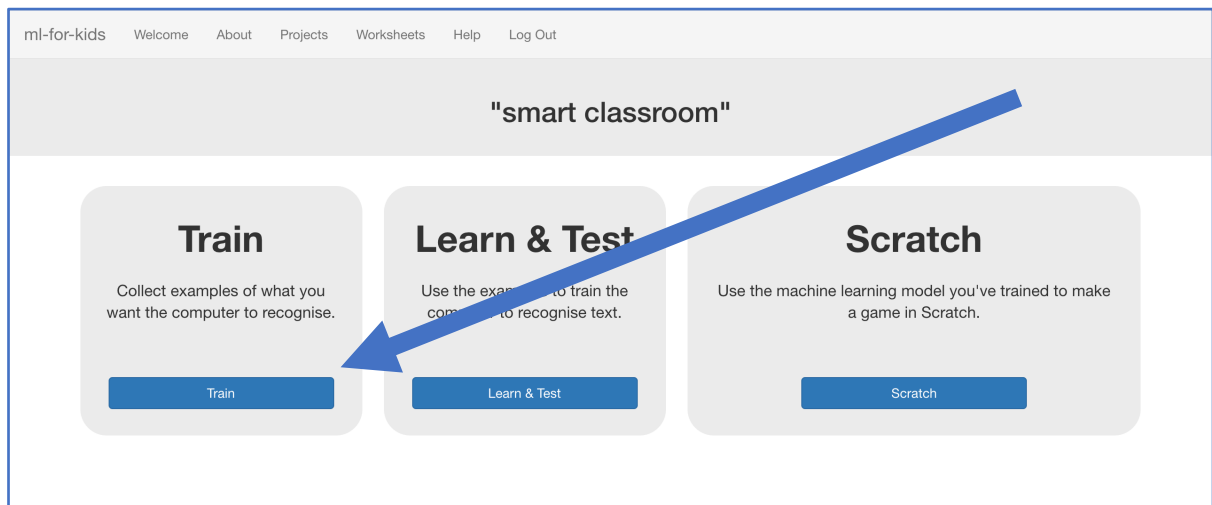


The screenshot shows the 'Start a new machine learning project' form on the ml-for-kids website. The form has a header with navigation links: ml-for-kids, Welcome, About, Projects, Worksheets, News, Help, and Log Out. Below the header is a title 'Start a new machine learning project'. The form contains two main input fields: 'Project Name *' with the value 'smart classroom' and 'Recognizing *' with a dropdown menu set to 'text'. A tooltip is visible next to the 'Recognizing' dropdown, providing instructions: '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"'. At the bottom right of the form are two buttons: 'CREATE' and 'CANCEL'.

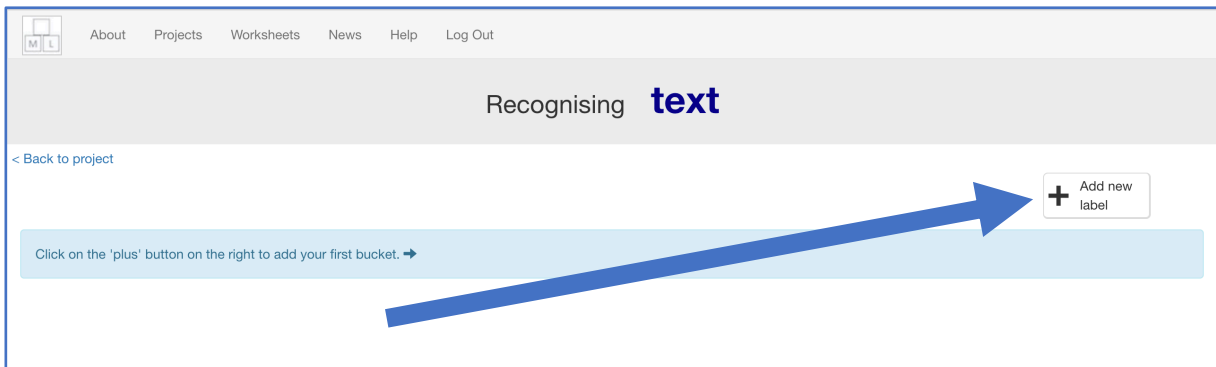
6. You should see “smart classroom” in your projects list. Click it.



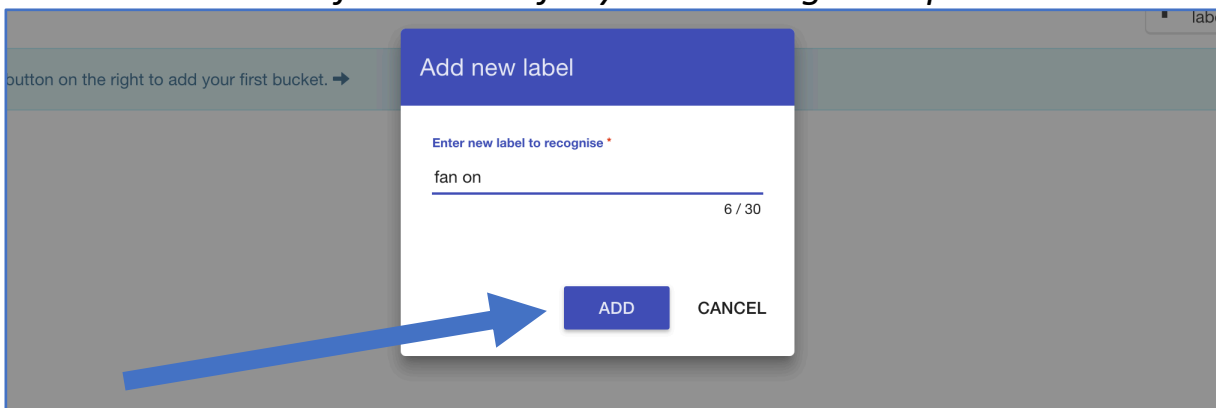
7. We need to collect some examples to train the computer.
*Click the **Train** button.*



8. Click on “+ Add new label”

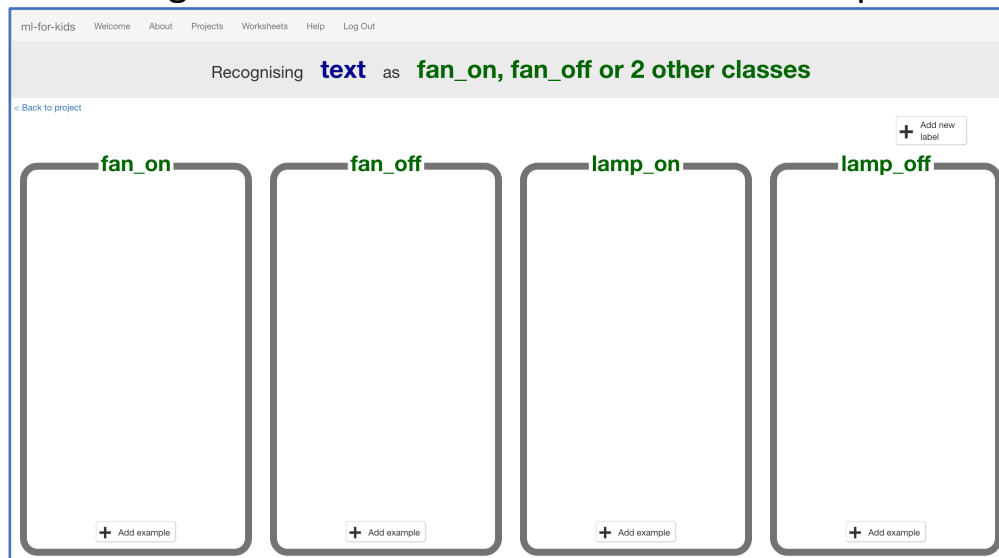


9. Type in “fan on” and click “**ADD**”
This will create the first bucket for your training examples.

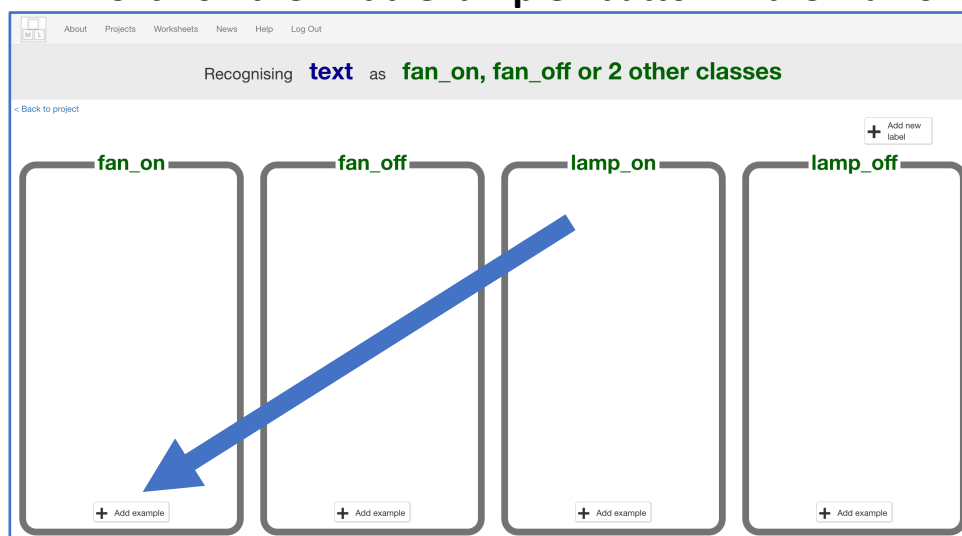


10. Click on “+ Add new label” again

- 11.** Create a second bucket called “fan off”
Do that again. Create a third bucket called “lamp on”.
Do that again. Create a fourth bucket called “lamp off”.



- 12.** Click on the “Add example” button in the “fan on” bucket



- 13.** Type in a way to ask for the fan to be turned on, then click “ADD”
For example, you could type “Please can you switch on the fan”.
- 14.** Click on the “Add example” button in the “fan off” bucket, and type in a way to ask for the fan to be switched off.
For example, you could type “I want the fan off now”
- 15.** Do the same for the “lamp on” and “lamp off” buckets.

- 16.** Repeat steps 12-15 until you've got at least **six** examples of each. *Be imaginative! Think of lots of different ways to ask each command. For "fan on" you could complain that you're too hot. For "fan off" you could complain that it's too breezy. For "lamp on" you could complain that it's too dark or that you can't see. For "lamp off" you could complain that it's too bright.*

ml-for-kids Welcome About Projects Worksheets Help Log Out

Recognising **text** as **fan_on, fan_off or 2 other classes**

[< Back to project](#)

[+ Add new label](#)

fan_on

Can we turn the fan on?

Can you switch on the fan?

fan on I need some air

I want the fan on

I'd like the fan on, please

I'm too hot It's too hot in here

Please switch the fan on

Please turn on the fan

Turn on the fan

[+ Add example](#)

fan_off

Can we have the fan off now

fan off

I don't want the fan on any more

I'm cold I'm feeling too cold

It's too breezy It's too windy

It's too windy in here

Please can you turn off the fan

Switch off the fan Turn off the fan

Turn the fan off

[+ Add example](#)

lamp_on

Can we have some light on?

Can we have the lamp on?

I can't see

I can't see. Let's have some light.

It's too dark It's too dark in here.

It's too dark. I can't see anything.

Lamp on Light on

Please turn on the lamp

Turn on the lamp

[+ Add example](#)

lamp_off

Can you turn off the lamp?

Can you turn the light off

Could you turn the light off please?

It's too bright Lamp off

Lamp off please

Please can you switch the light off

Please make it darker

Please turn off the lamp

Turn off the lamp

[+ Add example](#)

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

- 18.** Click the “Train new machine learning model” button.

Machine learning models

[< Back to project](#)

What have you done?

You have collected examples of text for a computer to use to recognise when text is fan_on, fan_off or 2 other classes.

You've collected:

- 11 examples of fan_on,
- 12 examples of fan_off,
- 12 examples of lamp_on,
- 11 examples of lamp_off

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](#)

19. Wait for the training to complete. This might take a minute or two.
Try the multi-choice quiz at the bottom of the page while you wait.

20. Once the training has completed, a Test box will appear.
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.
If you're not happy with how the computer recognises the messages, go back to step 12, and add more examples.
Make sure you repeat step 18 to train with the new examples!

Machine learning models

[< Back to project](#)

What have you done?

You have trained a machine learning model to recognise when text is fan_on, fan_off or 2 other classes.

You created the model on Monday, September 3, 2018 10:49 PM.

You have collected:

- 11 examples of fan_on,
- 12 examples of fan_off,
- 12 examples of lamp_on,
- 11 examples of lamp_off

What's next?

Try testing the machine learning model below. Enter an example of text below, that you didn't include in the examples you used to train it. It will tell you what it recognises it as, and how confident it is in that.

If the computer seems to have learned to recognise things correctly, then you can go to [Scratch](#) and use what the computer has learned to make a game!

If the computer is getting too many things wrong, you might want to go back to the [Train](#) page and collect some more examples. Once you've done that, click on the button below to train a new machine learning model and see what difference the extra examples will make!

Try putting in some text to see how it is recognised based on your training.

[Test](#)

21. Click on the “< Back to project” link, then the “Scratch” button.

ml-for-kids

Welcome About Projects Worksheets Help Log Out

"smart classroom"

Train

Collect examples of what you want the computer to recognise.

[Train](#)

Learn & Test

Use the examples to train the computer to recognise text.

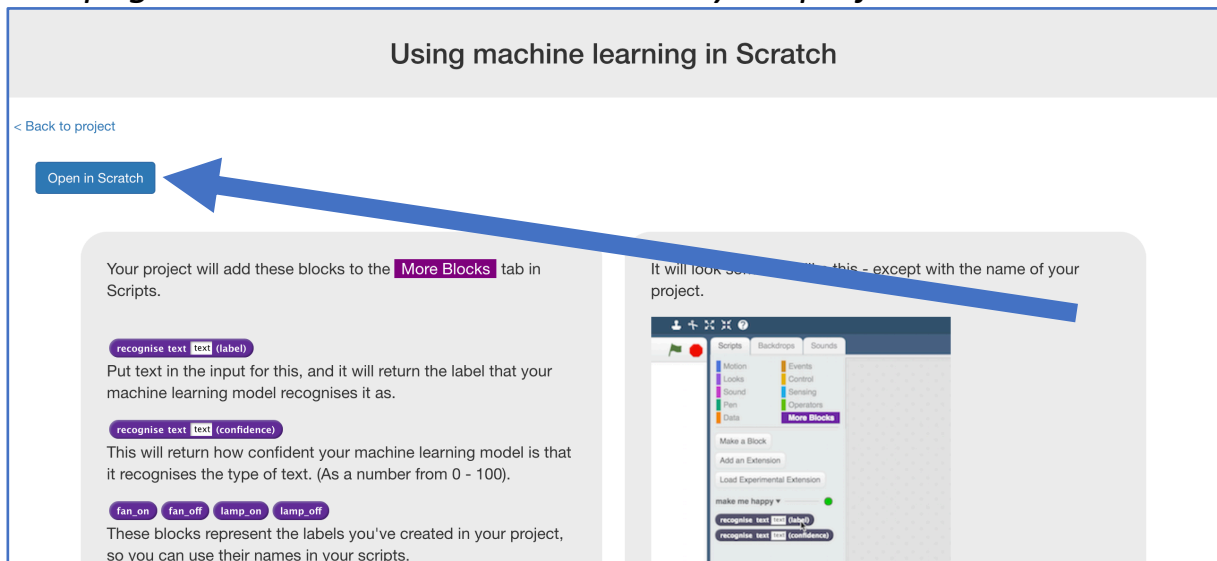
[Learn & Test](#)

Scratch

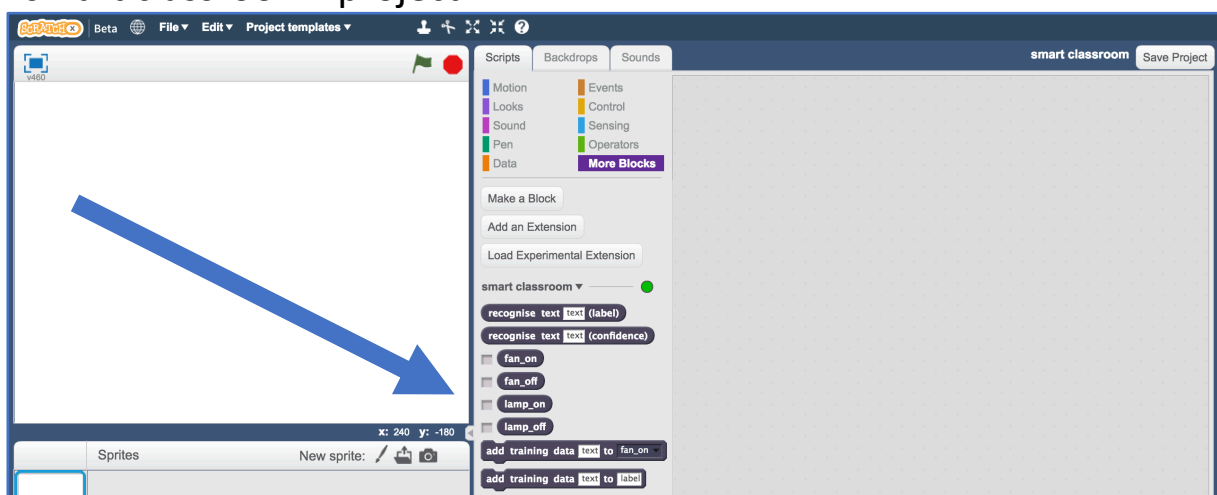
Use the machine learning model you've trained to make a game in Scratch.

[Scratch](#)

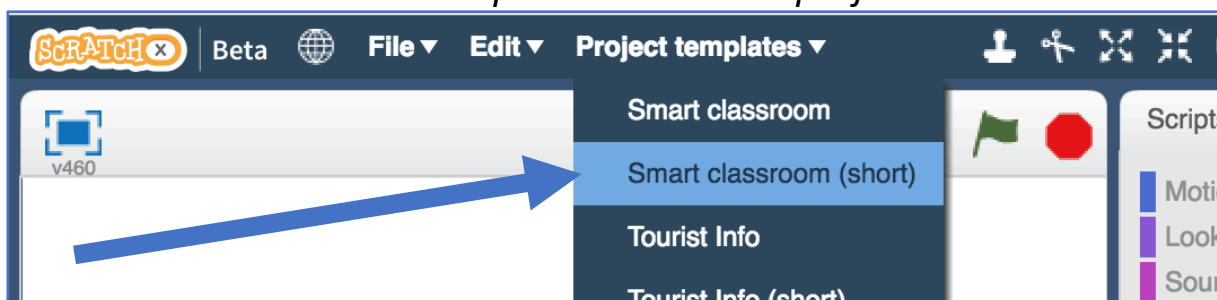
- 22.** Click **“Open in Scratch”** to launch the Scratch editor
This page has instructions on how to use your project in Scratch.



- 23.** You should see new blocks in the **“More blocks”** section from your **“smart classroom”** project.



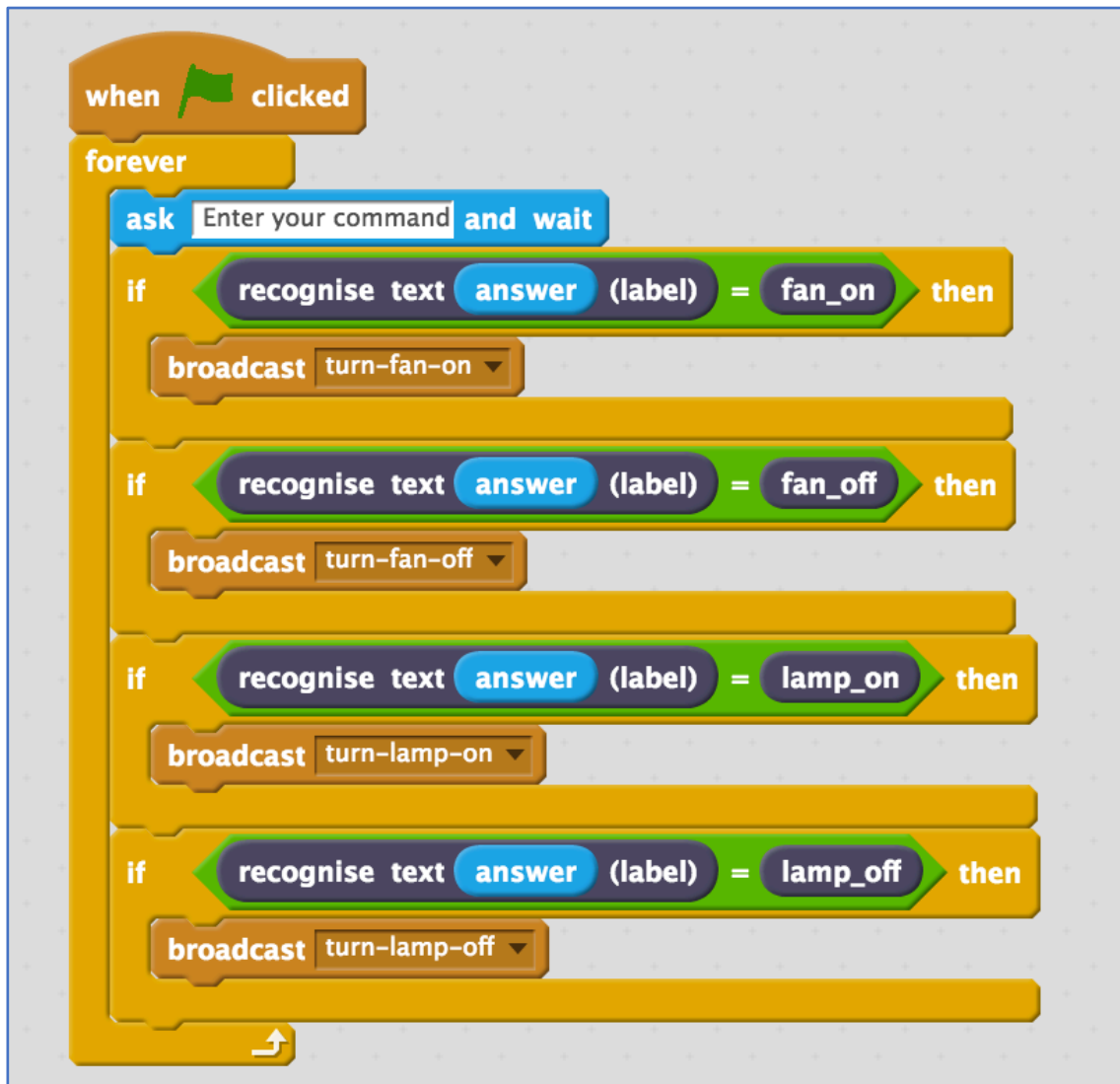
- 24.** Load the **Smart Classroom (short)** template
Click on “Project templates” -> “Smart Classroom (short)”
Click “OK” when it asks to replace the current project



- 25.** Click on the “**Scripts**” tab, and **change** the existing script, to use your machine learning model **instead** of the rules that are already there.

The “recognise text ... (label)” block is a new block added by your project.

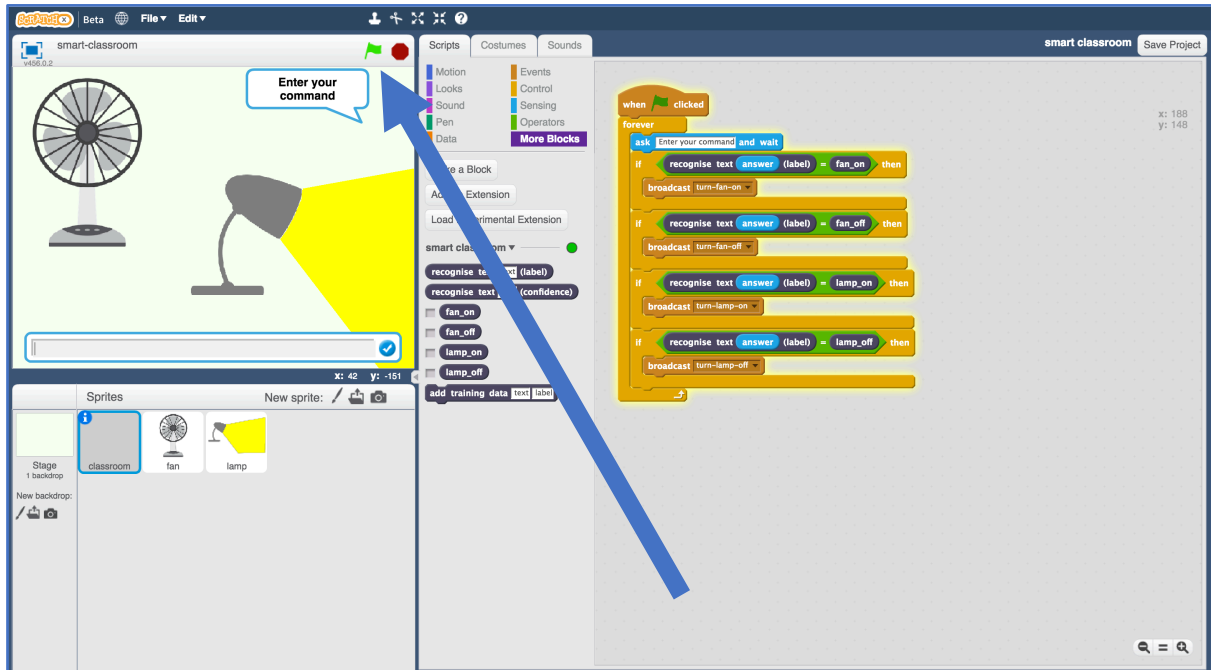
If you give it text, it will return the label for one of the four commands based on the training you’ve given to the computer.



26. Click the **green flag** to test

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?

You've trained a smart assistant – like a simple version of 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).

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.

Ideas and Extensions

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

Try another device

Instead of just a fan and a lamp, can you add another device to your smart classroom?

Use the confidence score

The other new Scratch block from your project gives the score for how sure your machine learning model is that it has recognised the message.

If you give it a command like "Please make me a cheese sandwich", the confidence score should be very low.

How can you use this to improve your script for commands that the computer can't recognise?

Do it for real!

Have a look at the smart assistants that developers have made for Amazon's Alexa : <http://amzn.to/2sxy1hw>

Developers made these in the same way that you did this project – creating labels for the commands they wanted it to recognise, and then collecting examples of how those commands might be phrased to train the Alexa to be able to understand them.

Find an Alexa Skill that you think sounds good. Look at the commands it can understand – can you think how you could've trained it?