Christmas Micro:bit

Objectives

To understand how run multiple processes simultaneously with your micro:bit. (Screen, sound and LEDs)

Success Criteria

Demonstrate multiple simultaneous processes running on your Micro:bit

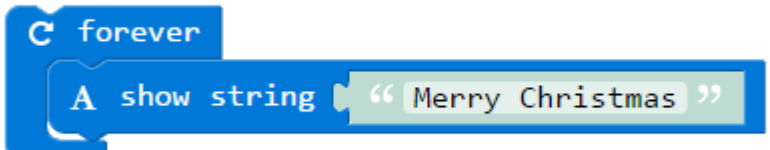
Literacy Objective

Be able to enter commands into a computer with accuracy

The screen

Starter for 10

Create a Simple message to display on your Micro:bit screen




```
1  from microbit import *
2
3  while True:
4      display.scroll("Merry Christmas")
```

Making Music

Simple Stuff - Python

- You must import the library with Python ***Import music***
- There are some pre-made songs try ***music.play(music.NYAN)***
- ***See HERE for a song list***

Writing your own

- Each note has a name (like c#), an octave (how high or low) and a duration.
- Octaves are 0 for the lowest, 4 contains middle C and 8.
- Duration is expressed in numbers, the bigger the number the longer the duration. (4 will last twice as long as two for example.
- Micropython also supports the note R which means rest
- The definition and scope of an octave conforms to the table listed on this page about scientific pitch notation.
- ***NOTE[octave][:duration]***

Extra

- Tempo and beats - A number of ticks (expressed as an integer) constitute a beat.
- Each beat is to be played at a certain frequency per minute (expressed as the more familiar BPM - beats per minute - also as an integer).
- ***music.set_tempo(ticks=4, bpm=120)***

Making Music Python

Python

For this example I have Pin 0 and ground connected to the speaker and we will use this piece of music

G, A, G, E
G, A, G, E
D, D, B..
C, C, G..
A, A, C, B, A, G.. A, G, E..
A, A, C, B, A, G.. A, G, E..
D, D, F, D, B, C, C, E..
C, G, E, G..
F, D, C..

Notation

- Working on the basis of a duration of 8 being a full not I've come up with the following Python Code.
- I'm no musician!! So **HERE** is the score for you to improve I based it on the score in **THIS** video.

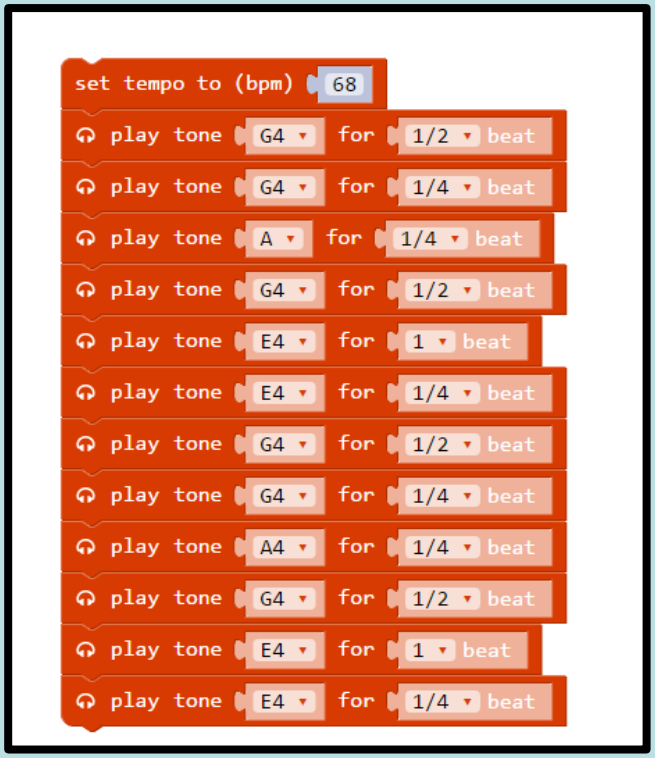
```
from microbit import *
import music
music.set_tempo(bpm=68)
#Silent Night in C

SilentNight  = [
"G4:6","A4:2","G4:4","E4:10","G4:6","A4:2","G4:4",
"E4:10","D5","B4","C5",
"G4","A4:6","C5:6","B4:1","A4:2","G4:4","A4:2","G4:4",
"E4:10","A4:6","C5:6","B4:1","A4:4","G4:6","A4:2","G4:4",
"E4:10","D5:8","F5:6","D5:2","B4:6","C5:6",
"E5:10","C5:6","G4:2","E4:4","G4:6","F4:2","D4:4","C4:10"
]
music.play(SilentNight)
```

Making Music PXT

PXT

- The same notation in PXT would look like below.
- Please note the PXT implementation of sound is not as clean as Python – you may need to fiddle with the notes to make it sound right on the speaker



The Lights

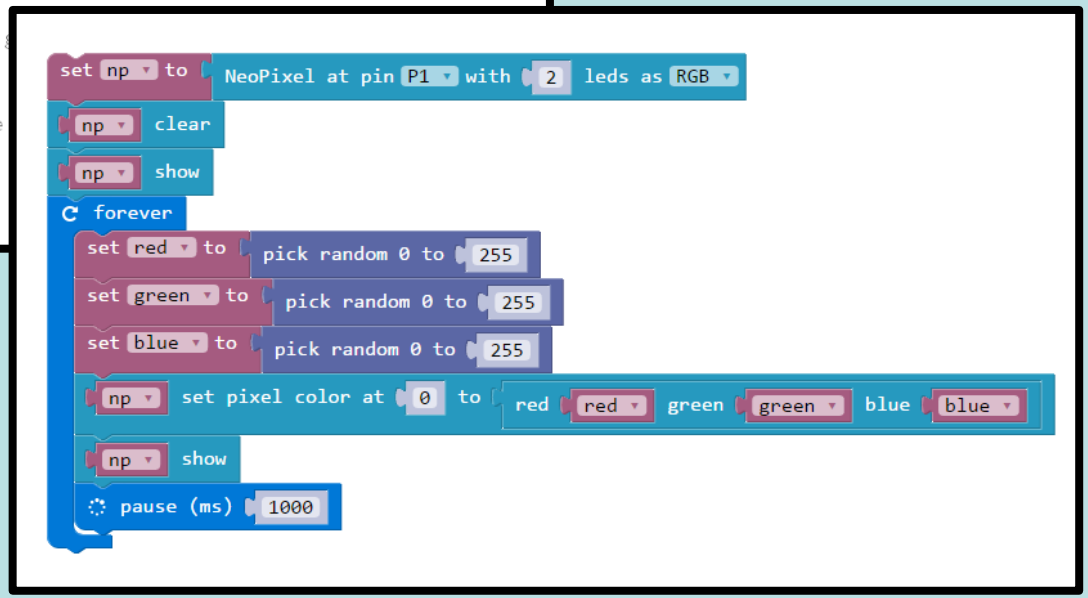
- For this example I am using a 2 programmable LEDs in parallel. This could easily be a strip of Neo-pixels and would work in the same way.
- The only limit is do not use more than 8 LEDs without a separate power supply

```
from microbit import *
import neopixel
from random import randint
np = neopixel.NeoPixel(pin1, 2)
while True:

    for pixel_id in range(0, len(np)):
        red = randint(0, 255)
        green = randint(0, 255)
        blue = randint(0, 255)

        # Assign the current LED a random red,
        np[pixel_id] = (red, green, blue)

        # Display the current pixel data on the
        np.show()
        sleep(50)
```



All together now!

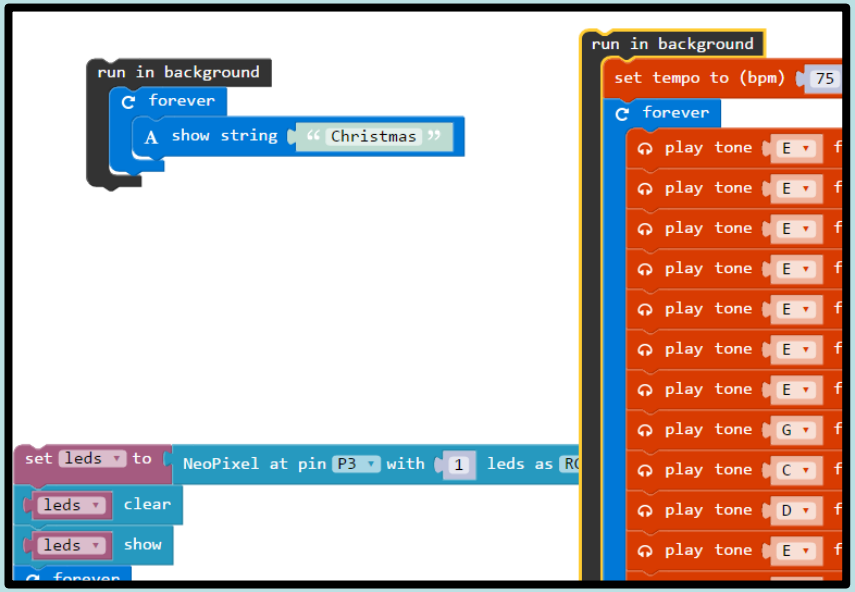
MicroPython

- MicroPython has a feature that is not well documented that allows you to run processes in the background
- ***wait=False*** (this can be set to True or False – if False the Micro:bit won't wait for the process to finish before running the next line of code
- ***Loop = True*** will force a process to be repeated even if it's not inside a for or while loop

PXT

The same result can be completed using the "Run in Background" block in PXT

```
32
33  music.play(jingle,wait=False,loop=True)
34  display.scroll("merry christmas",wait=False,loop=True)
35
36  np = neopixel.NeoPixel(pin1, 8)
37  while True:
38
39      for pixel_id in range(0, len(np)):
40          red = randint(0, 255)
41          green = randint(0, 255)
42          blue = randint(0, 255)
43
44          # Assign the current LED a random red, green and
```



Give it a go

Task

Your turn - Try this

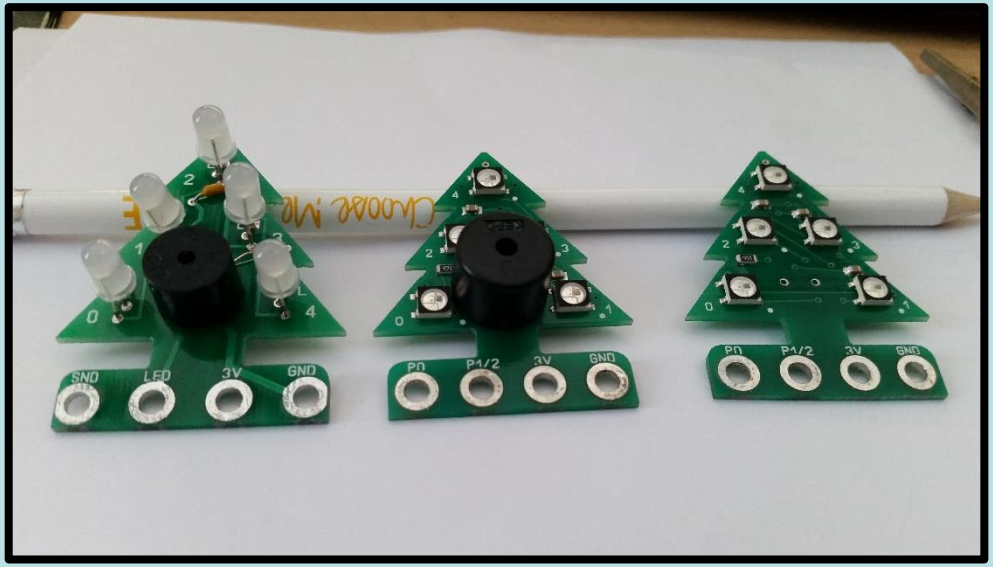
- Create a display on your screen that runs as a background processing and loops forever
- Write some music to play in the background on a repeat. Try and convert a simple nursery rhyme or carol. I have done Jingle Bells **HERE**
- Using a Neopixel or Programmable LED rotate some pretty colours.
- If you only have standard LEDs then you could use red and green and flash them alternatively.
- Make all this happen together

Most of all – Be creative and have fun!!

Oh Christmas Tree

PocketmoneyTronics Christmas Tree

- www.microbitsandbobs.co.uk have put this resource together in order to support buyers of the awesome http://www.pocketmoneytronics.co.uk/ Christmas Tree.
- This is currently on Kickstarter (25/10/16) which I hope is very successful and I'm sure you will be able to buy them direct from Andrew Gale via his website really soon.
- At the time of writing, I am aware of 3 Micro:bit versions of the Christmas Tree.
- Solder yourself, Neopixel with buzzer and Neopixel without buzzer



All the code here runs with any BBC Micro:bit with a piezo speaker and either standard programmable LED or neopixel ws2812 packages.