If you fail, never give up because F.A.I.L. means "First Attempt In Learning"

End is not the end. In fact E.N.D. means "Effort Never Dies"

If you get NO as an answer, remember N.O. means "Next Opportunity" Positive thinking !!!!

Who are you?

HIPSTER: Industrial and graphic designer – expert in product development/user experience

Who are you?

HIPSTER: Industrial and graphic designer – expert in product development/user experience

HACKER: Technical product developer – expert in electronics, mechanics and coding

HUSTLER: Face of the company – expert in business and commercialization strategy

Start Here

Thursday, 29 November 2018   12:30 PM
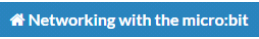
If you are just starting out, follow the order below:

1. https://makecode.microbit.org/courses/csintro

2.

3. https://makecode.microbit.org/

4. https://codeclubprojects.org/en-GB/microbit/

Other Resources

	Everything you need. Go here if you want to program in **python**	https://microbit.org/code/ https://makecode.microbit.org/ https://makecode.microbit.org/projects https://microbit.org/teach/iet/ https://microbit.org/guide/python/
	Alternative editors	https://microbit.org/code-alternative-editors/
	Learn via mini projects	https://codeclubprojects.org/en-GB/microbit/
	Intro to CS an introduction to coding and computer science by way of making and design, using the revolutionary new micro:bit microcontroller board, and Microsoft's easy and powerful MakeCode block-based coding environment.	https://makecode.microbit.org/courses/csintro
	10 Lesson Unit on Physical Computing with the Micro:Bit	Physical Computing with the Micro:Bit
	The home of the Unofficial micro:bit Community Magazine	https://micromag.cc/
	Huge list of links to microbit resources	http://microbitslug.org/resources/
	Free courses with microbit	https://groklearning.com/csedweek/aca-dt-mini-bk-microbit-rocket/ https://groklearning.com/csedweek/aca-dt-mini-py-microbit-intro/ https://groklearning.com/csedweek/aca-dt-mini-bk-microbit-intro/

	Description	Link
Kitronik	Inventor's Kit contains everything you need to complete 12 experiments including using LEDs, motors, LDRs and capacitors.	https://www.kitronik.co.uk/blog/kitronik-inventors-kit-resources
KITRONIK UNIVERSITY	Extensive lessons and courses	https://www.kitronik.co.uk/blog/bbc-microbit-kitronik-university/ https://www.kitronik.co.uk/blog/mipower-microbit-christmas-baubles
sparkfun START SOMETHING	SparkFun Inventor's Kit for micro:bit Experiment Guide	https://learn.sparkfun.com/tutorials/sparkfun-inventors-kit-for-microbit-experiment-guide/introduction-to-the-sparkfun-inventors-kit-for-microbit
BBC micro:bit MicroPython	Learn micropython	https://microbit-micropython.readthedocs.io/en/latest/tutorials/introduction.html https://microbit-challenges.readthedocs.io/en/latest/index.html
Networking with the micro:bit		https://microbit.nominetresearch.uk/networking-book-online/
101 Computing .net	Good list of well documented challenges and tutorials	https://www.101computing.net/category/bbc-microbit/
TECH WILL SAVE US	Various microbit projects	https://make.techwillsaveus.com/microbit
MultiWingSpan	Extensive collection of tutorials and resources: javascript, python, kodu, bitbot, visual basic	http://multiwingspan.co.uk/micro.php
KODU GAME LAB COMMUNITY Build Games. Play Games. Share Games.	BBC micro:bit and Kodu Interact	https://www.kodugamelab.com/resources/#microbit
MINECRAFT	These resources show you how to control the popular block-based building game Minecraft using your micro:bit. This is achieved using bitIO, an I/O library for Python. This allows you to interact directly with your micro:bit in Python 2 or 3 on your computer.	https://microbit.org/en/2018-11-02-bitio-minecraft/
GeoGebra	free online math tools for graphing, geometry, 3D, and more!	https://www.stem.org.uk/resources/community/resource/5517/computer-graphics-geogebra https://www.stem.org.uk/resources/community/resource/435272/data-logging-bbc-microbits-and-makecode-modelling-excel-and https://www.stem.org.uk/resources/community/resource/5518/getting-going-geogebra
MicroBits & Bobs Teaching and Support for the BBC Micro:Bit	There are loads of ways of programming your Micro:Bit most accessible via web based developers	http://www.microbitsandbobs.co.uk/
TE@CH WITH ICT	Lots of guides using sensors	http://www.teachwithict.com/physical-computing.html
Awesome micro:bit	Huge list of resources on github	https://github.com/carlosperate/awesome-microbit/blob/master/README.md
Wonderful Idea Co.	ideas	https://wonderfulidea.co/blog/
AMERICAN VISIONARY ART MUSEUM	Make a kinetic sculpture	http://avam.org/kinetic-sculpture-race/
PLEN Project Company Inc.	The world's first printable open-source humanoid, starter kit.	https://github.com/plenprojectcompany
16. Science	This site outlines a few ideas for using the micro:bit to teach classic science classes	https://sites.google.com/view/microbitofthings/16-science

Project Collections		• microbit.co.uk Site Index - The microbit.co.uk website contains an extensive list with all their projects and tutorials. • hackster micro:bit community - This hackster community contains user submitted projects for the micro:bit. • MakeCode Projects - List of micro:bit projects you can do with the MakeCode editor. • Tinkercademy Projects - Collection of projects using the micro:bit and Tinkercademy Tinker Kit. • Raspberry Pi micro:bit Projects - Collection of Raspberry Pi and micro:bit projects from the Raspberry Pi Foundation. • Hackaday.io micro:bit Projects - Projects using the micro:bit tag in Hackaday.io, a collaborative hardware development community. • Maker.io micro:bit projects - All the micro:bit projects posted to Maker.io, a playground for makers. • Electromaker micro:bit projects - All the micro:bit projects posted to Electromaker, a platform for makers to showcase their projects. • 10 BBC micro:bit Projects in 10 Days
	sloth:bit is a programmable biped robot powered by BBC micro:bit	https://makecode.microbit.org/pkg/sunfounder/pxt-sloth https://www.sunfounder.com/humanoid-robot-bbc-micro-bit.html
STEM LEARNING	List of learning resources	https://www.stem.org.uk/search?search_query=bbc+microbit
WORKBENCH	Use blockly to program parrot mambo	https://edu.workbencheducation.com/partners/microbit
adafruit	Arduino IDE can be used to program the micro:bit	https://learn.adafruit.com/use-micro-bit-with-arduino/overview https://blog.adafruit.com/2017/08/28/10-bbc-microbit-projects-in-10-days-microbit_edu-microbit-microbitlove-microbitmonday/
kids code jeunesse	Easy lessons for younger students	https://kidscodejeunesse.org/
BIT:AUSTRALIA	Little bird site	https://micro.bitaustralia.com.au/
Plen		https://www.kickstarter.com/projects/2107823129/plen-bit-sensor-controlled-robot-using-the-micro-b
TOKY LABS	Similar to bbc but with IOT focus	https://tokylabs.com/
PLTW		https://www.pltw.org/our-programs/pltw-gateway-curriculum#curriculum-4
element14 AN AVNET COMMUNITY		https://www.element14.com/community/community/stem-academy/microbit/content
MICRO:BIT FOR MAD SCIENTISTS		https://nostarch.com/microbitformad

Bitbot

Wednesday, 21 November 2018   8:12 AM

Introduction

It is assumed that you know the basics of coding the BBC micro:bit. If not start here first:

- https://makecode.microbit.org/
- https://microbit.org/

The instructions below were mashed and hacked from these sources:

- https://4tronix.co.uk/blog/?p=1490
- http://multiwingspan.co.uk/micro.php?page=pxtbotcontrol
- https://make.techwillsaveus.com/microbit/activities/microbot-radio-control
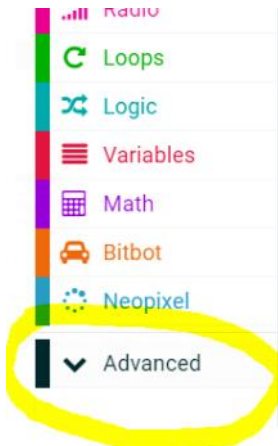- https://makecode.microbit.org/projects/rc-car

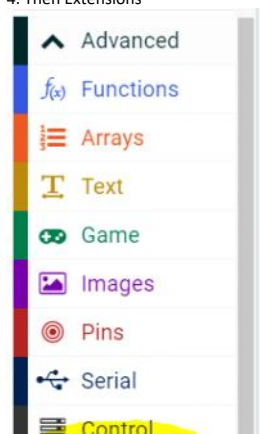I am very grateful to them for steering me in the right direction.

Before You Remote Control

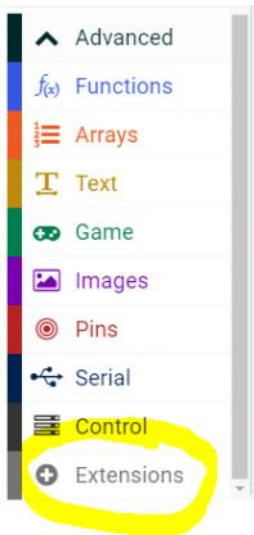Before we launch into remote control of Bitbot, we need to understand how to control motors with microbit.

Setup MakeCode

1. open https://makecode.microbit.org/#editor

2. Open the advanced features

4. Then Extensions

5. Search for https://github.com/4tronix/BitBot
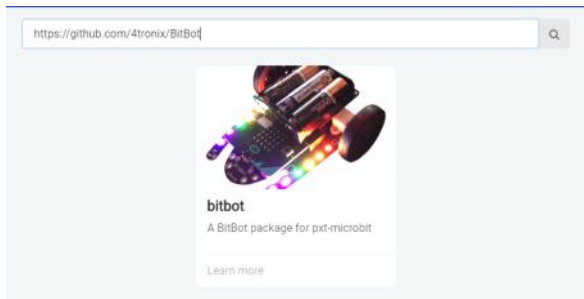

> pick the bitbot extension shown above
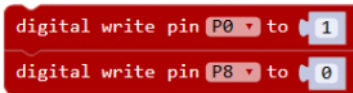
Coding the Motors

Each motor has two pins connected to it. One determines the speed and the other the direction:

Left motor: Speed Pin 0, Direction, Pin 8

Right motor: Speed Pin 1, Direction Pin 12

The simplest way to make the motors move is to set the Speed pin to HIGH and the Direction pin to LOW (to move full speed forwards)
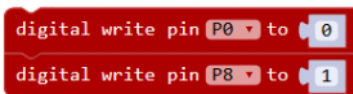
In MakeCode, move left motor Forwards:

NB. You can find the output pin commands in the "advanced" tab, under "pins"

To move the motor at full speed in reverse, we change which pin is 0 (Low) and 1 (High)

In MakeCode, move left motor Reverse:

Using analog write to change motor speed

If we want to change the speed of a motor, so that it is not going at full speed all the time, we need to use PWM (Pulse Width Modulation). This is means of changing the amount of power given to the motor by switching it on and off very fast; simulating an analog signal. The percentage value of PWM determines the amount of each cycle that the output is ON. So a percentage of 100% is the same as being on all the time and thus the same as the examples above. A percentage of 50% would mean that the motor is only energised half the time, so it will go much slower. Note that the actual speed of the motor is not the same as the percentage of PWM – the motor won't turn at all if the PWM value is too low and you will also get some stuttering at certain values. Nevertheless, being able to change the speed makes for a much better robot. For example, you can make a line follower that smoothly follows the line, rather than the normal shaking left and right.

To change the PWM value of a pin, we must use the analog_write commands. These can be set to a value between 0 (always off) to 1023 (always on), so 50% would be 511. Here are the commands to change the speed of the Right motor to approx 75% (value is 770)

In MakeCode, move right motor forwards at 75%

To change the PWM value of a pin, we must use the analog_write commands. These can be set to a value between 0 (always off) to 1023 (always on), so 50% would be 511. Here are the commands to change the speed of the Right motor to approx 75% (value is 770)

In MakeCode, move right motor forwards at 75%

```
analog write pin P1 ▾ to  770
digital write pin P12 ▾ to  0
```

Doing this for the motors moving in reverse is a little confusing. Remember we need to change the direction pin to 1 for reverse. Then we need to set the amount of time in each cycle that the speed pin is LOW. This is the opposite of moving forwards, where we set the time for it to be High. Se we simply take the number (770 in this case) away from 1023, giving 253.

In PXT, move right motor reverse at 75%

```
analog write pin P1 ▾ to  253
digital write pin P12 ▾ to  1
```

From <https://4tronix.co.uk/blog/?p=1490>

For example, to go forwards at full speed for 2 seconds and then stop, you would use,

```
digital write pin P8 ▾ to  0
digital write pin P12 ▾ to  0
analog write pin P0 ▾ to  1023
analog write pin P1 ▾ to  1023
pause (ms)  2000
analog write pin P0 ▾ to  0
analog write pin P1 ▾ to  0
```

You can write a value from 0 to 1023 in the write_analog statements. The higher your value, the quicker you move forwards. This would be a little under 80% speed.

```
digital write pin P8 ▾ to  0
digital write pin P12 ▾ to  0
analog write pin P0 ▾ to  800
analog write pin P1 ▾ to  800
pause (ms)  2000
analog write pin P0 ▾ to  0
analog write pin P1 ▾ to  0
```

To reverse, first write a 1 to the direction pins of each motor. Then write a value from 0 to 1023 like before. This time, however, the smaller your number, the quicker you go backwards. Subtract your speed from 1023 to get the value you write. If we want to reverse at '800', the same speed backwards as we just went forwards, we would write,

```
digital write pin P8 ▾ to  1
digital write pin P12 ▾ to  1
analog write pin P0 ▾ to  223
analog write pin P1 ▾ to  223
```

You can chain your movements together in a long string of blocks like this,

```
forever
  digital write pin P8 ▾ to  0
  digital write pin P12 ▾ to  0
  analog write pin P0 ▾ to  800
  analog write pin P1 ▾ to  800
  pause (ms)  2000
  analog write pin P0 ▾ to  800
```
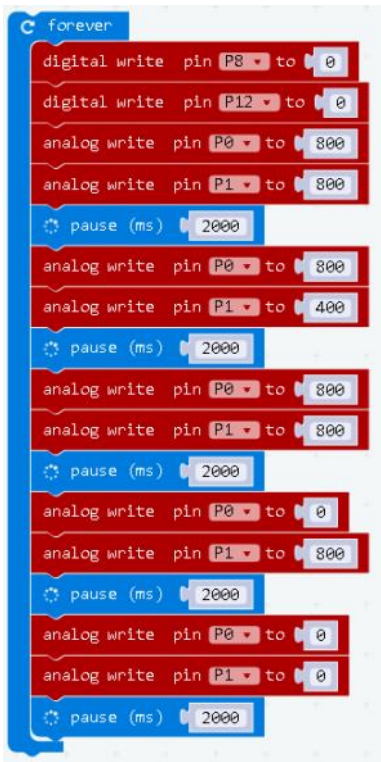
Left and Right Turn

If you press the JavaScript link in the editor, you will see the JavaScript equivalent of our blocks. The MakeCode editor con verts automatically between the languages.

```
basic.forever(() => {
    pins.digitalWritePin(DigitalPin.P8, 0)
    pins.digitalWritePin(DigitalPin.P12, 0)
    pins.analogWritePin(AnalogPin.P0, 800)
    pins.analogWritePin(AnalogPin.P1, 800)
    basic.pause(2000)
    pins.analogWritePin(AnalogPin.P0, 800)
    pins.analogWritePin(AnalogPin.P1, 400)
    basic.pause(2000)
    pins.analogWritePin(AnalogPin.P0, 800)
    pins.analogWritePin(AnalogPin.P1, 800)
    basic.pause(2000)
    pins.analogWritePin(AnalogPin.P0, 0)
    pins.analogWritePin(AnalogPin.P1, 800)
    basic.pause(2000)
    pins.analogWritePin(AnalogPin.P0, 0)
    pins.analogWritePin(AnalogPin.P1, 0)
    basic.pause(2000)
})
```

Adding some comments (shown here in red), you can see how to write out the JavaScript statements to make the robot move as yo u would like. If you want to do a lot of specific movements in a chain, you will find it easier to write the program in this view of the editor. You can copy and past lines of code and edit the numbers to make the process a lot quicker. Comments help to make your code easier for you and others to follow.
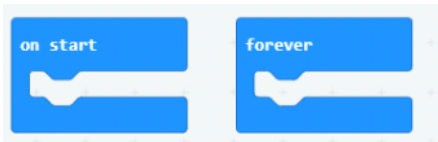
```
basic.forever(() => {
    // Set up direction pins for forward motion
    pins.digitalWritePin(DigitalPin.P8, 0)
    pins.digitalWritePin(DigitalPin.P12, 0)
    // forwards
    pins.analogWritePin(AnalogPin.P0, 800)
    pins.analogWritePin(AnalogPin.P1, 800)
    basic.pause(2000)
    // slow turn right
    pins.analogWritePin(AnalogPin.P0, 800)
    pins.analogWritePin(AnalogPin.P1, 400)
    basic.pause(2000)
    // forwards
    pins.analogWritePin(AnalogPin.P0, 800)
    pins.analogWritePin(AnalogPin.P1, 800)
    basic.pause(2000)
    // sharp left turn
    pins.analogWritePin(AnalogPin.P0, 0)
    pins.analogWritePin(AnalogPin.P1, 800)
    basic.pause(2000)
    // coast/stop
    pins.analogWritePin(AnalogPin.P0, 0)
    pins.analogWritePin(AnalogPin.P1, 0)
    basic.pause(2000)
})
```

You can see from the code, that to turn sharp LEFT, you stop the Left motor and move the right motor. This is known as a tank move, as only one side is moving to turn left or right. To turn more like a car, then use differential steering, with one wheel on one side turning faster than the other. For example, a differen tial turn RIGHT would be turning the left wheel faster (800) than the right wheel (400).
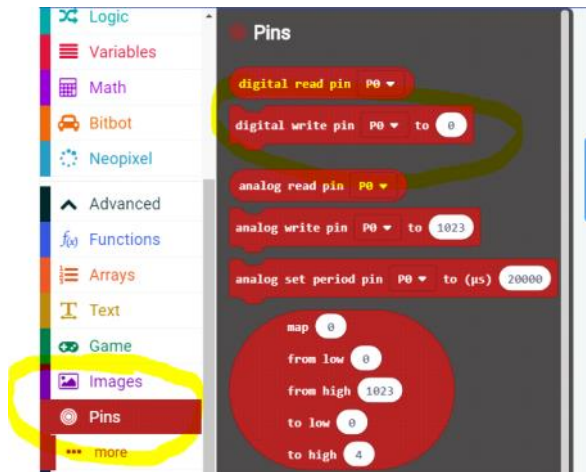
Let's try it!

When you start a new project, you always have these two blocks:
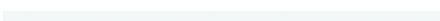
This is because in C and other java-like languages for embedded systems, the default is always a the setup function that runs once and a loop function runs over and over again forever.

1. A good practice is to initialize the motors in the setup or start function block.

> Drag out the digital write block 4 times into the start block

2. Let's drive forward and stop

> Test it out by uploading

The code explained:

```
basic.forever(function () {
pins.digitalWritePin(DigitalPin.P8, 0) //forward direction
pins.digitalWritePin(DigitalPin.P12, 0) //forward direction
pins.analogWritePin(AnalogPin.P0, 1023) //full speed
pins.analogWritePin(AnalogPin.P1, 1023) //full speed
basic.pause(2000) // keep going for 2 seconds (pause or delay for 2000 milliseconds)
pins.analogWritePin(AnalogPin.P0, 0) // stop motor
pins.analogWritePin(AnalogPin.P1, 0) //stop motor
})
```

It's interesting to note that the way the code works with the **pause ()** function. This does not stop the whole system, it just pauses before executing the next command or line of code. So, the code reads as spin both motors at full speed for 2 seconds before executing the next line of code. The pause() [or delay() i n other languages] function is used quite a bit in embedded systems.

Challenge
> Now try making it move backwards as well into its original starting position.

The Bitbot library

When you loaded the Bitbot extensions in the first step, a Bitbot library of functions were added. library.
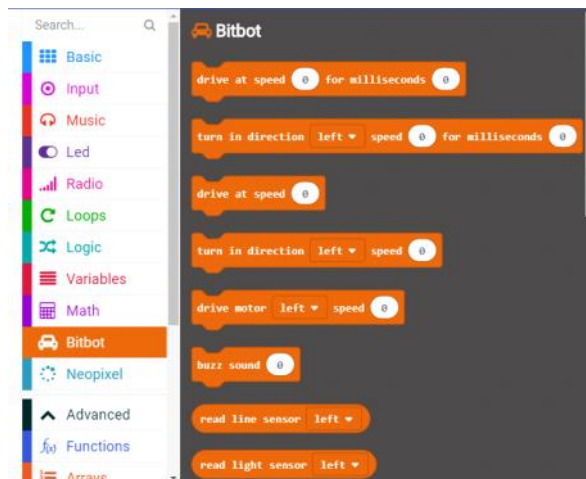
This essentially provided pre-coded functions for us, so instead of the blocks and code above, we can just use:

Left or Right turn Challenge
Before using these pre-built functions to turn left or right, try doing it the long way. Eg

```
basic.forever(() => {
    // Set up direction pins for forward motion
    pins.digitalWritePin(DigitalPin.P8, 0)
    pins.digitalWritePin(DigitalPin.P12, 0)
    // forwards
    pins.analogWritePin(AnalogPin.P0, 800)
    pins.analogWritePin(AnalogPin.P1, 800)
    basic.pause(2000)
    // slow turn right
    pins.analogWritePin(AnalogPin.P0, 800)
    pins.analogWritePin(AnalogPin.P1, 400)
    basic.pause(2000)
    // forwards
    pins.analogWritePin(AnalogPin.P0, 800)
    pins.analogWritePin(AnalogPin.P1, 800)
    basic.pause(2000)
    // sharp left turn
    pins.analogWritePin(AnalogPin.P0, 0)
    pins.analogWritePin(AnalogPin.P1, 800)
    basic.pause(2000)
    // coast/stop
    pins.analogWritePin(AnalogPin.P0, 0)
    pins.analogWritePin(AnalogPin.P1, 0)
    basic.pause(2000)
})
```

Challenges

1. Take the last example and adapt it to have the car move in a repeating pattern that takes it back to its starting point.
2. Set up an obstacle course with a start and an end point. Write a program that drives the Bit:Bot to the finish in the quickes t time. You will notice that full speed is not always the quickest route to victory in a complicated obstacle course.
3. You can still make things appear on the LED matrix when using the robot. When you are chaining a series of actions together, you can change the display to show what you intended your code to do. For simple movements, this can be an arrow pointing in the direction of travel. For other manoeuvres, you will ne ed to design your own images.
4. Experiment with the numbers you write in the analog write statements. Work out how long it takes to travel a given distance a nd how to turn 90° on the spot. Work out your own routines to drive fowards and backwards your chosen unit. Write two more for your left and right rotations. Use your functions to make it easier to write programs that send the robot on long planned routes. If you know how the car is going to move in small units, you will reduce the amount of trial and error needed to get the robot to follow a long route.

From <http://multiwingspan.co.uk/micro.php?page=pxtbotmove>

Remote Control
Before going all in with the remote control, lets practice using the microbit radio.

The Microbit Radio

Before you go ahead, familiarise yourself with the Radio blocks: https://makecode.microbit.org/reference/radio

Set Radio Group
The first bit of coding is to make sure the radios in the microbits are on the same channel. Under Radio, you'll find a block called radio set group. You can choose any number between 0 and 255, just make sure you use the same one. **Do this for both!**

Sending

On the sending device, make sure that you are transmitting the strongest signal.

Transmission Event

Next we need some action or event to trigger the transmission of data to the other microbit. This could be a button press, a shake or x/y acceleration movement. Let's try an on button A pressed event.
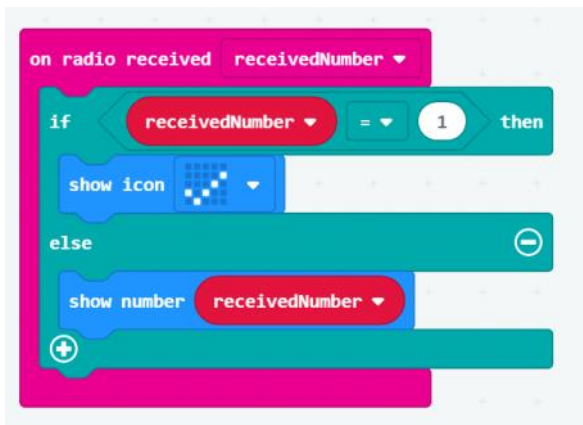

Download and save that to a micro:bit. This will act as your transmitter, or "remote."

Receive Event

Make a new project for the other receiving micro:bit. Start with:

Next, add the following

Download and save that to a micro:bit.

Accelerometer

The accelerometer on a BBC micro:bit measures acceleration, as its name suggests. The accelerometer can measure accelerations of between +2g to -2g.

The micro:bit measures movement along three axes:

- X - tilting from left to right.
- Y - tilting forwards and backwards.
- Z - moving up and down.
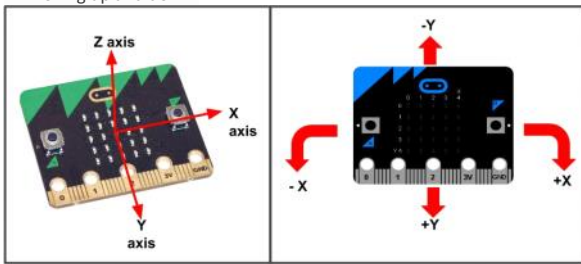
From <https://microbit-challenges.readthedocs.io/en/latest/tutorials/accelerometer.html>

The Input block for acceleration values is:

This will give values from - 1023 to +1023

y-axis, tilted forward, y=-1023	y-axis, tilted backwards, y=1023	x-axis, tilted to the left, x=-1023	x-axis, tilted to the right, x=1023
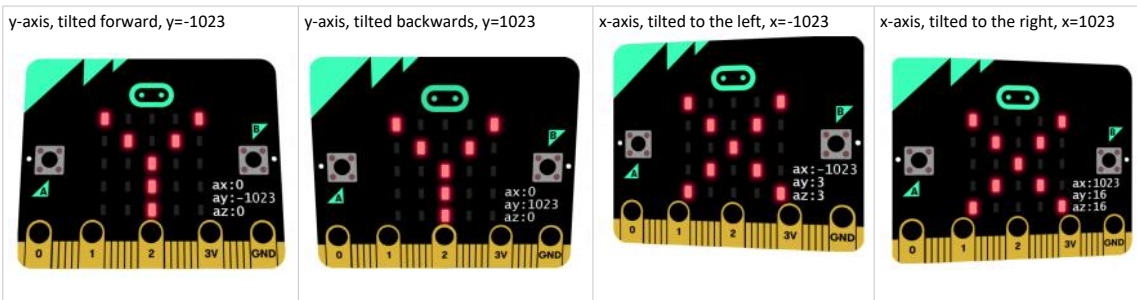
Test acceleration to see the values shift as you orient the microbit. Remember, you will be holding the microbit in reverse:
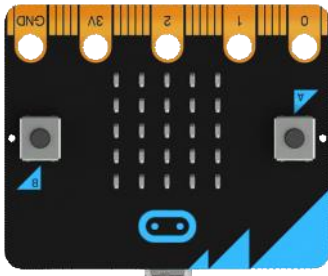

```
basic.forever(function () {
basic.showLeds(`
# . . . #
. # . # .
. . # . .
. # . # .
# . . . #
`)
basic.pause(500)
basic.showNumber(input.acceleration(Dimension.X))
basic.pause(500)
basic.showLeds(`
# . . . #
. # . # .
. . # . .
. . # . .
. . # . .
`)
basic.pause(500)
basic.showNumber(input.acceleration(Dimension.Y))
```

```
. . # . .
`)
basic.pause(500)
basic.showNumber(input.acceleration(Dimension.Y))
basic.pause(500)
basic.showLeds(`
# # # # #
. . . # .
. . # . .
. # . . .
# # # # #
`)
basic.pause(500)
basic.showNumber(input.acceleration(Dimension.Z))
basic.pause(500)
})
```

Hex Code microbit-ac celerome...	

<mark>>Record the values for x (tilting from left to right) and y (tilting forwards and backwards). You will need these later.</mark>

> You should get:

Tilt Left, x = 0 to 1023
Tilt Right, x = 0 to -1023
Tilt Forward, y = 0 to 1023
Tilt Backwards, y = 0 to -1023

> For this project, we need 2 BBC micro:bit's: one for the bitbot and one for the remote control. NOTE: The B -button is for moving **left** and the A-button is for moving **right**.
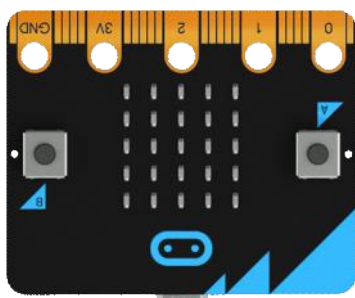
> We will try making **two** versions of the remote control:

1. A button for Right; B button for Left and x acceleration for forward and back
2. y acceleration for left and right and x acceleration for forward and back

Code the remote 1

A button for Left; B button for right and x acceleration for forward and back. Remember, everything is back to front and reve rsed.


```
let y = 0
let x = 0
radio.setGroup(0)
radio.setTransmitPower(7)
```

on start

```
radio set group (0)
radio set transmit power (7)
show leds
```

forever

```
set x to acceleration (mg) x
set y to acceleration (mg) y
if  button A+B is pressed  then
    show leds
    radio send number (0)
else if  x < 0  then
    show leds
    radio send number (1)
else if  x > 0  then
    show leds
    radio send number (2)
else if  y > 0  then
    show leds
    radio send number (3)
else if  y > 0  then
    show leds
    radio send number (4)
else
    show icon
```

```javascript
let y = 0
let x = 0
radio.setGroup(0)
radio.setTransmitPower(7)
basic.showLeds(`
. . . . .
. . # . .
. # # # .
. . # . .
. . . . .
`)
basic.forever(function () {
x = input.acceleration(Dimension.X)
y = input.acceleration(Dimension.Y)
if (input.buttonIsPressed(Button.AB)) {
basic.showLeds(`
# . . . #
. # . # .
. . # . .
. # . # .
# . . . #
`)
radio.sendNumber(0)
} else if (x < 0) {
basic.showLeds(`
. . # . .
. # . . .
# # # # #
. # . . .
. . # . .
`)
radio.sendNumber(1)
} else if (x > 0) {
basic.showLeds(`
. . # . .
. . . # .
# # # # #
. . . # .
. . # . .
`)
radio.sendNumber(2)
} else if (y > 0) {
basic.showLeds(`
. . # . .
. . # . .
# . # . #
. # # # .
. . # . .
`)
radio.sendNumber(3)
} else if (y > 0) {
basic.showLeds(`
. . # . .
. # # # .
# . # . #
. . # . .
. . # . .
`)
radio.sendNumber(4)
} else {
basic.showIcon(IconNames.Heart)
}
})
```

Hex File

microbit-Re
mote-Con...

This time, the microbit is oriented correctly


```
radio.onReceivedNumber(function (receivedNumber) {
if (receivedNumber == 0) {
basic.showLeds(`
#...#
.#.#.
..#..
.#.#.
#...#
`)
pins.digitalWritePin(DigitalPin.P8, 0)
pins.digitalWritePin(DigitalPin.P12, 0)
pins.analogWritePin(AnalogPin.P0, 0)
pins.analogWritePin(AnalogPin.P1, 0)
basic.pause(100)
} else if (receivedNumber == 1) {
basic.showLeds(`
..#..
...#.
#####
...#.
..#..
`)
pins.digitalWritePin(DigitalPin.P8, 0)
pins.digitalWritePin(DigitalPin.P12, 0)
pins.analogWritePin(AnalogPin.P0, 500)
pins.analogWritePin(AnalogPin.P1, 1023)
basic.pause(100)
} else if (receivedNumber == 2) {
basic.showLeds(`
..#..
.#...
#####
.#...
..#..
`)
pins.digitalWritePin(DigitalPin.P8, 0)
pins.digitalWritePin(DigitalPin.P12, 0)
pins.analogWritePin(AnalogPin.P0, 1023)
pins.analogWritePin(AnalogPin.P1, 500)
basic.pause(100)
} else if (receivedNumber == 3) {
basic.showLeds(`
..#..
.###.
#.#.#
..#..
..#..
`)
pins.digitalWritePin(DigitalPin.P8, 0)
pins.digitalWritePin(DigitalPin.P12, 0)
pins.analogWritePin(AnalogPin.P0, 1023)
pins.analogWritePin(AnalogPin.P1, 1023)
basic.pause(100)
} else if (receivedNumber == 4) {
basic.showLeds(`
..#..
..#..
#.#.#
.###.
..#..
`)
pins.digitalWritePin(DigitalPin.P8, 1)
pins.digitalWritePin(DigitalPin.P12, 1)
pins.analogWritePin(AnalogPin.P0, 100)
pins.analogWritePin(AnalogPin.P1, 100)
basic.pause(100)
```

```
else if  receivedNumber  =  4  then
    show leds
    [LED pattern]
    digital write pin  P8   to  1
    digital write pin  P12  to  1
    analog write pin  P0   to  100
    analog write pin  P1   to  100
    pause (ms)  100
else
    digital write pin  P8   to  0
    digital write pin  P12  to  0
    analog write pin  P0   to  0
    analog write pin  P1   to  0
    pause (ms)  100
```

```
pins.analogWritePin(AnalogPin.P0, 100)
pins.analogWritePin(AnalogPin.P1, 100)
basic.pause(100)
} else {
pins.digitalWritePin(DigitalPin.P8, 0)
pins.digitalWritePin(DigitalPin.P12, 0)
pins.analogWritePin(AnalogPin.P0, 0)
pins.analogWritePin(AnalogPin.P1, 0)
basic.pause(100)
}
})
radio.setGroup(0)
```

Hex code

microbit-re
cieved-1 (4)

> Test

NOTES: See how you go; the movement may be a bit jerky, based on the value you assign to the pause block. Experiment with changing t he pause values until it's a bit smoother. You can also play with the values for turning left or right as these are differential turns, with one wheel turning faster than the other.

Coding Variations

These blocks from the Bitbot extension library may work better. However, you can eventually extend on this remote with a real remote control car and these may not work on any other vehicle other than the Bitbot….??

Experiment with:

Or

Code the remote 2

y acceleration for left and right and x acceleration for forward and back. Remember:

Tilt Left, x = 0 to 1023
Tilt Right, x = 0 to -1023
Tilt Forward, y = 0 to 1023
Tilt Backwards, y = 0 to -1023


```
let y = 0
let x = 0
radio.setGroup(0)
radio.setTransmitPower(7)
```

radio set group (0)
radio set transmit power (7)
show leds

```
[LED grid display]
```

set x to acceleration (mg) x
set y to acceleration (mg) y
if button A+B is pressed then
show leds

radio send number (0)
else if (x) (<) (0) then
show leds

radio send number (1)
else if (x) (>) (0) then
show leds

radio send number (2)
else if (y) (>) (0) then
show leds

radio send number (3)
else if (y) (>) (0) then
show leds

radio send number (4)
else
show icon

```typescript
let x = 0
radio.setGroup(0)
radio.setTransmitPower(7)
basic.showLeds(`
. . . . .
. . # . .
. # # # .
. . # . .
. . . . .
`)
basic.forever(function () {
x = input.acceleration(Dimension.X)
y = input.acceleration(Dimension.Y)
if (input.buttonIsPressed(Button.AB)) {
basic.showLeds(`
# . . . #
. # . # .
. . # . .
. # . # .
# . . . #
`)
radio.sendNumber(0)
} else if (x < 0) {
basic.showLeds(`
. . # . .
. # . . .
# # # # #
. # . . .
. . # . .
`)
radio.sendNumber(1)
} else if (x > 0) {
basic.showLeds(`
. . # . .
. . . # .
# # # # #
. . . # .
. . # . .
`)
radio.sendNumber(2)
} else if (y > 0) {
basic.showLeds(`
. . # . .
. . # . .
# . # . #
. # # # .
. . # . .
`)
radio.sendNumber(3)
} else if (y > 0) {
basic.showLeds(`
. . # . .
. # # # .
# . # . #
. . # . .
. . # . .
`)
radio.sendNumber(4)
} else {
basic.showIcon(IconNames.Heart)
}
})
```

Hex Code

microbit-Re
mote-Con...

microbit-Re
mote-Con…

==This should work with the existing code for the microbit that is receiving.==

Smoother driving and acceleration

Remote 3

A/B button for throttle
x-tilt for steering


```
let steering = 0
let throttle = 0
radio.setGroup(1)
basic.forever(function () {
throttle = 0
if (input.buttonIsPressed(Button.A)) {
throttle = 100
} else if (input.buttonIsPressed(Button.B)) {
throttle = -100
}
radio.sendValue("throttle", throttle)
steering = 0
if (input.acceleration(Dimension.X) < -512) {
steering = -100
} else if (input.acceleration(Dimension.X) > 512) {
steering = 100
}
radio.sendValue("steering", steering)
})
```

Hex Code

microbit-Re
mote-3-R…

Receiving 3

A/B button for throttle
x-tilt for steering


```
radio.onReceivedValue(function (name, value) {
led.toggle(0, 0)
if (name == "throttle") {
if (value > 0) {
basic.showLeds(`
. . # . .
. . # . .
# . # . #
. # # # .
. . # . .
`)
```

```
if name = throttle then
    if value > 0 then
        show leds
        digital write pin P8 to 1
        digital write pin P12 to 1
        analog write pin P0 to 100
        analog write pin P1 to 100
        pause (ms) 100
    else if value < 0 then
        show leds
        digital write pin P8 to 0
        digital write pin P12 to 0
        analog write pin P0 to 1023
        analog write pin P1 to 1023
        pause (ms) 100
    else
        show leds
        digital write pin P8 to 0
        digital write pin P12 to 0
        analog write pin P0 to 0
        analog write pin P1 to 0
        pause (ms) 100
else if name = steering then
    if value > 0 then
        show leds
        digital write pin P8 to 0
```

```
# . # . #
. # # # .
. . # . .
`)
pins.digitalWritePin(DigitalPin.P8, 1)
pins.digitalWritePin(DigitalPin.P12, 1)
pins.analogWritePin(AnalogPin.P0, 100)
pins.analogWritePin(AnalogPin.P1, 100)
basic.pause(100)
} else if (value < 0) {
basic.showLeds(`
. . # . .
. # # # .
# . # . #
. . # . .
. . # . .
`)
pins.digitalWritePin(DigitalPin.P8, 0)
pins.digitalWritePin(DigitalPin.P12, 0)
pins.analogWritePin(AnalogPin.P0, 1023)
pins.analogWritePin(AnalogPin.P1, 1023)
basic.pause(100)
} else {
basic.showLeds(`
# . . . #
. # . # .
. . # . .
. # . # .
# . . . #
`)
pins.digitalWritePin(DigitalPin.P8, 0)
pins.digitalWritePin(DigitalPin.P12, 0)
pins.analogWritePin(AnalogPin.P0, 0)
pins.analogWritePin(AnalogPin.P1, 0)
basic.pause(100)
}
} else if (name == "steering") {
if (value > 0) {
basic.showLeds(`
. . # . .
. # . . .
# # # # #
. # . . .
. . # . .
`)
pins.digitalWritePin(DigitalPin.P8, 0)
pins.digitalWritePin(DigitalPin.P12, 0)
pins.analogWritePin(AnalogPin.P0, 1023)
pins.analogWritePin(AnalogPin.P1, 500)
basic.pause(100)
} else if (value < 0) {
basic.showLeds(`
. . # . .
. . . # .
# # # # #
. . . # .
. . # . .
`)
pins.digitalWritePin(DigitalPin.P8, 0)
pins.digitalWritePin(DigitalPin.P12, 0)
pins.analogWritePin(AnalogPin.P0, 500)
pins.analogWritePin(AnalogPin.P1, 1023)
basic.pause(100)
} else {
pins.digitalWritePin(DigitalPin.P8, 0)
pins.digitalWritePin(DigitalPin.P12, 0)
pins.analogWritePin(AnalogPin.P0, 0)
pins.analogWritePin(AnalogPin.P1, 0)
basic.pause(100)
}
```

```
    pins.analogWritePin(AnalogPin.P1, 0)
    basic.pause(100)
    }
    }
})
radio.setGroup(1)
basic.forever(function () {

})
```

Hex Code	
microbit-Re cieving-3	

>TEST

NOTE: Again, change the smoothness by changing pause and turning values.

Remote 4

y-tilt for throttle
x-tilt for steering


```
let steering = 0
let throttle = 0
radio.setGroup(1)
basic.forever(function () {
throttle = 0
if (input.acceleration(Dimension.Y) > 0) {
throttle = 100
} else if (input.acceleration(Dimension.Y) < 0) {
throttle = -100
}
radio.sendValue("throttle", throttle)
steering = 0
if (input.acceleration(Dimension.X) < -512) {
steering = -100
} else if (input.acceleration(Dimension.X) > 512) {
```

radio send value `throttle` = `throttle`

set `steering` to `0`

if `acceleration (mg) x` `<` `-512` then

    set `steering` to `-100`

else if `acceleration (mg) x` `>` `512` then ⊖

    set `steering` to `100`

⊕

radio send value `steering` = `steering`

```
steering = 0
if (input.acceleration(Dimension.X) < -512) {
    steering = -100
} else if (input.acceleration(Dimension.X) > 512) {
    steering = 100
}
radio.sendValue("steering", steering)
})
```

Hex Code

microbit-Re
mote-4

Design links

https://hackdesign.org/lessons

https://sites.google.com/site/digitalanddesigntechnologies/year-10/pump-up-the-volume

https://www.autodesk.com/campaigns/education/iste

https://100yearsea.com.au/create-it-comp/

3D Design

https://www.instructables.com/id/Teacher-Professional-Development-Design-Thinking/

https://briefbox.me/briefs/

https://www.instructables.com/id/Balloon-Cars/

http://www.technologystudent.com/

http://designonline.org.au/education/
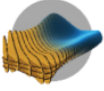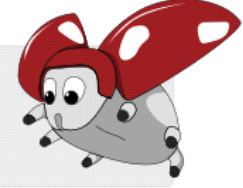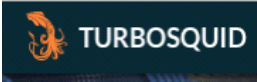
	Good for the basics	https://www.tinkercad.com/ https://www.tinkercad.com/learn/codeblocks https://www.instructables.com/lesson/Transforming-Your-World-With-Tinkercad/ https://www.instructables.com/id/Hour-of-Code-Make-Patterns-With-Code-and-CAD-in-Ti/ https://www.instructables.com/id/Plywood-Monsters/ https://www.autodesk.com/campaigns/education/iste https://www.instructables.com/id/Make-Your-Own-Tools/
	This is the best place to start your 3D design journey Needs approval Online Service Risk Review Catalogue. https://qlddet.service-now.com/ui_page.do?sys_id=a5e9ed52ed11da00dd6be96022259389	http://help.autodesk.com/view/fusion360/ENU/ https://www.autodesk.com/products/fusion-360/get-started https://f360ap.autodesk.com/courses https://academy.autodesk.com/getting-started-fusion-360 https://academy.autodesk.com/software/fusion-360 https://academy.autodesk.com/curriculum/maker https://academy.autodesk.com/curriculum/steam https://ultimaker.com/en/resources/52563-ultimaker-core-lessons-steam-set https://ultimaker.com/en/resources/education
		https://www.youtube.com/playlist?list=PL2mSc20yMLyfVumaRE14cBeUWMoN3uAYr https://www.sketchup.com/

	Description	Links
Slicer — Autodesk, Inc. ★★★★★ (34 reviews)	licer for Autodesk® Fusion 360™ is a tool to turn your digital 3D models into appealing artefacts. It slices and converts 3D models into 2D patterns that you can cut out of any flat material. Slicer for Fusion 360 also creates 3D instructions you can interact with, to help build a model. From <https://apps.autodesk.com/FUSION/en/Detail/Index?id=8699194120463301363&appLang=en&os=Mac>	https://apps.autodesk.com/FUSION/en/Detail/Index?id=8699194120463301363&appLang=en&os=Mac
ptc	Free Creo tutorials	https://www.ptc.com/en/academic-program/instructors/resources/modules http://apps.ptc.com/schools/How_to_model_almost_anything.zip#_ga=2.21162299.1407505109.1544662944-1482159676.1544662944 https://support.ptc.com/help/creo/creo_pma/usascii/index.html#page/tutorials_pma/online_help/aux_files/pma_tutorials.html https://learningconnector.ptc.com/content/tut-4109/getting-started-with-creo-direct https://www.concurrent-engineering.co.uk/creo-parametric-tutorials https://www.youtube.com/playlist?list=PL4B1C14161E7452D9 https://www.youtube.com/channel/UCqlEgtLz6j5eNW-9qCNXADg/playlists https://www.scribd.com/document/118434093/Creo-Parametric-Quick-Start https://learningconnector.ptc.com/seeMore/creo/parametric?version=all&contentType=tutorials&isNew=false&technicalArea=Tutorials&accessLevel=Free https://community.ptc.com/t5/PTC-Academic-Program-Discussions/How-are-you-learning-Creo-Parametric-CAD/td-p/263049
VELOCITY PAINTING 3D Printing in style	technique that allows you to add patterns to your 3D prints without the need to edit the model, use multiple extruders, or swap filament.	https://www.velocitypainting.xyz/blog/
blender		https://www.blender.org/ https://projects.raspberrypi.org/en/projects?software%5B%5D=blender
	Visual Code for 3D Design	http://beetleblocks.com/
3D SLASH A 3D PIECE OF CAKE	The easiest way to create in 3D... and the most fun	https://www.3dslash.net/index.php
	Teflon tubing	http://aus3d.com.au/ptfe-tubing-4mm https://www.jaycar.com.au/tl4100-teflon-tube-bowden-feed/p/TL4115
MakerCase Easy Laser Cut Case Design	Design an enclosure for lasercutting online	http://www.makercase.com/
make a box		https://makeabox.io/ http://jeromeleary.com/laser/ https://boxdesigner.connectionlab.org/
A Virtual Crash Course in Design Thinking	This is an online version of one of our most frequently sought after introductory learning experiences. Using a video, worksheets, and facilitation tips we will take you step by step through the process of hosting or participating in a 90 minute design challenge	https://dschool.stanford.edu/resources-collections/a-virtual-crash-course-in-design-thinking
instructables	Great intro projects	https://www.instructables.com/teachers/
3D Text		http://www.picturetopeople.org/text_generator/others/3d/3d_text.html

Logo	Description	Link
Paint 3D		https://education.microsoft.com/courses-and-resources/resources/Paint-3D-for-the-classroom https://education.microsoft.com/courses-and-resources/courses/introduction-to-paint-3d https://onedrive.live.com/redir.aspx?cid=91f4e618548fc604&resid=91F4E618548FC604!3321&parId=91F4E618548FC604!1512&authkey=!AkGG_F7l8EnP5do&Bsrc=SMIT&ref=button https://www.remix3d.com/discover?section=34b78f58881242e4ab611e4ab5ffaa78
		https://makershare.com/
Obrary	We make the source design files for all of the products available to anyone that wants to make them or want to improve on the design. From <https://obrary.com/collections/open-designs>	https://obrary.com/collections/open-designs
AB 3D Labs	Good but not free	http://www.ab3dlabs.com/
XYZ PRINTING	Looks like a clone of tinkercad	http://wiki.xyzprinting.com/xyzmaker/en/
morphi	Simple, powerful, easy to learn 3D Design + Creativity app for 3D Printing, AR, Visualization + more. For iPads + Mac + Windows computers. $4.99 per computer for 20+ purchases From <https://www.morphiapp.com/>	https://www.morphiapp.com/
TURBOSQUID	Find 3d models	https://www.turbosquid.com/
sculptris		http://pixologic.com/sculptris/
TINKERINE U	Tinkerine U is the place to learn (and to learn to teach) 3D printing.	https://u.tinkerine.com/#
3D SLASH A 3D PIECE OF CAKE	The easiest way to create in 3D... and the most fun! From <https://www.3dslash.net/index.php>	https://www.3dslash.net/index.php
instructables	Beginner 3D class	https://www.instructables.com/class/Beginner-3D-Printing-Class/ https://www.instructables.com/id/Personalized-3D-Printer-Pencil-Top/
sketchupschool	Sketchup tutorials	https://www.sketchupschool.com/sketchup-tutorials/
3D PRINTING IN THE CLASSROOM	Kathy Schrock's links	https://www.schrockguide.net/3d-printing.html
CITY X PROJECT	The City X Project is an international educational workshop for 8-12 year-old students that teaches creative problem solving using 3D printing technologies and the design process.	http://www.cityxproject.com/
Sculptfab	Sculpt 3D in your browser	https://labs.sketchfab.com/sculptfab/

CNC Milling

https://www.cnccookbook.com/how-to-make-cnc-turners-cube/
https://www.inventables.com/technologies/getting-started-with-3d-carving-book

CARVEY LICENCE

PDF 1902.20_Ba ntamTool...   **PDF** Skill Builder — CNC Pa...

Carving bits

	• (2) <u>1-flute spiral upcut</u> 1/8" cutting diameter bit • Ideal for soft plastics • (2) <u>2-flute straight cut</u> 1/8" cutting diameter • Ideal for woods and plastics • (2) <u>2-flute fishtail upcut</u> 1/8" cutting diameter • Ideal for carving plastics • (3) <u>2-flute fishtail upcut</u> 1/16" cutting diameter • Ideal for carving plastics
	<u>Solid Carbide Downcut Fish Tail</u> Spiral Bit 1/16 - Ideal for wood and plywood

Overview

In order to safely and responsibly use our Carvey CNC Mill, you must pass your Carvey Licence test. You will do this by using a problem solving approach.

WARMUP

https://www.youtube.com/watch?v=QIDNPNKuXgg
https://www.inventables.com/technologies/carvey

W.A.L.T We Are Learning To...	**W.I.L.F** What I'm Looking For...	**WORD POWER**
EXPLORE • **considering** factors that influence the selection of appropriate materials, components, tools and equipment. eg what materials can be used	**EXPLORE** • **outline** the limits of carving volume of the carvey cnc mill • **explain** what carving bit will be used and why	Computer Numerical Control (CNC) Carbide tooling Medium-density fibreboard (MDF) spindle mount waste board
DEVELOP • **investigating** emerging technologies and their potential impact on design decisions. eg 2.5D Design • **create** and **adapt** design ideas, **make** considered decisions by:	**DEVELOP** • **investigate** how the design software works so that you can decide what limits and boundaries to your design exist. • **sketch** 3 design ideas and, with feedback, choose one to take further	

- **using** a variety of critical and creative thinking strategies such as brainstorming, sketching and experimenting to generate innovative design ideas
- **considering** which ideas to further explore
- **communicate** by **producing** annotated concept sketches and drawings

GENERATE

- safely **produce** effective designed solutions for the intended purpose

EVALUATE & REFINE

- **evaluating** designed solutions and processes and transferring new knowledge and skills to future design projects

GENERATE

- **demonstrate** the **use** of:
    - software to digitise design ideas
    - safely securing materials
    - safe operation of equipment
    - producing solution
    - equipment maintenance

EVALUATE & REFINE

- verbally **expound** on the qualities of your produced solution and plans for future design projects.

Materials and Tools

150mm x 150mm Coloured MDF
1/16" spiral upcut fish-tail end mill

---

1. Create account at http://easel.inventables.com
2. Download driver: http://easel.inventables.com/downloads
3. View https://www.inventables.com/projects/learn-our-easel-software-in-4-minutes
4. Follow Easel Live: Mosaic Tile Maker Challenge or https://www.inventables.com/projects/mosaic-tiles

---

I DO

Machine Specifications

Your Carvey has a carving area of 11.6" x 8" (approximately 30cm x 20cm) in the X and Y axes respectively. Clearance in the Z axis varies depending on overall length of the installed milling bit, though the overall clearance from the waste board to the waste board to the cutting head is 90mm and the maximum travel of the Z axis is 80mm.
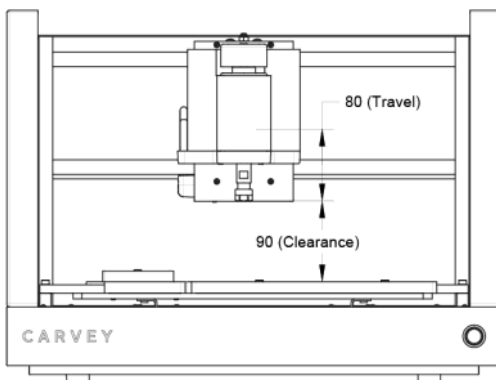
From <http://carvey-instructions.inventables.com/basics/>

Materials officially approved for use in Carvey should not exceed dimensions of: Width (X-axis): 12 inches (30 cm), Depth (Y-axis): 8 inches (20 cm), Height (Z-axis): 2.75 inches (7 cm) and are as follows:

- ABS
- Acrylic
- HDPE
- Hard and Soft woods of any natural wood species
- Aluminum*
- Corian
- FR1 Machinable Circuit Board Blanks
- Delrin
- Expanded PVC
- Machinable Foam
- Machinable Wax

*Safe limits for Aluminum are as follows: 5"/min feed rate, 2.5"/min plunge rate, 0.003"/pass with minimum 0.0625" milling bit.

WE DO

If the length of a carving bit from the base of the spindle and mount is 20mm, what is the maximum height you can carve to? Turn to a partner to work this

out.

EXPLORE

• **outline** the limits of carving volume of the carvey cnc mill

Materials officially approved for use in Carvey should not exceed dimensions of: Width (X-axis): 12 inches (30 cm), Depth (Y-axis): 8 inches (20cm), Height (Z-axis): 2.75 inches (7 cm).

From: http://carvey-instructions.inventables.com/materials/

I DO

[Carving Bits 101](#)

want to know more?

[Carving Bits 201 - Feeds, Speeds, and V-Bits](#)

WE DO

What carving bit will we be using and why?

EXPLORE

• **explain** what carving bit will be used and why

YOU DO

1. Create account at http://easel.inventables.com
2. Download driver: http://easel.inventables.com/downloads

I DO

[Learn Our Easel Software in 4 Minutes](#)

DEVELOP

• **investigate** how the design software works so that you can decide what limits and boundaries to your design exist.

---

https://www.retrofab.com.au/contact.html

From <http://carvey-instructions.inventables.com/materials/>

Mini-project 2
https://www.inventables.com/projects/boxes-with-sliding-lids

Mini-project 3
https://www.inventables.com/projects/cake-topper-party-pack

Learn More:

https://www.inventables.com/projects/how-to-make-balsa-wood-gliders-using-easel

https://www.inventables.com/collections/29

https://inventables.zendesk.com/hc/en-us/sections/360002650993-Easel-Tutorials

https://inventables.desk.com/customer/en/portal/topics/1022638-easel-tutorials/articles

Other ideas
https://www.instructables.com/id/CNC-Milled-Nail-Stamp-Plate/
https://www.instructables.com/id/CNC-Puzzle/

Integrated projects
https://www.inventables.com/projects/star-wars
https://www.inventables.com/projects/rubber-band-racer
https://www.inventables.com/projects/bartop-arcade-machine
https://learn.adafruit.com/circuit-playground-yoyo
https://learn.adafruit.com/circuit-playground-express-con-badge
https://learn.adafruit.com/retro-gaming-with-raspberry-pi
https://learn.adafruit.com/joy-bonnet-case
https://learn.adafruit.com/arcade-bonnet-controller
https://learn.adafruit.com/search?q=cnc
https://www.instructables.com/id/Animated-Star-Wars-CNC-LED-Lamp-Arduino-Controlled/
https://www.instructables.com/id/Pocket-Sized-Robot-Arm-meArm-V04/
https://learn.adafruit.com/circuit-playground-combadge/overview
https://www.instructables.com/howto/acrylic+electronic/
https://www.instructables.com/id/Electronic-Instrument/
https://create.arduino.cc/projecthub/projects/tags/wearables
https://www.hackster.io/wearables

Advanced
https://www.inventables.com/projects/rubber-band-racer

INVENTABLES	Project list	http://carvey-instructions.inventables.com/
		https://www.inventables.com/projects
		https://www.inventables.com/projects/learn-our-easel-software-in-4-minutes
		https://www.inventables.com/collections/29
		https://www.inventables.com/challenges
		http://carvey-instructions.inventables.com/easel/
		https://www.inventables.com/challenges
		https://imaginables.com.au/pages/resellers
		https://www.jesspublib.org/_uploads/Carvey-Quick-Start.pdf
		https://inventables.desk.com/customer/en/portal/articles/2359549-using-meshcam-with-easel
Carbide 3D		https://carbide3d.com/carbidecreate/download/
		https://carbide3d.com/nomad/
		https://carbide3d.com/carbidecreate/
		https://www.jesspublib.org/_uploads/Carvey-Quick-Start.pdf
		http://rodneyd.fabcloud.io/fa2018/fa2018/assets/Make-Getting_Started_with_CNC-Edward_Ford.pdf
		https://www.matterhackers.com/articles/tech-breakdown-carbide-3ds-nomad-883-pro
		https://docs.carbide3d.com/tutorials/
		https://www.picokit.com.au/Store/index.php
		https://docs.carbide3d.com/assembly/carbidecreate/video-tutorials/
		https://carbide3d.com/carbidecreate/
		https://carbide3d.com/blog/2018/cutrocket-a-cnc-project-sharing-site/
		https://www.youtube.com/user/carbide3d
		http://docs.carbide3d.com/assembly/carbidecreate/video-tutorials/
AUTODESK FUSION 360		https://makezine.com/2018/01/10/fusion-360-cam-tutorial/
		https://makezine.com/2016/07/15/how-to-use-autodesk-fusion-360-for-cnc-milling/
		https://www.instructables.com/id/Fusion-360-CAM-Tutorial-for-CNC-Beginners/
projects		https://www.instructables.com/id/Lotus-Meditation-Cube/
		https://www.instructables.com/id/3D-Milling-CAM-Setup-Fusion-360/
		https://www.inventables.com/projects

		1/ 16" 2FL Fish Tail (also called 1/16" spiral upcut fish-tail end mill) 1/8th upcut 1/16" Downcut Fish Tail Carving Bit
	Edge Lit LED Plexiglass Light	https://www.instructables.com/id/PI-Edge-Lit-LED-Plexiglass-Light/ https://community.carbide3d.com/t/my-first-edge-lit-led-sign/6064 https://www.v1engineering.com/forum/topic/my-first-useful-thing-made-with-my-mpcnc/ https://learn.adafruit.com/led-acrylic-sign/overview https://rlogiacco.wordpress.com/2018/06/13/milling-edge-lit-signs/ https://all3dp.com/2/laser-engraved-acrylic-sign/ https://www.instructables.com/id/Edge-Lit-Displays/ https://www.instructables.com/id/Edge-Lit-Acrylic-Sign/ https://www.instructables.com/id/DIY-Acrylic-RGB-LED-Sign/ https://learn.adafruit.com/led-acrylic-sign
	We make the source design files for all of the products available to anyone that wants to make them or want to improve on the design. From <https://obrary.com/collections/open-designs>	https://obrary.com/collections/open-designs

Basic tile

1. Create account at http://easel.inventables.com
2. Download driver: http://easel.inventables.com/downloads
3. View https://www.inventables.com/projects/learn-our-easel-software-in-4-minutes
4. Follow Easel Live: Mosaic Tile Maker Challenge or https://www.inventables.com/projects/mosaic-tiles

Option A

Just using Easel

Option B

Using image

>import>trace

Etch Acrylic

Wednesday, 24 April 2019   10:58 AM

Tracing Images for Inkscape and then Easel

From <https://www.youtube.com/watch?v=Mw3upQHCiTk>

- convert jpg or png to svg

Tracing Images for Inkscape and then Easel

From <https://www.youtube.com/watch?v=Mw3upQHCiTk>

Fill and stroke panel is in object>fill

This will have different effects, try each

Save as

https://inkscape.org/en/doc/tutorials/tracing/tutorial-tracing.html
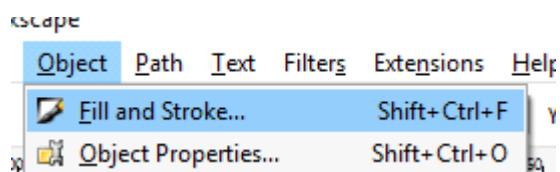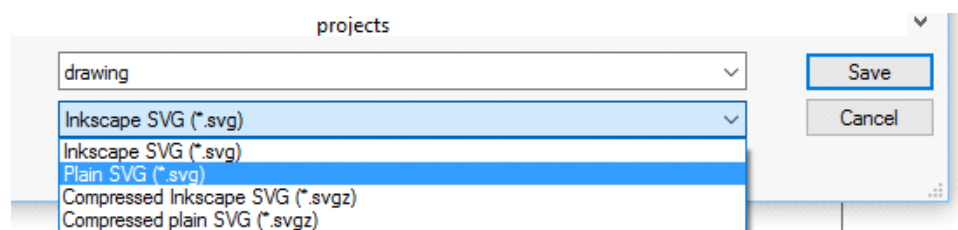
https://support.bantamtools.com/hc/en-us/articles/115001605814-Engraving-Dog-Tags-with-SVG-Files?_ga=2.141819058.1871890100.1558399177-543348048.1557877721

So far, the 20 degree etching bit is the best with the settings below. In easel, just tell it it's an upcut bit so you don't need to use pro

The upcut bit is ok, but needs 1/32 upcut

Feed rate ❓
762 mm/min

Plunge rate
304.8 mm/min

Depth per pass
0.3 mm

Cut	Shape

-0 mm

-1 mm

-2 mm

-3 mm

Depth 0.3 mm

1/32 upcut

Recommended **Custom**

Feed rate

250 mm/min

Plunge rate

150 mm/min

Depth per pass

0.1 mm

Jewellery

Tuesday, 30 April 2019   1:01 PM

Tracing Images for Inkscape and then Easel

From <https://www.youtube.com/watch?v=Mw3upQHCiTk>

- convert jpg or png to svg

Tracing Images for Inkscape and then Easel

From <https://www.youtube.com/watch?v=Mw3upQHCiTk>

Fill and stroke panel is in object>fill

This will have different effects, try each

Save as

https://inkscape.org/en/doc/tutorials/tracing/tutorial-tracing.html
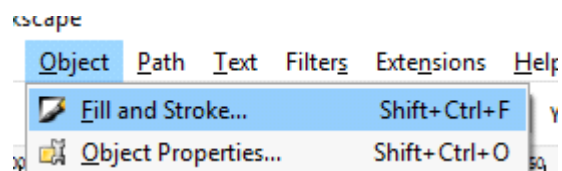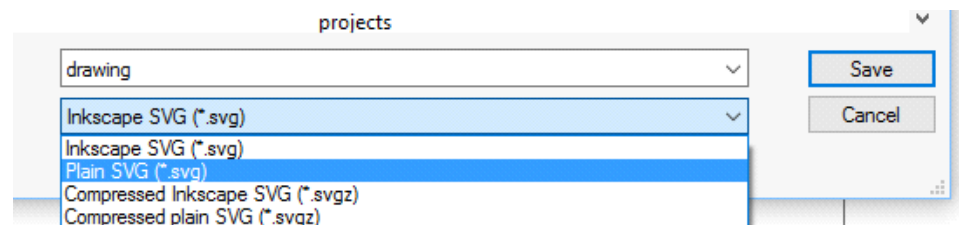
https://support.bantamtools.com/hc/en-us/articles/115001605814-Engraving-Dog-Tags-with-SVG-Files?_ga=2.141819058.1871890100.1558399177-543348048.1557877721

Step
1. Make sure image to vectorize is the correct size
2. turn into vector via inkscape or similar

Chanel	Peace_sign	

3. Import svg into http://easel.inventables.com (note use svg plain)
4.

Use

1/8 in

For Acrylic. Any smaller and the bit snaps

5. Measure the actual thickness of acrylic with calipers and input (not exactly 3mm and will carve waste board)

Cast Acrylic
100 × 100 × 3 mm

6. Adjust tabs

Depth 3 mm

Outline   Fill

☑ Use Tabs

Length 2.0 mm

Height 1.0 mm
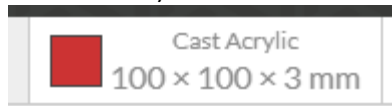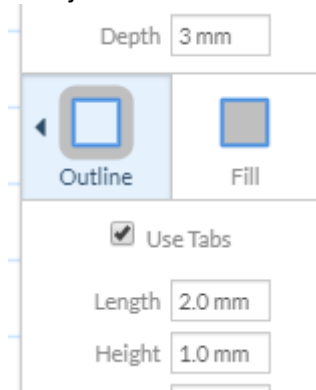
1/16

LV

Recommended   **Custom**

Feed rate
500 mm/min

Plunge rate
150 mm/min

Depth per pass
0.4 mm

☑ Use Tabs

Length | 2.0 mm
Height | 1.0 mm
Quantity | 8

1/32

Recommended | **Custom**

Feed rate
250 mm/min

Plunge rate
100 mm/min

Depth per pass
0.2 mm

Fill Method ❓

Offset | Raster | **PRO**

X axis | Y axis

Never more than half of the diameter of the bit in depth per pass.

https://www.inventables.com/projects/flower-swizzle-sticks
https://www.inventables.com/projects/diy-wooden-earrings
https://www.inventables.com/projects/fidget-spinners
https://www.inventables.com/projects/customizable-ornament-template

https://www.inventables.com/projects/cake-topper-party-pack
https://www.inventables.com/projects/wedding-cake-topper

Skill Builder #1: Tabs

When carving all the way through the material, it can be helpful to use tabs. Tabs are small bridges that hold the carved part to the stock material as the perimeter is carved out. They prevent the material from breaking loose and flying into the bit, damaging your new part. When you drag the cut depth to the full thickness of the material, the option for tabs appears on the Cut menu. Easel lets you set the number of tabs along with their height and width. I always try to use as few tabs as possible because it takes time to remove them.

Set the material dimensions for the length and width of the

material you are using. Now, grab your digital calipers and measure the thickness. Enter all of these dimensions into Easel.

Next, select your wing. In the Cut/Shape pane, select the Cut tab and drag the cut slider down so you are carving through the full thickness of your material. At the bottom of the panel, make sure tabs are selected. For this design, two tabs is probably sufficent to hold the wing in place. You can move them by dragging them. I like to put them on the flat sides opposite each other.

https://inventables.zendesk.com/hc/en-us/articles/360012848433-Calculating-Your-Cut-Settings-Basic-Feeds-and-Speeds-Information
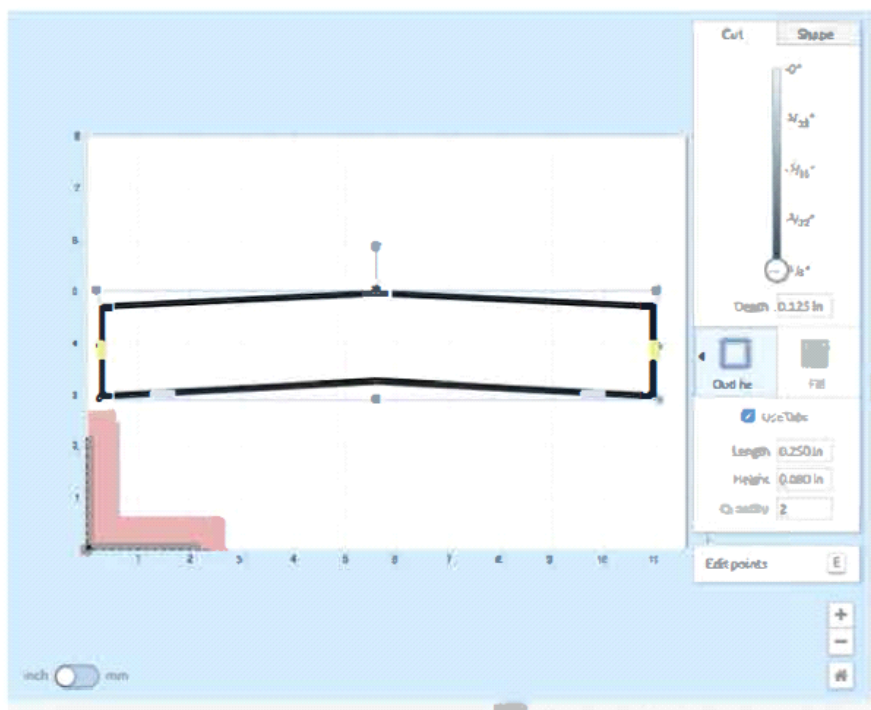
Cutting acrylic>
Try single flute uncut 1/8", .03 doc and 50 in/min spindle rpm 8 to 10k rpm

From <https://discuss.inventables.com/t/how-to-cut-clear-acrylic-board-on-carvey/65657>

Cutting acrylic
I like to use spiral upcut bits. The fishtail bits work great for me. I like the 1/16th

From <https://discuss.inventables.com/t/acrylic-cutting-tips/8241/6>

single flute spiral upcut, 100in/min 0.010" passes:

From <https://discuss.inventables.com/t/acrylic-cutting-tips/8241/8>

 I was cutting roughly 1/8" thick acrylic, using the 1/16" spiral upcut bit supplied with the kit. The settings were 75/min @ .01 depth and worked amazingly.

From <https://discuss.inventables.com/t/acrylic-cutting-tips/8241/18>

my settings:
Feedrate: 2000mm/min
Depth: 0.25mm/pass
1/8" Upcut 1 flute spiral
Dewalt 611 @ Speed 1

From <https://discuss.inventables.com/t/acrylic-cutting-tips/8241/31>

my settings:
1/16" 2-flute bit
60 ipm
0.01" doc
spindle at lowest setting

From <https://discuss.inventables.com/t/going-insane-from-issues-with-acrylic/36853/11>

Never more than half of the diameter of the bit in depth per pass.

From <https://discuss.inventables.com/t/going-insane-from-issues-with-acrylic/36853/11>

PCB Milling

https://www.inventables.com/projects/arduino-nano-ring-sequencer#instructions

https://www.inventables.com/projects/noise-o-tron-pcb#instructions

https://www.inventables.com/projects/make-led-lights-blink-to-music

https://core-electronics.com.au/tools/pcb-cnc-milling.html

https://www.instructables.com/id/Light-up-CNC-Name-Tag/

1. Milling the Bantam project

The support file is at:

https://support.bantamtools.com/hc/en-us/articles/115003204926-Bantam-Tools-PCB-Badge?_ga=2.249061632.62665710 9.1557877721-543348048.1557877721

Bantam_Tools_PCB_...	copper_top	drills	copper	

The instructions are at:
https://metatek.blogspot.com/2018/12/milling-pcbs-tinkercad-circuits-eagle.html

1. Download eagle
https://www.autodesk.com/education/free-software/eagle

Sign in on hotspot

2. open Bantam file

Bantam_Tools_PCB_...

3. Output cam files as zip

4. Material Setup: Go to the Carbide Copper 3D website. Check that the material dimensions match the copper blanks you are using

Blanks are 4" x 5" 1.6 mm thick

Material Setup

Units

⦿ MM   ○ Inches

Material size

Width (X): `102` mm

Height (Y): `127` mm

Thickness (Z): `1.6` mm

Job type

`Top Side Only ▾`

5. Copper Layer: Where it says Upload Gerber signal file click browse and find your CAM output folder and select the "copper_top.gbr" file to upload. **The v bit is 1/8"**

Copper Layer

Upload Gerber_RS247X signal file

Drag and drop your Gerber RS247X file here.

`Choose File` copper_top.gbr

Tool

`#502, Vee, 0.125 mm 40° ▾`

Isolation

Isolation Passes: `3 ▾`

Effective Diameter: 0.100 mm

Part Number...	Tip Dia (mm)...	Tip Angle
P3.0502	0.2	5
P3.1001	0.1	10
P3.1002	0.2	10
P3.1501	0.1	15
P3.1502	0.2	15
P3.2001	0.1	20
P3.2002	0.2	20
P3.2501	0.1	25
P3.3001	0.1	30
P3.3002	0.2	30

6. Drill Holes: On the next screen upload the "drills.xln" file and holes should appear on the pads in your board design.

So these are the drilling bits for the Carvey, ordered from Inventables, from left to right:

1.2mm = purple
1.1mm = maroon
1.0mm = dark green
0.80mm = blue
0.90mm = goldenrod
0.70mm = yellow
0.60mm = red
0.50mm = green
0.40mm = white
0.30mm = orange

Different components in your PCB need different sized holes drilled for them, so we will be making two different gcode files, each one for a specific bit size. To simplify the job we will make one file for the 0.9mm bit, and one for the 1.0mm bit.

From <<https://metatek.blogspot.com/2018/04/milling-pcbs-fritzing-flatcam-and-carvey.html>>

7. On the next screen check the box for Generate Outline Cut and enter the dimensions that will frame your design well. The X offset may not import to Easel for the Carvey if it is less than 25.4 mm.

The bit is the 1/8" upcut. Could use 1/16th on later run.

Board Routing

☑ Generate outline cut

Size & Position

X offset: 0.00 mm

Y offset: 0.00 mm

Width: 61 mm

Height: 72 mm

Tool:

#102, Flat, 3.175 mm 0° ▼
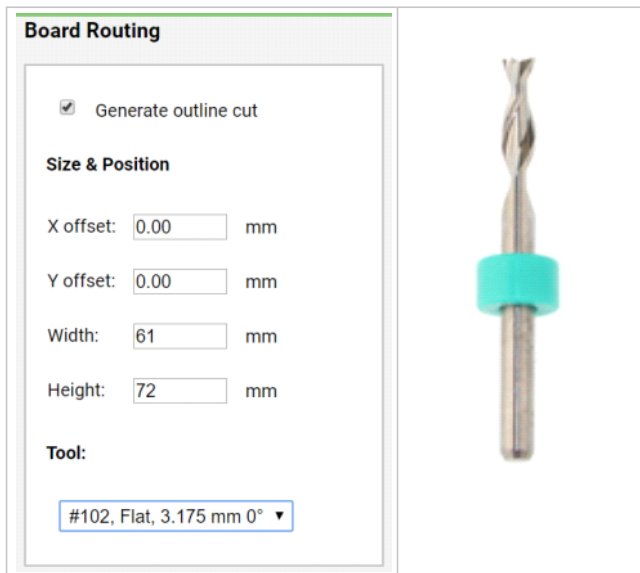
8. Rubout: used the 1/8th again so as not to break bits. Otherwise, 1/16 or smaller better

Area Rubout

☑ Generate Area Rubout

Tool:

#102, Flat, 3.175 mm 0° ▼

9.

G-code Output

G-code output

Generate and save to disk
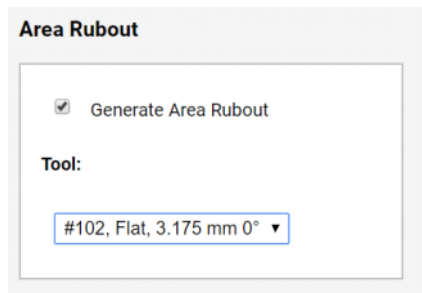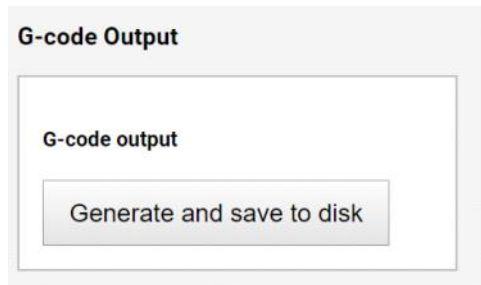
10. G-CODE CLEANUP

Since this website is designed for CNC machines made by the Carbide 3D company the g-code will need some modifications. The Carvey cannot handle g-code with tool change commands, which pause the job while you change the mill or drill bit, so the tool change commands must be removed and the file split into four files for the isolation, drill, rubout, and cutout processes.
Fortunately there is a Python program that does this.

Download python: https://www.python.org/

Download ide: https://thonny.org/

Correct python code is

ccgcode
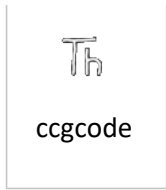
ccgcode

NOTE: Run the ccgcode.py file in the same location as the copper.nc gcode file from Carbice copper.

Next the program asks if you want to change the Z depth. Type yes and enter -0.01. You will do this twice. As it is explained on Github, the Carbide Copper Z depth, or carving depth, is too deep for the Carvey, and should be changed to -0.01. If this depth ends up being too shallow you can open the isolation and rubout files in a text editor and do a search and replace to make it go deeper. Better to cut too little rather than cutting too much.
This will leave you with 4 new files: isolation.gcode, drill.gcode, rubout.gcode, and cutout.gcode.
Time to mill and drill!

rubout   cutout   isolation   drill
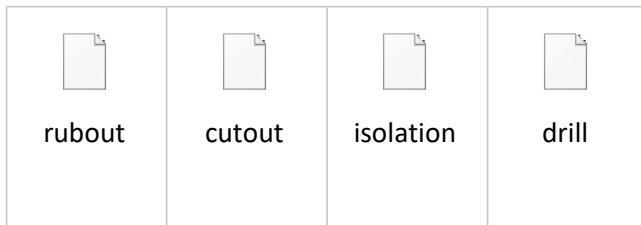
11.
USING EASEL TO MILL THE BOARD
Go to Easel.inventables.com and start a new project. Click File > Import g-code and upload the isolation.gcode file. The lower left corner of your design should be at about 1" X 1".
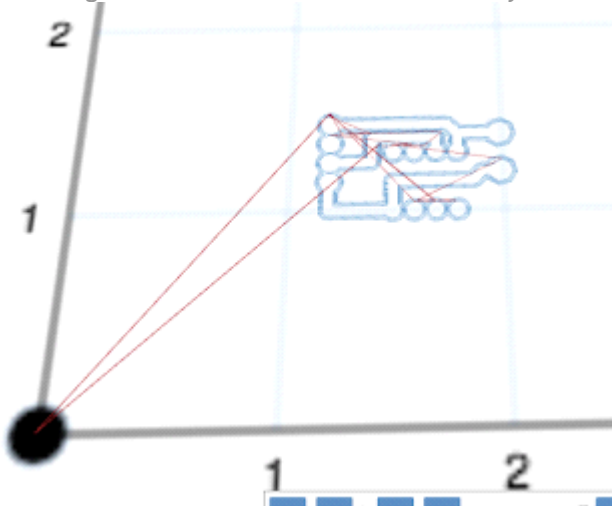
For the steps to mill the board I am indebted to this tutorial by Larry Ledden, which covers so many important details. Here are some details crucial to our process:

- Before milling we use double sided tape to tape the copper blank to a 3/4 inch piece of pine, making sure the middle does not bow up. Even a slight bow can cause the traces to be milled too thin.
- The first job is the isolation, done with this 0.2mm 30 degree engraving bit.
- Then import the drill gcode, using a 0.9 or 1.0 mm drill bit from the Inventables PCB bit set. The size of the drill depends on the components that will need to fit in the holes. Usually we can get away with all of them being drilled with 1.0 mm holes. For bigger pins such as those on an Adafruit Trinket, for example, we would need a 1.1 or 1.2 mm bit. Actually one thing this process does not detail is multiple drill files for different hole sizes.
- Finally switch to a 1/16 inch end mill like this fishtail and run the rubout gcode, and then the cutout gcode.

From <https://metatek.blogspot.com/2018/12/milling-pcbs-tinkercad-circuits-eagle.html>

2 parts:

1/32 upcut

20 degree v-cut

>which is better?

Step 1 Convert Eagle file to svg

http://flatcam.org/

https://carbide3d.com/copper/

https://metatek.blogspot.com/2018/12/milling-pcbs-tinkercad-circuits-eagle.html

Design Circuit Board

1. tinkercad circuit
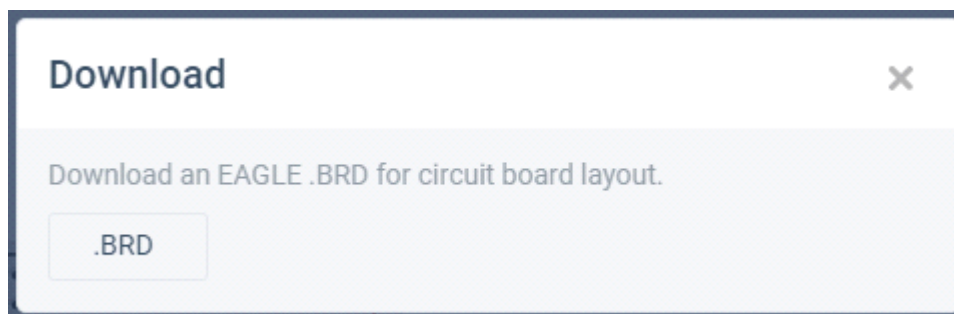
2. Eagle

layout the board in Eagle > export Gerber files > create a g-code file with Carbide Copper 3D > process g-code with a custom Python script > import g-code to Easel to mill the board.

From <https://metatek.blogspot.com/2018/12/milling-pcbs-tinkercad-circuits-eagle.html>

3D Printing

- [Lessons and tutorials by subject](#)
- [Ultimaker Core Lessons: STEAM Set](#)
- [Lesson ideas and starters](#)
- [Models by subject](#)
- [Where to find models](#)
- [Software choices](#)
- [Interesting projects and ideas](#)
- [How to use different softwares](#)
- [Lessons and tutorials by subject](#)
- [Resources by subject](#)
- [External guides (How to's)](#)
- https://ultimaker.com/en/resources/education/lessons
- https://ultimaker.com/en/resources/52765-the-met-set
- https://makezine.com/projects/make-42/stick-it-from-the-start/

2D printing on a 3D printer - Free and easy guide

From <https://www.youtube.com/watch?v=CuWZWAfBsm8&feature=youtu.be>

https://youtu.be/QdvSzXByi_g

https://edukits.co/printlab-3d-printing-classroom-resources/

http://www.ab3dlabs.com/

https://slic3r.org/download/

http://jthatch.com/Terrain2STL/

Flashforge Licence

Wednesday, 27 February 2019   10:10 AM

Overview

In order to use the Flashforge Adventurer III, you need to be licenced. To obtain your licence, you need to be trained and observed operating the equipment *safely* and responsibly, using the correct processes and procedures.

Conditions

You must design and generate a unique 3D name plate object. Only when you have successfully done this can you then be trained in the operation of the 3D Printer.

Options to make your name plate

Beginner: generate a 3D object from a 2D image

This is the easiest option to create your nameplate, but you won't learn very much about 3D Design skills. This consists of creating 'cool' text of your name and opening the 2D image in flashprint (the software that drives the printer).
Generate your text from one of the options:

- https://cooltext.com/
- https://coolsymbol.com/cool-fancy-text-generator.html
- https://maketext.io/
- https://www.designevo.com/logo-maker/
- http://smiley.cool/en/weirdmaker.php
- https://flamingtext.com/logo/Design-Cool
- http://www.picturetopeople.org/text_generator/others/3d/3d_text.html

- https://www.textfx.co/

Then follow these instructions:

Beginner: Tinkercad

This is a better option because you will start learning how to use a basic 3D CAD environment. Some tutorials that may help are:

- https://www.tinkercad.com/quests/eXdWHxWL64N-lesson-name-tag
- https://www.3dxstream-university.com/courses/tinkercad-make-a-name-plate/lessons/3d-modeling-make-a-name-plate/
- https://all3dp.com/how-to-3d-print-a-name-tag-using-tinkercad/
- https://www.youtube.com/watch?v=fDzb1wVsAHU
- https://www.youtube.com/watch?v=KMxtZta5Qkw

When finished, make sure that you export an STL file.

Advanced: Autodesk fusion 360

If you really want to get ahead of the game then try this. These are some easy ways to get started:

- https://www.instructables.com/id/Design-Model-and-3D-Print-an-Optical-Illusion-Name/
- https://www.princeton.edu/ssp/joseph-henry-project/mojo-printer/fusion-360-nameplate-tuto/
- https://www.youtube.com/watch?v=WgVKekntw84
- https://knowledge.autodesk.com/support/fusion-360/getting-started/caas/screencast/Main/Details/9613bd06-f677-4da9-884a-606ab03bb20a.html

Other options

- https://www.thingiverse.com/thing:714444
- https://www.thingiverse.com/tag:nameplate
- https://www.3dprintyourname.com/

Using the Flashforge Adventurer III

You will be trained face-to-face. The user manual below is for reference

flashprint

You will be trained face-to-face. The user manual below is for reference

Download software here: http://www.flashforge.com/support-center/flashprint-support/

UP Mini 2 Licence

Wednesday, 27 February 2019   10:10 AM

Overview

In order to use the 3D Printer, you need to be licenced. To obtain your licence, you need to be trained and observed operating the equipment *safely* and responsibly, using the correct processes and procedures.

Conditions

You must design and generate a unique 3D name plate object. Only when you have successfully done this can you then be trained in the operation of the 3D Printer.

Options to make your name plate

Beginner: Tinkercad

This is a better option because you will start learning how to use a basic 3D CAD environment. Some tutorials that may help are:

- https://www.tinkercad.com/quests/eXdWHxWL64N-lesson-name-tag
- https://www.3dxstream-university.com/courses/tinkercad-make-a-name-plate/lessons/3d-

modeling-make-a-name-plate/
- https://all3dp.com/how-to-3d-print-a-name-tag-using-tinkercad/
- https://www.youtube.com/watch?v=fDzb1wVsAHU
- https://www.youtube.com/watch?v=KMxtZta5Qkw

When finished, make sure that you export an STL file.

Advanced: Autodesk fusion 360

If you really want to get ahead of the game then try this. These are some easy ways to get started:

- https://www.instructables.com/id/Design-Model-and-3D-Print-an-Optical-Illusion-Name/
- https://www.princeton.edu/ssp/joseph-henry-project/mojo-printer/fusion-360-nameplate-tuto/
- https://www.youtube.com/watch?v=WgVKekntw84
- https://knowledge.autodesk.com/support/fusion-360/getting-started/caas/screencast/Main/Details/9613bd06-f677-4da9-884a-606ab03bb20a.html

Other options

- https://www.thingiverse.com/thing:714444
- https://www.thingiverse.com/tag:nameplate
- https://www.3dprintyourname.com/

Using the Up Mini 2

You will be trained face-to-face. The user manual below is for reference

UP Studio

You will be trained face-to-face. The user manual below is for reference
Download software here: https://www.tiertime.com/downloads/software/

Cocoon Create Licence

Wednesday, 27 February 2019   10:10 AM

Overview

In order to use the 3D Printer, you need to be licenced. To obtain your licence, you need to be trained and observed operating the equipment *safely* and responsibly, using the correct processes and procedures.

Conditions

You must design and generate a unique 3D name plate object. Only when you have successfully done this can you then be trained in the operation of the 3D Printer.

Options to make your name plate

Beginner: Tinkercad

This is a better option because you will start learning how to use a basic 3D CAD environment. Some tutorials that may help are:

- https://www.tinkercad.com/quests/eXdWHxWL64N-lesson-name-tag
- https://www.3dxstream-university.com/courses/tinkercad-make-a-name-plate/lessons/3d-

modeling-make-a-name-plate/
- https://all3dp.com/how-to-3d-print-a-name-tag-using-tinkercad/
- https://www.youtube.com/watch?v=fDzb1wVsAHU
- https://www.youtube.com/watch?v=KMxtZta5Qkw

When finished, make sure that you export an STL file.

Advanced: Autodesk fusion 360

If you really want to get ahead of the game then try this. These are some easy ways to get started:

- https://www.instructables.com/id/Design-Model-and-3D-Print-an-Optical-Illusion-Name/
- https://www.princeton.edu/ssp/joseph-henry-project/mojo-printer/fusion-360-nameplate-tuto/
- https://www.youtube.com/watch?v=WgVKekntw84
- https://knowledge.autodesk.com/support/fusion-360/getting-started/caas/screencast/Main/Details/9613bd06-f677-4da9-884a-606ab03bb20a.html

Other options

- https://www.thingiverse.com/thing:714444
- https://www.thingiverse.com/tag:nameplate
- https://www.3dprintyourname.com/

Using the Cocoon Create

You will be trained face-to-face. The user manual below is for reference

Cura

You will be trained face-to-face. The user manual above is for reference

Cura Setup
Install the Cura software on the included SD card or download the latest version of Cura from the link below: https://ultimaker.com/en/products/cura-software/list

You can learn how to install and use Cura from below link:
https://ultimaker.com/en/resources/16579-installation

After installing Cura, please add your Cocoon Create 3D Printer Touch to Cura:
1. On first launch, Cura will ask you to add a 3D Printer Touch. Alternatively, you can add a 3D Printer Touch by selecting Machine > Machine Settings > Add New Machine
2. Select Other
3. Select Custom…
4. Enter Machine name as 'Cocoon Create Touch', or your desired name
5. Input Machine width and depth as 200
6. Input Machine height as 180
7. Change Nozzle size to 0.4mm
8. Ensure Heated Print Bed is ticked
9. Select 'Finish'

Download the Latest Cura Profile
For optimal print settings, download the most up to date Cocoon Create 3D Printer Touch Cura Profile from the link below and import it into Cura. Note this is optimized for use with PLA.

Balco Licence

Wednesday, 27 February 2019   10:10 AM

Overview

In order to use the 3D Printer, you need to be licenced. To obtain your licence, you need to be trained and observed operating the equipment *safely* and responsibly, using the correct processes and procedures.

Conditions

You must design and generate a unique 3D name plate object. Only when you have successfully done this can you then be trained in the operation of the 3D Printer.

Options to make your name plate

Beginner: Tinkercad

This is a better option because you will start learning how to use a basic 3D CAD environment. Some tutorials that may help are:

- https://www.tinkercad.com/quests/eXdWHxWL64N-lesson-name-tag
- https://www.3dxstream-university.com/courses/tinkercad-make-a-name-plate/lessons/3d-modeling-make-a-name-plate/
- https://all3dp.com/how-to-3d-print-a-name-tag-using-tinkercad/
- https://www.youtube.com/watch?v=fDzb1wVsAHU
- https://www.youtube.com/watch?v=KMxtZta5Qkw

When finished, make sure that you export an STL file.

Advanced: Autodesk fusion 360

If you really want to get ahead of the game then try this. These are some easy ways to get started:

- https://www.instructables.com/id/Design-Model-and-3D-Print-an-Optical-Illusion-Name/
- https://www.princeton.edu/ssp/joseph-henry-project/mojo-printer/fusion-360-nameplate-tuto/
- https://www.youtube.com/watch?v=WgVKekntw84
- https://knowledge.autodesk.com/support/fusion-360/getting-started/caas/screencast/Main/Details/9613bd06-f677-4da9-884a-606ab03bb20a.html

Other options

- https://www.thingiverse.com/thing:714444
- https://www.thingiverse.com/tag:nameplate
- https://www.3dprintyourname.com/

Using the Balco

You will be trained face-to-face. The user manual below is for reference

https://support.balcolifestyle.com.au/hc/en-us

FAQs

- ★ Printing via USB Port

  From <https://support.balcolifestyle.com.au/hc/en-us/categories/201441583-3D-Printer>

  Print Materials

- ★ Specialty Filament Settings
- Getting Started Guide
- Instruction Manual

  From <https://support.balcolifestyle.com.au/hc/en-us/categories/201441583-3D-Printer>

Demonstration Videos

Unboxing and Setting Up: https://youtu.be/chFmgF8pbgM
Inserting and Removing Filament: https://youtu.be/rratQ01xIK4
More videos are available on our YouTube Channel

From <http://www.balcolifestyle.com.au/>

Cura

You will be trained face-to-face. The user manual above is for reference

Cura Setup
Install the Cura software on the included SD card or download the latest version of Cura from the link below: https://ultimaker.com/en/products/cura-software/list

Cura profile for printing in PLA on the Balco 3D Printer, available here (Right Click and select 'Save Target As' or 'Download Linked File')

From <http://www.balcolifestyle.com.au/download/>

Laser Cutting

Monday, 29 April 2019   8:16 AM

https://www.instructables.com/class/Laser-Cutting-Class/

https://www.cdsoft.com.au/p/9377999/makeblock-laserbox-pro.html

Hi Rohan,

So sorry for the delay. I can sell our ex demo 40W Quicksilver for just $7700 if you like with a full warranty.
Let me know if you're still interested and I can do up a formal quote for you.

Regards,

Philip Tallents
Manager
PicoKit
ABN: 88 995 830 437
Ph: 0402 239 363
Ph: (07) 5330 3095
Fax: (07) 3465 0154

Model	Price	Filter	Laser type	Work Area	Adv	software	Dis
Emblaser 2 - Laser Cutter & Engraver Complete Kit https://darklylabs.com/emblaser2/	$4,599.00 ex GST From <https://www.cdsoft.com.au/p/9237021/emblaser-2---laser-cutter-engraver-complete-kit.html> https://store.3dprintingsystems.com/emblaser-2-laser-cutter-engraver?search=emblaser	yes	Solid-State Diode Equivalent to 15-20watt CO2 laser Class I	Working on larger materials is now possible with a 500mm x 300mm (19.66" x 11.81") work area. The maximum material height has also been increased to 50mm (1.97")		Lightburn $80	
Glowforge	US$3500	yes	40W class 1	19.5" by 11" From <https://glowforge.com/>		Cloud https://glowforge.com/manual Inkscape AI	
Dremel https://digilab.dremel.com/products/lc40-laser-cutter	US$$5,999						
https://fslaser.com/Products/Lasers	US$5500						
Thunderlaser							

Others

https://www.laserscript.net/product/ls3020-laser-engraving-cutting-machine/
https://www.rayjetlaser.com/en-US-AU/laser-engraver/Pages/rayjet-laser-product-specs.aspx

Our Laser Cutter

Shenzhen *RuiDa* Technology Co.,Ltd (Ruida DSP)

LightBurn Software (DSP Version) will work with this controller.

The Ruida series controllers are popular in many 50 watt and up Chinese laser engravers. They offer PWM laserpower control and are quite advanced. These can be retrofitted into most lasers, even the K40, but require a higher level of technical aptitude to install as the connections will have to be configured manua lly and the control head will have to be flush mounted into the chassis.

The Ruida DSP ships with RDWorks which is also based off of CorelDRAW. LightBurn Software is the only other software known to work with the Ruida and it offers vast improvements over the shipped software. The cost of this controller is in the $300-$500 range. Some popular model numbers are RDC6442G, RDC6442GS, RDC6332G, RDLC-320A, and the R5-DSP (Rebranded for Lightobject).

From <https://lasergods.com/controller-dsp-identification/>
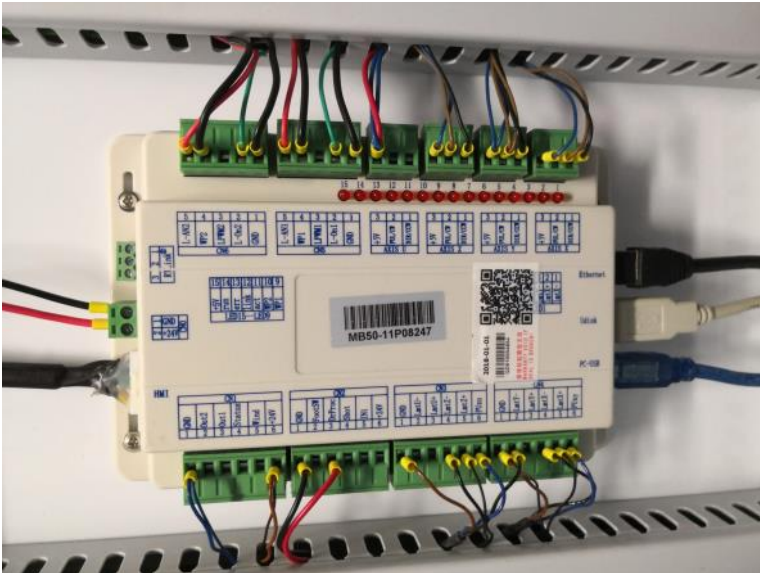
Stingray power levels
https://www.picokit.com.au/Store/index.php?route=product/product&path=39&product_id=232

V:\Secondary School\Faculties\Digital Technologies\Video\Digital Technologies\Laser Cutting
G:\Curriculum\TeacherCommon\Secondary School\Faculties\Digital Technologies\Admin\Digital Technologies\DT Resources\lasercutter\PicoKit
http://www.yueminglaser.com/

		Speed in m/min at 80% Power for Quality Cutting
	Thickness	130W
Acrylic	3mm	0.8
	5mm	0.6
	8mm	0.25
	12mm	0.15
	15mm	0.08
	18mm	0.07
	20mm	0.05
	25mm	0.04
	30mm	0.03
Plywood	3mm	3
	6mm	2
	9mm	1.2

https://www.youtube.com/watch?v=xZKE6VcfaaQ

https://www.youtube.com/watch?v=UyMrbO1SRqM

https://www.youtube.com/watch?v=-I4RpE4-ygo

https://www.youtube.com/watch?v=b_iv6RXsLFc

https://www.youtube.com/watch?v=9eUClp5Ird4

https://www.youtube.com/watch?v=9izqk_1bkVc

https://www.youtube.com/watch?v=z32dqJNnfII

https://www.youtube.com/watch?v=JZY9Cf9ny7Y

https://www.picokit.com.au/Store/index.php?route=product/product&product_id=240

Smartcarve Tutorials

https://wiki.imal.org/howto/inkscape-and-lasercutter

Full Spectrum LASER	Lots of resources	https://laser101.fslaser.com/
Darkly Labs.	Tutorials	https://darklylabs.zendesk.com/hc/en-us
Glowforge	Gallery of ideas	https://glowforge.com/ https://glowforge.com/customer-gallery
DREMEL	Project ideas	https://www.dremel.com/en_US/explore-projects/-/projects-by/category/1356679/laser-engraving
SMART DIYs making your idea a reality.	DIY	https://www.smartdiys.cc/products/fabool-laser-mini
THUNDER LASER	Merrimac has one There are 3 options for software to run our Thunder Laser machines, RD-works, Light Burn and Laser Maker (which is Thunder Laser's own software.) RD-works and Laser Maker are free to download off the website at anytime and are very user friendly to use. There are a lot of tutorials on the website of how to use the software and the Thunder laser machines. http://www.thunderlaser.com/video All the software programs are compatible with Illustrator and Inkscape but RD-works and Laser Maker only have a plugin for Coreldraw. From Illustrator or Inkscape you can just import your file such as a ai, eps or DXF files into the software. From there you select which layer you would like to engrave or cut, and give it a power and speed. Light Burn is a reasonably new software made and developed in America and is quickly becoming very popular. Here is a link if your interested in checking it out. https://lightburnsoftware.com/ RD-works and Light Burn don't need any dongle to run the program, Laser Maker does	http://www.thunderlaser.com/video http://www.thunderlaser.com/video/lasermaker-software-tutorial.html

	require one. **Glenn Traves** *Thunder Laser Australia* thunderlaser.com.au 3 Pipi Place, Mountain Creek Qld 4557 0407 963 306	
LIGHTBURN BETTER SOFTWARE FOR LASER CUTTERS	Best Software Does cost works with ours	https://lightburnsoftware.com/ https://lightburnsoftware.com/pages/tutorials
AEON LASER	Free software	https://aeonlaser.com.au/rd-works-8-0-download/
⚠K40 *Whisperer*⚠	Control software for the stock K40 Laser controller	https://www.scorchworks.com/K40whisperer/k40whisperer.html
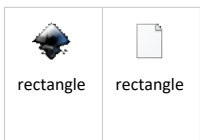
https://makezine.com/2019/04/15/40-laser-cutter-projects-to-take-you-from-beginner-to-advanced/

rectangle   rectangle

Stingray power levels
https://www.picokit.com.au/Store/index.php?route=product/product&path=39&product_id=232

V:\Secondary School\Faculties\Digital Technologies\Video\Digital Technolog

ies\Laser Cutting
G:\Curriculum\TeacherCommon\Secondary School\Faculties\Digital Technologies\Admin\Digital Technologies\DT
Resources\lasercutter\PicoKit
http://www.yueminglaser.com/

1. Convert svg to dxf in inkscape or AI
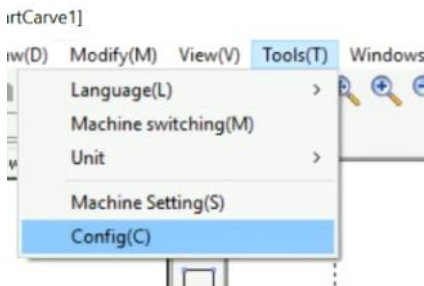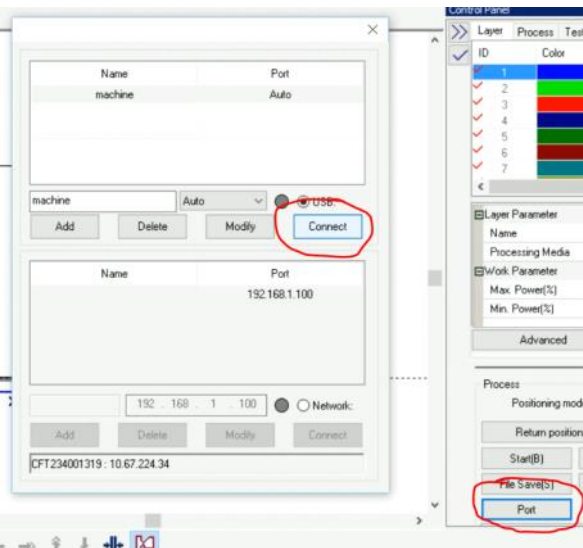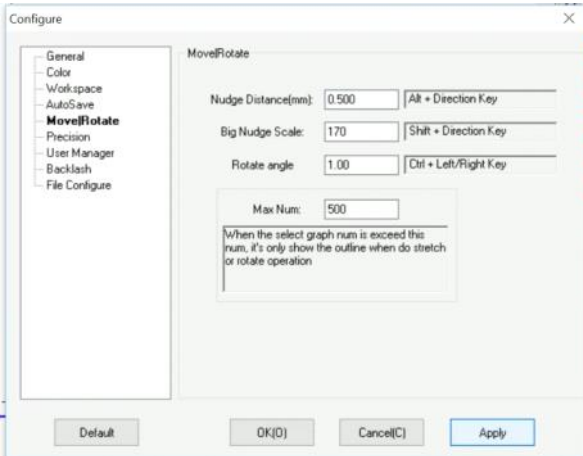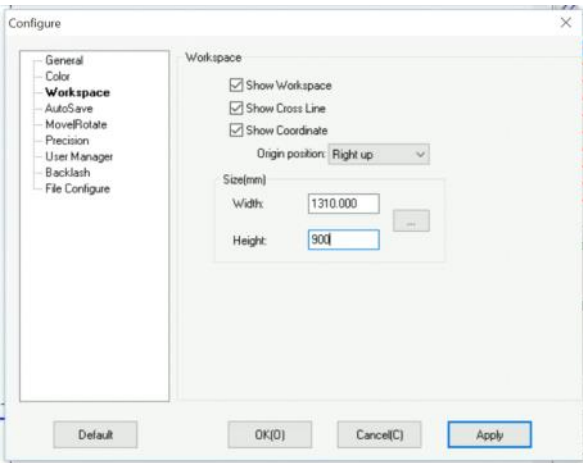
Open vector

Check size
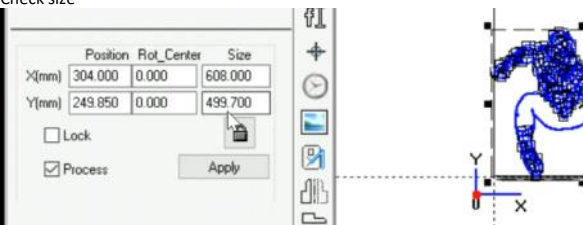
Right click

https://www.youtube.com/watch?v=xZKE6VcfaaQ

https://www.youtube.com/watch?v=UyMrbO1SRqM

https://www.youtube.com/watch?v=-I4RpE4-ygo

https://www.youtube.com/watch?v=b_iv6RXsLFc

https://www.youtube.com/watch?v=9eUClp5Ird4

https://www.youtube.com/watch?v=9izqk_1bkVc

https://www.youtube.com/watch?v=z32dqJNnfII

https://www.youtube.com/watch?v=JZY9Cf9ny7Y

https://www.picokit.com.au/Store/index.php?route=product/product&product_id=240

Smartcarve Tutorials

https://wiki.imal.org/howto/inkscape-and-lasercutter

3D Game Design

Monday, 10 December 2018   8:33 AM

	Design and create your own 3D game	https://glitch.com/edit/#!/cs1?path=README.md:1:0
	Open source game engine	https://godotengine.org/
	AgentCubes lets you build your own 3D games. Is a fee involved	https://agentcubesonline.com/
	3D Game engine. Only for the serious	https://www.unrealengine.com/en-US/what-is-unreal-engine-4
	3D Game engine. Only for the serious	https://unity3d.com/
	Free 3D drag and drop programming in java	http://www.alice.org/
		http://www.gamemaker3d.com/
	Open source 3D animation	http://www.moviesandbox.net/

Inkscape

Tuesday, 12 February 2019   2:09 PM

INKSCAPE *Draw Freely.*	Inkscape is a professional vector graphics editor for Windows, Mac OS X and Linux. It's free and open source.	https://inkscape.org/ https://inkscape.org/learn/ • FLOSS Inkscape Manual, from the makers of free manuals for free software • The unofficial manual, "Inkscape: Guide to a Vector Drawing Program" • Inkscape Documentation, at Inkscape.org, with links to official and unofficial tutorials and manuals • A quick guide to Inkscape, from microugly, featuring hints for Illustrator users. • Inkscape Extension Gallery Featuring additional helpful Inkscape plugins http://woodworkingteachers.com/default.aspx?g=posts&m=9747#9747 https://www.electromaker.io/tutorial/blog/using-inkscape-to-design-and-create-projects-ready-for-the-k40-part-2-62 https://www.electromaker.io/blog/article/what-is-the-k40-laser-cutter-and-how-can-i-set-one-up-part-1-57
Ai		https://www.pgsd.org/cms/lib07/PA01916597/Centricity/Domain/202/illustrator_for_beginners_tastytuts.pdf https://helpx.adobe.com/illustrator/tutorials.html https://www.creativeblog.com/digital-art/illustrator-tutorials-1232697 https://www.youtube.com/watch?v=IBouhf4seWQ For Laser cutting https://www.youtube.com/watch?v=FFK3VI7i6Eg https://www.instructables.com/id/How-to-create-a-laser-cut-file-in-Illustrator/ https://www.sculpteo.com/en/tutorial/prepare-your-model-laser-cutting-illustrator/ https://ponoko.zendesk.com/hc/en-us/articles/220289968-Creating-complex-laser-cut-shapes-easily-in-Illustrator- https://www.ponoko.com/starter-kits/adobe-illustrator https://onlinelasercutting.com.au/file-setup/ https://sendcutsend.com/blogs/blog/designing-for-laser-cutting-in-illustrator https://nyclasercut.com/drawing-setup/laser-cutting-wit-illustrator/ https://design.tutsplus.com/tutorials/how-to-create-a-laser-cut-self-mailer-using-adobe-illustrator-and-indesign--cms-24615 http://skillful.web.unc.edu/files/2018/02/laser-cutting-draft-final.pdf https://art.illinois.edu/index.php/tutorial-laser-cutter-guide https://www.gettingsmart.com/2016/10/introduction-design-laser-cutter/amp/?__twitter_impression=true
	For laser cutting	https://edutechwiki.unige.ch/en/Using_Inkscape_for_laser_cutting https://www.electromaker.io/tutorial/blog/using-inkscape-to-design-and-create-projects-ready-for-the-k40-part-2-62 https://wiki.nottinghack.org.uk/wiki/Laser_cutter/Inkscape https://core-electronics.com.au/tutorials/getting-started-with-laser-cutting-tutorial.html https://www.ponoko.com/starter-kits/inkscape
	Eleksdraw	http://eleksdraw.eleksmaker.com/ http://eleksmaker.com/nav/eleksdraw/ http://eleksegg.eleksmaker.com/ http://wiki.eleksmaker.com/doku.php?id=eleksdraw http://wiki.eleksmaker.com/doku.php?id=inkscape https://msurguy.github.io/SquiggleCam/ https://www.evilmadscientist.com/2012/stipplegen2/ https://www.lawcomall.com/index.php?main_page=product_info&products_id=378382
	A Python library to create SVG drawings. From <https://pypi.org/project/svgwrite/>	https://pypi.org/project/svgwrite/ https://gumroad.com/l/BgYM
## L-SYSTEMS AND PENROSE P3 IN INKSCAPE From <https://thebrickinthesky.wordpress.com/2013/03/17/l-systems-and-penrose-p3-in-inkscape/>		https://thebrickinthesky.wordpress.com/2013/03/17/l-systems-and-penrose-p3-in-inkscape/

	Create tesselations	http://www.shodor.org/interactivate/activities/Tessellate/
	Turn sketches into vector logos: Digitizing drawings with Photoshop and Illustrator From <https://www.youtube.com/watch?v=oiOlU0mkLss&feature=youtu.be> **2D printing on a 3D printer - Free and easy guide** From <https://www.youtube.com/watch?v=CuWZWAfBsm8&feature=youtu.be> https://tablelandscomputers.com/inkscape-training-course-material-using-inkscape-vinyl-cutting/ https://www.fablabfactory.com/en/service/inkscape/	https://www.youtube.com/watch?v=oiOlU0mkLss&feature=youtu.be
Vinyl cutter	https://www.fablabfactory.com/en/service/inkscape/ https://tablelandscomputers.com/inkscape-training-course-material-using-inkscape-vinyl-cutting/ https://www.spotlightstores.com/cricut?gclid=EAIaIQobChMIuNnx5Iz54AIVQ4aPCh2fCwHaEAAYASAAEgL_p_D_BwE	
	licer for Autodesk® Fusion 360™ is a tool to turn your digital 3D models into appealing artefacts. It slices and converts 3D models into 2D patterns that you can cut out of any flat material. Slicer for Fusion 360 also creates 3D instructions you can interact with, to help build a model. From <https://apps.autodesk.com/FUSION/en/Detail/Index?id=8699194120463301363&appLang=en&os=Mac>	https://apps.autodesk.com/FUSION/en/Detail/Index?id=8699194120463301363&appLang=en&os=Mac
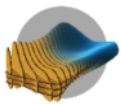
eggbot

Tuesday, 26 February 2019   5:39 PM

	eggbot	https://wiki.evilmadscientist.com/The_Original_Egg-Bot_Kit https://wiki.evilmadscientist.com/Making_your_first_plot https://wiki.evilmadscientist.com/Installing_software https://code.google.com/archive/p/eggbotcode/downloads https://www.instructables.com/id/Egg-bot-Creations-and-Tips/ https://msurguy.github.io/SquiggleCam/ https://www.evilmadscientist.com/2012/stipplegen2/ https://www.thingiverse.com/oskay/collections/eggbot-graphics

Getting Started

1. Install inskape 0.91 : https://inkscape.org/release/0.91/
2. follow these instructions to install eggbot extension:
https://wiki.evilmadscientist.com/Installing_software. Don't worry about installing the usb driver

3. Create svg design in inkscape, with size 800 pixels tall by 3200 pixels wide

4. follow these instructions: https://wiki.evilmadscientist.com/Making_your_first_plot

Blowing Eggs:

https://wiki.evilmadscientist.com/Blowing_Eggs

StippleGen

1. Download software: https://github.com/evil-mad/stipplegen/releases/tag/v2.31

2.

PCB Design and wearables

Plan

Must make wearable with sensor input

Use adafruit boards (gemma, circuit playground, lillypad) or ATtiny85

Convert prototype breadboard into pcb that fits enclosure

PCB Design

https://core-electronics.com.au/tutorials/make-arduino-shield-with-fritzing.html

https://core-electronics.com.au/tutorials/drawing-schematics-with-eagle.html

https://core-electronics.com.au/tutorials/fritzing-for-schematic-and-pcb-design.html

https://learn.adafruit.com/making-pcbs-with-oshpark-and-eagle

https://learn.adafruit.com/make-a-simple-debugging-featherwing-for-the-m0/overview

https://learn.adafruit.com/ktowns-ultimate-creating-parts-in-eagle-tutorial

https://learn.adafruit.com/make-beautiful-fritzing-parts-with-eagle2fritzing-brd2svg

https://learn.sparkfun.com/tutorials/make-your-own-fritzing-parts

https://en.m.wikipedia.org/wiki/Printed_circuit_board_milling

http://www.autoleveller.co.uk/ - level pcb milling

https://www.instructables.com/id/Make-your-own-PCBs-on-an-inexpensive-desktop-CNC-m/

https://www.build-electronic-circuits.com/pcb-design/

https://www.sparkfun.com/eagle

https://easyeda.com/

PCB Badge
https://www.instructables.com/id/How-to-Draw-a-Pattern-on-a-PCB-Board-and-Manufactu/
https://www.hackster.io/ywpg/build-the-hackster-logo-badge-54aa03
https://hackerworld.co/building-a-def-con-badge-in-two-weeks
http://www.tomarcher.co.uk/
https://medium.com/@urish/a-practical-guide-to-designing-pcb-art-b5aa22926a5c
https://www.sparkfun.com/news/1176
http://www.lucadentella.it/en/2015/01/31/pcb-non-rettangolari-grazie-a-inkscape-e-eagle/
https://www.digikey.com/en/videos/d/digi-key-electronics/methods-for-loading-logos-into-eagle---another-teaching-moment
https://blog.adafruit.com/2018/11/19/bringing-vector-artwork-into-autodesk-eagle-for-pcbs-adskeagle-badgelife-talldarknweirdo/
https://youtu.be/H0qHi9qTgVA
https://www.hackster.io/tbatey_tiny-circuits/tinynametag-50ade7

https://www.hackster.io/IObrizio/autobots-pin-badge-bb99d8

https://www.hackster.io/twinkletwinkie/lucky-oshcat-sao-930a65

Eagle
https://www.autodesk.com/products/eagle/learning-center
https://www.autodesk.com/products/eagle/blog/schematic-basics-part-1/
https://learn.sparkfun.com/tutorials/using-eagle-schematic/all
https://learn.sparkfun.com/tutorials/tags/eagle

Kicad
https://youtu.be/gIf8sdd-JL4?list=PLEBQazB0HUyR24ckSZ5u05TZHV9khgA1O
http://kicad-pcb.org/help/tutorials/
http://store.curiousinventor.com/guides/kicad
https://www.digikey.com/en/resources/design-tools/schemeit
https://hackaday.com/2019/04/18/byte-sized-pieces-help-the-kicad-go-down/

EasyEda
https://easyeda.com/
https://www.youtube.com/watch?v=LfOOkt01kgo&feature=youtu.be

Pcb wearables

https://learn.adafruit.com/touch-tone-for-circuit-playground-express/overview

https://blog.tindie.com/search/Badge/

https://www.seton.net.au/blank-brass-aluminium-and-stainless-valve-tags-08210w.html?pid=12479&source=google_shopping&gclid=Cj0KCQiA5Y3kBRDwARIsAEwIoL4OE5eTJCDeI7qZfqoxHsLjcjhiGpBuUBUP7BdDXBT9CMQzZdO0OWkaAp0gEALw_wcB

https://core-electronics.com.au/pcb-badge-kit.html

https://www.hackster.io/eric-schneider/pcb-snowflake-ornament-07a40e

https://reprap.org/wiki/PCB_Milling

https://sienci.com/2018/08/23/pcb-milling-tutorial/

Milling pcb Shortlist

https://learn.adafruit.com/circuit-playground-combadge/overview

https://learn.adafruit.com/circuit-playground-express-con-badge

https://www.instructables.com/id/High-Tech-Edelweiss-LED-KIT-SwarovskiIIR/

https://create.arduino.cc/projecthub/fablabag/led-matrix-display-badge-280cfb?ref=tag&ref_id=wearables&offset=44

https://www.instructables.com/id/Light-up-Hummingbird-Necklace-Kit/
https://www.instructables.com/id/Hello-World-Build-your-first-Othermill-circuit/
https://www.instructables.com/id/Make-your-first-circuit-with-Eagle-on-the-Othermil/

ToolHeadRa
    ck_vs2

Arduino shield/HAT

Prototype on Breadboard with easy project (vu meter, theramin)
Use Fritzing
Suppliment with Eagle
Find resource to cnc

https://circuitsfun.com/blogs/basic-instructions?page=2

https://blog.adafruit.com/2012/11/07/how-to-use-eagle-cad-to-create-your-own-arduinos-shield/?gclid=Cj0KCQjw4fHkBRDcARIsACV58_FDFnn7Hy9kI-ne8u43qdxVBSTYG5Bgn376YB1C2VDcd57GDCLJrNgaAkoZEALw_wcB

https://aaroneiche.com/2010/06/24/a-beginners-guide-to-making-an-arduino-shield-pcb/

https://www.youtube.com/playlist?list=PLB7EA719BEB74E295

https://efabless.com/general/challenges/AWWQ6wTLSTGqaujBICSE/info

https://www.open-electronics.org/how-to-make-an-arduino-shield-with-eagle-cad-tutorial/

https://hackaday.com/2017/11/26/making-an-arduino-shield-pcb-with-fritzing/

http://fritzing.org/learning/

https://www.allaboutcircuits.com/technical-articles/fritzing-takes-your-design-from-breadboard-to-pcb/

https://www.instructables.com/id/Create-a-PCB-directly-from-a-Breadboard/

https://www.instructables.com/id/VU-Meter-Using-Arduino/

https://www.autodesk.com/products/eagle/learning-center

https://www.udemy.com/pcb-design-with-eagle/

https://www.udemy.com/learn-kicad-printed-circuit-board-design/

https://www.pinterest.com.au/dloocke/pcb-milling-methods-and-projects/?lp=true

https://www.brainy-bits.com/cnc-pcb-milling-part-1/

https://www.inventables.com/projects/circuit-board-milling-starter-kit

https://core-electronics.com.au/tools/pcb-cnc-milling.html

https://blog.bantamtools.com/pcb-milling-resource-guide

https://www.digikey.com/en/maker/projects/everything-you-need-to-know-about-milling-pcbs/9b7575e4ee6e4109aa32c3ccd4d5605b

https://learn.sparkfun.com/tutorials/pcb-basics

Fan

https://blog.bantamtools.com/introducing-the-bit-fan-a-new-othermill-accessory-you-can-make

Milling

https://www.bantamtools.com/pages/projects

Atinny

https://hackaday.com/2019/04/13/simon-game-is-a-story-of-rushed-deadlines-and-holiday-cheer/

https://learn.sparkfun.com/tutorials/tiny-avr-programmer-hookup-guide/all

http://www.electronics-lab.com/attiny85-and-ssd1306-wearable-display/

http://www.technoblogy.com/show?201J

http://www.technoblogy.com/show?1Y7J

https://blog.adafruit.com/2017/04/26/sound-activated-leds-in-embroidery-using-an-attiny85-wearablewednesday/

https://www.electromaker.io/blog/article/introduction-to-the-attiny85-19

https://blog.adafruit.com/2017/04/26/sound-activated-leds-in-embroidery-using-an-attiny85-wearablewednesday/ - embroidery

http://wiki.textile-academy.org/fabricademy2017/classes/wearables1

http://www.kobakant.at/DIY/?p=4926

http://www.kobakant.at/DIY/?p=3923
http://www.kobakant.at/DIY/?p=3742

https://blog.adafruit.com/2013/11/21/adafruit-neopixel-ring-example-assembly-source-code-for-atmel-attiny85/

https://blog.adafruit.com/2018/01/03/when-you-want-your-jewelry-to-react-to-the-environment/

https://blog.adafruit.com/2017/08/16/how-to-make-wipprechts-high-tech-edelweiss-necklace-wearablewednesday/

http://etextilelounge.com/tag/attiny/

https://medium.com/@volkerwandering/sewable-attiny-pcb-soft-circuits-149d85571dca

http://etextile-summercamp.org/2017/summerof/fri-textile-pcbs-attiny-programming/

https://create.arduino.cc/projecthub/fablabag/led-matrix-display-badge-280cfb?ref=tag&ref_id=wearables&offset=44

Lillypad
https://www.sparkfun.com/search/results?term=wearable

Gemma
https://www.adafruit.com/product/3501

Wearable ideas
https://learn.adafruit.com/search?q=wearable - ideas
https://learn.adafruit.com/chameleon-scarf
https://learn.adafruit.com/flora-gps-jacket
https://www.adafruit.com/product/1093
https://learn.adafruit.com/flora-sensors
https://learn.adafruit.com/circuit-playground-slouch-detector
http://cutecircuit.com/

https://blog.adafruit.com/2018/10/30/wearable-heart-rate-badge-uses-bitalino-ecg-sensor-flora-neopixels-wearablewednesday-wearables-electrocardiography-bitalinoworld-badgelife/

https://learn.adafruit.com/light-activated-pixel-heart?view=all

https://blog.adafruit.com/2015/04/29/tardis-earrings-wearablewednesday/

https://blog.adafruit.com/2019/02/13/alex-glows-freeform-soldered-earring-wearablewednesday-valentinesday/

https://blog.adafruit.com/2013/11/01/from-the-forums-space-invader-pendant-wearablewednesday-electronichalloween/

https://learn.adafruit.com/trinket-slash-gemma-space-invader-pendant/overview

http://www.kobakant.at/DIY/

http://www.kobakant.at/DIY/?p=4926

https://create.arduino.cc/projecthub/electropeak/diy-smart-necklace-snowing-by-shake-with-arduino-8584d8?ref=tag&ref_id=wearables&offset=3

Circuit playground express
https://learn.adafruit.com/touch-tone-for-circuit-playground-express

Coding existing hardware
https://learn.adafruit.com/timesquare-watch-kit
https://shop.pimoroni.com/products/timesquare-diy-watch-kit-red-display-matrix

3d print onto clothes

https://www.youtube.com/watch?v=CuWZWAfBsm8&feature=youtu.be

Inkscape to Easel

Monday, 13 May 2019   3:13 PM

http://studying-abroad-in-us.com/import-images-into-easel-and-learn-inlay-concepts_H_obA4lm57kw.html

https://www.youtube.com/watch?v=33qdwGtGBPc
https://www.youtube.com/watch?v=Mw3upQHCiTk
http://nebula.wsimg.com/a8ab83c25fa7cc147052934fdb6975d6?
AccessKeyId=E8773B8EC3BE7F8620C3&disposition=0&alloworigin=1
https://www.youtube.com/watch?v=lWdiGvzriP0&feature=youtu.be
https://www.youtube.com/watch?v=ij_7haFRNAs&feature=youtu.be

Textiles

Wednesday, 26 June 2019   11:56 AM

https://freesewing.org/

https://www.instructables.com/id/Anatomy-Animals/?linkId=71128177
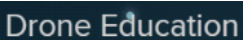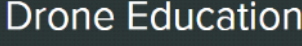
Resources

Friday, 7 December 2018   9:08 AM

Drone Education	Droneblocks for trello and dji	https://learn.droneblocks.io/p/introduction-to-tello-edu-drone-programming-with-droneblocks
ROBOLINK	The CoDrone is a tiny quadcopter drone you can easily program to do whatever you want	https://www.robolink.com/learn-codrone-pro/
Tynker CODING FOR KIDS	Tynker and Parrot have joined forces to teach kids Computer Science fundamentals through hands-on experimentation.	https://www.tynker.com/learn-to-code/code-this-drone/
	Parrot's Mambo, Airborne and Rolling Spider drones can take off, land, turn and perform aerial figures like flips, all under the control of code users create.	https://www.apple.com/au/newsroom/2017/06/swift-playgrounds-expands-coding-education-to-robots-drones-and-musical-instruments/
shemaps	STEM across the curriculum	https://shemaps.com/
JAR EDUCATION	Build your own drone	https://www.jar-aerospace.com.au/jar-education http://www.jar-education.com.au/
WORKBENCH	Use blockly to program parrot mambo	https://edu.workbencheducation.com/toolbox/programming
Drone Education		https://learn.droneblocks.io/p/advanced-tello-programming-with-droneblocks
AHS Makerspace	Year 6 Disaster Unit https://drive.google.com/file/d/1tsr_amdPOfbgs0O09snvxPHhKisc7u3K/view?usp=sharing Don't Spoil the Endgame Year 8 Activity https://drive.google.com/file/d/1q6dsVkOgvlzboe5tsC8PRz6cRsSXIUY0/view?usp=sharing Curriculum Links https://drive.google.com/file/d/1D-8j9BAiOBYNzqk3AOXvZF0Auc0iaaLb/view?usp=sharing Great Drone and Mapping Resources for Teachers https://www.worldofdroneseducation.com/ https://education.shemaps.com	https://ahsmakerspace.wordpress.com/2019/05/30/drone-lesson-ideas/amp/?__twitter_impression=true
circuit scribe CIRCUIT DRAWING KITS	Builder kit	https://shop.circuitscribe.com/products/drone-builder-kit
DCE UAS DRONE CONSULTING & EDUCATION		http://www.steamdrones.io/ https://edu.droneblocks.io/p/droneblocks-and-python-programming-with-tello
Fraser Coast Technology Challenge		https://www.frasercoasttechnologychallenge.com/rules-regulations

Aviation
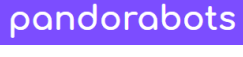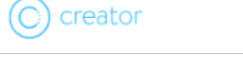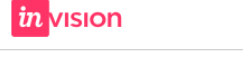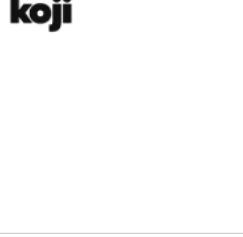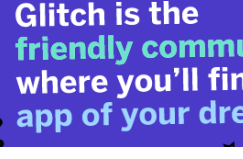
HELICOPTER 2050	This program teaches kids 9–16 STEM-based inventive thinking skills about the principles of flight and challenges them to develop new ideas for a helicopter of the future.	http://www.helicopter2050.com/
SAE INTERNATIONAL	Glider project	https://www.sae.org/learn/education/curriculum/glider

Options

appshed creative apps generation	Our next pick was appshed as it came with an easy to follow course , was easy to register and testing a live version on student phones was easy. We used the free version, which meant that there were ads everywhere; but this was not actually very noticeable. The paid version is very cost effective and is a good idea if you want to expand beyond prototyping. I notice from the comparison page that there are javascript, PHP, SQL and IoT technologies for Raspberry Pi and Arduino; must explore further.	https://appshed.com/
	App Lab is a programming environment where you can make simple apps. Design an app, code in JavaScript with either blocks or text, then share your app in seconds.	https://code.org/educate/applab CSD Unit 4 – The Design Process CSP Unit 5 – Building Apps.
blippit io	students need to be registered	https://blippit.io/
MIT APP INVENTOR	Although there are a few clones, such as AppyBuilder and Thunkablethat have become popular, I notice that App Inventor is still the goto App builder for most IoT projects. In terms of basic prototyping, App Inventor is much like App Lab and easy to create digital screen designs and code basic navigation. Just like App Lab, it is also very extensible. App Inventor is probably still the best supported technology, with a large volume of tutorials and guides available. Of course, at the end of the day, it only ports to Android.	http://appinventor.mit.edu/explore/ http://www.appinventor.org/ http://ai2.appinventor.mit.edu/ Good course: https://sites.google.com/a/sfusd.edu/app-inventor/ from https://www.csinsf.org/ http://www.mobile-csp.org https://projects.raspberrypi.org/en/CoderDojo/app-inventor-for-social-enterprise https://clogg.com/category-app https://projects.raspberrypi.org/en/projects?software%5B%5D=app-inventor http://puravidaapps.com/index.php http://iot.appinventor.mit.edu/#/getstarted/intro https://www.coursera.org/learn/app-inventor-android https://groups.google.com/forum/#!forum/mitappinventortest https://docs.google.com/document/u/1/pub?id=1Xc9yt02x3BRoq5m1PJHBr81OOv69rEBy8LVG_84j9jc#h.rq4w7wjpawqf https://github.com/mit-cml/appinventor-sources https://sourceforge.net/projects/ai2u/ https://www.rse.org.uk/schools/resources/#collapse-anintroductiontocomputingsciencestartingfromscratchupdated2016usingscratch2 https://www.youtube.com/channel/UCGJVKvMbiNP5ou2yz0FdVWw
Appy Builder	clone of App Inventor, so very similar features. One big disadvantage was the need for a google account and then it probably only ports to Android devices.	https://appybuilder.com/
thunkable	another google sign on, but can be published to Android or iOS. The downside is that this is not an entry level App builder and is not well supported with tutorials and guides. However, you could use the tutorials and guides for App Inventor and rig them for Thunkable.	https://thunkable.com/#/
Marvel	Marvel is purely a prototyping app builder. We didn't test this out and this is an afterthought. According to its splashpage: "With the Marvel design platform, access all the core functionality you need to build digital products – wireframe, prototype and generate design specs in one place." Another similar one is proto.io. An other similar one is build.me. This stands out because it also has built in guidance for User Interface (UI) and User Experience (UX) design.	https://marvelapp.com/ https://marvelapp.com/pop/
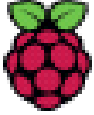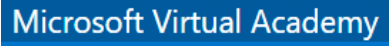
	Description	Link
Technovation	Every year, Technovation invites teams of girls from all over the world to learn and apply the skills needed to solve real-world problems through technology.	https://technovationchallenge.org/
appmakr	Build your own app in minutes, absolutely no coding experience required! Follow this easy step-by-step process to bring your idea to life.	http://www.appmakr.com/
appsbar	Appsbar is your free mobile app builder.	http://www.appsbar.com/
appypie.com	Another free mobile app builder	https://www.appypie.com/
Apps for Good	problem solve using not only apps, but Internet of Things and machine learning through our latest emerging technology courses.	https://www.appsforgood.org/
CLOQQ BETA	Design, create and customize your own app. If you love spending hours using your mobile, in CLOQQ you will be able to create your own application as you want and share it with your friends.	https://cloqq.com/category-app
mobiz SOFTWARE	Make your own mobile app with DIY mobile app builder. No coding required.	http://mobizsoftware.com/#
pandorabots	Build intelligent conversational agents	https://home.pandorabots.com/home.html
Wolfram|Alpha Widgets	A free, personalized mini-app that leverages the depth and breadth of the Wolfram|Alpha computational knowledge engine.	https://www.wolframalpha.com/widgets/tour/tour3.html
ALLCANCODE		https://www.allcancode.com/
	Applied CS Skills is a free online course by Google designed to prepare you for your CS career through hands on coding experience	https://appliedcsskills.withgoogle.com/index.html
Google Developers	Flutter, Google's free and open source SDK for building high-quality native iOS and Android apps from a single codebase.	https://codelabs.developers.google.com/flutterlive/
Developers	Android Studio provides the fastest tools for building apps on every type of Android device.	https://developer.android.com/studio/ https://android-developers.googleblog.com/2018/12/android-codelab-courses-are-here.html
	Need an apple	https://www.apple.com/swift/playgrounds/ https://www.apple.com/105/media/uk/education/codeweek2018/Incredible_CodeMachine_guide_092418_Final_en-GB.pdf
openSAP	This free open online course will help young people to get started with designing and developing apps and software. This course will help you to develop your own "Design Thinking". You'll learn how to use a free and fun **prototyping** tool called Build.	https://open.sap.com/courses/build1
creator	Creator is a simple drag-&-drop tool for going from idea to App Store, with just the drag of a mouse.	https://ionicframework.com/creator
Intro to App Development with Swift	Introduction to App Development with Swift: Student guide	https://itunes.apple.com/au/book/intro-to-app-development-with-swift/id1118575552?mt=11
in vision	Build App prototypes from scanned wireframes	https://www.invisionapp.com/
koji	**How Koji Works** • Developers create Templates that can be cloned by others • Cloning a Template automatically sets up a Project, with code you can modify, Visual Customization Controls (VCCs). • Customize your Project to fit your needs. If you need help, ask in Posts and use the Collaborate feature. • When you're ready to Deploy your project to the Internet, just click Deploy. • If you want to create a new Template, please do so, and submit it to our Developer Portal. From <https://gokoji.com/>	https://gokoji.com/
Glitch is the friendly community where you'll find the app of your dreams		https://glitch.com/

Web Apps

Monday, 10 December 2018   8:33 AM

	CODE	Best place to learn	https://studio.code.org/courses
	GROK LEARNING	The link is to free Tutorial. Otherwise, you need to pay	https://groklearning.com/course/aca-dt-78-js-invaders/ https://groklearning.com/course/aca-dt-78-js-cookie/
	codecademy	A lot of free javascript	https://www.codecademy.com/catalog/subject/all
	w3schools.com	WebApps: Good for javascript, html and css integration	https://www.w3schools.com/js/ https://www.edx.org/professional-certificate/w3cx-front-end-web-developer
	MDN web docs moz://a	Another webapps view of javascript	https://developer.mozilla.org/en-US/docs/Learn/JavaScript https://developer.mozilla.org/en-US/docs/Learn https://learning.mozilla.org/en-US/activities https://thimble.mozilla.org/en-US/
	freeCodeCamp(🔥)	Free	https://www.freecodecamp.org/ https://scrimba.com/g/gintrotojavascript

	CODE AVENGERS	**COURSES**
		      LEARN PYTHON
		      LEARN HTML & CSS
		      LEARN JAVASCRIPT
		      LEARN WEB DEVELOPMENT
		      LEARN DESIGN
			https://www.codeavengers.com/

	101 Computing .net	Good list of well documented challenges and tutorials	https://www.101computing.net/category/javascript/
	codecademy		https://www.codecademy.com/learn/learn-html https://www.codecademy.com/learn/learn-css https://www.codecademy.com/learn/introduction-to-javascript https://www.codecademy.com/learn/make-a-website
	//CODEDRAGON Learn web development with simple drag-and-drop blocks.	CodeDragon is a simple drag-n-drop code editor for building websites. It is designed to be fun, simple to use, and perfect for learning web development. It's kind of like **Scratch**, but for making proper websites.	https://codedragon.org/

Logo	Description	Link
code club		https://codeclubprojects.org/en-GB/webdev/ https://codeclubprojects.org/en-GB/resources/#html-&-css
(Raspberry Pi)		https://projects.raspberrypi.org/en/CoderDojo/html-css-for-social-enterprise https://projects.raspberrypi.org/en/projects/?software[]=html-css-javascript
Khan Academy		https://www.khanacademy.org/computing/computer-programming/html-css
envatotuts+		https://webdesign.tutsplus.com/series/web-design-for-kids--cms-823 https://webdesign.tutsplus.com/series/learn-css-the-complete-guide--cms-1065
LEARN-HTML.ORG	Learn HTML provides an interactive tutorial that explains how to build HTML & CSS websites step by step.	https://www.learn-html.org/
(HTMLDog)	Everything HTML, CSS, and JavaScript, the most common languages used in making web pages	http://www.htmldog.com/
MarkSheet	Free html, css tutorial	https://marksheet.io/
Dash	Dash is a fun and free online course that teaches you the basics of web development through projects you can do in your browser	https://dash.generalassemb.ly/
Google Developers	Flutter, Google's free and open source SDK for building high-quality native iOS and Android apps from a single codebase.	https://codelabs.developers.google.com/flutterlive/
thimble moz://a	Thimble is an online code editor that makes it easy to create and publish your own web pages while learning HTML, CSS & JavaScript.	https://thimble.mozilla.org/en-US/?ref=webmaker.org
ACADEMY-OF-CODE.COM	Academy-of-Code.com is built on the basis of the interactive way of learning, so as to engage people in coding in a fun and addicting way!	https://www.academy-of-code.com/en
GRID GARDEN	where you write CSS code to grow your carrot garden!	http://cssgridgarden.com/
Microsoft Virtual Academy	Build your first web app	https://mva.microsoft.com/en-US/training-courses/build-your-first-web-app-part-1-18181?l=tmagTEajE_4206218965
Snakify	Teach Python 3 and web design with 200+ exercises	https://snakify.org/en/
Lighthouse Offered by: https://developers.google.com/web	Chrome plugin. Lighthouse is an open-source, automated tool for improving the performance, quality, and correctness of your web apps. When auditing a page, Lighthouse runs a barrage of tests against the page, and then generates a report on how well the page did. From here you can use the failing tests as indicators on what you can do to improve your app.	https://chrome.google.com/webstore/detail/lighthouse/blipmdconlkpinefehnmjammfjpmpbjk

{X} CSSBattle	CSS code-golfing is here! Use your CSS skills to replicate targets with smallest possible From <https://cssbattle.dev/>	https://cssbattle.dev/
THE ODIN PROJECT	Our full stack curriculum is free and supported by a passionate open source community. From <https://www.theodinproject.com/>	https://www.theodinproject.com/
ThemeRoller	Css jquery	https://jqueryui.com/themeroller/
HTML Table Style Generator	Table style gen	http://tablestyler.com/
Glitch is the friendly community where you'll find the app of your dreams	What thimble used to be	https://glitch.com/
LittleWebHut	Might help	http://www.littlewebhut.com/
Web Fundamentals — Tutorials, guides, and best practices for building the next generation of web experiences. GET STARTED		https://developers.google.com/web/ https://developers.google.com/web/fundamentals/
PageSpeed Insights		https://developers.google.com/speed/pagespeed/insights/

http://taybenlor.com/2013/08/25/making-a-todolist-app.html

App Inventor

MIT APP INVENTOR	Although there are a few clones, such as AppyBuilder and Thunkablethat have become popular, I notice that App Inventor is still the goto App builder for most IoT projects. In terms of basic prototyping, App Inventor is much like App Lab and easy to create digital screen designs and code basic navigation. Just like App Lab, it is also very extensible. App Inventor is probably still the best supported technology, with a large volume of tutorials and guides available. Of course, at the end of the day, it only ports to Android.	http://appinventor.mit.edu/explore/ http://www.appinventor.org/ http://ai2.appinventor.mit.edu/ Good course: https://sites.google.com/a/sfusd.edu/app-inventor/ from https://www.csinsf.org/ http://www.mobile-csp.org https://projects.raspberrypi.org/en/CoderDojo/app-inventor-for-social-enterprise https://cloqq.com/category-app https://projects.raspberrypi.org/en/projects?software%5B%5D=app-inventor http://puravidaapps.com/index.php http://iot.appinventor.mit.edu/#/getstarted/intro https://www.coursera.org/learn/app-inventor-android https://groups.google.com/forum/#!forum/mitappinventortest https://docs.google.com/document/u/1/pub?id=1Xc9yt02x3BRoq5m1PJHBr81OOv69rEBy8LVG_84j9jc#h.rq4w7wjpawqf https://github.com/mit-cml/appinventor-sources https://sourceforge.net/projects/ai2u/
Appy Builder	clone of App Inventor, so very similar features. One big disadvantage was the need for a google account and then it probably only ports to Android devices.	https://appybuilder.com/
thunkable	another google sign on, but can be published to Android or iOS. The downside is that this is not an entry level App builder and is not well supported with tutorials and guides. However, you could use the tutorials and guides for App Inventor and rig them for Thunkable.	https://thunkable.com/#/

Block based programming

	Get Creative with Coding!		https://scratch.mit.edu/ https://clogg.com/ https://csfirst.withgoogle.com/c/cs-first/en/curriculum.html https://projects.raspberrypi.org/en/projects?software%5B%5D=scratch https://sites.google.com/sfusd.edu/3-5cs/home?authuser=0 https://www.101computing.net/category/scratch/ https://uni-cs4hs-scratch.appspot.com/preview http://scratched.gse.harvard.edu/ https://www.rse.org.uk/schools/resources/#collapse-anintroductiontocomputingsciencestartingfromscratchupdated2016usingscratch2 https://aca.edu.au/resources/scratch-maze/ http://scratch.ie/sites/all/themes/scratch_theme/resources/supplessons/Scratch%20Lessons%20Tutors%20Manual.pdf http://code-it.co.uk/gold/
	cratchMaths is a two-year computing and mathematics-based curriculum for Key Stage 2 pupils (Years 5 and 6). Its aim is to enable pupils to engage with and explore important mathematical ideas through learning to program. We are using the free online programming environment **Scratch**. From <https://www.ucl.ac.uk/ioe/research/projects/scratchmaths>		https://www.ucl.ac.uk/ioe/research/projects/scratchmaths
	Learn how to program your own interactive stories, games and animations		https://codeclubprojects.org/en-GB/scratch/ https://codeclubau.org/curriculum/
	programming language for kids and adults that's also a platform for serious study of computer science		https://snap.berkeley.edu/ https://bjc.edc.org/bjc-r/course/bjc4nyc.html http://ddi-mod.uni-goettingen.de/ComputerScienceWithSnap.pdf
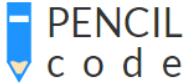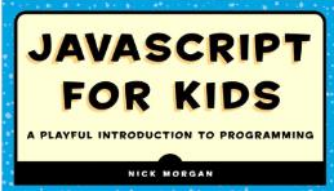
CS First	Computer science and the programming language Scratch. Different themes attract and engage students of varying backgrounds and interests. All materials are free and easy to use.	https://csfirst.withgoogle.com/c/cs-first/en/curriculum.html
GROK LEARNING	Blockly challenge	https://groklearning.com/course/aca-dt-56-bk-invaders/ https://groklearning.com/course/aca-dt-78-js-cookie/
Blockly		https://developers.google.com/blockly/ https://blockly-games.appspot.com/ https://aca.edu.au/resources/blockly-turtle/
Microsoft	Microsoft MakeCode brings computer science to life for all students with fun projects, immediate results and both block and text editors for learners at different levels.	https://www.microsoft.com/en-au/makecode
Made w/ Code	Teen girls can literally do anything with code!	https://www.madewithcode.com/
ALLCANCODE		https://www.allcancode.com/
GAMEFROOT		http://make.gamefroot.com/auth/login
GAMEBLOX	Gameblox is a game editor that uses a blocks based programming language to allow anyone to make games. It's free and no downloads are required. You can make games online that you can play both on this site and on your mobile device.	https://gameblox.org/
scriptr;	Secure endpoints and logic for the Internet of Things Create APIs to connect your data, events & orchestration to enterprise systems	https://www.scriptr.io/
NOVA LABS	Take cybersecurity into your own hands. In this Lab, you'll defend a company that is the target of increasingly sophisticated cyber attacks. Your task is to strengthen your cyber defenses and thwart the attackers by completing a series of cybersecurity challenges. You'll crack passwords, craft code, and defeat malicious hackers.	https://www.pbs.org/wgbh/nova/labs/lab/cyber/
stencyl	Game making platform	http://www.stencyl.com/
PENCIL code	work in either blocks or text. Create art, music, games, and stories.	https://pencilcode.net/
(turtle)	Not block based, but basic use of Logo Programming language	http://turtleacademy.com/
YOYO GAMES	Drag and drop gamemaking engine. Need to pay for useful features	https://www.yoyogames.com/gamemaker
Tynker CODING FOR KIDS	Great, but costs	https://www.tynker.com/
STARLOGO NOVA	StarLogo Nova is an agent-based game and simulation programming environment that combines an easy-to-use blocks-based programming language with a powerful simulation engine and 3D renderer.	https://www.slnova.org/
TALE BLAZER	augmented reality (AR) software platform	http://taleblazer.org/

	Description	Link
Alice	Free 3D drag and drop programming in java	http://www.alice.org/
KODU Game Lab Community	Kodu lets kids create games on the PC and Xbox via a simple visual programming language	https://www.kodugamelab.com/
GDevelop	Events create any kind of game: platformers, puzzles, shoot 'em up, strategy	https://gdevelop-app.com/
//CODEDRAGON	CodeDragon is a simple drag-n-drop code editor for building websites. It is designed to be fun, simple to use, and perfect for learning web development. It's kind of like **Scratch**, but for making proper websites.	https://codedragon.org/
Code For Life	Code For Life is a non profit initiative that delivers free, open-source games that help all students learn computing.	https://www.codeforlife.education/
Workbench	Browse content from leading edge educational companies making robots, circuits, and drones, making it easy to teach with technology in your classroom. Many of the products from these partner channels have been integrated into the Workbench Programming canvas, enabling you to program multiple devices at once.	https://edu.workbencheducation.com/
kids code jeunesse	Easy lessons for younger students	https://kidscodejeunesse.org/
Australian Computing Academy	Lots of free learning resources	https://aca.edu.au/resources/
CS4FN Computer Science For Fun		https://teachinglondoncomputing.org/
Barefoot Computing	Resources p-6	https://www.barefootcomputing.org/

Code your own fabri...

Javascript
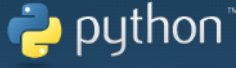
PENCIL code	work in either blocks or text. Create art, music, games, and stories.	https://pencilcode.net/
CODE COMBAT	CodeCombat is a platform **for students** to learn computer science while playing through a real game. **Limited free**	https://codecombat.com/
GROK LEARNING	The link is to free Tutorial. Otherwise, you need to pay	https://groklearning.com/course/aca-dt-78-js-invaders/
codecademy	A lot of free javascript	https://www.codecademy.com/catalog/subject/all
CODE	Best place to learn javascript	https://code.org/
w3schools.com	WebApps: Good for javascript, html and css integration	https://www.w3schools.com/js/ https://www.edx.org/professional-certificate/w3cx-front-end-web-developer
MDN web docs moz://a	Another webapps view of javascript	https://developer.mozilla.org/en-US/docs/Learn/JavaScript
freeCodeCamp(🔥)	Free	https://www.freecodecamp.org/ https://scrimba.com/g/gintrotojavascript https://www.youtube.com/watch?v=PkZNo7MFNFg

CODE AVENGERS	**COURSES**
	    LEARN PYTHON
	    LEARN HTML & CSS
	    LEARN JAVASCRIPT
	    LEARN WEB DEVELOPMENT
	    LEARN DESIGN
		https://www.codeavengers.com/

101 Computing.net	Good list of well documented challenges and tutorials	https://www.101computing.net/category/javascript/
WebsiteSetup	Javascript cheatsheet and guide	https://websitesetup.org/javascript-cheat-sheet/
BuzzCoder	BuzzCoder provides a fun environment for students to learn coding in popular programming languages Python and Javascript. Instead of doing boring coding exercises, students will write code in visual games.	https://buzzcoder.com/
Script Academy.net	After completing this course, you will be able to create simple games and share them online.	https://www.scriptacademy.net/
JAVASCRIPT FOR KIDS	Good book	https://www.amazon.com/dp/B00QL616QE?ref_=cm_sw_r_kb_dp_VblLyb1DMQRZ8&tag=kpembed-20&linkCode=kpe
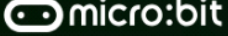
	4 different modes to learn javascript as a game	http://www.crunchzilla.com/
	Has free options	https://www.kodable.com/
	Hello! p5.js is a JavaScript library that starts with the original goal of Processing, to make coding accessible for artists, designers, educators, and beginners, and reinterprets this for today's web.	https://p5js.org/ https://editor.p5js.org/ https://nycdoe-cs4all.github.io/ https://www.youtube.com/watch?v=yPWkPOfnGsw&feature=youtu.be
	Execute code directly on the browser:	https://www.greycampus.com/codelabs
	Test yourself - Track progress - Compete - Computer Science - ICT Welcome to testandtrack.io - self marking, automated assessment, trackable and specific only to Computer Science and Programming. Get started with 1000s of quizzes, tests and interactive learning. "A flipped learning miracle". The whole syllabus and beyond done for you. Here's a quick start guide, you can see what we're up to here and do please preview all our content and features. From <https://www.testandtrack.io/> **NOTE: paid but very cheap**	https://www.testandtrack.io/
	learn JavaScript coding through fun and easy to follow tutorials. Try one now – no account necessary!	https://codeguppy.com/
Khan Academy		https://www.khanacademy.org/computing/computer-programming/programming
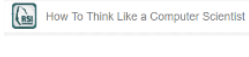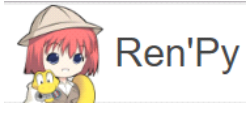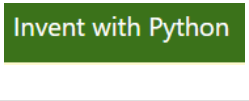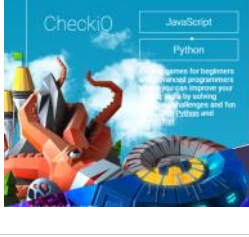
Python

Thursday, 29 November 2018   11:50 AM

Onedrive resources	From steve tucker	https://qedu-my.sharepoint.com/:f:/r/personal/stuck63_eq_edu_au/Documents/Shared_programming_resources?csf=1&e=HbdZMF
GROK LEARNING	Payment required	https://groklearning.com/launch/#type=course
CODE COMBAT	CodeCombat is a platform **for students** to learn computer science while playing through a real game. **Limited free**	https://codecombat.com/
CODESTERS	create interactive projects in Python. Very limited free option	https://www.codesters.com/
pythonroom	Free option for Teachers. May be limited for students	https://pythonroom.com/
CodingBat code practice	free site of live coding problems to build coding skill in Java and Python	https://codingbat.com/python
Game Frame	GameFrame has been developed to take the excellent PyGame libraries and make them more accessible and easy to use for beginner to intermediate programmers. GameFrame aims to help with learning the concepts of text based game programming without getting caught up in the implementation details	https://gameframeforpygame.wordpress.com/
code club	Good work at own pace modules	https://codeclubprojects.org/en-GB/python/
		https://projects.raspberrypi.org/en/projects?software[]=python https://www.raspberrypi.org/blog/raspberry-pi-beginners-guide/ https://projects.raspberrypi.org/en/coderdojo
python	Where to get it	https://www.python.org/downloads/
codecademy	A lot of free javascript and some python	https://www.codecademy.com/catalog/subject/all
pygame	pygame (the library) is a Free and Open Source python programming language library for making multimedia applications like games built on top of the excellent SDL library py	https://www.pygame.org/news
	Pygame Zero is for creating games without boilerplate. It is intended for use in education, so that teachers can teach basic programming without needing to explain the Pygame API or write an event loop. From <https://pygame-zero.readthedocs.io/en/stable/>	https://pygame-zero.readthedocs.io/en/stable/
Ren'Py	Ren'Py is a visual novel engine that helps you use words, images, and sounds to tell interactive stories that run on computers and mobile devices.	https://www.renpy.org/

Logo	Description	URL
CODE AVENGERS	**COURSES** LEARN PYTHON LEARN HTML & CSS LEARN JAVASCRIPT LEARN WEB DEVELOPMENT LEARN DESIGN	https://www.codeavengers.com/
101 Computing.net	Good list of well documented challenges and tutorials	https://www.101computing.net/category/python-challenges/
Python	Python Programming tutorials from beginner to advanced on a massive variety of topics. All video and text tutorials are free.	https://pythonprogramming.net/
BuzzCoder	BuzzCoder provides a fun environment for students to learn coding in popular programming languages Python and Javascript. Instead of doing boring coding exercises, students will write code in visual games.	https://buzzcoder.com/
Snakify	Teach Python 3 and web design with 200+ exercises	https://snakify.org/en/
(mu logo)	a simple Python editor for beginner programmers.	https://codewith.mu/
Introduction to Python	Free online tutorial	http://introtopython.org/
PRACTICE PYTHON Beginner Python exercises	There are over 30 beginner Python exercises just waiting to be solved. Each exercise comes with a small discussion of a topic and a link to a solution.	http://www.practicepython.org/
micro:bit	Everything you need. Go here if you want to program in **python**	https://microbit.org/guide/python/
edublocks	Makes the transition from block-based programming to Python easier. Works in a browser.	https://microbit.edublocks.org/
kids code jeunesse	Easy lessons for younger students	https://kidscodejeunesse.org/resources_document.html?doc=python
edhesive	Edhesive Collaborates With Amazon To Bring Computer Science To High School Students Nationwide the course can be delivered in Australia via the internet.	https://edhesive.com/
Australian Computing Academy	Lots of free learning resources	https://aca.edu.au/resources/
//GreyCampus codelabs	Execute code directly on the browser:	https://www.greycampus.com/codelabs
PY4E	work through my course materials related to my free Python for Everybody text book. From <https://www.py4e.com/>	https://www.py4e.com/
TestandTrack.io	*Test yourself - Track progress - Compete - Computer Science - ICT* Welcome to testandtrack.io - self marking, automated assessment, trackable and specific only to Computer Science and Programming. Get started with 1000s of quizzes, tests and interactive learning. "A flipped learning miracle". The whole syllabus and beyond done for you. Here's a quick start guide, you can see what we're up to here and do please preview all our content and features. From <https://www.testandtrack.io/> **NOTE: paid but very cheap**	https://www.testandtrack.io/
Writing Web Applications in Python with Bottle		http://pwp.stevecassidy.net/bottle/python-webapps.html#web-applications
Python for EV3	You can now use your EV3 Brick to unleash the power of Python programming using MicroPython. Simply install the EV3 MicroPython image onto any micro SD card and boot up your EV3 Brick from it to start programming straight away.	https://education.lego.com/en-us/support/mindstorms-ev3/python-for-ev3

	Switching back to the standard LEGO® MINDSTORMS® EV3 firmware is just as simple. We have also provided full documentation and sample API code to get you started. From <https://education.lego.com/en-us/support/mindstorms-ev3/python-for-ev3>	
	Kivy - Open source Python library for rapid development of applications that make use of innovative user interfaces, such as multi-touch apps. From <https://kivy.org/#home>	https://kivy.org/#home The documentation, beginner tutorials on Kivy.org are reasonably good. https://kivy.org/doc/stable/gettingstarted/intro.html (They might be pitched at developers more than students, though) Amanda Hogan has a youtube video introduction to Kivy, it has some assumed background knowledge. https://www.youtube.com/watch?v=3GBNMBhm6UU Kivy has its own design language, (a pythonised YAML)
THE LITTLE BOOK OF ALGORITHMS	Free Book!	http://www.mrlaulearning.com/2019/04/LBOA.html?m=1
Pygame Zero	Pygame Zero is for creating games without boilerplate. It is intended for use in education, so that teachers can teach basic programming without needing to explain the Pygame API or write an event loop.	https://pygame-zero.readthedocs.io/en/stable/ https://www.raspberrypi.org/magpi/pygame-zero-invaders/ https://www.raspberrypi.org/magpi/pygame-zero-space-invaders-ii/ https://www.raspberrypi.org/magpi/code-pac-man-in-python/ https://www.raspberrypi.org/magpi/code-pac-man-python-part-2/
Real Python	Take your coding skills to the next level with Real Python's accelerated study plans for beginner, intermediate, and advanced Python developers. From <https://realpython.com/learning-paths/>	https://realpython.com/learning-paths/
How To Think Like a Computer Scientist		http://interactivepython.org/runestone/static/thinkcspy/index.html
learnpython.org		https://www.learnpython.org/
Ren'Py	Ren'Py is a visual novel engine – used by thousands of creators from around the world – that helps you use words, images, and sounds to tell interactive stories that run on computers and mobile devices.	https://www.renpy.org/
trinket		https://hourofpython.com/
Invent with Python	Lots of free books	http://inventwithpython.com/ http://inventwithpython.com/blog/2012/02/20/i-need-practice-programming-49-ideas-for-game-clones-to-code/ http://inventwithpython.com/bookshelf/
Django Girls	Tutorial	https://tutorial.djangogirls.org/en/index.html
PyCharm Edu	An Easy and Professional Tool to Learn & Teach Programming with Python	https://www.jetbrains.com/pycharm-edu/
CheckiO	Coding game	https://checkio.org/
SOLOLEARN	COURSES CODE PLAYGROUND DISCUSS TOP LEARNERS BLOG SIGN IN Learn to code for FREE!	https://www.sololearn.com/

Computer Science
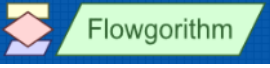
Thursday, 29 November 2018   12:13 PM
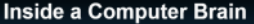
Pseudocode

Pseudocode Guide

Algorithms

https://www.codingkids.com.au/product/coding-robotics-free-ebook/
https://www.openprocessing.org/

CODE	Best place to learn		https://studio.code.org/courses
DIGITAL TECHNOLOGIES HUB	Next best place		https://www.digitaltechnologieshub.edu.au/
#CSinSF	a middle years computer science curriculum		https://sites.google.com/a/sfusd.edu/mycs-teacher/ https://www.csinsf.org/
codecademy	A lot of free javascript and some python		https://www.codecademy.com/catalog/subject/all https://www.codecademy.com/learn/paths/computer-science
Computer Science Field Guide	An online interactive resource for high school students learning about computer science		http://www.csfieldguide.org.nz/en/
IDS Introduction to Data Science	Data Science focus		https://www.mobilizingcs.org/

CODE AVENGERS	**COURSES**
	    LEARN PYTHON
	    LEARN HTML & CSS
	    LEARN JAVASCRIPT
	    LEARN WEB DEVELOPMENT
	    LEARN DESIGN
			https://www.codeavengers.com/

Khan Academy	**Free course**		https://www.khanacademy.org/computing/computer-science

	Description	Link
	Applied CS Skills is a free online course by Google designed to prepare you for your CS career through hands on coding experience	https://appliedcsskills.withgoogle.com/index.html
	CS Unplugged is a collection of free teaching material that teaches Computer Science through engaging games and puzzles that use cards, string, crayons and lots of running around.	https://csunplugged.org/en/
	Flowgorithm is a **free** beginner's programming language that is based on simple graphical flowcharts.	http://www.flowgorithm.org/
	Explore how computer science is also about people, solving puzzles, creativity, changing the future and, especially having fun.	http://www.cs4fn.org/ https://teachinglondoncomputing.org/
	Learn everything	https://www.sololearn.com/Courses/
	Resources for CS	https://computerscienceuk.com/
	Discover resources to support and encourage students in computing. Find in-class lesson plans and opportunities beyond the classroom to give students valuable computing skills and experiences.	http://www.trycomputing.org/inspire
	Through Mobilize units, students will engage with and learn about the nature of data. Mobilize centers its curricula around participatory sensing campaigns in which students use their mobile devices to collect and share data about their communities and their lives, and to analyze these data to gain understanding. The UCLA MobilizingCS app is a cross-platform mobile application available in the Android and Apple stores. Once installed, users can download the data collection projects and start collecting data. To access the materials users must register.	https://www.mobilizingcs.org/technology
	Heaps of resources	http://www.bbc.co.uk/schools/0/computing/28975331
	Exploring Computer Science is a year-long, research-based, high school intro-level computer science curriculum and teacher professional development program that focuses on broadening participation in computing. We support teachers and districts through implementation of the course regardless of school resources.	http://www.exploringcs.org/
	Edhesive Collaborates With Amazon To Bring Computer Science To High School Students Nationwide the course can be delivered in Australia via the internet.	https://edhesive.com/
		https://www.101computing.net/
	Lots of free learning resources	https://aca.edu.au/resources/
	Execute code directly on the browser:	https://www.greycampus.com/codelabs
	Test yourself - Track progress - Compete - Computer Science - ICT Welcome to testandtrack.io - self marking, automated assessment, trackable and specific only to Computer Science and Programming. Get started with 1000s of CS quizzes, tests and interactive learning. "A flipped learning miracle". The whole syllabus and beyond done for you. Here's a quick start guide, you can see what we're up to here and do please preview all our content and features. From <https://www.testandtrack.io/> **NOTE: paid but very cheap**	https://www.testandtrack.io/

Logo	Description	URL
Hwb — Uywodraeth Cymru Welsh Government — Home > Resources	The Curriculum for Wales and free educational tools and materials. From <https://hwb.gov.wales/>	https://hwb.gov.wales/repository/tree?sort=created&language=en
Canada Learning Code		https://www.canadalearningcode.ca/lesson-plans/
ERD	A database modeling tool for creating Entity Relationship Diagrams, Relational Schemas, Star Schemas, and SQL DDL statements. From <https://erdplus.com/#/>	https://erdplus.com/#/
Terrace Course Hub		http://www.wonko.info/ds/
Cambridge GCSE Computing Online	Resources and Courses to help teach and learn Computer Science	https://cambridgegcsecomputing.org/
UC DAVIS C-STEM Center	Transforming Math Education Through Coding and Robotics	https://c-stem.ucdavis.edu/
ORACLE Academy	Getting Started with Java Using Alice; Creating Java Programs with Greenfoot; Programming the Finch Robot in Greenfoot; Programming the Finch Robot in Java; Solve It with SQL	https://academy.oracle.com/en/training-workshops.html
Simon Haughton's website — Download my FREE primary computing curriculum:		http://www.simonhaughton.co.uk/
How To Think Like a Computer Scientist		http://interactivepython.org/runestone/static/thinkcspy/index.html
BOOTSTRAP Equity • Scale • Rigor	**Computational modeling in Algebra, Physics and Data Science, for all students.** From <https://www.bootstrapworld.org/>	https://www.bootstrapworld.org/
hackr.io	Find the Best Programming Courses & Tutorials	https://hackr.io/
repl.it	Stop wasting time setting up a development environment. Repl.it gives you an instant IDE to learn, build, collaborate, and host all in one place.	https://repl.it/
Learn-C.org	C languages	https://www.learn-c.org/
aGupieWare applications • technology • politics	Hypothetical course drawn from free courses	http://blog.agupieware.com/2014/05/online-learning-bachelors-level.html
MIT OPEN COURSEWARE MASSACHUSETTS INSTITUTE OF TECHNOLOGY	Open free courses	https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/
SOLOLEARN	COURSES CODE PLAYGROUND DISCUSS TOP LEARNERS BLOG SIGN IN Learn to code for FREE!	https://www.sololearn.com/
Inside a Computer Brain	Explore AI and Machine Learning (Secondary+Tertiary) From <https://mycomputerbrain.net/> Learn how the computer processor works! (Secondary+Tertiary) From <https://mycomputerbrain.net/>	https://mycomputerbrain.net/
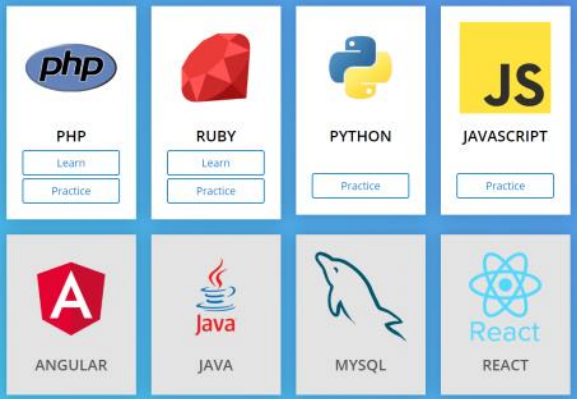
Explore Computer Algorithms (Secondary+Tertiary)

From <https://mycomputerbrain.net/>

Explore Computer Graphics (Secondary)

From <https://mycomputerbrain.net/>

Explore Computer Algorithms (Secondary+Tertiary)

From <https://mycomputerbrain.net/>

Explore Computer Graphics (Secondary)

From <https://mycomputerbrain.net/>

Java

Wednesday, 5 December 2018   9:08 AM

	free site of live coding problems to build coding skill in Java and Python	https://codingbat.com/python
	Applied CS Skills is a free online course by Google designed to prepare you for your CS career through hands on coding experience	https://appliedcsskills.withgoogle.com/index.html
ORACLE		https://docs.oracle.com/javase/tutorial/index.html https://academy.oracle.com/en/resources-resources-library.html https://giant.ict.griffith.edu.au/JPL/
Alice	Free 3D drag and drop programming in java	http://www.alice.org/ http://digitaldivasclub.org/vic/node/28 https://academy.oracle.com/en/resources-resources-library.html
	Best place to learn java	https://www.greenfoot.org/door https://greenroom.greenfoot.org/door
Mr. Ferraro's Courses	Comprehensive lessons	http://feromax.com/apcs/lessons/ http://feromax.com/wp/?p=10
LEJOS Java for LEGO Mindstorms	Java Virtual Machine that supports Java.	http://www.lejos.org/ev3.php
Developers	Android Studio provides the fastest tools for building apps on every type of Android device.	https://developer.android.com/studio/ https://android-developers.googleblog.com/2018/12/android-codelab-courses-are-here.html
GreyCampus codelabs	Execute code directly on the browser:	https://www.greycampus.com/codelabs
Georgia Tech Institute for Computing Education		https://www.cc.gatech.edu/ice/resources.html

Programmr
Programmer's Playground
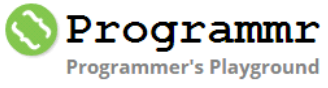
Minecraft

contact the Dream factory as they are managing the licenses. Search for 'Minecraft:
Education Edition - KBA0027719 ' on the Service Centre for the form and more information.

https://qlddet.service-now.com/sco?id=search&spa=1&q=minecraft

Download the course
The course is also available for download in these formats:

- **HTML** - The entire course in a single HTML page that you can print to PDF or paper (2 minutes to download)
- **OneNote Notebook** - Intro to CS with MakeCode for Minecraft

From <https://minecraft.makecode.com/courses/csintro>

See coding onenote

https://minecraft.makecode.com/docs

https://minecraft.makecode.com/courses/csintro

https://minecraft.makecode.com/

https://minecrafteducation.zendesk.com/hc/en-us/articles/360001429328-Exporting-in-3D-

Documenting in minecraft:

https://youtu.be/1XGVqoIJ53E

Using slash commands:

https://youtu.be/4eVe1FzQfN4

Flying:

https://youtu.be/t1YLPf5VdfA
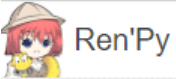
	Start here	https://education.minecraft.net/ https://education.minecraft.net/australia/
	explore concepts in computer science through Microsoft MakeCode and Minecraft.	https://minecraft.makecode.com/courses/csintro
	You can use MCEdit to import Tinkercad creations into Minecraft	https://www.instructables.com/lesson/Transforming-Your-World-With-Tinkercad/

Game Design

Monday, 10 December 2018   8:32 AM

https://www.codingkids.com.au/product/coding-robotics-free-ebook/
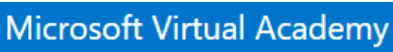
the GameCreators	Free for schools. ou can easily create your own apps or codes your own game easily and quickly From <https://www.thegamecreators.com/> [PDF] how-to-ma ke-a-vide...	https://www.thegamecreators.com/
Sploder! Where games come true	Make your own games free	http://www.sploder.com/
GAMEBLOX	Gameblox is a game editor that uses a blocks based programming language to allow anyone to make games. It's free and no downloads are required. You can make games online that you can play both on this site and on your mobile device.	https://gameblox.org/
stencyl	Game making platform	http://www.stencyl.com/
YOYO GAMES	Drag and drop gamemaking engine. Need to pay for useful features	https://www.yoyogames.com/gamemaker
Tynker CODING FOR KIDS	Great, but costs	https://www.tynker.com/
pygame	pygame (the library) is a Free and Open Source python programming language library for making multimedia applications like games built on top of the excellent SDL library	https://www.pygame.org/news
Ren'Py	Ren'Py is a visual novel engine that helps you use words, images, and sounds to tell interactive stories that run on computers and mobile devices.	https://www.renpy.org/

KODU GAME LAB COMMUNITY — Build Games. Play Games. Share Games.	Kodu lets kids create games on the PC and Xbox via a simple visual programming language	https://www.kodugamelab.com/
GDEVELOP	Events create any kind of game: platformers, puzzles, shoot 'em up, strategy	https://gdevelop-app.com/
CS First	learn basic video game coding concepts by making different types of games, including racing, platform, launching, and more!	https://csfirst.withgoogle.com/c/cs-first/en/game-design/overview.html https://csfirst.withgoogle.com/c/cs-first/en/animation/overview.html
GROK LEARNING	Blockly challenge	https://groklearning.com/course/aca-dt-56-bk-invaders/ https://groklearning.com/course/aca-dt-78-js-cookie/
easy	Design and create your own 3D game	https://glitch.com/edit/#!/cs1?path=README.md:1:0
GODOT	Open source game engine	https://godotengine.org/
	AgentCubes lets you build your own 3D games. Is a fee involved	https://agentcubesonline.com/ http://www.agentsheets.com/products/index.html
CLOQQ BETA		https://cloqq.com/category-videogames
GAMESTAR MECHANIC	game-based quests and courses to help you learn game design and make your own video games!	https://gamestarmechanic.com/
pygame	pygame (the library) is a Free and Open Source python programming language library for making multimedia applications like games built on top of the excellent SDL library	https://www.pygame.org/news
	Pygame Zero is for creating games without boilerplate. It is intended for use in education, so that teachers can teach basic programming without needing to explain the Pygame API or write an event loop. From <https://pygame-zero.readthedocs.io/en/stable/>	https://pygame-zero.readthedocs.io/en/stable/
Adventure Game Studio	Adventure Game Studio provides the tools to make your own adventure, for free!	http://www.adventuregamestudio.co.uk/
edX	Learn game design with gameblox	https://www.edx.org/course/introduction-game-design-mitx-11-126x-0
GAMEBLOX	Gameblox is a game editor that uses a blocks based programming language to allow anyone to make games. It's free and no downloads are required. You can make games online that you can play both on this site and on your mobile	https://gameblox.org/

	Description	Link
	device.	
	Just have this incase I need to hack a 1up machine	https://hackaday.com/2018/12/01/arcade1up-cabinet-solderless-upgrade-with-a-side-of-raspberry-pi/
	2D+3D game making for indies. Free and open source	http://superpowers-html5.com/index.en.html
Microsoft Virtual Academy	Want to create game apps? Get started today, with our game development training courses.	https://mva.microsoft.com/training-topics/game-development#!index=2&jobf=Developer&lang=1033
TURBOSQUID	Free 3D models	https://www.turbosquid.com/
OpenGameArt.Org	Free game art	https://opengameart.org/
freesound	Free sounds	https://freesound.org/
PICO-8	PICO-8 is a fantasy console for making, sharing and playing tiny games and other computer programs. When you turn it on, the machine greets you with a commandline and simple built-in tools for creating your own cartridges and exploring the PICO-8 cartverse. From <https://www.lexaloffle.com/pico-8.php> pico-8	https://www.lexaloffle.com/info.php?page=schools
CODE	pixelation	https://studio.code.org/s/pixelation
GB Studio	A free and easy to use retro adventure game creator for your favourite handheld video game system	https://www.gbstudio.dev/
GODOT	Free 2d/3d game engine	https://godotengine.org/
GAMEBENDER	Jnr console for modifying and creating games in scratch	https://www.gamebender.com/
Brush Ninja Animated Gif Creator GALLERY TEACHERS		https://brush.ninja/

	32blit is designed to allow you to realise your amazing game ideas in a frictionless and fun way.	https://32blit.com/
	AppGameKit is an easy to learn game development engine, ideal for Beginners, Hobbyists & Indie developers. Costs	https://www.appgamekit.com/
Python and rasp pi		https://projects.raspberrypi.org/en/projects/?interests[]=games https://www.raspberrypi.org/magpi/pygame-zero-invaders/ https://www.raspberrypi.org/magpi/pygame-zero-space-invaders-ii/
	Pygame Zero is for creating games without boilerplate. It is intended for use in education, so that teachers can teach basic programming without needing to explain the Pygame API or write an event loop.	https://pygame-zero.readthedocs.io/en/stable/ https://www.raspberrypi.org/magpi/pygame-zero-invaders/ https://www.raspberrypi.org/magpi/pygame-zero-space-invaders-ii/ https://www.raspberrypi.org/magpi/code-pac-man-in-python/ https://www.raspberrypi.org/magpi/code-pac-man-python-part-2/
	BotLogic.us is an educational puzzle game that challenges kids and adults to tackle complex logic problems while teaching valuable programming concepts. Using simple commands (and eventually code), players program their bots to navigate through progressively challenging mazes. As their skills improve, players earn rewards by using the fewest number of commands and go head-to-head with friends in programming tournaments. It's smart. It's fun. BotLogic.us is all about helping children and adults to develop and maintain strong logic and spatial reasoning skills that will benefit them for a lifetime.	http://botlogic.us/
	Adventure Game Studio (AGS) provides the tools to make your own adventure, for free!	https://www.adventuregamestudio.co.uk/
		https://www.construct.net/

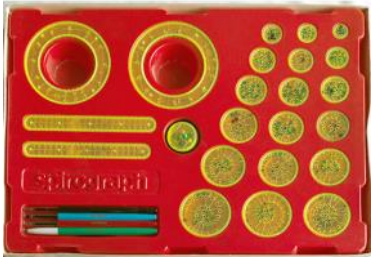|		
Ren'Py	Ren'Py is a visual novel engine – used by thousands of creators from around the world – that helps you use words, images, and sounds to tell interactive stories that run on computers and mobile devices.	https://www.renpy.org/
textadventures.co.uk	Build text adventure games and interactive fiction	http://textadventures.co.uk/quest/
Welcome to **Adventure Maker** FREEWARE	Quickly create point-and-click games and virtual tours for Windows (native), PSP, iPhone and iPod Touch (web apps)! No programming required - very easy to use! Free edition contains all the main features Includes free drawing tool and music composer	http://www.adventuremaker.com/
ARIS Create location-based games and stories	Create mobile games, tours and interactive stories with ARIS games. Players experience a hybrid world of virtual characters and media in physical space.	https://fielddaylab.org/make/aris/
AUSTRALIAN STEM VIDEO GAME CHALLENGE		https://www.stemgames.org.au/
CODE.GAME		https://www.code.game/home
PiSKEL	Piskel is a free online editor for animated sprites & pixel art Create animations in your browser.	https://www.piskelapp.com/
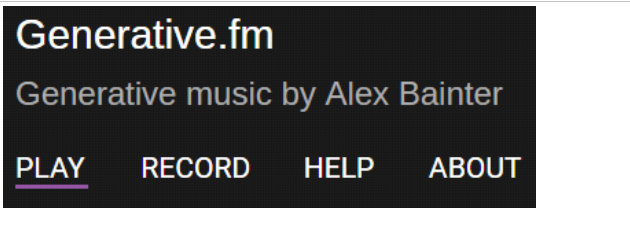
SQL
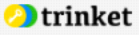
ERD	A database modeling tool for creating Entity Relationship Diagrams, Relational Schemas, Star Schemas, and SQL DDL statements. From <https://erdplus.com/#/>	https://erdplus.com/#/
SQLBolt Learn SQL with simple, interactive exercises.		https://sqlbolt.com/
Khan Academy		https://www.khanacademy.org/computing/computer-programming/sql
essentialSQL		https://www.essentialsql.com/getting-started/
Stanford University		https://lagunita.stanford.edu/courses/DB/SQL/SelfPaced/course/#i4x://DB/SQL/sequential/seq-vid-introduction_to_sql
SQL for Web Nerds by Philip Greenspun		http://philip.greenspun.com/sql/
MySQLTUTORIAL		http://www.mysqltutorial.org/
LEARN SQL THE HARD WAY		https://learncodethehardway.org/sql/
SQLZOO		https://sqlzoo.net/

Music

EarSketch	Learn to code in python or javascript by making music	https://earsketch.gatech.edu/landing/#/
	Musical Experiments	https://musiclab.chromeexperiments.com/Experiments
π	Sonic Pi is a code-based music creation and performance tool. Simple enough for computing and music lessons. Powerful enough for professional musicians. Free to download with a friendly tutorial. Diverse community of over 1.5 million live coders. Learn to code creatively by composing or performing music in an incredible range of styles from Classical & Jazz to Grime & EDM.	http://sonic-pi.net/
mimic	The mimic project offers a way to make new kinds of music, sound and creative arts experiences using machine learning, machine listening and artificial intelligence.	https://mimicproject.com/about
Generative.fm Generative music by Alex Bainter PLAY RECORD HELP ABOUT		https://generative.fm/
Make music online Get started for free		https://soundation.com/accounts
soundzabound	The ONLY royalty free music library which meets all the licensing and technology requirements needed for education!	http://www.soundzabound.com/
SCREENBIRD	STUNNING MUSIC VISUALIZATION FOR YOUR STAGE	http://screenbird.webflow.io/

Turtle Graphics

Tuesday, 26 February 2019   9:20 AM

	Turtle Academy makes it surprisingly easy to start creating amazing shapes using the LOGO language	https://turtleacademy.com/
	Coding using snap	https://www.turtlestitch.org/ http://ddi-mod.uni-goettingen.de/ComputerScienceWithSnap.pdf
	Logo - turtle graphics in Scratch	https://scratch.mit.edu/studios/3745811/ https://scratch.mit.edu/projects/15513542/editor
	TurtleArt lets you make images with your computer. The Turtle follows a sequence of commands. You specify the sequence by snapping together puzzle like blocks. The blocks can tell the turtle to draw lines and arcs, draw in different colors, go to a specific place on the screen, etc. There are also blocks that let you repeat or name sequences. Other blocks perform logical operations. The sequence of blocks as a program that describes an image. This kind of programming is inspired by the LOGO programming language. It was designed to be easy enough for children and yet powerful enough for people of all ages. TurtleArt is focused on making images while allowing you to explore geometry and programming.	http://turtleart.org/gallery/index.html http://turtleart.org/programming/samples/index.html
	Algorithms and ideas	http://wiki.sugarlabs.org/go/Activities/Turtle_Art
	Artwork	
	u5_3_tn	http://www.windmillhillacademy.org/storage/secure_download/azE3REEyUnRLVUQxYkVkUm5jVXBuQT09
LogoTurtle A programmable floor turtle		http://joshburker.com/logoturtle/LogoTurtle.html
turtle — Turtle graphics Source code: Lib/turtle.py	The turtle module provides turtle graphics primitives, in both object-oriented and procedure-oriented ways. Because it uses tkinter for the underlying graphics, it needs a version of Python installed with Tk support.	https://docs.python.org/3/library/turtle.html https://docs.python.org/2/library/turtle.html
trinket	Welcome to this Hour of code activity, sponsored by Trinket.io	https://hourofpython.trinket.io/a-visual-introduction-to-python#/welcome/an-hour-of-code https://sites.google.com/a/trinket.io/hour-of-python/going-deeper-with-turtle
	take your first steps with the programming language Python to draw shapes, patterns, and spirals.	https://projects.raspberrypi.org/en/projects/turtley-amazing
GeeksforGeeks A computer science portal for geeks		https://www.geeksforgeeks.org/turtle-programming-python/ https://coolpythoncodes.com/python-turtle/ https://www.simplifiedpython.net/python-turtle-module/
101 Computing .net		https://www.101computing.net/2d-shapes-using-python-turtle/

		http://www.schoolcoders.com/wiki/Spirographs_(digital_art)?id=projects-inkscape
	Robot turtle	https://www.element14.com/community/thread/49887/l/robotic-turtle-for-logo-graphics?displayFullThread=true
		https://pencilcode.net/
		http://orteil.dashnet.org/lsystem
	ACA	https://groklearning.com/course/aca-dt-56-bk-turtle/ https://groklearning.com/course/aca-dt-78-py-turtle/ https://groklearning.com/course/aca-dt-7-bk-geometry/ https://aca.edu.au/resources/python-turtle/ https://aca.edu.au/resources/blockly-turtle/
	Code.org	https://studio.code.org/s/artist/stage/1/puzzle/1
	Artbotics is a program that has been designed to introduce students to art, computer science, and robotics, by creating interactive, kinetic sculptures. From <http://artbotics.cs.uml.edu/wordpress/>	http://artbotics.cs.uml.edu/wordpress/?page_id=183

3D

	Free 2d/3d game	https://godotengine.org	
	Not free	https://www.block42.w	

The Art of Code: 3D

https://www.autodesk.com/campaigns/education/iste

Year 9

Journal ideas from https://nclab.com/

Tynkercad = algorithm

Openscad = text based code

Sequence ideas from :

https://nclab.com/

https://www.blockscad3d.com/

https://www.instructables.com/id/Make-Awesome-3D-Geometry-by-Programming-CNC-code/#click=https://t.co/klCDPo8mro

3D Sequence

https://youtu.be/ouvf-4wciak

https://ultimaker.com/en/blog/52739-code-your-3d-designs-with-tinkercads-new-codeblocks-app
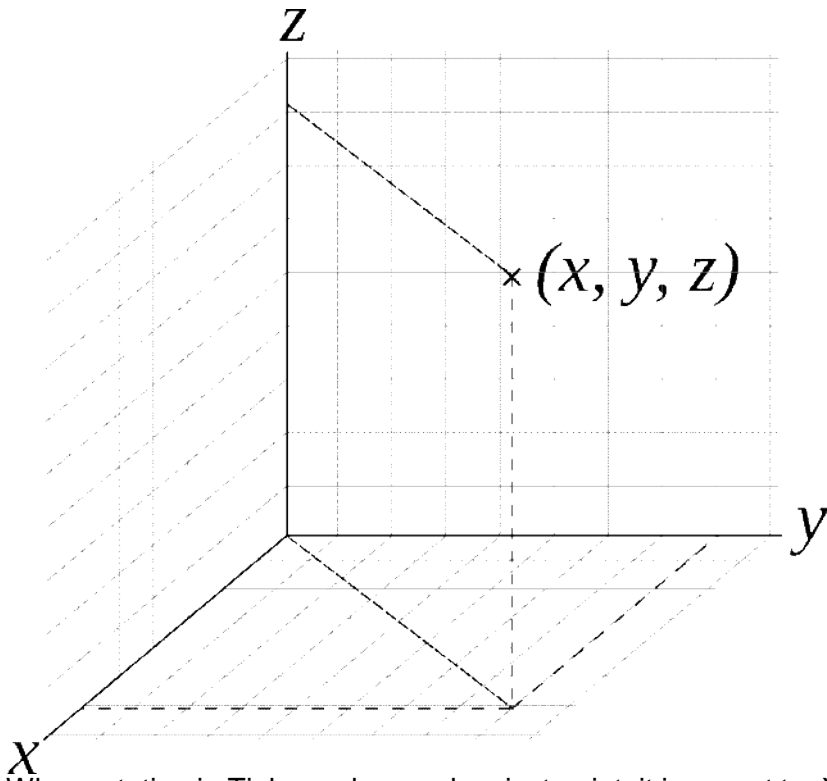
When rotating in Tinkercad around a pivot point, it is preset to: X:0, Y:0, Z:0

1. Translation

Crazy Shape

Quatrefoil Pattern

```
Create New Object   quatrefoil ▾
Add  [🟫] (🟠) (⬜)  ⟨  Radius (5) H (10) Sides (64) edge (0) Edge Steps (1)
Move:  X: (0) Y: (-50) Z: (0)
Rotate around  Axis x ▾  by (90)  Degrees  from Pivot
Move:  X: (0) Y: (25) Z: (9)
Scale:  X: (.5) Y: (1) Z: (1)
Copy  (🟠) (⬜)
Rotate around  Axis y ▾  by (90)  Degrees  from Pivot
```

```
Create New Object   circle pattern ▾
Create Variable   angle ▾  (30)
Repeat (12) Times
  Add Copy of Object  quatrefoil  (🟠) (⬜)
  Rotate around  Axis z ▾  by (angle) Degrees  from Pivot  X: (0) Y: (0) Z: (0)
  Change  angle ▾  by (30)
Delete Object  quatrefoil
```
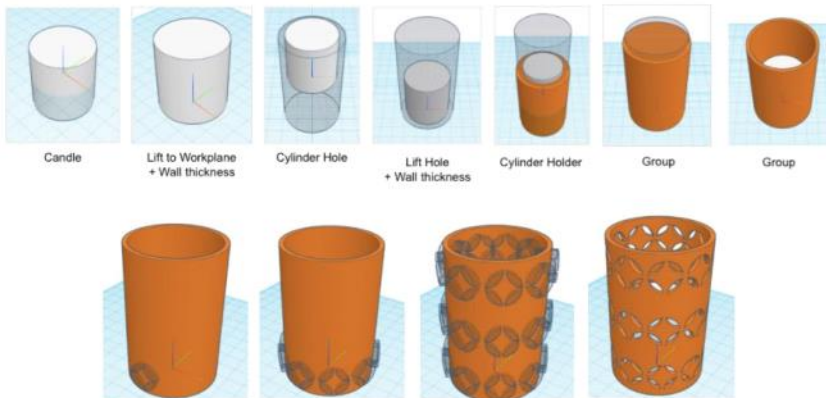
```
Create New Object   rectangle pattern ▾
Create Variable   distance ▾  (20)
Repeat (3) Times
  Add Copy of Object  circle pattern  (🟠) (⬜)
  Move:  X: (0) Y: (0) Z: (distance)
  Change  distance ▾  by (20)
```

Star Pattern

```
Create New Object   star ▾
Add  [🐟] (🟡) (⬜)  ⟨  Sides (5) Radius (5) Inner Radius(%) (.5) H (2.5)
Scale:  X: (1) Y: (1) Z: (4)
Move:  X: (0) Y: (-50) Z: (0)
Rotate around  Axis x ▾  by (90)  Degrees  from Pivot
Move:  X: (0) Y: (25) Z: (9)
```

```
Create New Object   circle pattern ▾
Create Variable   angle ▾  (30)
Repeat (12) Times
  Add Copy of Object  star  (🟠) (⬜)
  Rotate around  Axis z ▾  by (angle) Degrees  from Pivot  X: (0) Y: (0) Z: (0)
  Change  angle ▾  by (30)
Delete Object  star
```

```
Create New Object   rectangle pattern ▾
Create Variable   distance ▾  (20)
Repeat (3) Times
  Add Copy of Object  circle pattern  (🟠) (⬜)
  Move:  X: (0) Y: (0) Z: (distance)
  Change  distance ▾  by (20)
```

Step 6: Add the Pattern to a Tea Light Holder

From <https://www.instructables.com/id/Hour-of-Code-Make-Patterns-With-Code-and-CAD-in-Ti/>

Complete Tea Light

Candle | Lift to Workplane + Wall thickness | Cylinder Hole | Lift Hole + Wall thickness | Cylinder Holder | Group | Group

Step 7: Create a GIF

For more instant gratification, your students could also make GIF

recordings of their Code-CAD creations. This can be done inside the Tinkercad editor by hitting the Share button and then choosing to "Save Gif" in the next screen. Make sure you run it first in the editor. (Note: It takes a few minutes for your GIF to package and download. Totally worth the wait!)

Here's how...
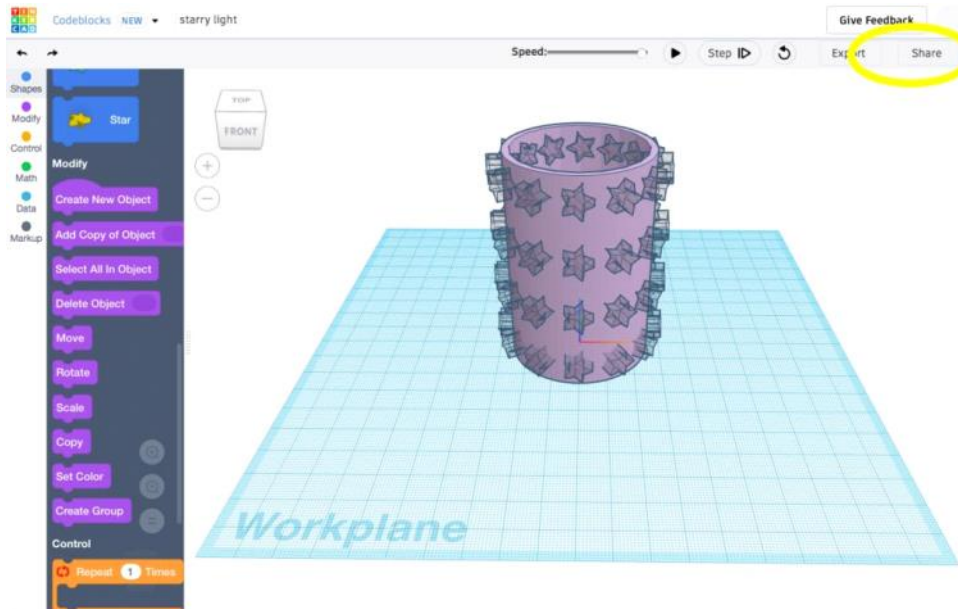
Be sure to remind students to add this script to the end of their program before they make a GIF, so that everything groups properly...
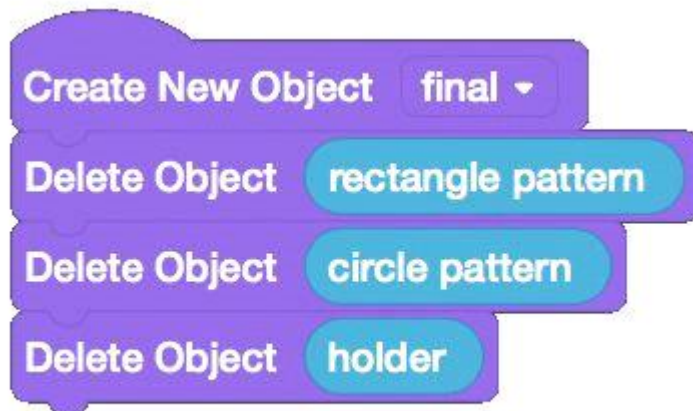
From <>

Rotation
Difference
Scale/Sides
Hull
Intersection
Variables
Loops

Modules
Warmup, Summary, and Group Projects

Other objects

Pg 58 http://beetleblocks.com/static/bb-primer.pdf

3D

https://www.blockscad3d.com/
https://www.blockscad3d.com/edu/resources/standards_documents/BlocksCAD_Intro_Series_Summary.pdf
https://www.blockscad3d.com/edu/resources/
https://www.blockscad3d.com/edu/lessons/
https://www.blockscad3d.com/hourofcodepizzaprinter
https://www.blockscad3d.com/hourofcodebirdhouses
https://www.blockscad3d.com/hourofcodesugarcube
https://www.blockscad3d.com/hourofcoderobot
https://www.blockscad3d.com/hourofcodesnowflake
https://www.blockscad3d.com/hourofcodeicecreammachine
https://www.blockscad3d.com/hourofcodeclock

3d python
https://nclab.com/

Openscad

https://all3dp.com/2/openscad-tutorial-for-beginners-5-easy-steps/

https://www.openscad.org/

Tinkercad

https://www.tinkercad.com/learn/codeblocks

https://www.instructables.com/lesson/Transforming-Your-World-With-Tinkercad/

https://www.instructables.com/id/Hour-of-Code-Make-Patterns-With-Code-and-CAD-in-

https://www.autodesk.com/campaigns/education/iste

Codecraft

https://craft.buzzcoder.com/

https://inkstitch.org/

https://www.blockscad3d.com/

https://www.youtube.com/watch?v=gAvgpbA3hsA&feature=youtu.be

GCODE
https://www.autodesk.com/industry/manufacturing/resources/manufacturing-engineer/g-code
https://www.cnccookbook.com/cnc-programming-g-code/#chapter5
https://all3dp.com/g-code-tutorial-3d-printer-gcode-commands/
https://gcodetutor.com/gcode-tutorial.html
https://makezine.com/2016/10/24/get-to-know-your-cnc-how-to-read-g-code/
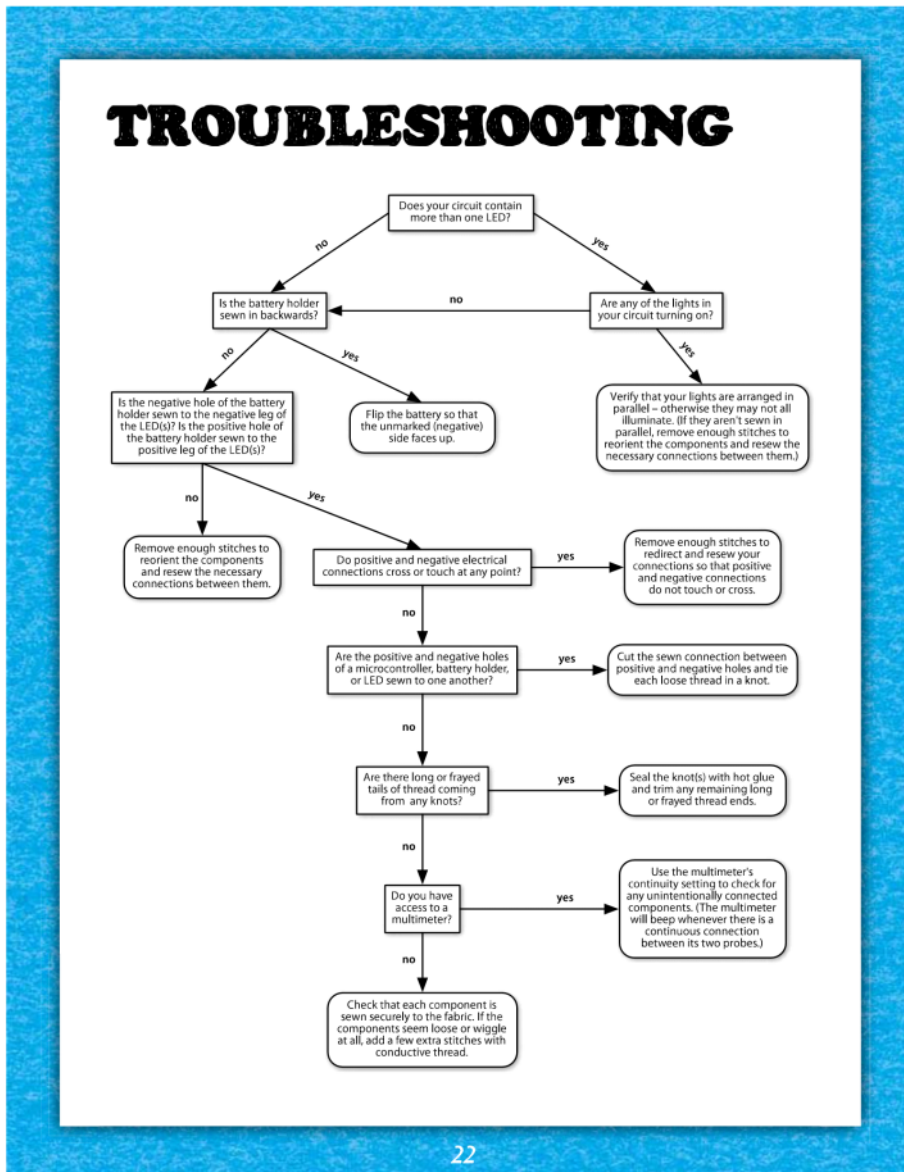
Circuit Basics

1. Glowing Pin

2. Parallel Circuits

STITCHING the Loop — An Electronic Textiles Unit in Exploring Computer Science	*students explore electronic textiles (e-textiles): articles of clothing, accessories, or home furnishings with embedded electronic and computational elements.* From <http://www.exploringcs.org/e-textiles>	http://www.exploringcs.org/e-textiles
ELECTRO FASHION	Extensive support	https://www.kitronik.co.uk/blog/e-textiles-wearables-tutorials-resources/
soft circuits — getting hands-on with, a workshop facilitator's guide	An e-textile workshop facilitators guide by Emily Lovell (e-book)	http://alumni.media.mit.edu/~emme/guide.pdf http://highlowtech.org/?p=1003 guide
gella craft	Projects that use conductive thread to connect electronic components together directly on fabric. Soft, flexible, and sometimes wearable.	https://www.gellacraft.com/diy/
	Working with conductive thread	https://www.youtube.com/watch?v=XT5ygUt8Cbk https://learn.adafruit.com/conductive-thread/ https://learn.sparkfun.com/tutorials/lilypad-basics-e-sewing

Glowing Pin

A SIMPLE CIRCUIT
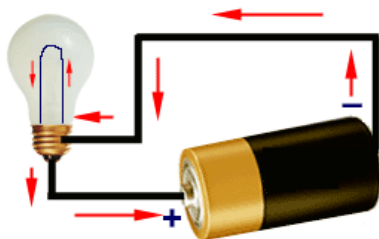### connecting a light and a battery

Overview

Students are introduced to circuits and sewing with electrically conductive thread. Each student will create his/her first soft circuit, connecting a light and battery.

WARMUP

What Is Electricity

https://youtu.be/oB1v-wh7EGU

Simple circuit with light

| W.A.L.T We Are Learning To...	W.I.L.F What I'm Looking For...	WORD POWER
• Understand basic circuits and polarity • Use a running stitch • Design a pin badge		Electron Circuit Current Polarity

Materials and Tools

- LilyPad Coin Cell Battery Holder
- 3V Coin Cell Battery
- 1 Adafruit LED Sequin (carefully snap out from the panel of five)
- Conductive Thread
- Needle
- Pin Template (1 piece) - see Planning Your Project for printable downloads
- Felt (you will need at least 6-8cm)
- Pin Back
- Scissors
- Glue
- Pen, marker, or chalk
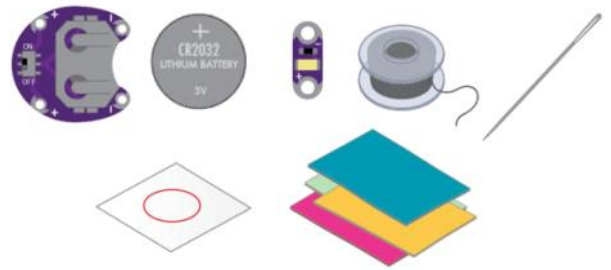
Wearable Tech Kit P...
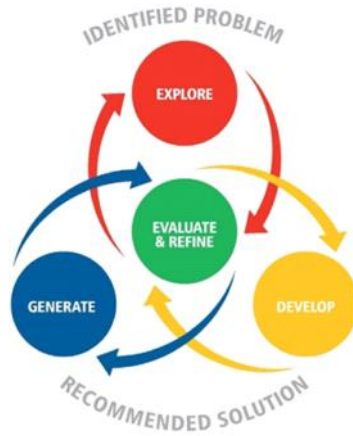
Sewing Skills
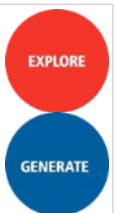
How to Sew: Running Stitch

- dividing thread
- practice running stitch

Extension

How to Sew: Backstitch

STEP 1 - Planning Your Project

GlowingPin
 Template
- Create your design ideas by sketching 3 design ideas within each circle
- seek TAG feedback from a friend
- evaluate and refine to create a fourth and final design
- cut out the pin template
- cut out your final design, but leave the edge slightly larger, as this will be the top layer of the pin.

STEP 2 - Understanding Your Circuit
https://learn.sparkfun.com/tutorials/glowing-pin

Understanding Your Circuit

This project is an example of a basic circuit – an electrical loop that travels from a power source along a path (called a trace) to a component (or components) that uses the electricity to function, and then back to the power source. For our project, we'll use an LED (Light-Emitting Diode). When this loop is completed by stitching the pieces together with conductive thread traces, electricity from the power source is able to flow from the positive (+) side of the battery through to the LED (lighting it up) and back to the negative(–) side of the battery. This electric flow is called current. As you build projects with LilyPad pieces, you will learn different ways to design conductive thread circuits and experiment with additional pieces that help control or use the flow of electricity.
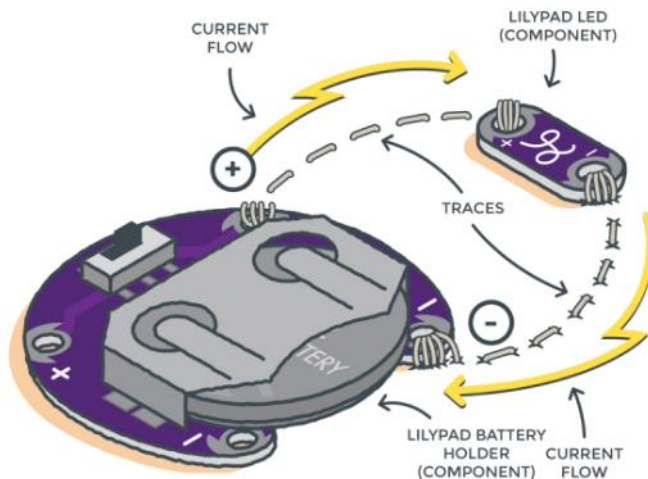

In this circuit, the LED is installed facing the fabric to shine through the other side. Other LilyPad projects may use LEDsfacing outward from the fabric.

Take a look at the LED and battery holder. Notice that the silver sew tabs are labeled either positive or negative. Many electronic components have polarity, meaning electric current can only flow through them in one direction.
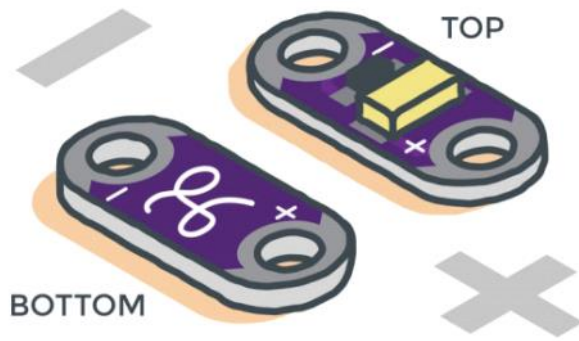
If hooked up incorrectly, they will not light up. The batteries in this kit are also polarized; they have a positive and negative side. Always check the labels on LilyPad pieces to make sure they are correctly oriented before sewing together a circuit.
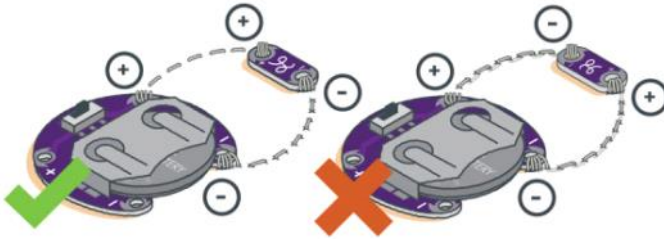
From <<https://learn.sparkfun.com/tutorials/glowing-pin>>

STEP 3
Trace the pin template on felt and cut out. We'll be building our circuit on the felt piece, then adding a decorative layer of fabric with designs on top of it.

STEP 4 - Arranging Your Circuit

Arranging Your Circuit

 Don't put your battery in yet.

Position the battery holder with the ON/OFF switch to the left side and the bottom two sew tabs close to the bottom edge of the felt. Use a small dot of hot glue in the center of the holder to attach it to the felt, as shown. Gluing the battery holder on this way leaves room for placing the LilyPad LED on the felt.

Remember: Glue is great for keeping your components in place, but it can interfere with your circuit. Try to keep glue clear of sew tabs.
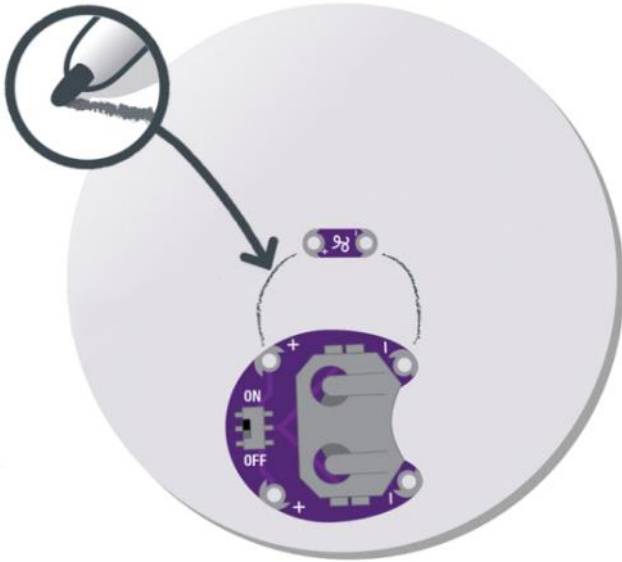
While planning the LED's placement, note that it will need to be slightly above the center or toward the top half of the fabric so it doesn't touch or overlap the battery holder.

If you are using one of SparkFun's pre-made designs, hold the design over the felt, and use a fabric marker or chalk to mark where the LED should be placed to shine through. Gather one LED (snap off of an LED panel if needed).

For this project only, we'll place the LED with the lens facing the felt, allowing it to shine through to the other side. The back of the LED has a cursive L, which should be facing you. For the rest of the projects in the LilyPad Sewable Electronics Kit, we'll install the LED with the lens up (away from the felt).

Before attaching the LED, rotate it so the (+) and (–) symbols on the LED board align with the (+) and (–) symbols on the battery holder's sew tabs. Use a small dab of hot glue on the center of the front of the board to secure to the felt. Be careful not to cover the holes with glue – we'll need those to sew through later.

From <https://learn.sparkfun.com/tutorials/glowing-pin>

STEP 5 - e-sewing basics

https://youtu.be/vD6KsrWi9vo

https://learn.sparkfun.com/tutorials/lilypad-basics-e-sewing

STEP 5 - Stitching It Together

Stitching It Together

If you need help sewing with conductive thread, this tutorial covers the basics.
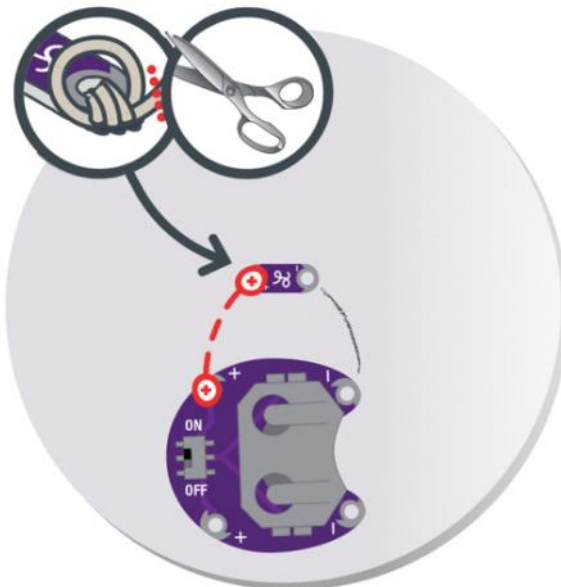
STEP 1:

Cut a long piece of conductive thread, thread the needle, and tie a knot at the end. Now, it's time to connect the LED to the battery holder with the conductive thread. One line of stitching will connect the positive (+) side of the battery holder to the positive end of the LED. A second line of stitching will connect the negative (–) sides of the boards and complete the circuit.
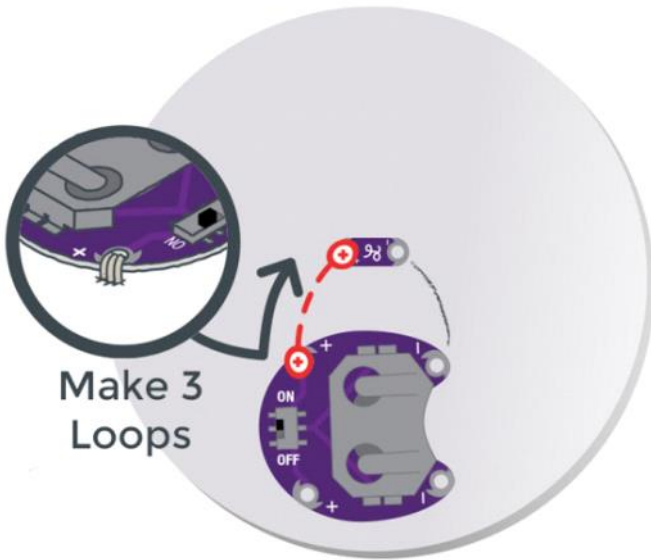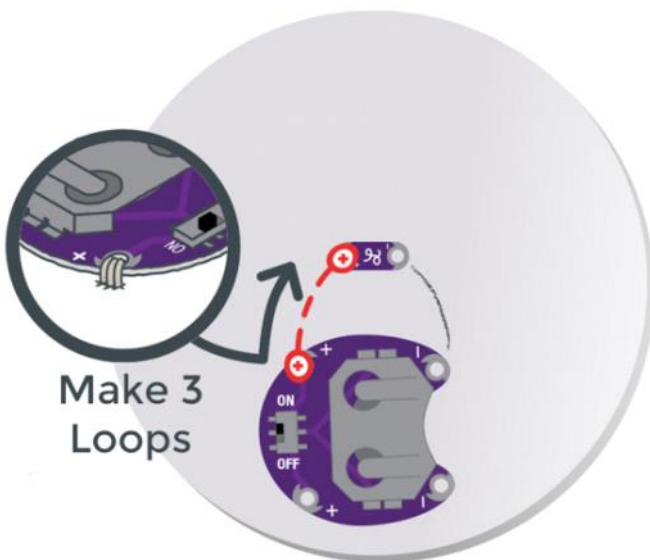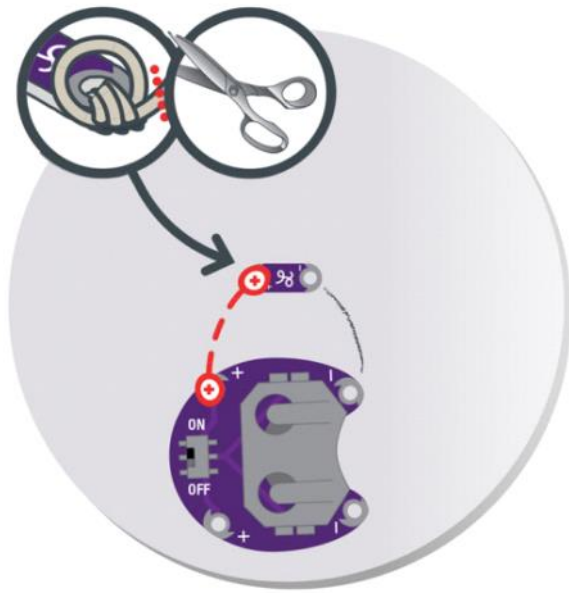
Make 3
Loops

STEP 2:

Finish your first line of stitching by tying a [finishing knot](#) on the sew tab and trimming your excess thread.

Don't forget! You'll need to tie a new knot at the end of your thread before you begin the next section of stitching.

STEP 3:

Repeat the process with a new piece of thread to connect the negative side of the battery holder to the negative end of the LED. Be careful not to let the stitches touch the path used for the positive connections, as that would cause a short circuit. Trim any thread tailsbefore testing. Now, the circuit is complete!
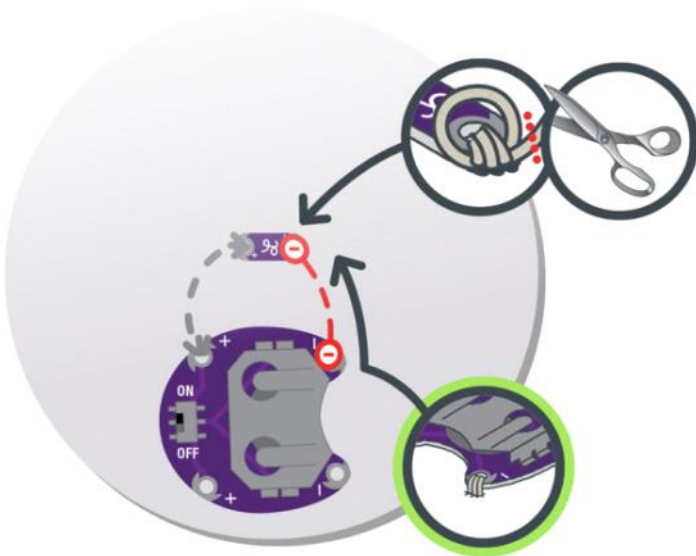
STEP 6 - Installing Your Battery and Testing

Stitching It Together

If you need help sewing with conductive thread, this tutorial covers the basics.

STEP 1:

Cut a long piece of conductive thread, thread the needle, and tie a knot at the end. Now, it's time to connect the LED to the battery holder with the conductive thread. One line of stitching will connect the positive (+) side of the battery holder to the positive end of the LED. A second line of stitching will connect the negative (–) sides of the boards and complete the circuit.

STEP 2:

Finish your first line of stitching by tying a finishing knot on the sew tab and trimming your excess thread.

Don't forget! You'll need to tie a new knot at the end of your thread before you begin the next section of stitching.

STEP 3:

Repeat the process with a new piece of thread to connect the negative side of the battery holder to the negative end of the LED. Be careful not to let the stitches touch the path used for the positive connections, as that would cause a short circuit. Trim any thread tailsbefore testing. Now, the circuit is complete!
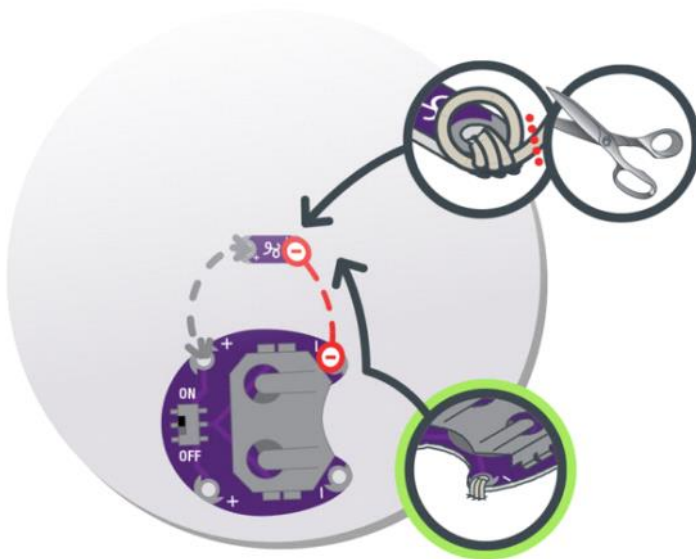
Installing Your Battery and Testing

Insert the coin cell battery with the positive side facing up, labeled as (+), into the opening on the battery holder acrossfrom the ON/OFF switch. Turn on the switch to allow current to flow through the circuit. Turn off the switch when not in use to prolong battery life.
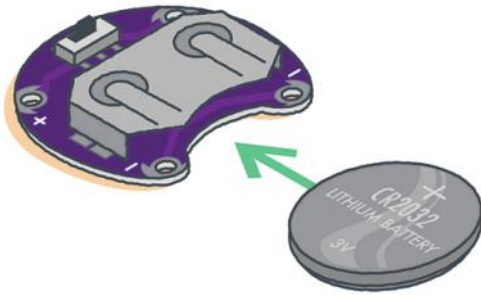
How to place a battery in a LilyPad Battery Holder..

Troubleshooting

With any electronics project, there are times you will have to troubleshoot if your circuit isn't working. If your circuit isn't lighting up, try a new battery or check that your project is switched on. Check your sewing for any loose threads or ends that may be touching other parts of your circuit and causing a short circuit. Learn more about troubleshooting your project in the LilyPad Basics: E-Sewing tutorial.

From <https://learn.sparkfun.com/tutorials/glowing-pin>

STEP 7 - Finishing Touches

Finishing Touches

 Always remove your battery when working on your project to avoid damaging your components.
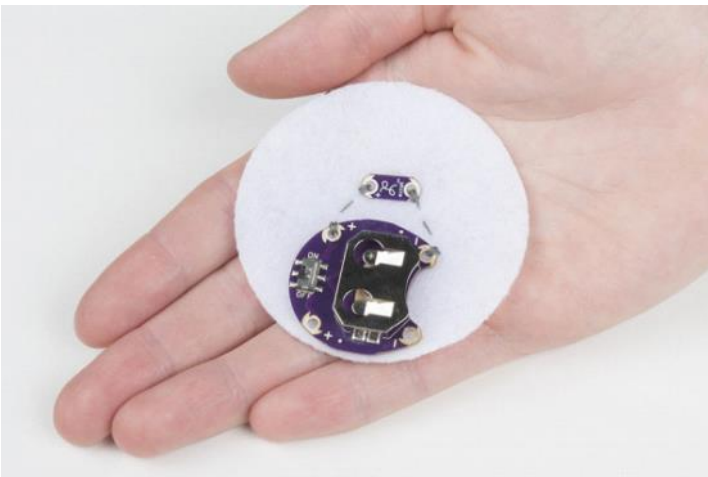
With the battery removed, use a hot glue gun or thread to attach your fabric design over your felt circle so the LED shines through. Draw a design on the fabric, if you'd like (or see design templates in the Planning Your Project step). Turn the project over, and attach an adhesive pin back to finish up your wearable art!

Here are a few examples of creative glowing pins:

Discuss with your partner. Make reflection notes if you want.

What did you learn? Evidence?

• Understand basic circuits and polarity
• Use a running stitch
• Design a pin badge

## How can you use what you have learned in the future?

What do you want to know more about?
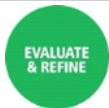
Sewing with Conductive Thread

The examples in this tutorial will walk through creating a hand sewn conductive thread circuit connecting a LilyPad Coin Cell Battery Holder to LilyPad LEDs. These techniques will be useful for connecting any LilyPad pieces together.

Most LilyPad projects use conductive thread to complete electrical circuits. The following sections will introduce you to som e basic sewing techniques as well as a few special pointers for using conductive thread to build working circuits. Even if you're already familiar with using a needle and thread, this s ection may still be useful to you, specifically where it pertains to sewing with LilyPad parts.
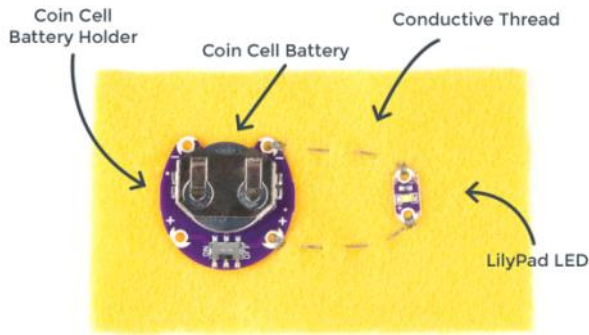
Parts of a LilyPad Circuit

Securing Your Components

Each LilyPad piece has large holes with conductive silver pads called sew tabs. These tabs are designed to give you plenty of room to pass a needle and thread through the hole several times. Before you begin stitching your circuit, identify the sew tabs you would like to connect, and orient them so t hey are easily accessible in your design. If following along with SparkFun templates, the pieces will have a specific location on the design for both ease of sewing and visual appeal.

sew tabs x4
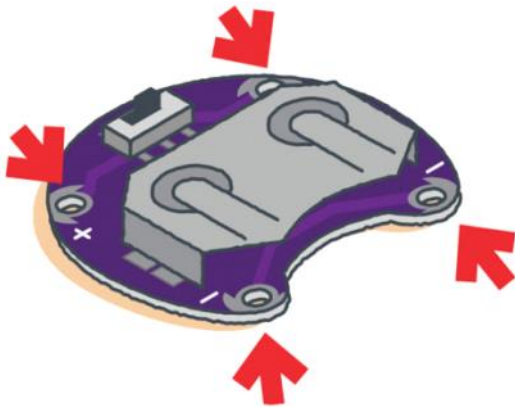
We recommend using a small dot of hot glue (preferred) or fabric glue to attach each LilyPad piece to the fabric to keep it f rom moving while you sew. Make sure not to accidentally seal up the holes in the sew tabs.
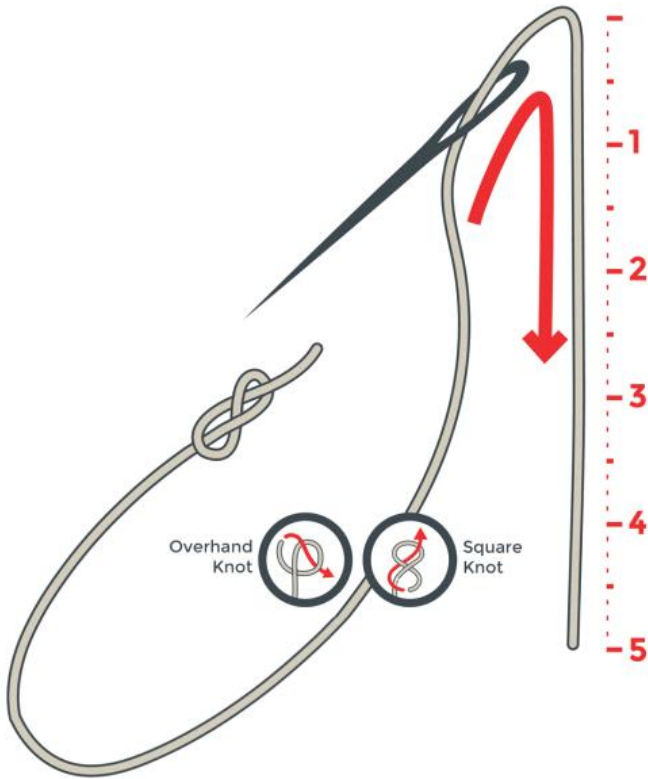
To help plan where the stitches will go, you can use a marker to draw lines between the components.

Threading a Needle

Cut a piece of conductive thread approximately 2 feet long. Push one end of the thread through the eye (opening) of the needl e and pull through, leaving a tail of about 5 inches.

Before you begin sewing your project, you will need to tie a knot at the long end of the thread to prevent you from completel y pulling it through the fabric. You can tie a simple overhand or square knot. The next sections will explain a few other knot methods.

Starter Knot

A starter knot is a method of starting your stitch with a knot directly on your fabric.
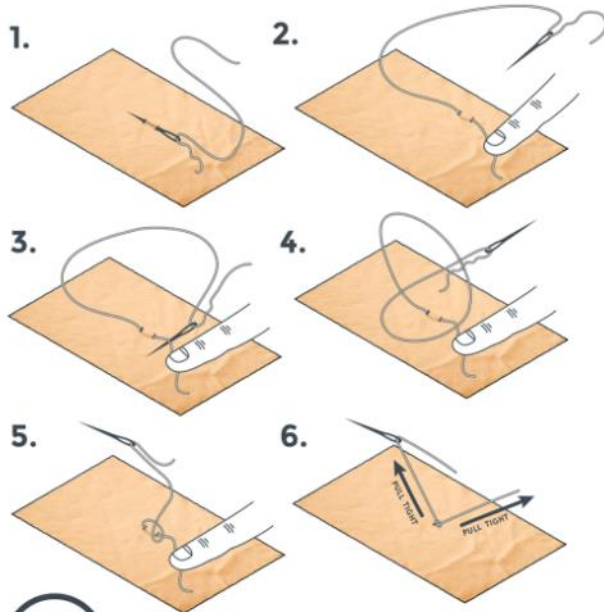
Repeat, making a few more loops through the fabric before trimming the loose tail.

Quilter's Knot

The slightly more advanced quilter's knot is a way to tie a quick, secure knot on the thread. After some practice, this knot can be tied very quickly.
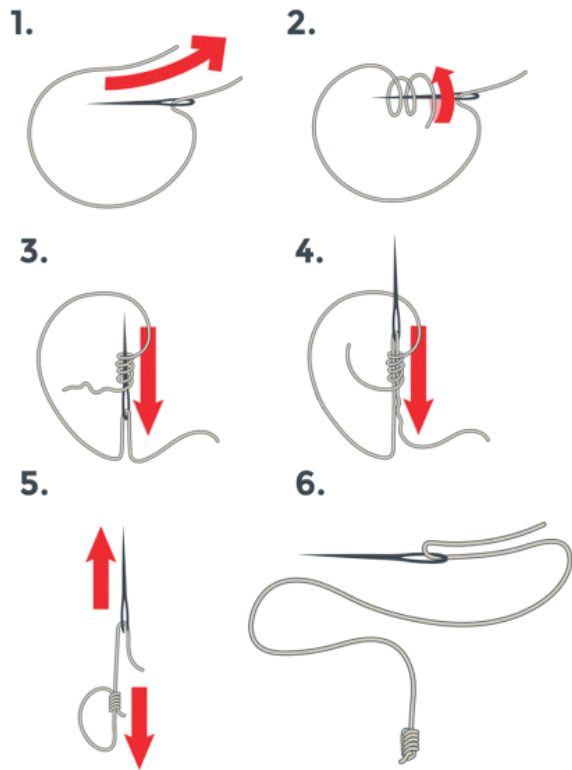
Connecting To LilyPad Sew Tabs

We'll stitch conductive thread around LilyPad sew tabs in our circuits to connect the pieces together. It's important that yo u make three to four loops each time you connect your thread around an empty sew tab and pull the thread snug with each pass. This ensures you have made a strong electrical and ph ysical connection between the thread and the sew tab. Pull loops tight before continuing your stitch.


Repeat to make three to four loops.

Don't cut your thread yet. You'll need it to connect the next piece.
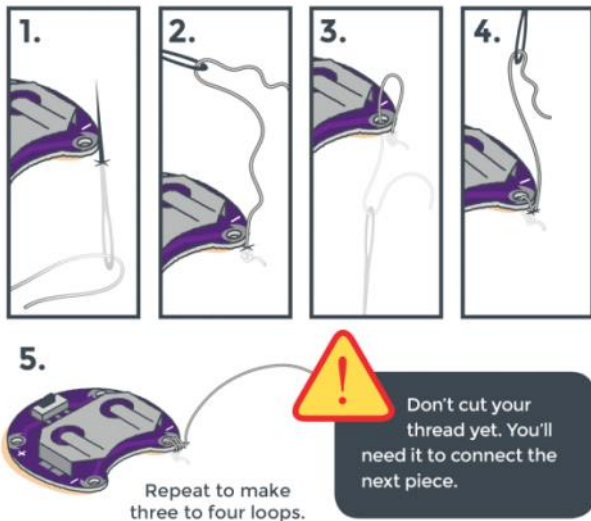
Sewing Basics

After sewing loops around a sew tab, a running stitch will enable you to connect LilyPad pieces together with a continuous le ngth of conductive thread. Follow these steps:

Push the needle through the fabric about ¼" in the direction of your stitch path.
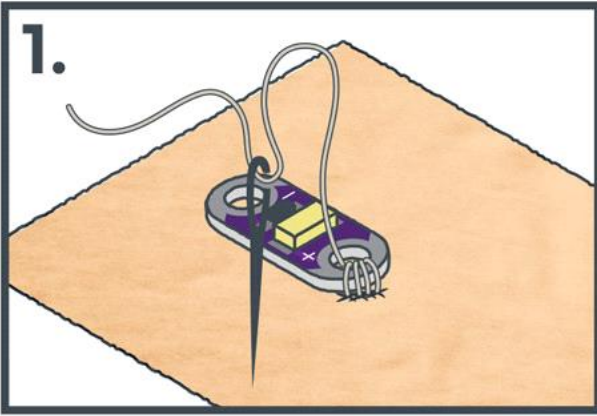
Pull the slack of the thread through so it sits flush with the fabric.
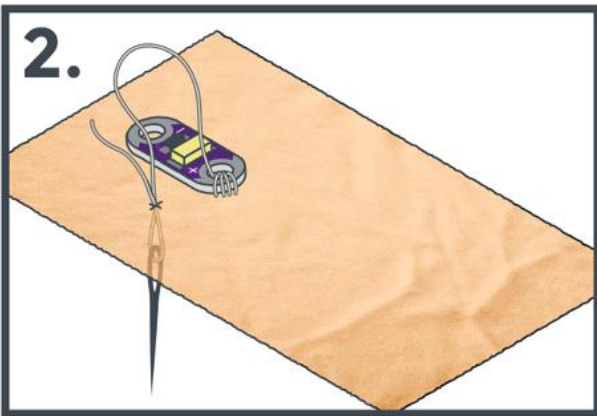
Push the needle back up through the fabric another ¼" along the stitch path.
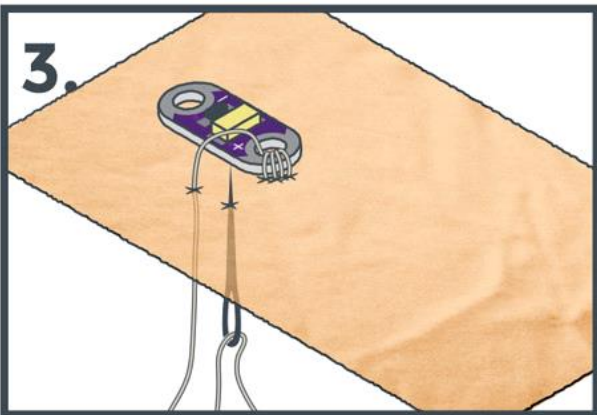
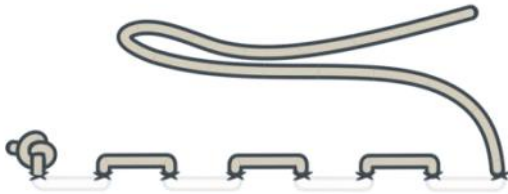Pull the slack of the thread through so it sits flush with the fabric.
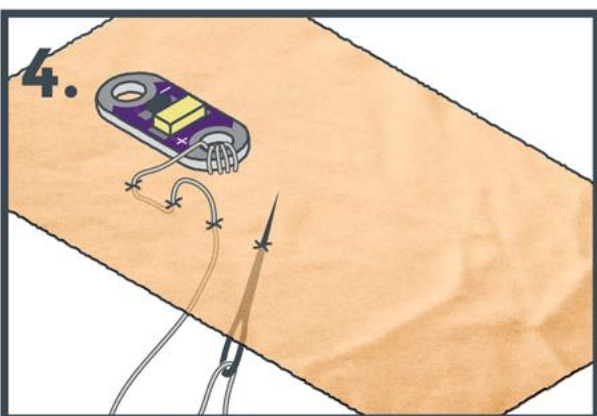
Repeat this process to travel along the path to the next LilyPad piece you want to connect to, keeping stitches evenly spaced .
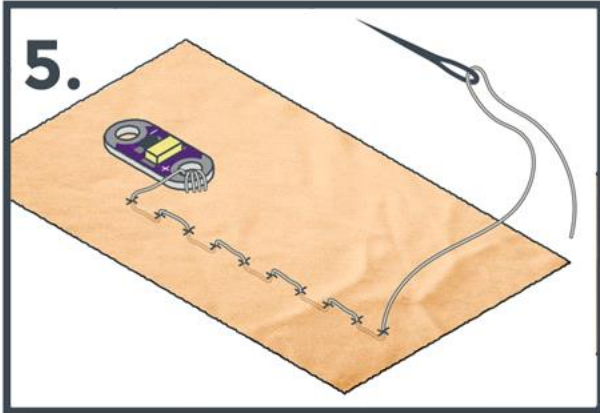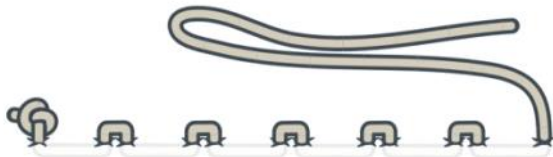
Running vs. Hidden Stitch

In a basic running stitch, the stitching will be even on both sides of the fabric.

To hide the stitches so that they are not seen on the outside of the project, make a longer stitch on the back of the project and a very small stitch on the front of the project. This method is called a "hidden stitch."


As you sew, flip your fabric over every so often to make sure the conductive thread isn't getting knotted or tangled. If you are just starting out with sewing, your stitching may take some practice before it feels comfortable or easy. Remember to be patient with yourself and take your time while stitching. I f your thread breaks, you can stitch onto existing conductive thread to continue the electrical connection.

Connecting LilyPad Pieces

Both running and hidden stitches will enable you to connect LilyPad components together with a single length of conductive th read. To connect two LilyPad pieces, continue stitching after completing three to four loops around the sew tab.
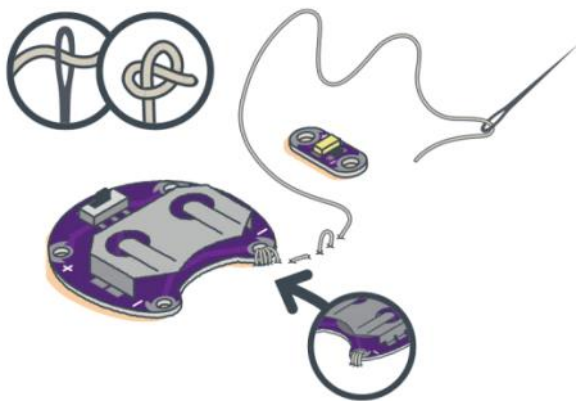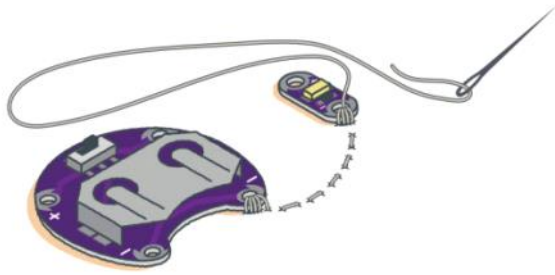
Connecting Multiple LilyPad Pieces

To connect more than two LilyPad pieces, instead of trimming your thread and starting over, continue stitching to the next pi ece, make three to four loops, and repeat as necessary. There is no need to use a new length of thread if the pieces will share a connection.
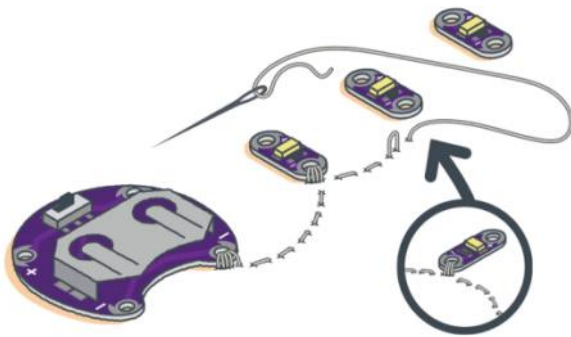
Finishing Your Connection

When you have completed connecting components, use a finishing knot. Thread tails can cause electrical shorts, so be sure to trim your thread afterward.

Finishing Knot

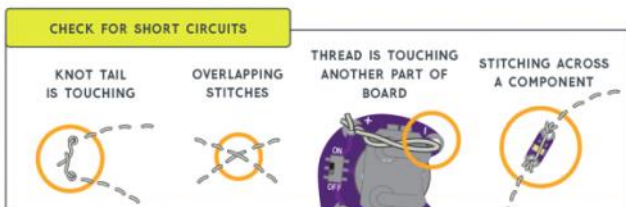**Repeat this finishing loop two times before cutting.**
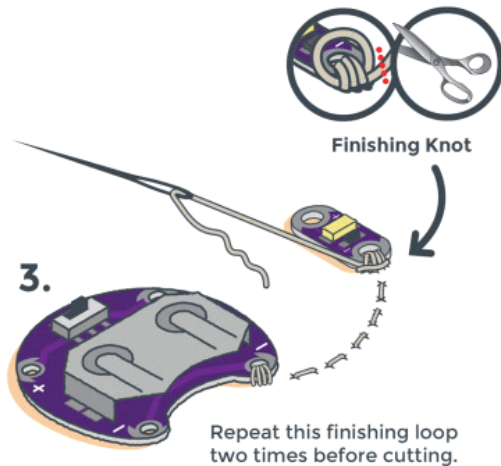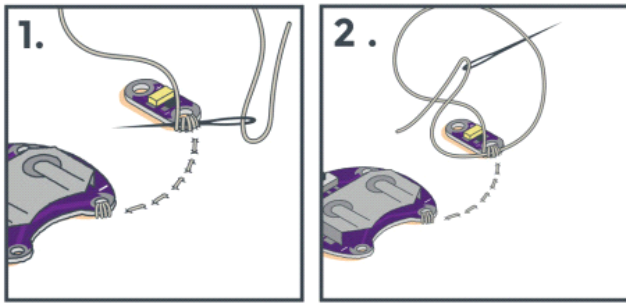
Checking for Conductive Thread Short Circuits

Watch out for any loose threads or knot tails in your project. If any piece of the conductive thread from the positive (+) si de of your circuit accidentally touches the negative (−) side, it can cause a short circuit. A short circuit connects the battery to itself and bypasses the rest of your project causing an unwanted amount of current draw from the battery. Stitching directly over stitches in another part of the circuit can also cause a short.
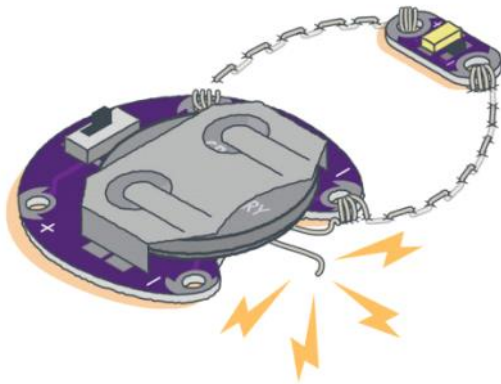

One of the most common short circuits in e-sewing happens when a loose thread tail near the negative tab on the battery holder touches the battery. Always check your st itching before powering your project.

It's important that your stitches do not cross over each other or touch other parts of the circuit. The batteries used in the se projects shouldn't burn or shock you if they short circuit (although they may heat up), but higher voltage projects or power sources could be dangerous.

CHECK FOR SHORT CIRCUITS

| KNOT TAIL IS TOUCHING | OVERLAPPING STITCHES | THREAD IS TOUCHING ANOTHER PART OF BOARD | STITCHING ACROSS A COMPONENT |

## Installing Your Battery and Testing Your Finished Circuit

Once all your pieces are connected with conductive thread, your finished circuit needs a power source. Install your coin cell battery, positive (+) side up, into the battery holder. The image below shows how to place a battery in a LilyPad Coin Cell Battery Holder.
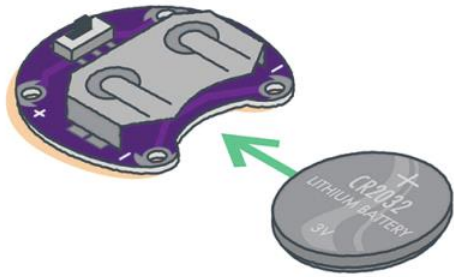
Always remove your battery if you need to continue working on your project to avoid damaging your components.

After completing the conductive thread connections, switch your circuit on, and see what it can do! If the circuit fails to w ork, you may have a short, a loose connection, a reversed component, or even something as simple as a dead battery.

When you turn on the battery holder switch, current flows through the conductive thread to the other parts of your circuit.
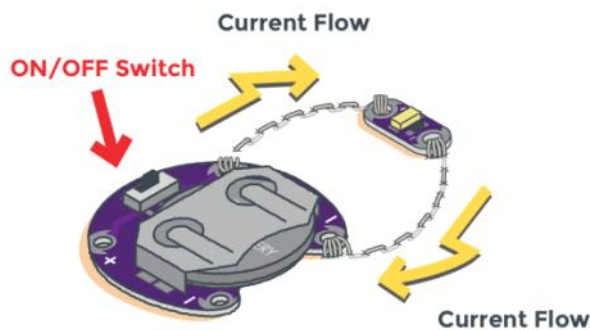
Read more about current flow and electricity here:

- What is a Circuit?
- What is Electricity?

Or continue on to of the LilyPad Sewable Electronics Kit to build your own circuit.

Troubleshooting

As you work on e-sewing projects, you may encounter problems such as loose connections that keep LEDs from lighting or cause your circuit to m alfunction. Most LilyPad tutorials have a troubleshooting section to help you identify and solve problems with your circuit.

Circuit only working sometimes? Check for loose connections.

If the conductive thread is not making a tight connection to the LilyPad piece's sew tabs, current will not be able to flow t hrough consistently. If the project moves, the conductive thread may pull away from the sew tab and disconnect the circuit. To fix, pull stitching tight with tweezers or a needle if p ossible. You may also sew over the top of existing thread to create more tension and hold the thread securely to a sew tab.
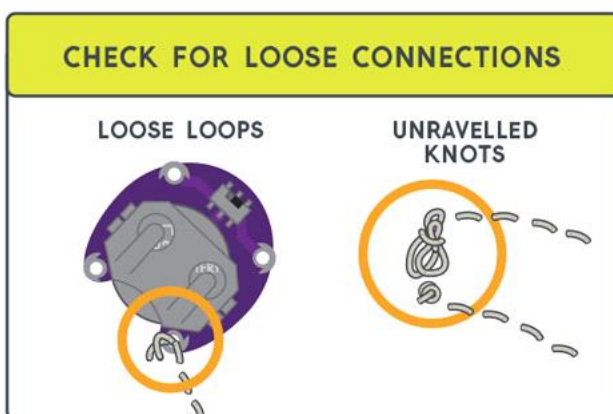
Circuit not working? Double check your polarity.

Some LilyPad components are polarized, meaning electric current can only flow through them in one direction. If sewn into the circuit incorrectly, they will not f unction. Double check the labeled sew tabs before you stitch to make sure they are oriented correctly.

**CHECK FOR REVERSED POLARITY**
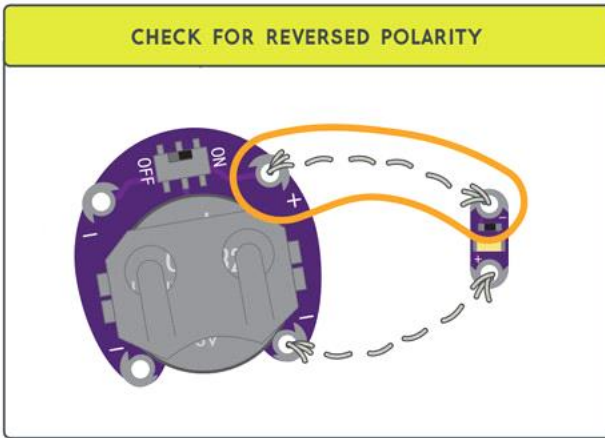
Other issues to check for:

- Make sure the switch on your battery holder is in the ON position.
- Check to see if your battery is dead. You can do so with a multimeter. Try installing a spare battery.
- If following a project template, double check that the components are connected together in the right configuration

If you are still having trouble, you can use a multimeter to check for continuity or issues with your circuit. Our How To Use a Multimeter tutorial will help you get started.

Click here to view a pdf of Troubleshooting pages from the LilyPad Sewable Electronics Kit.

Caring For Your Project

Unlike copper wire, which has a coating, conductive thread is uninsulated. This means the thread behaves like bare wire and c an accidentally short circuit if stray strands come in contact with each other.
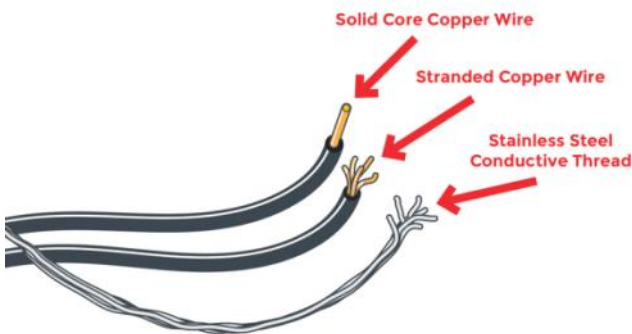
To avoid any accidental short circuits after the project is stitched and tested, we recommend covering the thread with a thin layer of fabric glue, fabric paint, or an additional layer of fabric. This is especially important for projects that are wearable or three -dimensional. Never work on a metal surface when using conductive thread. For more detailed insulation instructions, take a look at this tutorial:

Insulation Techniques for e-Textiles

JANUARY 22, 2015

Learn a few different ways to protect your conductive thread and LilyPad components in your next wearables project.
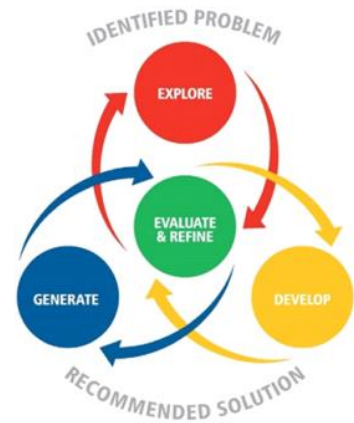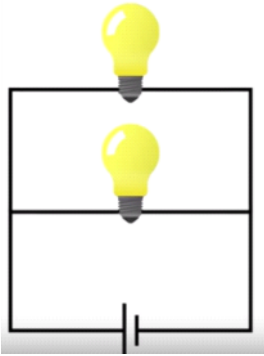
Cleaning Your Project

If your project gets dirty, remove the battery and carefully hand wash with mild detergent. Let your project air dry; a dryer can damage the LilyPad pieces or stitching.

From <https://learn.sparkfun.com/tutorials/lilypad-basics-e-sewing>

2. Parallel Circuits

Tuesday, 5 February 2019   1:27 PM

PARALLEL CIRCUITS

Overview

Students come to understand what constitutes a parallel circuit. Each student will leverage this knowledge as he/she fabricates a wristband or mask which incorporates multiple lights and turns on only when it is worn.

WARMUP

What is electricity?
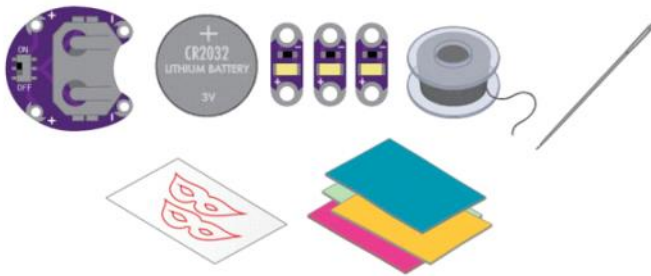What is Polarity?
How do you make a basic circuit?
https://youtu.be/Bs-npHUC66M

W.A.L.T
We Are Learning To...

• understand that lights arranged in a parallel configuration each receive the same amount of voltage.
• understand that multiple lights within one circuit should be arranged in parallel to ensure that they all light up.

W.I.L.F
What I'm Looking For...
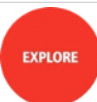
Materials and Tools

- LilyPad Coin Cell Battery Holder
- 3V Coin Cell Battery
- 3 LilyPad LEDs (carefully snap out from the panel of five) Conductive Thread
- Needle
- Mask Templates (2 piece) - see Planning Your Project for printable downloads
- Elastic Cord
- Felt (one 9"x12" sheet of craft felt will make one mask; try mixing colours for a more festive mask)
- Pen, marker, or chalk
- Scissors
- Hot glue gun (with extra glue)
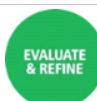- Optional: Craft supplies for decorating (feathers, sequins, buttons, etc.)

[wristband Medium](#)

Mask	Wristband	
STEP 1 - Planning Your Project - sketch your design https://learn.sparkfun.com/tutorials/illuminated-mask	a. Cut out a long strip of paper, as wide as you want your wristband to be. b. Wrap the strip around your wrist and trim it to the correct length – it should overlap by about 2-5 cm to leave enough room for the snaps and battery holder. c. Sketch the electrical connections and placement of components for their project, which will incorporate three lights. This may look similar to the example pictured here (see below), or it can vary. The electrical traces may spiral and/or travel anywhere on the fabric, so long as positive and negative connections do not touch or intersect. d. Cut felt to the same size as paper e. Transfer their sketched circuit design onto your piece of felt with a pen or marker	DEVELOP
STEP 2 - Understanding Your Circuit https://youtu.be/Bs-npHUC66M	In order to add additional lights to a circuit, the lights must be arranged in parallel. This means that the first light's positive end is connected to the second light's positive end. Likewise, the first light's negative end should be connected to the second light's negative end.	EXPLORE
STEP 3 - Arranging Your Circuit	follow the marked pattern to sew the connections between snaps and components	GENERATE
STEP 4 - Stitching It Together	follow the marked pattern to sew the connections between snaps and components. Make sure that the snaps are connected.	
STEP 5 - Installing Your Battery and Testing		
STEP 6 - Finishing Touches		

Discuss with your partner. Make reflection notes if you want.

What did you learn? Evidence?

• understand that lights arranged in a parallel configuration each receive the same amount of voltage.
• understand that multiple lights within one circuit should be arranged in parallel to ensure that they all light up.

How can you use what you have learned in the future?

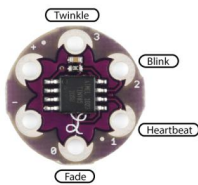## What do you want to know more about?

Extension - adding a microprocessor
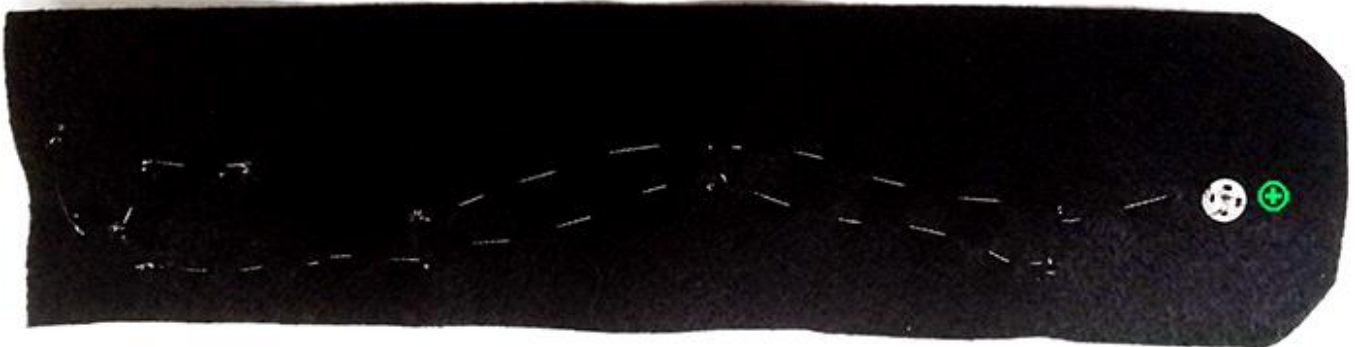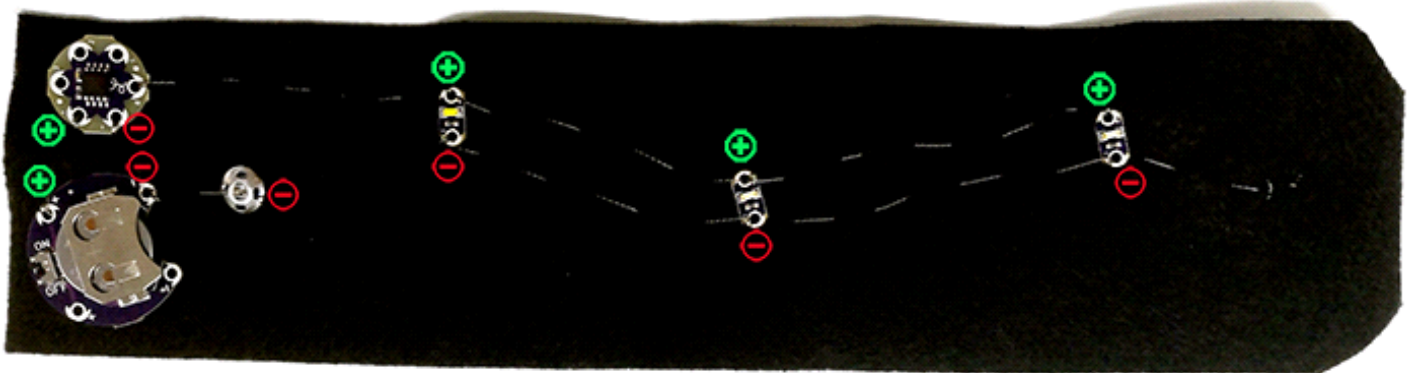
1. use this template

writband
template

2. Sew in

https://youtu.be/jd2I9MGPjqI?list=PL_lmSbKUwY4Oj8T84po6qkPj6OkkB9IsE

3. Adding a Microcontroller

Tuesday, 5 February 2019   2:08 PM

Install the drivers for Circuit Playground Express before next Week: https://learn.adafruit.com/adafruit-circuit-playground-express/adafruit2-windows-driver-installation

adafruit_dri
vers_2.3....

Overview

Students are exposed to microcontrollers and the concept of programmability. Each student will make a personalized light-up patch, using a sewable pre-programmed microcontroller to control the behaviour of an LED.

WARMUP

What kind of circuit is this?
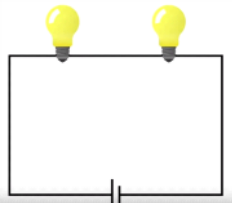
Is the same amount of power going through each bulb?

How about this one?
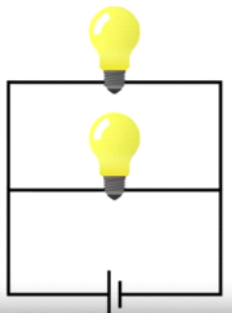
W.A.L.T
We Are Learning To...

• understand what a microcontroller is and how programming can add interactivity and dynamic behaviour to an e-textile project.

W.I.L.F
What I'm Looking For...

Materials and Tools

- LilyTiny
- LilyPad Coin Cell Battery Holder
- 3V Coin Cell Battery
- 3 LilyPad LEDs (carefully snap out from the panel of five) Conductive Thread
- Needle
- Monster template - download and print the pdf template.
- Felt - a 9x12 sheet of craft felt will make one monster.
- Scissors
- Hot glue gun
- Cotton or embroidery thread
- Fiber fill or something to stuff the monster with - such as scrap fabric
- Optional - extra craft supplies to decorate (feathers, sequins, googly eyes, etc).

Sewing Skills

[How to Sew: The Blanket Stitch](#)

[How to Sew: Blanket Stitch Appliqué](#)

[How to Sew: Beaded Blanket Stitch](#)

Others
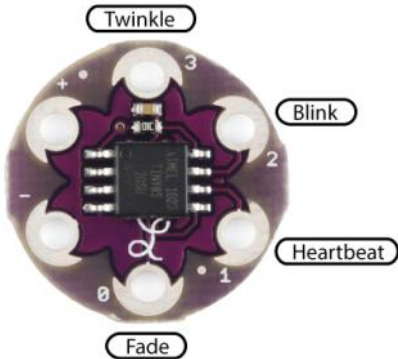
[How to Sew: Whip Stitch Appliqué](#)

Hand Embroidery for Beginners

PDF Embroider stitches

I DO
WE DO
YOU DO

Step 1: Cut Out Template Modify if necessary Sketch where components will go https://learn.sparkfun.com/tutorials/lilytiny-plush-monster	**DEVELOP**
Step 2: Place Components **Step 3: Stitch Power and Ground Lines**	**GENERATE**
Step 4: Exploring the LilyTiny Pins Microcontroller as a miniature computer that can be programmed to control certain behaviours within a circuit. The microcontrollers in this activity have been pre-programmed to control the behaviour of an LED, making it:	**EXPLORE**
Step 5: Place LEDs **Step 6: Connect LEDs to LilyTiny** **Step 7: Sew and Stuff Monster**	**GENERATE**
REVIEW REFLECT RESPOND Discuss with your partner. Make reflection notes if you want. What did you learn? Evidence? • understand what a microcontroller is and how programming can add interactivity and dynamic behaviour to an e-textile project. How can you use what you have learned in the future? What do you want to know more about?	**EVALUATE & REFINE**

Homework

Install the drivers for Circuit Playground Express before next Week: https://learn.adafruit.com/adafruit-circuit-playground-express/adafruit2-windows-driver-installation

Circuit Playground Express

Friday, 1 February 2019   12:44 PM

Start here
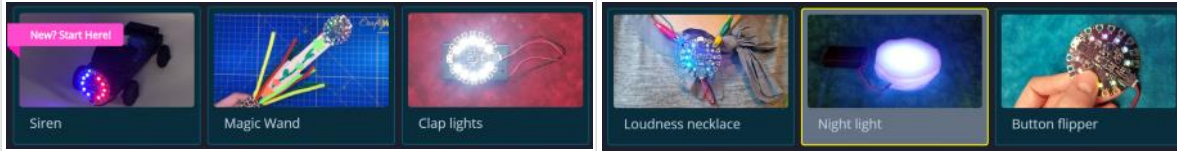
Explore
- WALT/WILF
- Overview/Concepts
- tutorial

Develop
- how could you use
- mods
- sketch/outline/spec

Generate
- modify code according to your ideas
- test

Eval refine
- what did you learn? Evidence?
- how can you use what you have learned in the future?
- what do you want to know more about?

https://makecode.adafruit.com/

Wearable Projects ideas using Circuit Playground Express

	Make a tutu that reacts to your dancing	https://learn.adafruit.com/dance-reactive-tutu-sparkle-skirt
	Make a sparkly t-shirt that sparkles with real lights. The lights are triggered by the Circuit Playground's shake sensor, so they twinkle when you move, dance, jump, or wiggle.	https://learn.adafruit.com/easy-sparkle-pocket-t-shirt
	change the pitch and volume by tilting the Circuit Playground Express in various directions.	https://learn.adafruit.com/the-tilt-trumpet

StarFlower Neopixel Strand with MakeCode	Make beautiful 3d printed glowing flowers to string around	https://learn.adafruit.com/starflower-neopixel-strand>
Make It Sense	This guide will help you use the Circuit Playground Express sensors quickly, with code examples, so you can experience how the sensors work and how you might wish to use the sensors in your own project. From <https://learn.adafruit.com/make-it-sense>	https://learn.adafruit.com/make-it-sense>
Spinning Logo	The two buttons on the Circuit Playground control the direction of the spinning wrenches but you can easy modify the code to respond to any of the on board sensors! From <https://learn.adafruit.com/spinning-logo>	https://learn.adafruit.com/spinning-logo>
Circuit Playground Express Laser Tag	The Circuit Playground Express has a built in infrared (IR) transmitter and receiver. With a pair of Circuit Playground Express boards, you can send and receive messages that will cause the boards to run prepared operations. From <https://learn.adafruit.com/circuit-playground-express-laser-tag>	https://learn.adafruit.com/circuit-playground-express-laser-tag>
NeoPixie Dust Bag with Circuit Playground Express	It sparkles and blinks, and you can squeeze the touch sensor wire to change the colors on the beautifully twinkling NeoPixel ring! From <https://learn.adafruit.com/NeoPixieDustBag_CPX>	https://learn.adafruit.com/NeoPixieDustBag_CPX>
NeoPixels with MakeCode	The Circuit Playground Express is equipped with 10 NeoPixel LEDs that can be controlled with code to create tons of cool visual effects. In this guide, you will learn the various ways to use the Microsoft MakeCode editor to use those LEDs. The guide also covers how to use additional NeoPixel strips. From <https://learn.adafruit.com/neopixels-with-makecode>	https://learn.adafruit.com/neopixels-with-makecode>
Sword & Wand Prop Effects with Circuit Playground	Want to upgrade your prop sword/battle axe/light saber/magic wand with motion reactive light animation and sound effects? From <https://learn.adafruit.com/sword-and-wand-prop-effects-with-circuit-playground>	https://learn.adafruit.com/sword-and-wand-prop-effects-with-circuit-playground>
		https://learn.adafruit.com/category/wearables https://create.arduino.cc/projecthub/projects/tags/wearables?page=5
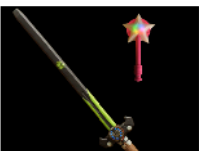
https://www.hackster.io/search?i=projects&q=wearables

https://magazines-static.raspberrypi.org/issues/full_pdfs/000/000/011/original/HackSpaceMag04.pdf?1518787630

https://makezine.com/category/technology/wearables/

https://www.instructables.com/id/Wearable-Electronic-Intro-Projects/

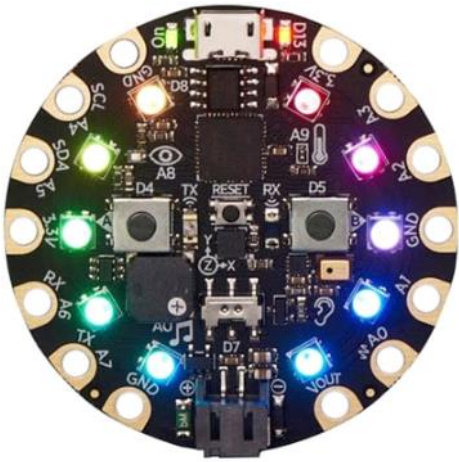https://www.instructables.com/id/Wearable-Tech/

Other Resources

	The place to buy and other learning resources	https://core-electronics.com.au/circuit-playground-express-developer-edition.html
	Adafruit learning resources	https://learn.adafruit.com/adafruit-circuit-playground-express/overview https://cdn-learn.adafruit.com/downloads/pdf/introducing-circuit-playground.pdf https://learn.adafruit.com/category/express https://cdn-learn.adafruit.com/downloads/pdf/adafruit-circuit-playground-express.pdf https://cdn-learn.adafruit.com/downloads/pdf/circuitpython-made-easy-on-circuit-playground-express.pdf
	Programming with makecode	https://makecode.adafruit.com/

1. First Steps

FIRST STEPS

Overview

Students are exposed to microcontrollers and the concept of programmability. Each student will make a personalized light-up patch, using a sewable pre-programmed microcontroller to control the behaviour of an LED.

1. What was the name of the microcontroller we used last time?
2. What did it do for us?
3. Did we program it to do that?

- Understand the main parts of the Circuit Playground Express
- Use Microsoft MakeCode blocks:
    - Forever
    - Show Animation
    - Play Sound
    - On shake
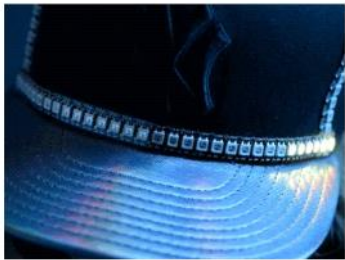- Develop a different algorithm
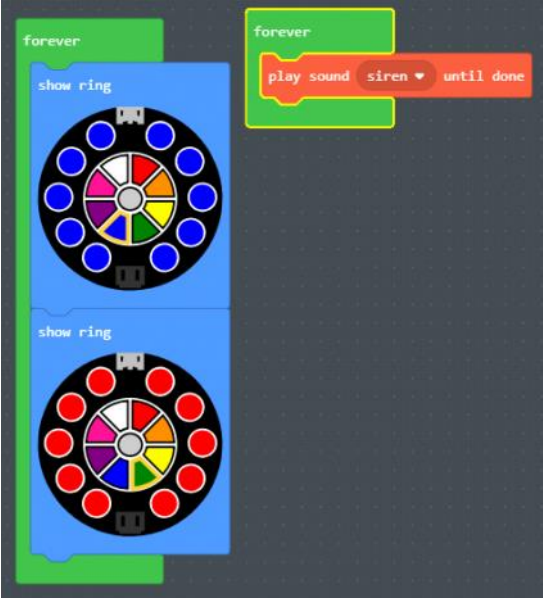
- CPE lights up with sound
- create a unique siren animation

Siren

Materials and Tools

- 1 x Circuit Playground Express
- 1 x Micro-USB cord

[Guided Tour](#)	**EXPLORE**
Siren https://makecode.adafruit.com/ 	**GENERATE**
How could you modify this algorithm to work differently or better?	**EVALUATE & REFINE**
How are you going to modify the algorithm? Discuss this with your partner	**DEVELOP**
Now change the coding according to your designs and then test.	**GENERATE**

REVIEW REFLECT RESPOND
 	
Discuss with your partner. Make reflection notes if you want.
 	
What did you learn? Evidence?
 	
• Understand the main parts of the Circuit Playground Express
• Use Microsoft MakeCode blocks:
    ○ Forever
    ○ Show Animation
    ○ Play Sound
• Develop a different algorithm
 	
How can you use what you have learned in the future?
	EVALUATE & REFINE

What do you want to know more about?	

Extension Challenge

Can you alternate colours as well as sounds? Show me!

Magic Wand

Materials and Tools

- 1 x Circuit Playground Express
- 1 x Micro-USB cord
- Blutac
- Glue
- Length of wood
- Battery pack
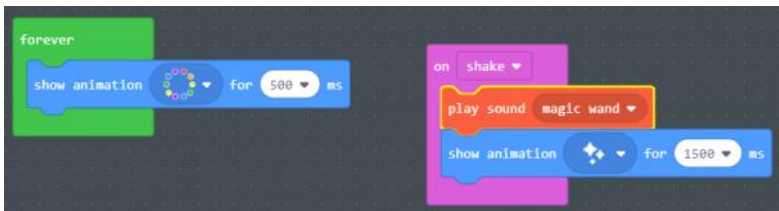
Magic Wand https://makecode.adafruit.com/ 	GENERATE
How could you modify this algorithm to work differently or better?	EVALUATE & REFINE
How are you going to modify the algorithm? Discuss this with your partner	DEVELOP
Now change the coding according to your designs and then test.	GENERATE
Sketch the design for your wand and seek feedback from your partner. Refine your design based on feedback.	DEVELOP / EVALUATE & REFINE
Build your wand and test	GENERATE

REVIEW REFLECT RESPOND
 	
Discuss with your partner. Make reflection notes if you want.
 	
### What did you learn? Evidence? 	
 	
• Understand the main parts of the Circuit Playground Express
• Use Microsoft MakeCode blocks:
  ○ Forever
  ○ Show Animation
	EVALUATE & REFINE

○ Play Sound
　　　○ On shake
• Develop a different algorithm

How can you use what you have learned in the future?

What do you want to know more about?

Flora Wearable ideas

Friday, 1 February 2019   12:45 PM

Wearable Projects for ideas

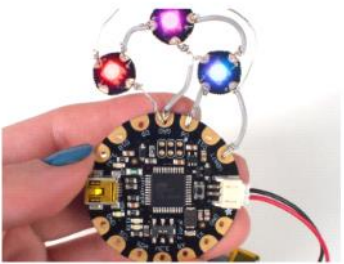|		
 Ursula's Seashell Necklace	Wear this necklace and it will respond to your beautiful Mermaid voice whenever you talk or sing. From <https://learn.adafruit.com/ursulas-seashell-necklace>	From <https://learn.adafruit.com/ursulas-seashell-necklace>
 Sunscreen Reminder Hat	Help remember to reapply your sunblock by building a reminder right into your hat! From <https://learn.adafruit.com/sunscreen-reminder-hat>	https://learn.adafruit.com/sunscreen-reminder-hat>
 VU Meter Baseball Hat	Add sound-reactive NeoPixels to your baseball cap! Use our 144-density NeoPixel strip as a wraparound VU meter with a small microphone at the side. The FLORA microcontroller takes input from the mic and sends the LEDs flashing according to the volume in the room! From <https://learn.adafruit.com/vu-meter-baseball-hat>	https://learn.adafruit.com/vu-meter-baseball-hat>
 Firewalker LED Sneakers	Light up your stride! Mod a pair of high-tops with NeoPixel strip From <https://learn.adafruit.com/firewalker-led-sneakers>	https://learn.adafruit.com/firewalker-led-sneakers>
 Light-Up Angler Fish Embroidery	embroidered angler fish on a pair of shorts From <https://learn.adafruit.com/light-up-angler-fish-embroidery>	https://learn.adafruit.com/light-up-angler-fish-embroidery>

Heart Rate Badge	Build a badge to show the beat of your heart! From <https://learn.adafruit.com/heart-rate-badge>	<https://learn.adafruit.com/heart-rate-badge>
Sparkle Skirt	Make clothing that lights up when you move! From <https://learn.adafruit.com/sparkle-skirt>	https://learn.adafruit.com/sparkle-skirt>
FLORA Pixel Brooch	Make this color-changing LED brooch From <https://learn.adafruit.com/flora-pixel-brooch>	https://learn.adafruit.com/flora-pixel-brooch>

https://core-electronics.com.au/flora-wearable-electronic-platform-arduino-compatible.html

https://www.adafruit.com/category/92

https://learn.adafruit.com/category/flora
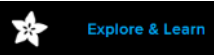
Other Wearable ideas

Friday, 1 February 2019   12:47 PM

Wearable_
Tech_Proj...

STITCHING the Loop — An Electronic Textiles Unit in Exploring Computer Science	*students explore electronic textiles (e-textiles): articles of clothing, accessories, or home furnishings with embedded electronic and computational elements.* From <http://www.exploringcs.org/e-textiles>	http://www.exploringcs.org/e-textiles
Explore & Learn	*Many projects using multiple tech*	https://learn.adafruit.com/category/wearables
ELECTRO FASHION	Extensive support	https://www.kitronik.co.uk/blog/e-textiles-wearables-tutorials-resources/
sparkfun START SOMETHING	Here's a guide to planning a successful project with LilyPad or other wearables products. From <https://learn.sparkfun.com/tutorials/planning-a-wearable-electronics-project/all>	https://learn.sparkfun.com/tutorials/planning-a-wearable-electronics-project/all
Make: DIGITAL FABRICATION	Multiple projects from MAKE: mag	https://makezine.com/category/technology/wearables/
HackSpace WEARABLE TECH	Hackspace mag wearable tech issue	https://magazines-static.raspberrypi.org/issues/full_pdfs/000/000/011/original/HackSpaceMag04.pdf?1518787630
instructables	Great intro projects	https://www.instructables.com/id/Wearable-Electronic-Intro-Projects/ https://www.instructables.com/id/Wearable-Tech/ https://www.instructables.com/id/Wearable-Tech-Projects/ https://www.instructables.com/id/E-Textiles/
soft circuits a workshop facilitator's guide	An e-textile workshop facilitators guide by Emily Lovell (e-book)	http://alumni.media.mit.edu/~emme/guide.pdf http://highlowtech.org/?p=1003 guide
gella craft	Projects that use conductive thread to connect electronic components together directly on fabric. Soft, flexible, and sometimes wearable.	https://www.gellacraft.com/diy/
HOW TO GET WHAT YOU WANT	Lots of alternative wearable tech ideas	http://www.kobakant.at/DIY/
fashioningtech	Fashion forward ideas	https://fashioningtech.com/
	Working with conductive thread	https://www.youtube.com/watch?v=XT5ygUt8Cbk https://learn.adafruit.com/conductive-thread/ https://learn.sparkfun.com/tutorials/lilypad-basics-e-sewing
BOYD EDUCATION	resources on e-textiles including free tutorials and project ideas From <http://www.julieboyd.co.uk/e-textiles.html>	http://www.julieboyd.co.uk/e-textiles.html>

hackster.io AN AVNET COMMUNITY	Project ideas	https://www.hackster.io/projects/tags/wearables LED Matrix Display Badge Arduino LilyPad Controlled NeoPixel Earrings MetaUV - A Necklace UV Sensor so you don't burn TV Tee Shirt Firebeetle MicroPython Badge Custom PCB Design with KiCad! Customizable LED Display Hat Wearect - Wearable Posture Correction Device Cyberpunk 3D-Printed Fabric Light-Up Corset Counting Punches with Circuit Playground Express Breadboard to PCB Part 1 - Making the Simon Says Game Milling PCB With CNC Router (The Easy Way) 4: Assembling
ARDUINO PROJECT HUB	Project ideas	https://create.arduino.cc/projecthub/projects/tags/wearables?page=5
Pinterest	e-textile ideas on pinterest	https://www.pinterest.com.au/search/pins/?q=E-textiles
STEM LEARNING	Resources from STEM learning - heaps of teaching ideas	https://www.stem.org.uk/resources/search?resource_query=wearable https://www.stem.org.uk/resources/search?resource_query=e-textile&items_per_page=10
eTextile Lounge	Think it. Make it. Share it. All here in The eTextile Lounge!	http://etextilelounge.com/
A Virtual Crash Course in Design Thinking	This is an online version of one of our most frequently sought after introductory learning experiences. Using a video, worksheets, and facilitation tips we will take you step by step through the process of hosting or participating in a 90 minute design challenge	https://dschool.stanford.edu/resources-collections/a-virtual-crash-course-in-design-thinking
make		https://makezine.com/projects/make-43/creating-animated-gif-for-led-matix/
		Arduino Wearable... How to 3D Print Dire... How to 3D Print on T... Neopixel patch fabric pattern
WEARABLE TECH PROJECTS 30 PROJECTS TO MAKE, SEW, AND WEAR!		https://store.rpipress.cc/products/wearable-tech-projects-2019

Embroidery

Tuesday, 12 February 2019   8:42 AM

Pages from HackSpac...

Embroider stitches

https://en.m.wikipedia.org/wiki/Comparison_of_embroidery_software

https://www.echidnasewing.com.au/machines/embroidery-only-machines/

https://www.brother.com.au/en/home/all-sewing-machines/compare

Making Sense of t...

http://sophiesew.com/SS2/the-software/
https://en.m.wikipedia.org/wiki/Comparison_of_embroidery_software

http://embroidermodder.org/features.html

3d print onto clothes

https://www.youtu

Review_ Brother S...

Brother SE625 _ C...

 How to 3D Print Dire...

 Learn the Lingo_ M...

 How to 3D Print on T...
be.com/watch?v=CuWZWAfBsm8&feature=youtu.be

Fashion and Wearables

https://csfirst.withgoogle.com/c/cs-first/en/fashion-and-design/overview.html

Fashioning Tech

Technology: https://csermoocs.adelaide.edu.au/library/Introduction_to_programming_with_LilyPad_Arduino.pdf ;
https://www.digitaltechnologieshub.edu.au/teachers/lesson-ideas/programming-led-circuit-with-arduino-ide ;
https://www.digitaltechnologieshub.edu.au/teachers/lesson-ideas/light-up-soft-toy-with-lilypad ;
https://learn.sparkfun.com/tutorials/getting-started-with-lilypad; https://learn.sparkfun.com/tutorials/lilypad-light-sensor-hookup-guide#attaching-to-a-lilypad-arduino ;https://learn.sparkfun.com/tutorials/planning-a-wearable-electronics-project ; https://learn.adafruit.com/category/wearables ; https://www.instructables.com/id/Wearable-Tech-Projects/ ; https://makezine.com/projects/make-43/creating-animated-gif-for-led-matix/ ; https://fashioningtech.com/ ;
http://www.cs4fn.org/fashion/

Flora: https://www.adafruit.com/product/659; https://projects.raspberrypi.org/en/projects/getting-started-with-wearables; https://projects.raspberrypi.org/en/projects/cd-intermediate-wearables-sushi

Circuit Playground Express: https://www.adafruit.com/product/3333; https://makecode.adafruit.com/

Wearable computing, e-textiles

- **Lilypad Arduino** – A special Arduino board for projects using textiles and wearable electronics.
- **Arduino Wearables** – by Tony Olsson. This book is a project-based introduction to wearable computing, prototyping, and smart materials using the Arduino platform. Each of the ten chapters takes you all the way from idea to finished project, gradually increasing in complexity and challenge.
- **Getting hands-on with soft circuits** – An e-textile workshop facilitators guide by Emily Lovell (e-book)
- **Fashioning Technology** – Syuzi Pakhchyan is an experience designer whose work investigates the intersection between code, cloth and culture. If you like the blog, you might also like her book.
- **Soft Circuit Saturdays** – Tutorials and project ideas very suitable for kids from Angela, a maker in New England.
- ~~talk2myShirt~~ – News, blogs, and projects using wearable electronics. Some of the projects are very technical, but well worth looking at for inspiration.
- **How To Get What You Want** – This website collects projects, global workshops and events, references, tutorials, and more for wearable technology and soft circuits. It has a unique section on techniques that aren't finished projects, but might spark ideas.

http://www.exploringcs.org/e-textiles

https://www.madewithcode.com/projects/

Bbc microbit

Free E-Textiles Sample Packs:
- What is the Kitronik D&T Sample pack?

E-Textiles Tutorials:
- BBC micro:bit emoji bag.
- Rocket themed countdown pencil case.
- Add Additional Light Sensing To The BBC micro:bit.

From <https://www.kitronik.co.uk/blog/bbc-microbit-kitronik-university/>

https://www.amazon.com.au/Make-Electronics-prototype-interactive-Technology-ebook/dp/B00MNTH1H6/ref=pd_sim_351_24?_encoding=UTF8&pd_rd_i=B00MNTH1H6&pd_rd_r=5249d4e7-e720-11e8-afbf-2376b859e712&pd_rd_w=3ahq2&pd_rd_wg=bejiH&pf_rd_i=desktop-dp-sims&pf_rd_m=ANEGB3WVEVKZB&pf_rd_p=70ab0957-b1c7-4db9-bc84-be7af9c3c04f&pf_rd_r=FFZX7Q6QXGVDX0E80VWV&pf_rd_s=desktop-dp-sims&pf_rd_t=40701&psc=1&refRID=FFZX7Q6QXGVDX0E80VWV

https://electra.design/products/colour-matching-light-up-modular-bracelet

Augmented Reality (AR)

Thursday, 29 November 2018   11:55 AM

TALE BLAZER	augmented reality (AR) software platform	http://taleblazer.org/
Patches	Patches is a visual programming editor for building WebVR and WebGL experiences. From <https://patches.vizor.io/>	https://patches.vizor.io/
BRIOvr	Create VR and AR online	https://briovr.com/
CO SPACES EDU	build and code AR/VR experiences. Good free and $3.50 for pro	https://cospaces.io/
metaverse	Easily Create Interactive AR Content	https://gometa.io/
hp REVEAL	A new Extended Reality Platform from HP	https://www.hpreveal.com/ https://studio.hpreveal.com/landing
FIELD DAY	Create mobile games, tours and interactive stories with ARIS games. Players experience a hybrid world of virtual characters and media in physical space.	https://fielddaylab.org/make/aris/
MERGE	Meet the MERGE Cube, the world's first, holographic object you can hold in the palm of your hand.	https://mergevr.com/cube
zapworks	Create your own augmented reality experiences. Educator seats cost just $247/year, with access to the entire suite of AR creation tools. An Educator account allows teachers to purchase individual Student seats for just $2 per student per year.	https://zap.works/pricing/education/#nav
	Google VR	https://vr.google.com/earth/ https://edu.google.com/intl/en_au/expeditions/#about https://edu.google.com/products/vr-ar/expeditions/?modal_active=none https://vr.google.com/tourcreator/

		https://vr.google.com/blocks/
		https://poly.google.com/
		https://www.tiltbrush.com/
ART LOVERS AUSTRALIA	Aussie-first app makes every home an art gallery hoverlay	https://youtu.be/lJ4SMyzCSVc
Zappar Zappar Ltd Entertainment 3+	Zappar is an augmented reality platform that creates interactive experiences which can be used in a variety of ways - in education, advertising, publishing and even retail. All you have to do is download the free Zappar App and scan a QR code to begin the experience. What makes Zappar unique is it allows for multiple experiences and isn't limited to one niche category. It allows students to work with a range of experiences all on the same app.	https://www.zappar.com/getzappar/
		http://augthat.com/

Projects

create a dynamic VR exhibition

create a static virtual tour

Create AR quiz for subject area

make an AR game

AR treasure hunt

Haven't Investigated for viability

https://mergevr.com/cube

https://www.zappar.com/; https://zap.works/pricing/education/#nav

https://vr.google.com/earth/

https://edu.google.com/intl/en_au/expeditions/#about

https://vr.google.com/tourcreator/

https://vr.google.com/blocks/

https://poly.google.com/

https://www.tiltbrush.com/

Virtual Reality (VR)

Monday, 10 December 2018   8:11 AM

	build and code AR/VR experiences. Good free and $3.50 for pro	https://cospaces.io/
	Create webVR experiences without writing code	https://patches.vizor.io/
	Create VR and AR online	https://briovr.com/
	Make your VR apps in minutes	https://www.instavr.co/
	Google VR	https://vr.google.com/earth/ https://edu.google.com/intl/en_au/expeditions/#about https://vr.google.com/tourcreator/ https://vr.google.com/blocks/ https://poly.google.com/ https://www.tiltbrush.com/

Science

https://teacherswithguts.org/welcome

https://education.mit.edu/project/biograph/

Maths

Maths: https://www.bootstrapworld.org/

STEM	Engaging, action-driven challenges and interactive activities within each game motivate students to explore and experience math like never before.	http://www.stemcollaborative.org/
IDS	Through Mobilize units, students will engage with and learn about the nature of data. Mobilize centers its curricula around participatory sensing campaigns in which students use their mobile devices to collect and share data about their communities and their lives, and to analyze these data to gain understanding. The UCLA MobilizingCS app is a cross-platform mobile application available in the Android and Apple stores. Once installed, users can download the data collection projects and start collecting data. To access the materials users must register.	https://www.mobilizingcs.org/technology
Australian Computing Academy	Explore geometry through programming, and draw intricate patterns and explosive fireworks!	https://aca.edu.au/resources/blockly-geometry/
UCDAVIS C–STEM Center	Transforming Math Education Through Coding and Robotics	https://c-stem.ucdavis.edu/
BOOTSTRAP Equity • Scale • Rigor	**Computational modeling in Algebra, Physics and Data Science, for all students.** From <https://www.bootstrapworld.org/>	https://www.bootstrapworld.org/
re(Solve) MATHS BY INQUIRY	The reSolve teaching resources provide exemplary materials from Years F to 10. They put into practice the elements of the reSolve Protocol and promote fluency, deep understanding, strategic problem solving, and mathematical reasoning. Each teaching resource is carefully designed to develop progressive understanding through tasks that encourage a spirit of inquiry. From <http://resolve.edu.au/teaching-resources>	http://resolve.edu.au/teaching-resources

STEM Projects

Thursday, 6 December 2018   2:22 PM

https://www.stem.org.uk/resources/elibrary/resource/35961/plastic-challenge

https://nmssanctuaries.blob.core.windows.net/sanctuaries-prod/media/docs/edu-webinar-marine-debris-monitoring-toolkit-for-teachers.pdf

https://www.designboom.com/

https://www.openideo.com/

https://sites.google.com/education.nsw.gov.au/ddcos-steam-focus-group/technologies-scope-and-sequence?authuser=0

https://education.cu-portland.edu/blog/teaching-resources/steam-teaching-resources/

The Space @ The Precinct is OPEN for all STEM, Environment and Geography students!

What is The Space @ The Precinct?

The Department of Natural Resources, Mines and Energy has a presence at The Precinct to collaborate and share our expertise with Queensland schools, start-ups and incubators in:

- Geospatial information, applications and data
- Aerial and satellite imagery
- Surveying and GPS/GNSS positioning

We have a dedicated teacher driving our education program to inspire students toward a career in geospatial information. Our program room, The Space, allows us to share our expertise in geospatial information, applications, imagery and data to enable informed decision making across government, industry and the community and we can cater for groups as small as 1 and up to 100. We invite you to get in touch with your requirements and we will fit you in. Note that there is no cost associated with visiting The Space.

What do we offer schools?

You have the opportunity to schedule a visit with us here at The Space and we can tailor content to suit your classroom studies. We have experts in water management, vegetation management, hazards, remote sensing, surveying, UAVs/drones and geospatial information who we can call on, depending on your needs.

Since March we have hosted over 500 students through The Space and they have been able to take advantage of some of our technology, including:

- AR Sandbox
- VR/AR experience
- Giant touch screen
- iPads

How do you book?

Simply email Mick at spatialeducation@dnrme.qld.gov.au to get in touch and secure your booking. We're looking forward to hosting you and your students in the near future!

Thanks,

Mick Law
Senior Education Advisor
Queensland Spatial Information Council
LSI Client Engagement | Land and Spatial Information
Department of Natural Resources, Mines and Energy
T 07 3330 4760
E mick.law@dnrme.qld.gov.au
W Spatial Education

Level 17, 275 George St, Brisbane, QLD, 4000

	Inspiring Australia is a national strategy to help build connections between scientists, organisations, businesses, and students to foster public participation in STEM (science, technology, engineering and mathematics) and innovation. From family fun to ground-breaking discoveries, Queensland is buzzing with STEM and innovation. The Inspiring Queensland website aims to showcase all the STEM-related events happening across Queensland. Find out what's on near you or submit an event to be featured on the website!	https://www.industry.gov.au/funding-and-incentives/science-and-research/inspiring-australia-science-engagement-in-australia
	SOLAR ENERGY INSTALLATIONS	https://www.digitaltechnologieshub.edu.au/teachers/lesson-ideas/integrating-digital-technologies/solar-energy-installations
	The STARportal is Australia's first centralised national portal for exciting and engaging STEM activities from around the country. This searchable database connects parents, students and teachers with their local and online STEM activities in real time.	https://starportal.edu.au/about-star-portal
	Hacking STEM Lessons & Hands-On Activities Build affordable inquiry and project-based activities to visualize data across science, technology, engineering, and math (STEM) curriculum. Middle school standards-based lesson plans written by teachers for teachers.	https://www.microsoft.com/en-us/education/education-workshop/default.aspx?ocid=FY19STEM_soc_pmc_edu_fb_1204C
	Real-world problems	https://www.neefusa.org/environmental-education-week

	Description	Link
STEM COLLABORATIVE.ORG	Engaging, action-driven challenges and interactive activities within each game motivate students to explore and experience math like never before.	http://www.stemcollaborative.org/
OSU.EDU	Quality resources and powerful connections for math and science in the middle grades	https://msms.ehe.osu.edu/tag/real-life-problems/
TeachEngineering STEM curriculum for k-12	searchable, web-based digital library collection	https://www.teachengineering.org/
IET Education The Institution of Engineering and Technology Faraday	real-life applications via case studies that showcase some of the most innovative examples of current engineering and technology from around the world.	https://faraday-secondary.theiet.org/
APPLIED STELR	STELR (Science and Technology Education Leveraging Relevance) is a national initiative of the Australian Academy of Technology and Engineering.	https://stelr.org.au/
Questacon The National Science and Technology Centre	We've compiled our favourite hands-on activities, with everything you need to know to recreate innovative activities in your classroom around science and technology.	https://www.questacon.edu.au/teacher-resources
Makerspaces .com	25 Makerspace Projects For Kids	https://www.makerspaces.com/25-makerspace-projects-for-kids/
NASA	It's NASA!	https://www.nasa.gov/audience/foreducators/index.html
NOVA	NOVA Education supports STEM education and engagement nationwide through the creation of resources from NOVA's broadcast and digital productions.	https://www.pbs.org/wgbh/nova/brand/education/
WORKBENCH	Browse content from leading edge educational companies making robots, circuits, and drones, making it easy to teach with technology in your classroom. Many of the products from these partner channels have been integrated into the Workbench Programming canvas, enabling you to program multiple devices at once.	https://edu.workbencheducation.com/
HELICOPTER 2050	This program teaches kids 9–16 STEM-based inventive thinking skills about the principles of flight and challenges them to develop new ideas for a helicopter of the future.	http://www.helicopter2050.com/
STEMpedia	Intro course	https://learn.thestempedia.com/
create ENGINEERING IDEAS INTO REALITY	Create Digital is powered by Engineers Australia, the trusted voice of the engineering profession. We are the global home for engineering professionals renowned as leaders in shaping a sustainable world.	https://www.createdigital.org.au/
stemaustralia.org.au		http://www.stemaustralia.org.au/
F1 in Schools	Technology Challenge	http://www.f1inschools.com/
exploratorium		https://www.exploratorium.edu/explore/engineering-tinkering
STEM WORKS	resource for teachers, mentors, parents, STEM professionals, volunteers, and everyone passionate about getting children eager to learn about science, technology, engineering, and math.	http://stem-works.com/#container
Regional Development Australia HUNTER ME PROGRAM	ME Program equips students with the skills and knowledge that will prepare them for 21st century STEM careers	http://www.meprogram.com.au/
SAE INTERNATIONAL	Our program brings Science, Technology, Engineering, and Math (STEM) education to life for students in grades K-8 with hands-on activities.	https://www.sae.org/learn/education/middle-school-curriculum
A Virtual Crash Course in Design Thinking	This is an online version of one of our most frequently sought after introductory learning experiences. Using a video, worksheets, and facilitation tips we will take you step by step through the process of hosting or participating in a 90 minute design challenge	https://dschool.stanford.edu/resources-collections/a-virtual-crash-course-in-design-thinking
instructables	Great intro projects	https://www.instructables.com/teachers/
TOKY LABS	Similar to bbc but with IOT focus	https://tokylabs.com/

	Space Design Competitions Australia is the premier provider of industry-simulation events for high-school students in Australia.	https://www.ausspacedesign.org.au/
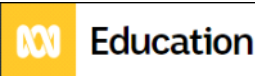
Engineering

Monday, 10 December 2018   11:53 AM

TeachEngineering STEM curriculum for k-12	searchable, web-based digital library collection	https://www.teachengineering.org/
IET Education The Institution of Engineering and Technology | Faraday	real-life applications via case studies that showcase some of the most innovative examples of current engineering and technology from around the world.	https://faraday-secondary.theiet.org/
100 Engineering Projects For Kids		https://thehomeschoolscientist.com/100-engineering-projects-kids/
WORKBENCH	Browse content from leading edge educational companies making robots, circuits, and drones, making it easy to teach with technology in your classroom. Many of the products from these partner channels have been integrated into the Workbench Programming canvas, enabling you to program multiple devices at once.	https://edu.workbencheducation.com/
4-H STEM LAB	STEM Lab provides fun, hands-on STEM activities for kids of all ages to do anywhere!	https://4-h.org/parents/stem-agriculture/youth-stem-activities/?
create ENGINEERING IDEAS INTO REALITY	Create Digital is powered by Engineers Australia, the trusted voice of the engineering profession. We are the global home for engineering professionals renowned as leaders in shaping a sustainable world.	https://www.createdigital.org.au/
ENGINEERING TAKE A CLOSER LOOK		https://www.yearofengineering.gov.uk/school
MACGILLIVRAY FREEMAN'S DREAM BIG ENGINEERING OUR WORLD		https://dreambigfilm.com/education/
coolaustralia.org Learn for life		https://www.coolaustralia.org/

Sustainability

Tuesday, 11 December 2018   10:34 AM

	Description	Link
GREEN BATCH	GreenBatch is working towards building Western Australia's first plastic recycling facility.	https://www.greenbatch.com/ https://www.createdigital.org.au/engineer-transforming-plastic-waste-filament/
	We create tools that make it easier to start recycling plastic.	https://preciousplastic.com/
PLASTIC COLLECTIVE	More machines for recycling	https://www.plasticcollective.co/
WRIQ	is the industry's association in Queensland, representing more than 90 Queensland-based organisations ranging from large multi-national organisations through to small family owned and operated businesses.	https://wriq.com.au/
STEM LEARNING	understanding of plastics and plastic waste on a global scale.	https://www.stem.org.uk/resources/elibrary/resource/35961/plastic-challenge
instructables	16 Great Gifts Made From Garbage	https://www.instructables.com/id/16-Great-Gifts-made-from-Garbage/
SUBSTATION33	Electronics recycling in Logan	https://www.substation33.com.au/
ABC Education	War on waste resources	http://education.abc.net.au/newsandarticles/blog/-/b/2535555/25-educational-resources-to-help-kids-with-the-war-on-waste http://www.abc.net.au/btn/resources/teacher/episode/20170627-waronwasteschool.pdf http://www.abc.net.au/btn/story/s4663466.htm http://www.abc.net.au/btn/story/s4667338.htm http://www.abc.net.au/btn/story/s4530722.htm

ICT Capabilities

How to Record **Video** of an App in **Windows** 10

1. Open the app you want to record. ...
2. Press the **Windows** key and the letter G at the same time to open the Game Bar dialog.
3. Check the "Yes, this is a game" checkbox to load the Game Bar. ...
4. Click on the Start **Recording** button (or Win + Alt + R) to begin **capturing video**.

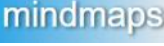The video will be available at My Documents\My Videos\Captures

Cooperative Learning Strategies

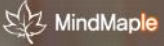From <https://sites.google.com/a/emints.org/cooperative-learning-strategies/>

http://advocate.csteachers.org/2019/02/17/scrum-in-the-computer-science-classroom/

IDS	Through Mobilize units, students will engage with and learn about the nature of data. Mobilize centers its curricula around participatory sensing campaigns in which students use their mobile devices to collect and share data about their communities and their lives, and to analyze these data to gain understanding. The UCLA MobilizingCS app is a cross-platform mobile application available in the Android and Apple stores. Once installed, users can download the data collection projects and start collecting data. To access the materials users must register.	https://www.mobilizingcs.org/technology
fya		https://www.fya.org.au/
A Virtual Crash Course in Design Thinking	This is an online version of one of our most frequently sought after introductory learning experiences. Using a video, worksheets, and facilitation tips we will take you step by step through the process of hosting or participating in a 90 minute design challenge	https://dschool.stanford.edu/resources-collections/a-virtual-crash-course-in-design-thinking
CAREERSwithSTEM	Posters and magazine resources	https://careerswithstem.com.au/product-category/posters/

Mind Mapping

Thursday, 7 March 2019   8:49 AM

mindmaps		https://app.mindmapmaker.org/#m:new	
mindmeister		https://www.mindmeister.com/	
	Needs to be unblocked	https://coggle.it/	
		https://www.draw.io/	
MindMaple	MindMaple Lite is a free application for generating mind maps, planning projects, running brainstorming sessions, and generally helping you From <https://www.downloadcrew.com/article/33529-mindmaple_lite>	https://www.downloadcrew.com/article/33529-mindmaple_lite	

League of Legends

Learn with League: https://oce.learnwithleague.com/

User Guide: https://na.leagueoflegends.com/en/game-info/get-started/new-player-guide/

Get Started: https://signup.oce.leagueoflegends.com/en/signup/index#/

Competition portal at home: Students jump online 30 minutes before and join the game lobby/ UQ LoL discord server.

Here's the discord: https://discord.gg/Bvq4hxg

What is League of Legends?
High School Esports Trailer and
Queensland High Schools League Week 3 Highlights

Da Crocs

REGISTRATION
We have 3 forms that need to be filled out:
Team Sign-Up Form
Player Details Form (1 for each student)

UQ Media
Release F...

Tenielle Lynch
High School Esports Representative
University of Queensland Union | UQU

[M] +61 435 051 285
[E] tenielle.lynch@uqu.com.au **[W]** www.uqu.com.au
[A] Level 4, Union Building (bld 21A), University of Queensland, St Lucia, QLD 4072

Beginners_
Guide_Ho...

GAME_CHE
CK_IN

Post-Game
_Analysis

High School
LoL Hand...

You can see all matches via the links in the #matches channel of the Discord:
https://discord.gg/GyD7MSb

After clicking on your match, navigate to the players tab to see the summoner names of your opponents:
https://www.toornament.com/tournaments/2299317816651374592/stages/2299334724263862272/groups/2317180686965956638/rounds/2519889888029941760/#structure
If you don't see your team in the link above:
https://www.toornament.com/tournaments/2299317816651374592/stages/2519691096960606208/groups/2519710355466141696/rounds/2519727284489977856/#structurere

Tournament codes will be posted in each school Discord channel tomorrow. If you would like to receive your code via email as well, please let me know.

Get your students to launch the LoL client and select "Play". Then click on the Tournament button (with a little trophy on it) in the top-right corner, and paste your code in the field.

In the case you cannot use the tournament code, please organise a custom game with the referees in the Discord.

Please join the Referee Helpline voice chat in the Discord if you have any queries before your match.

Da Croc Team

	Name	Surname	Summoner Name	email
	Liam	Corner-Evans		CORNER, Liam (lcorn40)
	Marvin	Coghlan	KenthLaza	CASUCIAN, Marvin (mcasu1)
	Jack	Nguyen	SBTC Ngaosss	NGUYEN, Jack (qnguy52)
	Lydia	Xue	AsianPsychpath	XUE, Lydia (lxue2)
	Simon	Peak	Felix Fell	PEAK, Simon (speak8)
	Paris	Huynh	Meowka	HUYNH, Paris (phuyn17) <phuyn17@eq.edu.au>
	Bailey	O'Brian	RocketGamez54	bobri3@eq.edu.au
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https://u.gg/

Presenting

Wednesday, 8 May 2019   1:52 PM

https://www.screencastify.com/
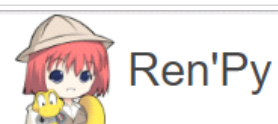
Nimbus Screenshot

From <https://www.educatorstechnology.com/2019/05/here-is-great-screen-recording-tool-for.html>

https://www.blackmagicdesign.com/products/davinciresolve/

https://ictevangelist.com/five-tools-to-help-you-create-your-end-of-year-celebration-videos/

		https://www.literacyideas.com/
	Create engaging infographics and reports in minutes	https://infogram.com/
	Create impactful social graphics, web pages, and short videos in minutes with Adobe Spark	https://spark.adobe.com/
	Create your own website	https://education.weebly.com/
	One stop shop for making presentations	https://www.canva.com/
	Ren'Py is a visual novel engine – used by thousands of creators from around the world – that helps you use words, images, and sounds to tell interactive stories that run on computers and mobile devices.	https://www.renpy.org/
	MonkeyJam is a digital penciltest and stopmotion animation program. It is designed to let you capture images from a webcam, camcorder, or scanner and assemble them as separate frames of an animation. You can also import images and sound files already on your computer. Although it is designed for pencil and paper, MonkeyJam can also be used for StopMotion animation and has several features just for that. Movies created in MonkeyJam can be exported as AVI files.	http://monkeyjam.org/
	With designer templates, millions of reusable presentations, and a PowerPoint-to-Prezi converter, there's no need to start from scratch—unless you want to.	https://prezi.com/
	Basic Image Editor online	https://www.picozu.com/

Picture to People *Free Online Photo Editors, Text Logo Makers and More*		http://www.picturetopeople.org/
StoryboardThat	Storyboard	https://www.storyboardthat.com/
TOONATOR	Toonator is online cartoon editing tool. With Toonator you can easly make funny animations From <https://toonator.com/>	https://toonator.com/

21st C skills

https://learning.mozilla.org/en-US/web-literacy/

Links

Tuesday, 26 February 2019   10:13 AM

	Arcgis	https://esriaustralia.com.au/about-arcgis
	Different ways to code data	http://selection.datavisualization.ch/
	Create engaging infographics and reports in minutes	https://infogram.com/
	With DataCamp, you learn data science today and apply it tomorrow.	https://www.datacamp.c

Tuesday, 26 February 2019   10:18 AM

		https://projects-raspberry.com/

ASD AUSTRALIAN SIGNALS DIRECTORATE	The **ASD CyberEXP** sponsored by the Australian Signals Directorate, is an interactive online cyber career exploration experience run on the LifeJourney platform. It enables students to test drive a day in the life of five ASD cyber professionals. Users will participate in challenging real-life cyber scenarios, discover the skills and tools used by these ASD cyber mentors, and explore the vast number of careers available in cyber security today. From <https://asdcyberexp.com.au/>	https://asdcyberexp.com.au/
filius	Network simulator	http://www.lernsoftware-filius.de/downloads/Introduction_Filius.pdf https://www.youtube.com/playlist?list=PLp-hd7MmooQ1mccBeEB31MXVtg01RUs1y https://www.lernsoftware-filius.de/
‹ ⚡ › TOKY L A B S	Similar to bbc but with IOT focus	https://tokylabs.com/
		https://www.futurelearn.com/courses/introduction-to-networking
🏠 Networking with the micro:bit		https://microbit.nominetresearch.uk/networking-book-online/

Networking

Networking

Technology: http://www.open.edu/openlearncreate/course/index.php?categoryid=146

Year Level: 7-10

Assessment:

Description: This collection has been developed for teachers of School children aged 5-16, based on the UK's National Curriculum for Computing. The collection initially provides an introduction to the Internet and the services it provides, with an emphasis on security awareness and personal safety considerations when online.

The content and organisation of topics is based on the CAS Computing **Progression Pathways guide** developed by Computing at School (CAS). This collection focuses on the Communications and Networks Theme.

Schools interested in using these materials as part of the National Curricula are free to do so. Additional teaching resources to support the delivery, manage classes and run quizzes are available for free to schools by registering to become a **Cisco Academy**.

https://www.cybersecuritychallenge.org.uk/education/schools/teachers ;

cisco

https://www.netacad.com/

https://www.netacad.com/courses/iot/introduction-iot

https://www.cybersecuritychallenge.org.uk/education/schools/teachers

http://www.open.edu/openlearncreate/course/index.php?categoryid=146

https://community.computingatschool.org.uk/resources/3189/single

https://teknoteacher.makes.org/thimble/MTQ3MDEwMzgwOA==/hack-for-good

https://www.pbs.org/wgbh/nova/labs/lab/cyber/

https://cryptii.com/

http://www.hackerhighschool.org/

https://www.pbs.org/wgbh/nova/brand/education/

https://dayofstem.com.au/optus.html

https://www.digitaltechnologieshub.edu.au/docs/default-source/resource-bank/networking_with_the_microbit.pdf?sfvrsn=2

Cybersecurity optus

Instruct your students to use the address and the registration key below to initially register and run LifeJourney.

LifeJourney
Address: https://au.golifejourney.com

Student Registration Key: ss7jl54

From <https://au.golifejourney.com/lifeJourney/home#!/dashboard>

DIGITAL TECHNOLOGIES HUB	Next best place	https://www.digitaltechnologieshub.edu.au/	
SAE INTERNATIONAL.		https://www.sae.org/learn/education/curriculum/keeping-our-networks-secure	