



## Codes to buy

This booklet contains the codes students could buy if they are struggling to create their own code. They should be placed in a folder in the shop. Codes cost 50 Faradays to buy and should only be sold to students if they have attempted to write their own code.

If students wish to buy a code they should be given the description sheet to choose the code they wish to buy. Students will still need to enter the code in the code editor (in this case MakeCode) but they may choose to adapt the code to suit their own purposes.

## Codes to buy

These are the codes you can buy from the shop. They are 50 Faradays each so choose carefully!

Theme	Name of code	Description
Health	Peripheral vision test	This code might be used by an optician to test the peripheral vision of a person, that is whether a person can see all around rather than things which are just in front of them. It works by lighting up the LEDs on the BBC micro:bit randomly when button A is pressed.
	Fall alarm	This code might be used by an elderly or ill person to alert a carer if they fall. It works by scrolling the words 'Call 999' across the LEDs if the BBC micro:bit falls suddenly.
Travel	Train driver's alert	This code might be used by a train company to ensure that the driver is awake at all times. It works by showing a smiley face if the train driver is holding the BBC micro:bit. If the driver lets go then the message 'Stop train' scrolls across the LEDs.
	Automatic light switch	This code might be used in a car to automatically turn on the lights when it starts to go dark. The code is a prototype at the moment and simply shows a light bulb when the light levels are low. You will need to buy three crocodile leads and a light dependent resistor at a cost of 30 Faradays to make this code work on your BBC micro:bit.
Sport	Basic scoreboard	This code might be used in a game to keep track of the score. Pressing button A adds one to the score, pressing button B subtracts one and pressing buttons A and B together resets the score to 0.
	Reaction time	This code tests the reaction times of someone by timing how long it takes them to let go of a button.
Home and leisure	Central heating thermostat	This code might be used in the home to tell you whether a room is too cold or too warm. There are two options for doing this. For the first option you will need to buy three crocodile leads and a thermistor at a cost of 30 Faradays to make this code work on your BBC micro:bit. The code will show you when the room is too cold or just the right temperature. The second option uses the BBC micro:bit in-built temperature sensor and you will not need to buy anything else.
	Anti-burglary alarm	This code might be used to keep something safe in your house. It creates an alert when the circuit is broken. You could make a pressure switch to make this even better.

## Codes to buy

### Peripheral vision eye test

Opticians use a variety of tests to see our range of vision. One of these looks at our peripheral vision that is how well we can see all around us and not just in front. This code models this by lighting the LEDs in a random pattern. The optician will ask the person to say where they see the dot on the screen.

```

on button A pressed
  set testing to 1
  set score to 0
  clear screen

on button B pressed
  if visible
  then
    change score by 1

on button A+B pressed
  set testing to 0
  show number score

forever
  if testing
  then
    set x to pick random 0 to 4
    set y to pick random 0 to 4
    plot x x y y
    set visible to true
    pause (ms) 500
  if testing
  then
    unplot x x y y
    set visible to false
    pause (ms) 500
  
```

#### Make it your own.

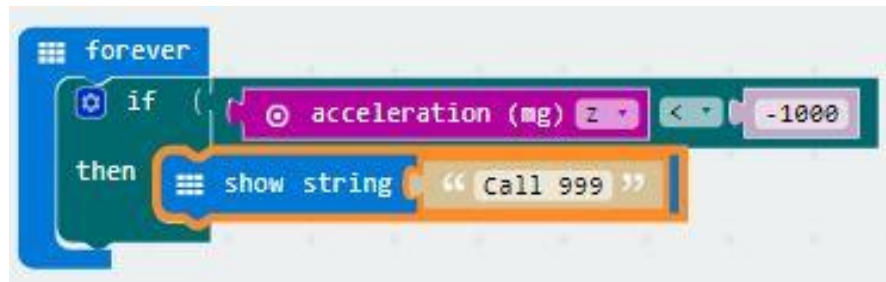
You could adapt this script to make it your own by changing:

- the input
- the random set of images that the person will see
- the brightness of the leds
- the purpose this code might be used for.

## Codes to buy

### Fall alarm

Older people living in supported housing often have alarms to press if they fall. Sometimes they forget or don't want to wear these alarms around their neck or they don't fall near enough to their alarm to press it. This alarm can be built into a piece of clothing to alert a carer to call the emergency services should they fall.



#### Make it your own.

You could adapt this script to make it your own by changing:

- the image or words that are sent as a message
- the level or axis on which the message will be sent
- the purpose this code might be used for.

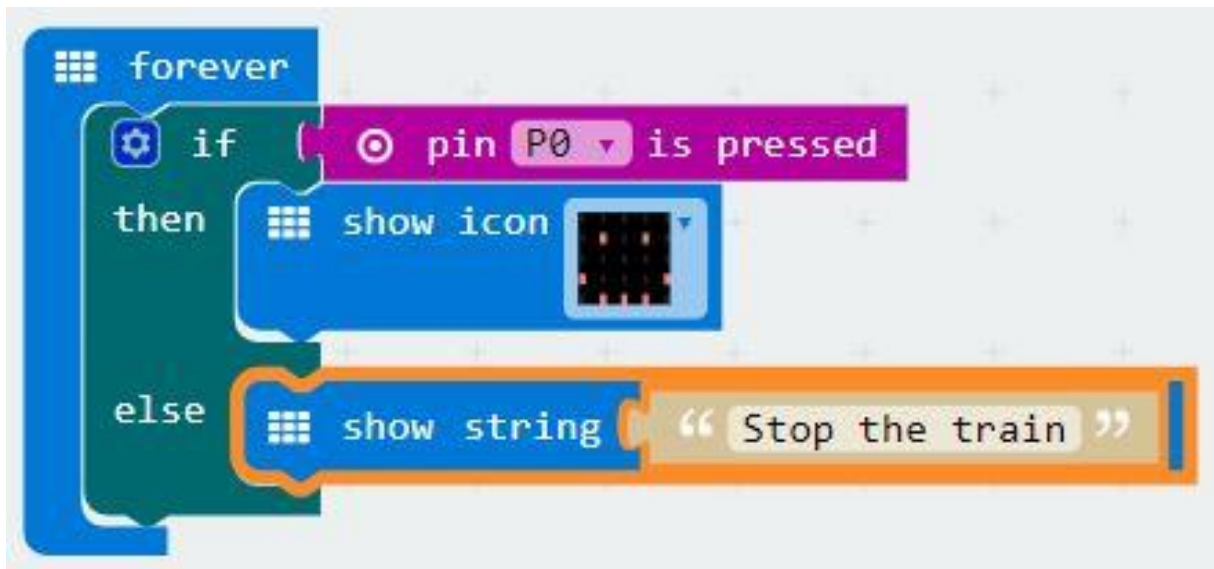


## Codes to buy

### Train driver's alert

Train drivers need to be alert at all times. Train companies often include a button or device for them to press or hold; if they do not press the button or continue to hold the device then the train will stop.

In this example the driver would need to hold the '0' and the 'GND' ring; if they let go the BBC micro:bit flashes with the message 'Stop train' which could be attached to the train's power supply to automatically stop the train.



#### Make it your own.

You could adapt this script to make it your own by changing:

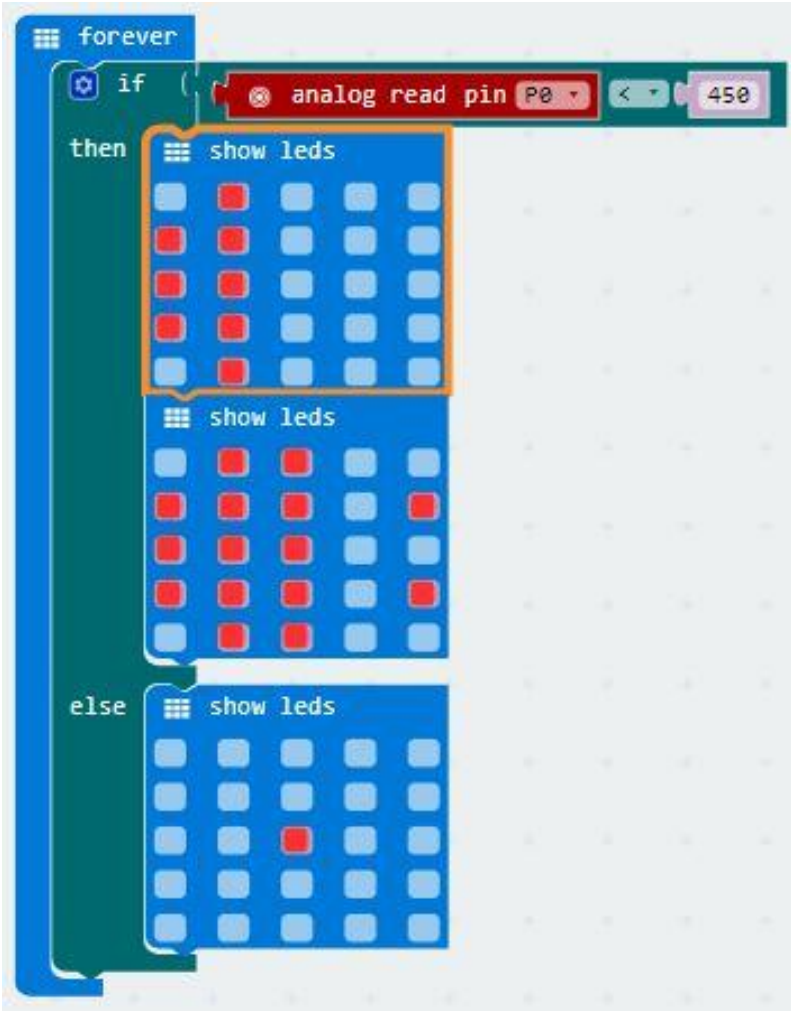
- the ring the driver needs to hold
- the image which shows when the driver is holding the BBC micro:bit
- the words which scroll when the driver stops holding the BBC micro:bit
- the purpose this code might be used for.

## Codes to buy

### Automatic light switch

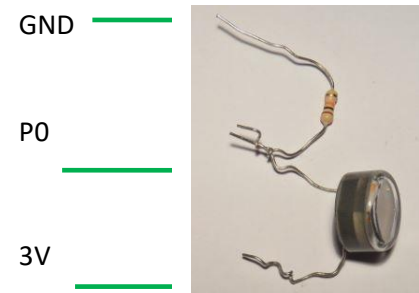
Sometimes it is useful to have lighting which comes on automatically when the light levels drop. This is a prototype one for a car. It could be connected to the car lights to turn them on automatically but, at the moment, it brings up an animation on the car dashboard screen to tell the driver to turn on their lights when it is getting dark.

You will need to write the code and then connect a Light Dependent Resistor and resistor to the BBC micro:bit using crocodile leads as shown next to the code.



#### Attaching the components

1. Twist together one leg of the Light Dependent Resistor and one leg of the resistor.



2. Attach the BBC micro:bit with crocodile leads as shown

#### Make it your own.

You could adapt this script to make it your own by changing:

- the animation or the message
- the level at which the message appears
- the animation speed

## Codes to buy

### Basic Scoreboard

This code adds 1 to the score every time the A button is pressed and subtracts 1 from the score every time the B button is pressed. The current score is constantly displayed on the LED array. To reset the score to 0 press the A and B buttons at the same time.

```
on start
  show number score

on button A pressed
  change score by 1
  show number score

on button B pressed
  if score > 0
  then
    change score by -1
    show number score

on button A+B pressed
  set score to 0
  show number score
```

#### Make it your own.

You could adapt this script to make it your own by changing:

- the number that is added or subtracted from the score each time.
- the input that modifies the score.



## Codes to buy

### Reaction Time Tester

Reaction times are important for many people including athletes and drivers. The following code runs a reaction time test, when the user pressed Button A five lights appear and then go out. The user needs to let go of Button A as quickly as they can after the lights have gone out. Once they have done this the time taken is displayed on the LED array in milliseconds and then seconds.

```

forever loop
  show string "???"
  while not (button A is pressed)
  do
    show icon [1 light]
    show icon [2 lights]
    show icon [3 lights]
    show icon [4 lights]
    show icon [5 lights]
    pause (ms) 500
    pause (ms) pick random 0 to 500
  clear screen
  set start to (running time (ms))
  while not (button A is pressed)
  do
    set stop to (running time (ms))
    set ms to (stop - start)
    show number [ms]
    show string "ms"
    show number [(ms) / 1000]
    show string "sec"
  
```

### Make it your own

You could adapt this script to make it your own by changing:

- the animation that is shown
- the maximum length of time the animation pauses for before disappearing
- how the time taken is displayed

## Codes to buy

### Central heating thermostat

These thermostats allow you to monitor the temperature in a room and then turn the heating up or down to make it cooler or warmer. You have two options for making this thermostat. The first requires you to connect a thermistor to the BBC micro:bit whilst the second uses the in-built temperature sensor in the BBC micro:bit.

#### Option 1 – connecting a thermistor.

This prototype thermostat will alert you when the room becomes too cold by scrolling the message 'Turn me up'.

You will need to write the code and then connect a thermistor and resistor to the BBC micro:bit using crocodile leads as shown beneath the code.

```

    forever
    set reading to ( analog read pin P0 )
    if ( reading < 400 )
    then
    show string " Turn me up "
  
```

You may need to change this number if the room you are working in is very warm or very cold.

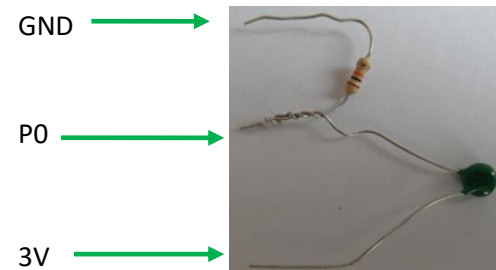
#### Attaching the components

- Twist together one leg of the thermistor and one leg of the resistor.
- Attach the BBC micro:bit with crocodile leads as shown

#### Make it your own.

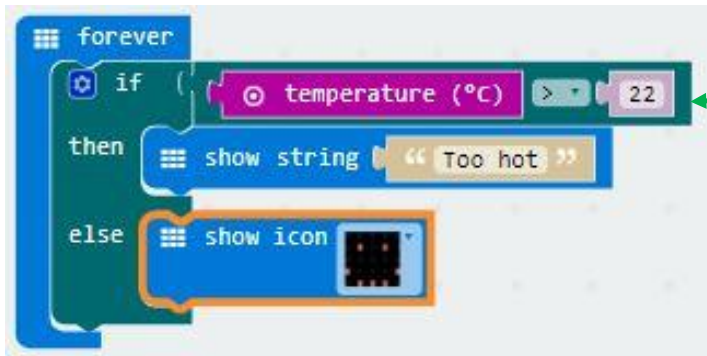
You could adapt this script to make it your own by changing:

- the level at which thermostat is set to respond.
- whether the thermostat shows a message if the temperature is too hot as well as too cold.
- the message or whether you make it a visual animation rather than words.



## Option 2 – using the in-built temperature sensor

In this option the words 'Too hot' will scroll across the screen when you put your hands around the BBC micro:bit and warm it up. A smiley face will appear when the room temperature is just right (around 21°C).



You may need to change this number if the room you are working in is very warm or very cold.

### Make it your own.

You could adapt this script to make it your own by changing:

- the level at which thermostat is set to respond.
- whether the thermostat shows a message if the temperature is too hot as well as too cold.
- the message or animation when it is too hot or just right.

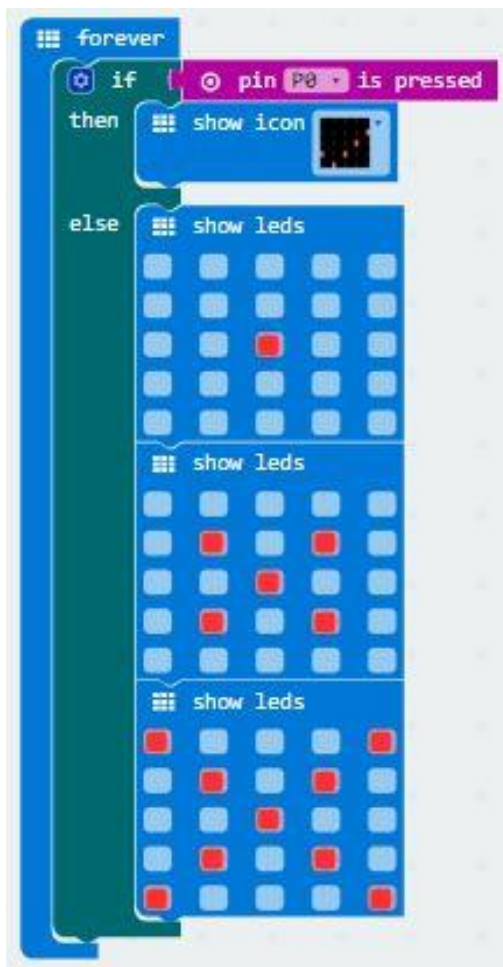
## Codes to buy

### Anti-burglary alarm

This code creates an alert when the circuit is broken. When the circuit is complete the BBC micro:bit LEDs will show a smiley face but when the circuit is broken it shows an animation of a flashing 'X'.

You will need to write the code and then connect a crocodile lead to ring '0' and another to 'GND'. You can then simply join the other two ends of the crocodile leads to show what happens when the circuit is complete but this would mean anything you wanted to attach to this anti-burglary alarm would need to be a conductor of electricity.

Alternatively you could develop a pressure switch for an object to sit on. When the object is lifted up the circuit would be broken, triggering the alarm. You can make a simple switch using a sponge and some tin foil. See over the page if you would like some help in doing this.



#### Make it your own.

You could adapt this script to make it your own by changing:

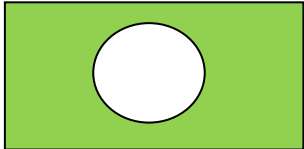
- the animations shown
- the ring you connect the alarm to
- the animation speed
- the type of connection for the circuit – try making your own pressure switch

## Making a pressure switch

You will need:

- 2 crocodile leads
- 1 piece of rectangular sponge
- 1 piece of tin foil
- Some sticky tape

Method:

1. Cut a circular hole in the centre of the sponge at least 3 cm in diameter.
  2. Cut two pieces of tin foil large enough to cover the top and the bottom of the sponge
- 
3. Tape the tin foil onto the top and bottom of the sponge making sure that the two sides do not touch.
  4. Attach one of the crocodile leads to ring '0' on the BBC micro:bit and to the top piece of tin foil.
  5. Attach the other crocodile lead to GND and to the bottom piece of tin foil.
  6. When you press down in the middle of the sponge the two piece of tin foil will connect and the circuit will be complete. When you let go of the sponge it should bounce back breaking the connection between the tin foil pieces and breaking the circuit.

