

PIMORONI education

Lesson Plan

Using block code to program the glove



Background

In lesson two, your class will learn about physical computing and the role coding plays in creative technologies. They will use a block code editor to create and upload their first code to the microbit, then program simple animations and sounds to be triggered by movement and gesture.

You will need the gloves from the previous lesson, although this one can be used stand-alone to explore gesture based triggers for the microbit.

All code will be written using makecode - either online at makecode.com

or offline via the Windows app (Makecode for microbit).

There is a beta version of a MacOS app at:
<https://makecode.microbit.org/offline>

You will need	Age & Ability
<ul style="list-style-type: none">• Minimu gloves• USB cable• Access to computers to edit code	<ul style="list-style-type: none">▲ 7-11 years (KS2)★ 11-14 years (KS3)■ 14-16 years (KS4)
	Additional Info
	Check wiring has been done previous lesson - if not, use handout- "minmu wiring".

Outcomes

From this lesson, students could...

- Use a systematic approach to problem solving (Computing)
- Estimating angles (Mathematics)

Support

For students with limited movement, tilt left/right, and logo up are the easiest gestures to make.

If fine motor movements are not possible, a single movement such as raising and lowering the arm can be used (logo up).

Additional languages are available through the settings menu of the makecode editor.

High contrast mode is available through the settings menu of the makecode editor.



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Lesson Plan Using block code

Starter ideas

How do you move?

Ask children to say hello, but without using words. (Wave, nod, smile etc). How many different moves are there with your hand? Give an example, eg tilt right. Let them have some time to explore and guess a "number" of moves. Discuss what makes a tilt - does the angle count?

Show the slide with the microbit gestures on - there are 11 recognised gestures.



Main

Students test gestures and outputs. See handout.

Task 1 (all) - make a gesture trigger a sound effect

Task 2 (most) - use the glove to play a tune with more than one gesture

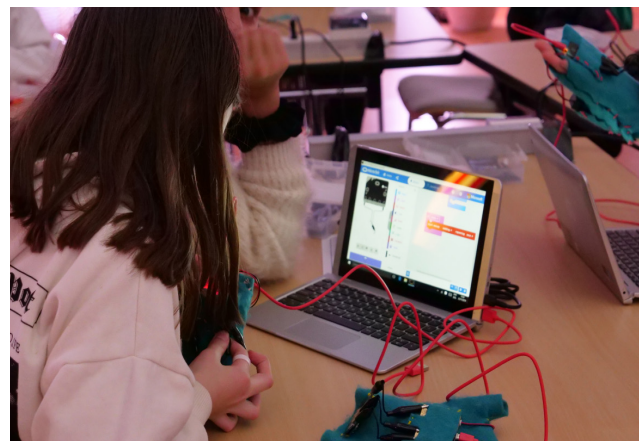
Extension (some) - use angle of tilt to change pitch or tempo

Students could write their own tunes and perform them for the group or to a partner. They could group together to perform a tune with more notes (eg 3+3 with two gloves).

Plenary

Discuss gesture "clashes" - when one gesture gets mistaken for another. How can you avoid it? Which gestures are hard to use as reliable triggers?

Are any modifications needed for the glove? If pockets are loose then the battery pack may try to move and a couple of stitches might be needed. Allow time for quick modifications.



Links

www.makecode.com

Handouts

Sound Effects / Play a Tune / Angles

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Handout Sound Effects

Task - try out gestures (moves) to trigger sound effects

1. Look at the picture of all the moves you can make.
2. Choose one move (gesture)
3. Drag the "on shake" block out of the **input** menu.
4. Drag the "start melody" block out of the **music** menu.
5. Change the melody to "ba ding" - this is the shortest sound effect. If you leave it on "dadadum" it will drive you crazy!
6. Load your code onto the micro:bit and try it out.



Change "shake" to try out different gestures.

Change "dadadum" to "ba ding"

Next steps

Try changing the gesture from "on shake" to something else. Which gestures are easiest to make?

Add more than one gesture. Which gestures clash? (get in the way of each other)

Why is "screen up" a bad gesture to choose?

Glossary

gesture [jess-chur]

a movement or position you can put the microbit in to trigger an action

melody [mel-oh-dee]

a short bit of music

Handout Play a Tune

Task - make one gesture play one note, and play a tune with them

1. Drag the “on shake” block out of the **input** menu.

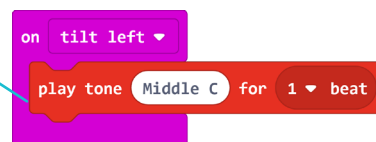


2. Drag another two “on shake” blocks out of the **input** menu. They will go lighter until you change the gesture.

3. Change the “on shake” gesture on all of them to three new gestures (we used tilt left, logo up, and tilt right).



4. Drag a “play tone Middle C” out of the **music** menu and drop it into the **tilt left** block.



5. Repeat this for the other two blocks. You might need to move around them a bit so they don't get in the way on your screen.



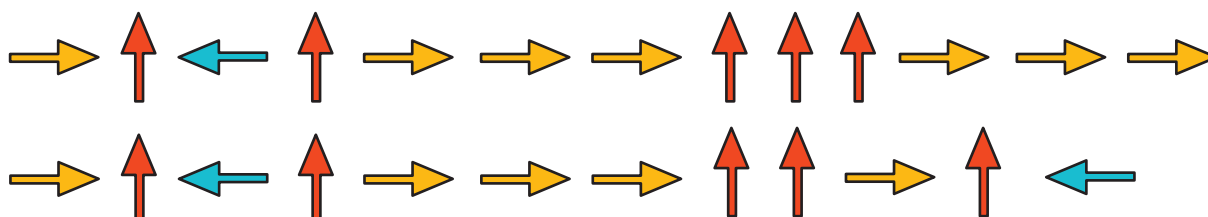
6. Change the tone for **logo up** to a Middle D, and the tone for **tilt right** to a Middle E.



7. Load your code onto the micro:bit.

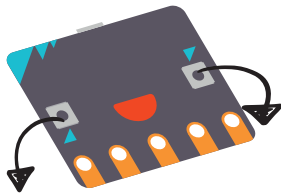
Next steps

See if you can play a tune following these moves:

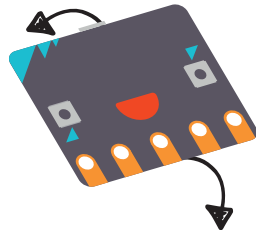


Try making your own tune - you can change the notes, or add more than one note to a gesture!

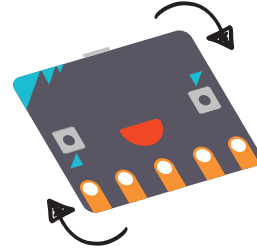
Handout Angles



x-axis
tip left and right

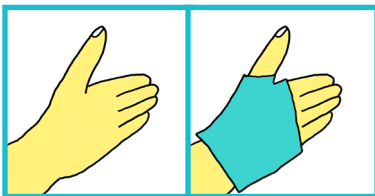


y-axis
tip backward and forward

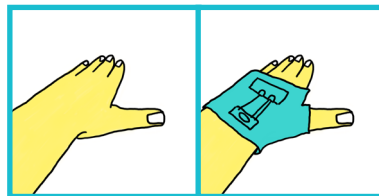


z-axis
twist like a steering wheel

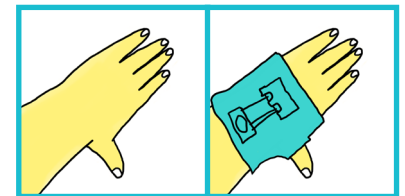
The micro:bit can detect changes of angle in three different directions. For example:



Thumb up
 $x = -1023$



Flat hand
 $x = 0$



Thumb down
 $x = 1023$

This is rotation around the x-axis.

Flat gives you a reading of zero, tipping the right side to the floor gives you a positive value for x and tipping the left side to the floor gives you a negative value for x. If you use your right hand, the positive and negative are reversed.

Task - change the note with the angle of your glove

1. Drag a "ring tone (Hz)" out of the **music** menu and drop it into the **forever** block.

2. Drag the "acceleration (mg)" block out of the **input** menu.

3. Drag a "rest" out of the **music** menu and drop it under the ring tone block. Change it to 1/16 beat.

4. Load your code onto the micro:bit. Tilt your glove like in the pictures.

```

forever
  ring tone (Hz) acceleration (mg) x
  rest(ms) 1/16 beat
  
```

Next steps

Change the axis to y or z and see how the gesture changes. Change the rest time using angles.