# Icon Description automatically generated

# Slider scheme of work

## Scheme introduction

The aim of this scheme is to engage students with programming concepts through the building of a circuit using the micro:bit and slider component. In each lesson the students build a working project using the slider component. The MonkMakes Slider for micro:bit allows you to interact with your micro:bit by sliding a control left and right. The board uses a 10kΩ linear variable resistor (pot) to output a voltage between 0 and 3V that can be measured in your micro:bit programs using one of the micro:bit connections as an analog input. When the micro:bit is interacting with the slider we use an inbuilt function called pin2.read\_analog() this function measures the voltage at the connector specified but rather than return the actual voltage in Volts, it returns a number between 0 and 1023. The 0 signifies the leftmost position and the 1023 the rightmost. It may be helpful to explain this to the students at the outset of the scheme as the figure 1023 needs some manipulation for a digital output and bar graph reading.

In each lesson the students focus on one or two specific concepts or features which are utilised by that lesson’s program. Additional concepts are introduced throughout the lessons, via a slide presentation and either through worksheet exercises or directly demonstrated by the program. The main programming concepts and features within this unit are while loops, casting data types, for loops, user-defined functions, lists, tuples and using the plotter function on Mu. All the examples and activities for this unit use a micro:bit and Monk Makes slider.

## Prior knowledge

It is assumed that the students will have previously learned the basics of how to flash programs to the micro:bit and have a basic understanding of python.

## Outline of lessons

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| **Lesson** | **Focus of lesson and brief overview** | **Learning objectives** |
| Lesson 1: Slider number | *Focus: introduction to slider and casting data types*  Students are introduced to the functionality of the slider component. They engage with the concept of casting through a starter exercise and worksheet. They will run a short program which, utilising a while loop, constantly displays a number between 0 and 9 reflecting the voltage of the slider position. The students then engage in the compilation of a code conversation to demonstrate their understanding of the program syntax and are given the opportunity to build their own program. They then complete a plenary to demonstrate their understanding of the syntax. | * Understand the purpose and functionality of the slider * To successfully set up a micro:bit/slider number circuit and flash code to the micro:bit * Apply knowledge of type conversion * To be able to read and interpret a program containing a while loop * To be able to read and interpret a program containing data type casting * To be able to successfully modify a program containing multiple programming constructs |
| Lesson 2: Slider bar graph | *Focus: for loops using range () inbuilt function*  The focus of this lesson is to illustrate the use of a for loop in a practical way. The lesson starts with activities which demonstrate the syntax and purpose of a for loop and enables the students to practice them through class and individual exercises. The students then engage in the compilation of the slider bar graph program ‘code conversation’ to demonstrate their understanding of the program syntax. The slider bar graph program contains a user-defined bargraph function that expects a number  between 0 and 5 as its parameter and then displays 0 to 5 lines of LEDs. They are then given the opportunity to build their own program. Finally, they complete a plenary to demonstrate their understanding of the syntax. | * To successfully set up a micro:bit/slider bar graph circuit and flash code to the micro:bit * Apply knowledge of a for loop * To be able to read and interpret a program containing user defined functions * To be able to read and interpret a program containing a bar graph function * To be able to read and interpret a program containing an if statement * To be able to successfully modify a program containing multiple programming constructs |
| Lesson 3: Slider snake | *Focus: lists*  The focus of this lesson is to illustrate the use of lists in a practical way. The lesson starts with activities which demonstrate the syntax and purpose of lists and enables the students to practice them through class and individual exercises. The students then engage in the compilation of the snake program ‘code conversation’ to demonstrate their understanding of the program syntax. The slider snake program uses the slider to make a wiggly snake animation when you move the slider. They are then given the opportunity to build their own program. Finally, they complete a plenary to demonstrate their understanding of the syntax. | * To successfully set up a micro:bit/slider snake circuit and flash code to the micro:bit * Apply knowledge of a for loop * To be able to read and interpret a program containing a list * To be able to read and interpret a program containing user defined functions * To be able to read and interpret a program containing a while loop * To be able to read and interpret a program containing a for loop * To be able to successfully modify a program containing multiple programming constructs |
| Lesson 4: Slider Plotter  N.B. This program is the shortest and the focus on tuples is quite brief. This should leave time for the students to experiment more implementing their own ideas with the slider and micro:bit. | *Focus: tuple and use of plotter in Mu*  The focus of this lesson is to illustrate the use of a tuple in a practical way. The lesson starts with activities which demonstrate the syntax and purpose of tuples and enables the students to practice them through class and individual exercises. The students then engage in the compilation of the plotter program ‘code conversation’ to demonstrate their understanding of the program syntax. They are then given the opportunity to build their own program. Finally, they complete a plenary to demonstrate their understanding of the syntax. | * To successfully set up a micro:bit/slider plotter circuit and flash code to the micro:bit using Mu * Apply knowledge of tuples * To be able to read and interpret a program containing a while loop * To be able to read and interpret a program containing the time module * To be able to successfully modify a program containing multiple programming constructs |

https://pixabay.com/illustrations/slide-swimming-pool-pleasure-1015723/