

Circuits - An Introduction to littleBits

Topic: Computer Science; Programming and Control



Lesson Objectives:

- Identify and understand the functional grouping of the the four colour-coded Bits: powers, inputs, outputs, wires
- Use logic to create basic circuits to create light.

Timing:

Approx 45 Minutes

Resources and Planning:

- Steam littleBits Set
- iPad / Camera

Learning Structure:

Students will learn how to create a circuit using the littleBits kits.

They will investigate what each Bit does in order to use them in future lessons.

Students should take an image of each of the Bits in the kit and write a brief synopsis of what they do and some examples of how they might use this.

Students should develop an understanding of what is needed to create a circuit such as power, switches and conductors as well as motors, sensors, triggers and lights.

Circuits require a battery and its associated bits to create a light that switches on when the button is pressed.

All evidence should be recorded as the students progress through creating the circuit using whatever method they feel appropriate.

Students should investigate the symbols that are used to create a diagrammatical representation of the circuit that they have created understanding how they differ slightly.

Greater Depth Learning:

Students need to investigate what the effect of adding more lights to the circuit might be on the overall effectiveness of the solution. Does the order of the circuit matter or will it work in any order?



Building an Alarm

Topic: Computer Science; Programming and Control



Curriculum Objectives:

- To investigate the different triggers of a circuit
- Develop their understanding of circuits and their application in the real world

Timing:

Approx 45 Minutes

Resources and Planning:

- Steam littleBits Set
- iPad / Camera
- Cardboard box

Learning Structure:

Students will investigate how to create a alarm for a Storage Box.

The task is to create an alarm that will trigger when someone opens the door of their storage box.

Students need to work together to discuss what triggers they need to use in order for them to be able to complete this task. They will need to weigh up the pros and cons for each sensor so that they can choose the right sensor for the job.

Once they have decided on their sensor, they need to work out how they are going to raise the alarm so that people are aware of the intruder into their storage box.

After all the decisions have been made, the alarm circuit needs to be created and tested, making any alterations as they go along.

All evidence needs to be recorded along with any changes that are made, highlighting the reasons for these changes.

Students should use the symbols that they have learnt in order to create a diagrammatical representation of the circuit that they have just created.

Greater Depth Learning:

Students now need to apply their learning to the classroom with the different access points, making them aware of what is required to secure a building.



Circuits - Create A Moving Animation

Topic: Computer Science; Programming and Control



Curriculum Objectives:

- Develop their understanding of circuits and triggers and moving parts
- Learn how to create movement using littleBits

Timing:

Approx 45 Minutes

Resources and Planning:

- Steam littleBits Set - servo, motors, lights and buzzer
- iPad / Camera

Task :

To create a physical poster with a moving character to advertise a recent movie.

Learning Structure:

Students will need to decide on the movie and subsequent character that they are going to advertise. They will need to research this on the internet in order to print off any materials that they require.

Once they have done this, they need to decide on how the poster is going to come alive and whether it is going to have any other alternatives to the design such as lights and sounds etc.

Students need to use the appropriate Bits in order to create their own circuits developing them so that the sequence of events work in the order that they want them to. They need to understand that the order of the Bits is important when creating a circuit as any part of the circuit that is placed in the wrong place can stop the circuit from working.

Students should investigate the symbols that are used to create a diagrammatical representation of the circuit that they have created understanding how they differ slightly.

Greater Depth Learning:

Students need to investigate whether the poster automatically works from being switched on or it is trigger by some sort of sensor. They need to work out how this is done automatically.



Circuits - Create a Moon Buggy

Topic: Computer Science; Programming and Control



Curriculum Objectives:

- Develop students understanding of how motors work either together or against each other
- Learn how to create movement using littleBits

Timing:

Approx 45 Minutes

Resources and Planning:

- Steam littleBits Set - servo, motors, lights and buzzer
- iPad / Camera

Task:

To create a moon buggy using littleBits.

Learning Structure:

Students will need to use the documentation which comes with the littleBits kit to help them create a moving Moon buggy. They need to be able to start and stop the buggy and race it over a straight course. They will need to understand how the motors work and how they need to work in tandem with each side for the buggy to move forward.

Students need to decide on how many wheels their buggy will have and the design of the buggy itself. A discussion needs to take place whether it will require one or more power sources.

Once they have designed the buggy, they need to build it and customise if time allows ready for a race at the end of the lesson.

Students should document all of their decision making process and the build as they go along. Highlighting any improvements they might make along the way.

Students should create a diagrammatical representation of the circuit using the symbols already learnt or making up their own, showing a key as to how it all links together.

Greater Depth Learning:

Students should start to investigate ways in which the buggy could be controlled if it was on the Moon and needed to be automated from Earth.



Circuits - Different Types of Triggers

Topic: Computer Science; Programming and Control



Curriculum Objectives:

- Develop their understanding of the different types of triggers and how they are used

Timing:

Approx 45 Minutes

Resources and Planning:

- Steam littleBits Set
- Cloud Bit / Bluetooth Bits
- iPad / Camera
- IFTTT Login

Task:

To understand how systems can be automated using technology.

Learning Structure:

Students will further extend their knowledge of circuits and how they can work by developing their understanding of how the circuits can be triggered. They have already learnt how they can be modified using some proximity, light or heat sensors but we want to broaden their minds by examining how to control this differently.

Wireless and bluetooth technologies will need to be explained to the students along with their limitations so that they can understand which technology might be appropriate for which trigger.

Students can look at the bluetooth Bits and see the different alternatives for managing a simple light circuit that they need to build. They need to learn how to connect to the bluetooth Bit and then how to use it to their advantage.

When looking at wireless technologies such as Home on iOS devices, students need to understand how this is going to trigger their devices. The CloudBit allows students to use the IFTTT website to create wireless triggers for their circuits so that it runs when something happens such as every quarter of an hour or at a certain time each day.

This will allow students to start to imagine what might be possible in the future.

Greater Depth Learning:

Students need to investigate different technologies that are currently available that would be able to help solve some of the issue in their home ie picking up clothes or tidying bedrooms.

Circuits - Create an Automated Device Animation

Topic: Computer Science; Programming and Control



Curriculum Objectives:

- Use all their knowledge to create an automated device that will assist a modern day problem

Timing:

2 or 3 lessons

Resources and Planning:

- Steam Little Bits Set - for testing
- iPad / Camera

Task:

To Create a device that they could sell that would help a certain aspect of a person's life.

Learning Structure:

Now that students have the knowledge of creating circuits and how they can be triggered, they can start designing theoretical solutions to problems.

Splitting the class into small groups, they will be tasked with coming up with an idea that they would like to address and then invent their own solution to this using technology.

Once the group have agreed their problem, they need to agree on how this can be triggered and how that assists the problem that they face.

Students should not only create a diagrammatical representation of their solution but should think about how they can market this product/solution in the future. This means that they will need to come up with a name, slogan, advertising campaign etc explaining how this wonderful invention can solve the problem.

Greater Depth Learning:

Students adapt the learning that they are using here to creating apps for the mobile phone as the skills that have been learnt are transferrable. This will fit neatly into the computer curriculum and future coding sessions.

