

# Block Based Programming

Learning How To Create Your Own Traffic Light



# Training Session Agenda

- User interface/pairing
- Traffic light lesson
- Learning outcomes / future ready skills

# SAM Space Overview

Pairing

User panel

Connect SAMs

My Computer

- Camera
- Keyboard
- To Key
- Control Cursor
- To Keyboard
- Sound Player

Internet

- Tweet Out
- Facebook Out

IFTTT Out

Commands

- Text
- Morse Code
- Custom Code

Behaviours

- Toggle
- Slider
- Click

Toolbox

Untitled Project

Canvas

Onboarding

Welcome to **SAM** Space Education!

Ready to start building? Follow this simple tutorial to learn the ins and outs of SAM.

Start the tutorial

morten  
Offline  
Sign Out Edit Profile

My Projects +

Examples +

My Apps +

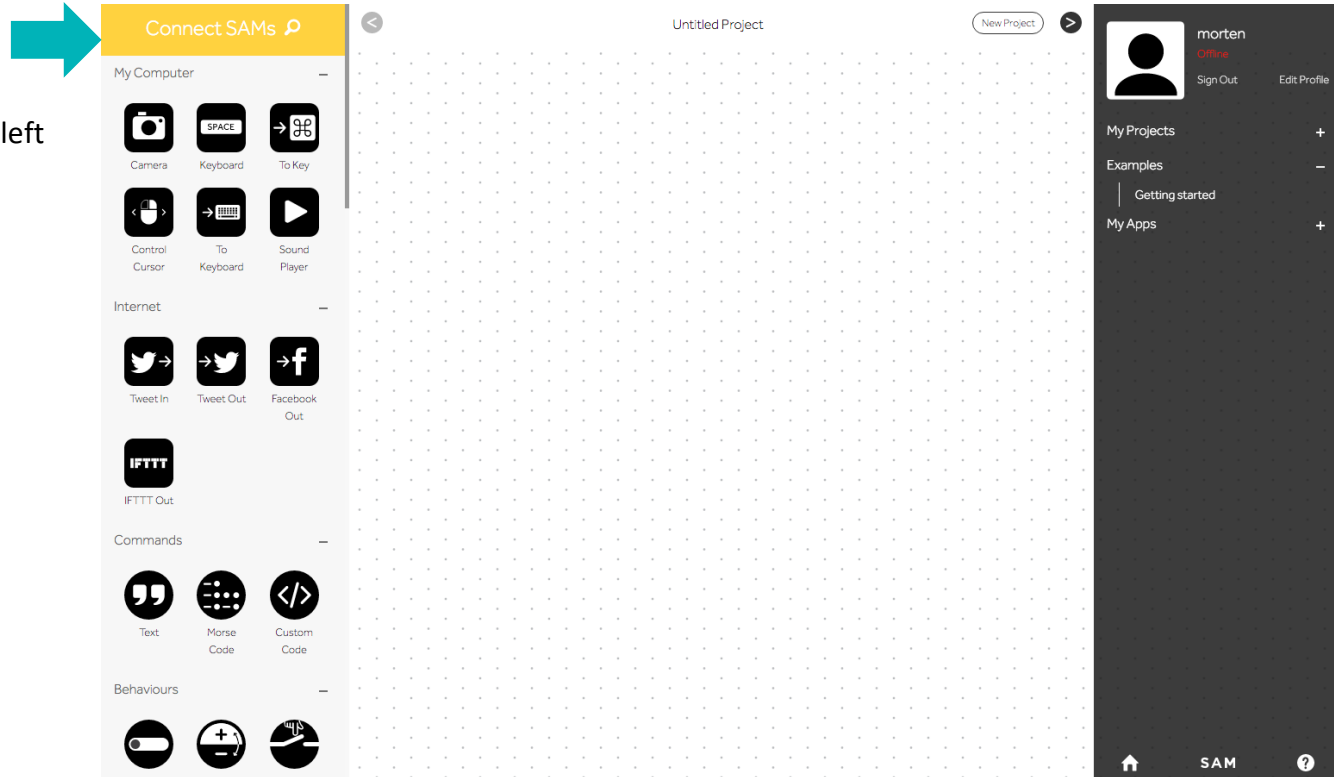
SAM ?

# Pairing

The first step in getting set up in SAM Space, is pairing the blocks

Step 1

Open the pairing window in the top left



# Pairing

## Step 2

Once the pairing window is open, turn on the SAM blocks.

For this project, we will be using a RGB LED and a Button

The screenshot displays the SAM Labs pairing interface. It features a teal header for 'My SAMs', a yellow header for 'SAMs near me', and a dark grey sidebar on the right. The 'My SAMs' section includes an 'Unpair all' button and a help icon. The 'SAMs near me' section shows an illustration of a hand holding a SAM block with a 'HOLD 2 SEC' callout, and text instructing to turn on blocks near the computer. The sidebar shows the user's profile (morten, Offline), navigation options (My Projects, Examples, My Apps), and a 'Click to close' button. The bottom navigation bar includes a home icon, 'SAM', and a help icon.

# Pairing

## Step 3

You will now see the blocks appear in the central column of the pairing window

The screenshot displays the SAM Labs pairing interface, which is divided into three vertical columns. The leftmost column, titled "My SAMs", is currently empty. The middle column, titled "SAMS near me", features an illustration of a hand holding a SAM block with a blue callout that says "HOLD 2 SEC". Below the illustration, the text reads: "Turn on your blocks and hold them near the computer". At the bottom of this column is a yellow "Unpair all" button and a teal question mark icon. The rightmost column is a dark grey sidebar containing a user profile for "morten" (Offline), with options for "Sign Out" and "Edit Profile". Below the profile are sections for "My Projects" (+), "Examples" (-) with a sub-option "Getting started", and "My Apps" (+). At the bottom of the sidebar is a "Click to close" button. The bottom navigation bar includes a home icon, the text "SAM", and a teal question mark icon.

# Pairing

## Step 4

Click on a block to open the pairing option.

The selected physical block will now flash on the side to indicate which block is which.

Click on the tick to pair each block.

A paired block will have a white status light on the side.

And that's it!

The screenshot shows the SAM Labs interface during the pairing process. The interface is divided into three main sections: a teal header for 'My SAMs', a yellow header for 'SAMs near me', and a dark grey sidebar on the right. The 'My SAMs' section contains an 'Unpair all' button and a help icon. The 'SAMs near me' section displays an illustration of a hand holding a SAM block with a 'HOLD 2 SEC' callout, and text instructing the user to 'Turn on your blocks and hold them near the computer'. The sidebar on the right shows the user's profile (morten, Offline), navigation options (My Projects, Examples, My Apps), and a 'Click to close' button. The bottom navigation bar includes a home icon, the text 'SAM', and a help icon.

## Traffic Light Lesson

The traffic light is a great way to showcase a few features of SAM in a relatable project.

It covers:

- Inputs and outputs
- Combining hardware and software
- Computational thinking
- Using number and timing controls
- Has a step-by-step, iterative approach

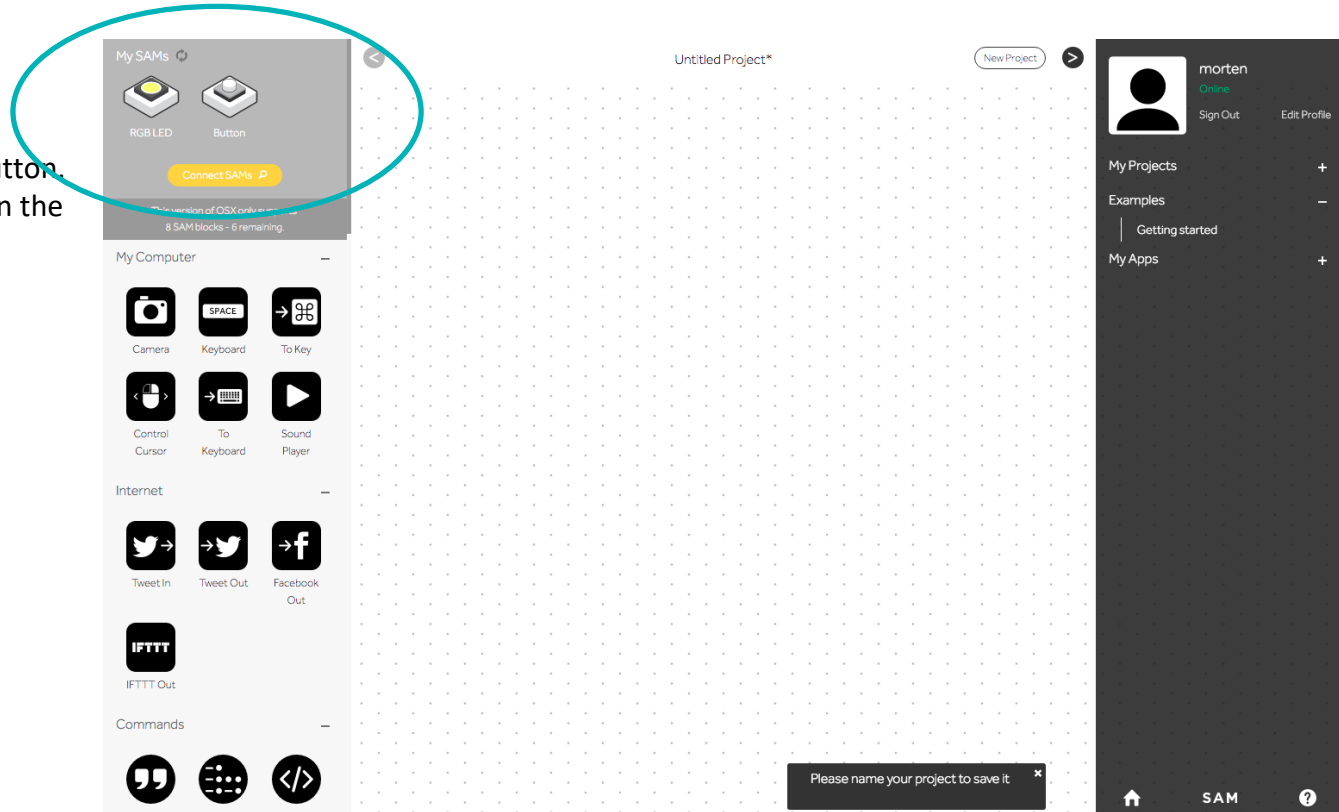




# Traffic Light Lesson

## Step 1

Turn on both of the RGB LED and Button. They will be visible in your toolbox in the top left



# Traffic Light Lesson

## Step 2

Drag the button and the RGB LED onto the canvas. They will change to two different colours. This shows which circuit they are a part of.

In this case, the button is part of the blue circuit and the RGB LED is part of the orange circuit

The screenshot displays the SAM Labs software interface. On the left is a component palette with categories: My SAMs (Connect SAMs, 8 SAM blocks - 6 remaining), My Computer (Camera, Keyboard, To Key, Control Cursor, To Keyboard, Sound Player), Internet (Tweet In, Tweet Out, Facebook Out, IFTTT Out), Commands (Text, Morse Code, Custom Code), and Behaviours. The main canvas, titled 'Untitled Project\*', shows a button component (blue dot) and an RGB LED component (orange dot) on a dotted grid. A teal oval highlights both components. A notification at the bottom right says 'Please name your project to save it'. The right sidebar shows the user profile 'morten' (Online) with options for Sign Out and Edit Profile, and sections for My Projects, Examples (Getting started), and My Apps. The bottom navigation bar includes a home icon, the text 'SAM', and a help icon.

# Traffic Light Lesson

## Step 3

Connect the blocks by dragging from the full blue circle next to the button to the orange ring next to the RGB LED.

The connection must always be made from an input (full circle) to an output (ring)

Both blocks will now be the same colour (blue in this example)

We now have the basic connection between the button and the light.

The screenshot displays the SAM Labs software interface. On the left is a sidebar menu with categories: My SAMs (with a 'Connect SAMs' button and a note about OS support), My Computer (containing Camera, Keyboard, To Key, Control Cursor, To Keyboard, and Sound Player), Internet (containing Tweet In, Tweet Out, Facebook Out, and IFTTT Out), Commands (containing Text, Morse Code, and Custom Code), and Behaviours. The main workspace, titled 'Untitled Project\*', shows a button block on the left and an RGB LED block on the right, connected by a blue line. A teal oval highlights this connection. At the bottom of the workspace, a notification box says 'Please name your project to save it'. On the right side of the interface, there is a user profile for 'morten' with options for 'Sign Out' and 'Edit Profile', and sections for 'My Projects', 'Examples', and 'My Apps'.

# Traffic Light Lesson

## Step 4

Press the button on the physical block to turn on the light. This will produce a white light on the RGB LED.

The app will give visual feedback on this as well: both on the button being depressed and the light cone appearing.

This visual feedback helps children make the association between the physical actions they do, and the programming logic powering SAM.

The screenshot displays the SAM Labs app interface. On the left is a sidebar menu with categories: My SAMs (with a 'Connect SAMs' button and a note: 'This version of OSX only supports 8 SAM blocks - 6 remaining'), My Computer (containing Camera, Keyboard, To Key, Control Cursor, To Keyboard, and Sound Player), Internet (containing Tweet In, Tweet Out, Facebook Out, and IFTTT Out), Commands (containing Text, Morse Code, and Custom Code), and Behaviours. The main workspace, titled 'Untitled Project\*', shows a button block connected to a light block by a blue line, with a yellow light cone emanating from the light block. A teal oval highlights this connection. At the top right, there is a 'New Project' button. At the bottom right, a notification box says 'Please name your project to save it'. On the far right, a user profile for 'morten' is visible with options for 'Sign Out' and 'Edit Profile'. The bottom navigation bar includes a home icon, the text 'SAM', and a help icon.

# Traffic Light Lesson

## Step 5

Next we will change the colour of the LED.

To do this, we double click on the block to open a contextual menu.

Click anywhere on the colourwheel to select a colour. For this demo, we will select red.

When you have selected the colour, press ok.

The screenshot displays the SAM Labs education software interface. On the left is a sidebar menu with categories: My SAMs (with a 'Connect SAMs' button and a note: 'This version of OSX only supports 8 SAM blocks - 6 remaining'), My Computer (containing Camera, Keyboard, To Key, Control Cursor, To Keyboard, and Sound Player), Internet (containing Tweet In, Tweet Out, Facebook Out, and IFTTT Out), Commands (containing Text, Morse Code, and Custom Code), and Behaviours. The main workspace, titled 'Untitled Project\*', shows a traffic light block on a grid. A red circle highlights the block, and a blue line connects it to a color selection dialog. The dialog features a color wheel with a white dot on the red section, a 'Brightness' slider, and an 'OK' button. A notification at the bottom of the workspace says 'Please name your project to save it'. On the right is a user profile for 'morten' (Online) with 'Sign Out' and 'Edit Profile' options, and sections for 'My Projects', 'Examples', and 'My Apps'. The bottom navigation bar includes a home icon, the text 'SAM', and a help icon.

# Traffic Light Lesson

## Step 6

When you now press the button, the RGB LED will shine a red light.

The screenshot displays the SAM Labs software interface. On the left is a sidebar menu with categories: My SAMs (with a 'Connect SAMs' button and a note: 'This version of OSX only supports 8 SAM blocks - 6 remaining'), My Computer (containing Camera, Keyboard, To Key, Control Cursor, To Keyboard, and Sound Player), Internet (containing Tweet In, Tweet Out, Facebook Out, and IFTTT Out), Commands (containing Text, Morse Code, and Custom Code), and Behaviours. The main workspace is titled 'Untitled Project\*' and features a grid background. A blue wire connects a 'To Key' block to a 'Sound Player' block. The 'Sound Player' block is highlighted with a red circle and a red cone of light, indicating it is active. A notification box at the bottom right says 'Please name your project to save it'. On the right side, a user profile for 'morten' is visible, along with navigation options for My Projects, Examples, and My Apps. The bottom navigation bar includes a home icon, the text 'SAM', and a help icon.

# Traffic Light Lesson

## Step 7

But of course, traffic lights need more than one colour.

We will therefore now need to use the software blocks to program the RGB LED to shine different colours.

In the toolbox on the left, we have over 40 different features. They are sorted by type. We will scroll down to the “RGB LED” section.

The screenshot displays the SAM Labs software interface. On the left is a vertical toolbox with various software blocks categorized into sections: Logic (NOR, XOR, OR, NAND, AND), DC Motor, Switch/Direction, RGB LED (highlighted with a red circle), Buzzer, Note/Cycle Volume/Frequency, and Sequencer. The main workspace on the right shows two RGB LED components connected by a blue line. A notification at the bottom says "Please name your project to save it". The right sidebar shows user information for "morten" and navigation options.

# Traffic Light Lesson

## Step 8

Drag and drop the “Colour” icon onto the canvas 3 times.

Make sure that they do not connect to the line between the button and the RGB LED.

The screenshot shows a block-based programming environment titled "Untitled Project\*". On the left is a component palette with categories: Logic (NOR, XOR, OR, NAND, AND), DC Motor, Switch Direction, Direction, RGB LED (Colour, Cycle Colours, Cycle Brightness), Buzzer (Note, Cycle Volume, Cycle Frequency), and Sequencer. The main canvas features a button on the left and an RGB LED on the right, connected by a blue wire. A teal oval highlights three "Colour" blocks (yellow, blue, and pink) placed vertically in the center of the canvas. A notification box at the bottom right says "Please name your project to save it". On the right side, a user profile for "morten" is visible with options for "Sign Out" and "Edit Profile". Below the profile are sections for "My Projects", "Examples" (with a "Getting started" link), and "My Apps". The bottom navigation bar includes a home icon, the text "SAM", and a help icon.



# Traffic Light Lesson

Learning outcomes:  
Design thinking

## Step 9

Next we will change these three colours to the colours of a traffic light. This is done by double-clicking on each colour icon and selecting the colour from the colourwheel.

The visual layout of SAM makes the association with a real traffic light very strong.

The screenshot displays the SAM Labs software interface. On the left is a vertical toolbar with various components: NOR, XOR, OR, NAND, AND, DC Motor, Switch Direction, Direction, RGB LED (Colour, Cycle Colours, Cycle Brightness), Buzzer (Note, Cycle Volume, Cycle Frequency), and Sequencer. Below the toolbar is a section for 'Sleeping SAMs'. The main workspace, titled 'Untitled Project\*', features a grid background with a large teal oval. Inside the oval are three colored circles: a yellow one at the top, a blue one in the middle, and a red one at the bottom. Two physical SAM components are connected to the oval: one on the left and one on the right. A notification box at the bottom right of the workspace says 'Please name your project to save it'. On the right side of the interface is a dark sidebar with a user profile for 'morten' (Online), options for 'Sign Out' and 'Edit Profile', and sections for 'My Projects', 'Examples', and 'My Apps'. At the bottom of the sidebar are icons for home, SAM, and help.

# Traffic Light Lesson

## Step 10

To test that it works to send a new colour to the RGB LED, we will connect it to the button and the RGB LED.

But first we must remove the existing connection: this is done by clicking on the line and clicking on the “X”

The screenshot displays the SAM Labs education software interface. On the left is a component palette with categories: Logic (NOR, XOR, OR, NAND, AND), DC Motor, Switch/Direction, RGB LED (Colour, Cycle Colours, Cycle Brightness), Buzzer (Note, Cycle Volume, Cycle Frequency), and Sequencer. The main workspace, titled "Untitled Project\*", shows a button connected to an RGB LED via a blue line. A red "X" is positioned on the connection line, indicating the removal of the existing connection. Other components like a yellow light, a blue light, and a pink light are also visible. A notification at the bottom right says "Please name your project to save it". The right sidebar shows the user profile "morten" with options for "Sign Out" and "Edit Profile", along with sections for "My Projects", "Examples", and "My Apps". The bottom navigation bar includes a home icon, the text "SAM", and a help icon.

# Traffic Light Lesson

## Step 11

We will now draw a line from the button (full blue circle) to the ring on the left of the colour block that has the colour orange programmed.

Then we will draw a line from the full blue circle next to the colour block to the ring next to the RGB LED.

The screenshot shows a block-based programming environment titled "Untitled Project\*". On the left is a component palette with categories: Logic (NOR, XOR, OR, NAND, AND), DC Motor, Switch/Direction, RGB LED (Colour, Cycle Colours, Cycle Brightness), Buzzer (Note, Cycle Volume, Cycle Frequency), and Sequencer. The main workspace contains a circuit diagram with a button, a red LED, a blue LED, and a green LED. A blue line connects the button to the left ring of an orange color block, and another blue line connects the full blue circle of the orange block to the left ring of an RGB LED block. A cyan oval highlights the button and the orange color block. A pink oval highlights the RGB LED block. A notification at the bottom says "Please name your project to save it". The right sidebar shows a user profile for "morten" with options for "Sign Out" and "Edit Profile", and sections for "My Projects", "Examples", and "My Apps".

# Traffic Light Lesson

Learning outcomes:  
Critical thinking

## Step 12

Now to test that sending a colour works, we will press the physical button, and the RGB LED will shine orange.

SUCCESS!

p.s. the light will stay on, because the colour block sends an RGB array [0,0,0] but does not send a false after it to turn the light off like a button would do. This is ok.

The screenshot shows a block-based programming environment titled "Untitled Project\*". On the left is a component palette with categories: Logic (NOR, XOR, OR, NAND, AND), DC Motor, Switch/Direction, RGB LED (Colour, Cycle Colours, Cycle Brightness), Buzzer (Note, Cycle Volume, Cycle Frequency), and Sequencer. The main workspace contains a circuit diagram with a button, a blue circular block, and an RGB LED. A cyan oval highlights the button and the blue block. A pink circular block is positioned below the main circuit. A notification at the bottom right says "Please name your project to save it". On the right side, a user profile for "morten" is visible with options for "Sign Out" and "Edit Profile". The bottom navigation bar includes a home icon, "SAM", and a help icon.

# Traffic Light Lesson

## Step 13

Now that we have tested that the colour sending works, we will need to set up a sequence to send a message to the different blocks in turn.

To do this, we will go to the numbers section and use the Counter and the Compare.

This will allow us to count how many times the button has been pressed, compare that to a specific number, and pass a message through if true.

The screenshot shows a block-based programming environment titled "Untitled Project\*". On the left is a library of blocks categorized into Behaviours, Numbers, Timing, and Music. The "Numbers" section is highlighted, showing the "Compare" block (set to "= 60") and the "Counter" block, both circled in red. The main workspace contains a sequence of blocks: a button block, a "Compare" block, a "Counter" block, and another button block. A "New Project" button is visible in the top right. On the right side, there is a user profile for "morten" with options for "Sign Out" and "Edit Profile". Below the profile are sections for "My Projects", "Examples" (with "Getting started"), and "My Apps". At the bottom right, there is a notification box that says "Please name your project to save it".

# Traffic Light Lesson

## Step 14

Drag a counter onto the canvas and drop it on the line between the button and the middle colour block. It will automatically connect.

Then drag a compare block onto the line between the counter and the colour block.

p.s. You might need to move the blocks around a bit to make room.

The screenshot shows a block-based programming environment titled "Untitled Project\*". On the left is a vertical toolbar with categories: Text (Text, Morse Code, Custom Code), Behaviours (Toggle, Inverse, Switch), Numbers (Log), Numbers (Number, Filter, Map), Numbers (Compare, On-Off, Counter), Timing (Delay, Hold, Interval), and Music (Time Trigger). The main canvas is a grid with a blue oval highlighting a sequence of blocks: a button, a counter block (set to 0), a compare block (set to = 60), and a color block (orange). To the right of the oval is a traffic light icon. Above the oval is a yellow light icon, and below it is a red light icon. A notification box at the bottom right says "Please name your project to save it". On the right side of the screen is a user profile for "morten" with options for "Sign Out" and "Edit Profile", and sections for "My Projects", "Examples", and "My Apps".

# Traffic Light Lesson

Learning outcomes:  
Computational thinking

## Step 15

To test that the counter works, press the button a few times. In this example, the button was pressed 5 times.

Then double click on the compare block and change the default 60 value to 2.

The screenshot displays the SAM Labs programming environment. On the left is a library of blocks categorized into Behaviours (Toggle, Inverse, Switch, Log), Numbers (Number, Filter, Map, Compare, On-Off, Counter), Timing (Delay, Hold, Interval, Time Trigger), and Music. The main workspace, titled 'Untitled Project\*', shows a sequence of blocks: a button block, a counter block (displaying '005'), a compare block (displaying '= 2'), a light block (orange), and another button block. A teal oval highlights the counter and compare blocks. The workspace also features a yellow light block at the top and a pink light block at the bottom. On the right, a user profile for 'morten' is visible with options for 'Sign Out' and 'Edit Profile'. A bottom navigation bar includes a home icon, the name 'SAM', and a help icon. A notification at the bottom right says 'Please name your project to save it'.

# Traffic Light Lesson

## Step 16

Double click on the counter and press the “reset” button to bring it back to 0.

Then drag and drop two more compare blocks onto the canvas: one near the top colour block and one near the bottom one.

Draw a line from the counter (full circle to the right) to each compare block (ring on the left). Do the same from each compare block to the colour blocks.

Double-click on the top compare block and change this to 1. Double-click on the bottom one and change this to 3.

Now connect from the two colour blocks to the RGB LED.

The screenshot displays the SAM Labs education software interface. On the left is a vertical toolbar with various blocks categorized into Behaviours (Toggle, Inverse, Switch, Log), Numbers (Number, Filter, Map), Timing (Delay, Hold, Interval, Time Trigger), and Music. The main workspace, titled "Untitled Project\*", contains a circuit diagram. A central counter block is connected to three compare blocks labeled "= 1", "= 2", and "= 3". The "= 1" block is connected to a red light block, the "= 2" block to an orange light block, and the "= 3" block to a green light block. These light blocks are connected to a single RGB LED block. A notification box at the bottom right says "Please name your project to save it". On the right side, a user profile for "morten" is visible, along with navigation options like "My Projects", "Examples", and "My Apps".



# Traffic Light Lesson

## Step 17

Now we will test the sequence by pressing the button 3 times. The RGB LED will first go red, then orange, and finally green.

The screenshot displays a block-based programming environment titled "Untitled Project\*". On the left, a sidebar lists various block categories: Text (Text, Morse Code, Custom Code), Behaviours (Toggle, Inverse, Switch, Log), Numbers (Number, Filter, Map, Compare, On-Off, Counter), Timing (Delay, Hold, Interval, Time Trigger), and Music. The main workspace shows a sequence of blocks: a button block, a counter block (003, 0-100), three comparison blocks (= 1, = 2, = 3), and three color selection blocks (red, orange, green). These are connected to an RGB LED block. A notification at the bottom says "Please name your project to save it". On the right, a user profile sidebar shows "morten" with "Online" status, "Sign Out", and "Edit Profile" options. Below the profile are sections for "My Projects", "Examples", and "My Apps". At the bottom right, there are icons for home, user name "SAM", and help.

# Traffic Light Lesson

Learning outcomes:  
Problem solving

## Step 18

The problem is now that if we keep clicking on the button, the counter goes up and the RGB remains green.

We will therefore need to find a solution: we will need a loop.

For this, we will drag on one more compare block and set this to 4.

Connect from the counter to the compare block

The screenshot shows a block-based programming environment with a workspace titled "Untitled Project\*". On the left is a palette of blocks categorized into Behaviours, Numbers, Timing, and Music. The workspace contains a logic flow starting with a button block connected to a "003" number block. This is followed by a series of compare blocks labeled "= 1", "= 2", "= 3", and "= 4". The "= 4" block is highlighted with a red circle. The flow then branches into three paths: one leading to a red light icon, another to an orange light icon, and a third to a green light icon. Each path eventually leads to a button block. A "Please name your project to save it" dialog box is visible at the bottom right. On the far right, a user profile sidebar for "morten" is visible, showing options like "Sign Out" and "Edit Profile".

# Traffic Light Lesson

**Learning outcomes:**  
Learn programming commands

## Step 19

When the counter reaches 4, we want the counter to reset to 0.

We will therefore go to the “command” section in our toolbox and drag on the Text block.

Place this to the left of the “4” compare block.

Double-click on the text block and write “reset”.

Then connect the counter to the text block.

Then connect text block to compare 4, and from compare back to the counter.

This will send a reset command from the text block to the counter.

The screenshot displays a visual programming environment for a traffic light simulation. The workspace contains a sequence of blocks: a counter starting at 0, followed by comparison blocks for values 1, 2, 3, and 4. Each comparison block is connected to a corresponding traffic light icon (red, orange, green). A text block with the word "reset" is placed to the left of the "= 4" comparison block and is connected to it. The counter is also connected to the text block, forming a loop that resets the counter when it reaches 4. The toolbox on the left shows various blocks categorized into Internet, Commands, Behaviours, and Numbers. The user profile sidebar on the right indicates the user is "morten" and is online. A notification at the bottom prompts the user to name their project.

# Traffic Light Lesson

Learning outcomes:  
Creativity

## Step 20

Now reset the counter by double-clicking on it and pressing the “reset” button. It should now be back on 0.

Then click the button 3 times to go through the sequence of red, orange and green.

Then press the button again to see the counter reset when it goes to 4.

There are many alternative ways to build this loop (using the Number block to send 0, defining the loop range in the counter contextual menu from 0-4, etc.)

The screenshot displays a programming environment with a project titled "Untitled Project\*". On the left is a sidebar with various blocks categorized into Commands, Behaviours, Numbers, and Timing. The main workspace shows a script starting with a button click event, followed by a loop of four "say" blocks (labeled = 1, = 2, = 3, = 4) and a "set counter to 0" block. The counter is currently at 0. The script is connected to a traffic light graphic with three lights (red, orange, green) and a "say" block. A notification at the bottom right says "Please name your project to save it". The right sidebar shows the user profile for "morten" and navigation options.

# Traffic Light Lesson

## Step 21

The next step is to automate the traffic light so that you don't need to press the button for each change of lights.

For this, we will need the toggle block from Behaviours, and the interval block from Timing

The screenshot displays the SAM Labs programming environment. On the left is a palette of blocks categorized into Commands, Behaviours, Numbers, and Timing. The 'Toggle' block in the Behaviours section and the 'Interval' block in the Timing section are highlighted with red circles. The main workspace shows a project titled 'Untitled Project\*' with a flowchart. The flowchart starts with a button block connected to a 'Toggle' block. This is followed by a sequence of four 'Interval' blocks labeled '= 1', '= 2', '= 3', and '= 4'. Each interval block is connected to a corresponding traffic light icon (red, orange, green, and red again). The flowchart ends with a 'Text' block. On the right side, there is a user profile for 'morten' with options for 'Sign Out' and 'Edit Profile'. Below the profile are sections for 'My Projects', 'Examples', and 'My Apps'. At the bottom right, there is a notification box that says 'Please name your project to save it'.

# Traffic Light Lesson

## Step 22

Move the button up to the top left to give yourself some more room.

Then drag and drop the toggle onto the line between the button and the counter.

Then drag and drop the interval block between the toggle and the counter.

The toggle will switch between the “False” state on the left and the “True state” on the right.

The interval converts this True message into a pulse of False and True. It will first be False and then True.

The screenshot shows the SAM Labs Blockly workspace for an "Untitled Project". The workspace contains a circuit diagram for a traffic light simulation. On the left, a button is connected to a toggle block. The toggle block is connected to a counter block (displaying '000'). The counter block is connected to a series of four comparison blocks labeled "= 1", "= 2", "= 3", and "= 4". Each comparison block is connected to a corresponding traffic light color block: red for "= 1", orange for "= 2", green for "= 3", and red for "= 4". The green light block is currently illuminated. A notification box at the bottom right says "Please name your project to save it". The right sidebar shows the user profile for "morten" and navigation options.

# Traffic Light Lesson

## Step 23

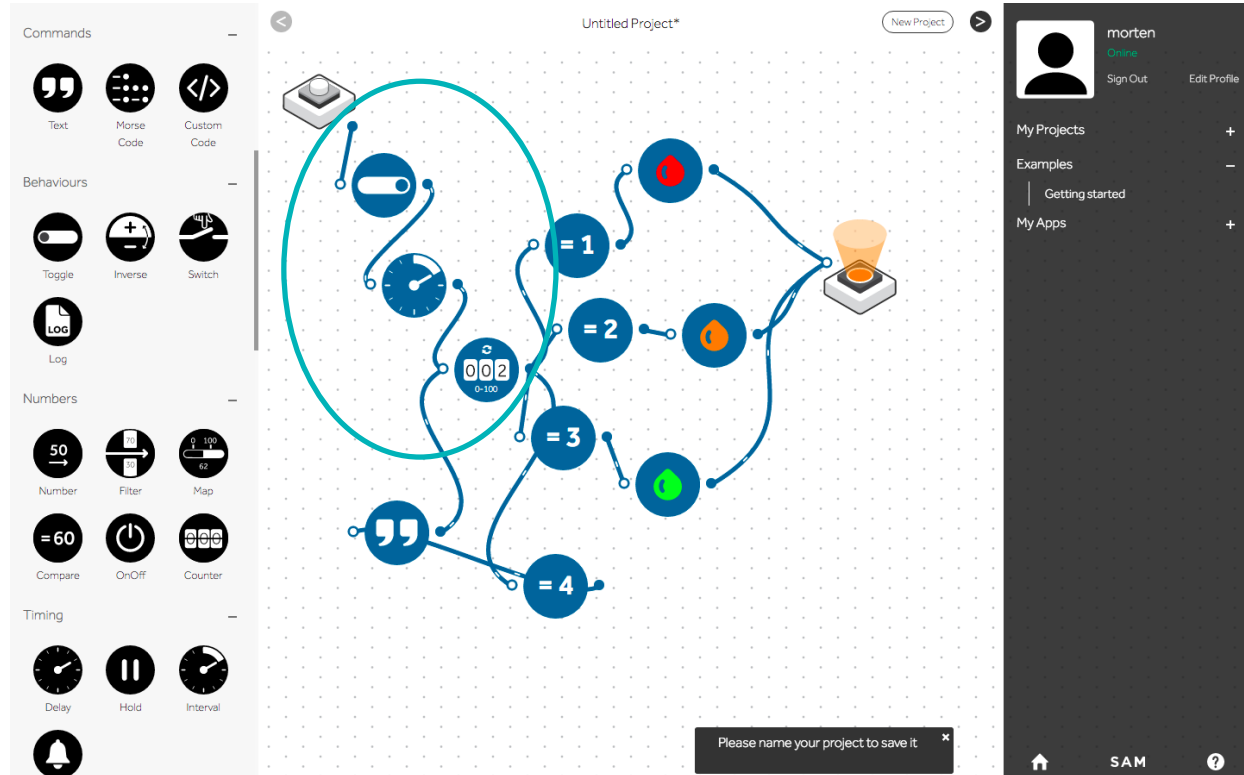
Now press the button.

This will switch the toggle to True, essentially “turning on” the traffic light.

The Interval converts the True signal to a pulse of False and True (nothing will therefore happen for the first second).

Every time the interval is True, the counter will go up by one. The lights will therefore also toggle between red, orange and green.

This will continue for as long as the toggle is in True and the system is “on”.



# Traffic Light Lesson

**Learning outcomes:**  
Real world scenario  
modelling

## Step 24

Currently, the timing of the traffic light is not correct as the Red is on for 2 seconds (when the counter is 1), the orange for 2 seconds (when the counter is 2) and green for 4 seconds (when the counter is 3 and 0).

You can adjust the length of time on each light by changing the compare blocks. To set the red light for 6 seconds, the orange light for 2 seconds and the green light for 8 seconds, set the compare blocks to 7,4,3,8 from the top to bottom.

You can also change the timing of the interval by double clicking on it. Each count will be double the length of time of the interval.

The screenshot shows a programming environment with a workspace titled "Untitled Project\*". On the left is a sidebar with block categories: Commands (Text, Morse Code, Custom Code), Behaviours (Toggle, Inverse, Switch), Numbers (Log), Numbers (Number, Filter, Map), Compare (= 50), On/Off (On/Off), Counter (Counter), Timing (Delay, Hold, Interval), and a Notification bell. The workspace contains a traffic light sprite on the right, a counter block showing "001", and several compare blocks with values 3, 4, 7, and 8. These compare blocks are connected to on/off blocks and delay blocks, which are in turn connected to the traffic light's red, orange, and green lights. A "New Project" button is at the top right, and a user profile for "morten" is on the far right. A notification at the bottom right says "Please name your project to save it".



# Traffic Light Lesson

## Step 25

And that's it!

Now name the project by clicking on the name at the top and typing in your name.

The project is saved in the cloud and can be reopened on another device by logging in.

The screenshot displays the SAM Labs education interface. On the left is a vertical toolbar with categories: Commands (Text, Morse Code, Custom Code), Behaviours (Toggle, Inverse, Switch), Numbers (Log), Numbers (Number, Filter, Map), and Timing (Delay, Hold, Interval). The main workspace shows a flowchart for a traffic light project. It starts with a physical button icon, followed by a toggle, a delay, a counter (001), and a series of comparison nodes (= 3, = 4, = 7, = 8). These nodes control three light icons: red, orange, and green. A 'Traffic Light\*' label at the top is circled in red. A 'New Project' button is in the top right. A user profile sidebar on the right shows 'morten' is online, with options for 'Sign Out' and 'Edit Profile'. A bottom navigation bar includes home, SAM, and help icons. A notification at the bottom right says 'Please name your project to save it'.

# Get in touch with the SAM Labs team!



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Local support in all regions coming late 2017 onwards