Glow Your Own

Worksheet for session 1

Coding is the language used by machines and computers, including everything from how a mobile phone works to controlling the colour sequence of traffic lights. Learning to code can open new areas of creativity, problem solving, collaboration and communication.

Glow Your Own is a six week project, bringing together science and arts organisations, that connects creative coding and artistic practice to help develop a range of transferable skills during an enjoyable project. It started in 2020 and previous videos and How To sheets are online: if-oxford.com/GYO

Glow Your Own aims to help people of all ages and groups to join in online: go from technology trepidation to creative coding confidence, using Arduino, Tinkercad computer programming and craft making.

Arduinos

Arduinos are microcontrollers: small electronic devices which control things. Microcontrollers are used in everyday life as well as in scientific experiments: washing machines, for example, are controlled by them. You can connect your Arduino to a computer to code it (give it a set of instructions), and to electronic components, like buttons, or lights.

An Arduino is a microcontroller – you can code it to follow simple instructions. It is connected to a computer via a USB cable and to electronic circuits via the pins – the pins are all labelled.

USB connector
This is connected to a computer’s USB port

Ground pin
Each component must be connected to ground for the electricity to flow – these are labelled GND.

Power Pin
All electrical components need power, constant 5 Volt power comes from here – it is labelled 5V.

Analogue Pins
Can be set to any value between 0 and 1023. This could be an LED brightness. They are labelled A0-A5.

Digital pins
These can be connected to electronic components and can be used either to send signals (e.g. to turn an LED on) or to receive signals (e.g. to determine if a button is on). They are labelled 0-13.
Building and coding your circuit

You can build, test and code your circuits virtually on Tinkercad: www.tinkercad.com

If you would like to join the Glow Your Own class on Tinkercad, please log on to https://www.tinkercad.com/joinclass/TQ4WP2KL8Z91 and enter your nickname – your nickname has the form gyo3###, and everyone who signed up received a unique code.

If you need a new nickname, please email visitral@stfc.ac.uk

Getting started with Tinkercad

- The first time you’ve signed in to Tinkercad you’ll see a screen as below. Click on “Create your first Circuits design” – circled in red.
• First – name your circuit! You can do this by clicking in the box at the top left of the screen – here we’ve named the circuit “Glow Your Own – Getting Started”. This will make it easier for you to remember what each circuit does.

• You can see the electronic components you can use on the right hand side of the screen. To choose a component, simply click on it and drag it to the working area on the left hand side. You can find out more about each component by changing the view, using the button below.
• You can code your Arduino by clicking on the ‘Code’ button and dragging the code blocks you need to the right.

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Circuits to build and code

Turning on a light

The simplest circuit to build and code is one that turns on a light – which we call an LED (Light Emitting Diode). It uses an LED, two wires (sometimes called ‘jumper wires’) and a resistor.
(The best value to use for your resistor is 220 Ω.)

To turn your light on, you can use the following piece of code:

```
forever
set pin 4 to HIGH
```

This tells the Arduino to send a message saying “turn on” to pin number 4. You can then test your code by clicking “Start Simulation” on Tinkercad. Does your LED turn on?

You can also get your light to flash in beautiful patterns by changing your code as follows:

```
forever
set pin 4 to HIGH
wait 1 secs
set pin 4 to HIGH
wait 1 secs
```

This code will make your LED flash on and off at regular intervals.