Experiment 9 – Make an adjustable table lamp

Instruction

The eye is a very important organ for us. We can see the colorful world by them. so protecting eyes is very important to us! Reading in a too bright or too dark environment can cause damage to our eyes, so when we read a book, we must pay attention to the brightness of the light to be appropriate. Maybe what we need at this time is a table lamp with adjustable brightness, let's start to make it!

Target

- Learn how linear potentiometer works and use it to make an adjustable table lamp with LED.
- Learn how to change the brightness of the LED.
- Learn how to create variables to store value.
- Learn how to remap numbers from one range to another.

Required Parts

- Micro:bit x1
- Crowtail-Base shield for Micro:bit x1
- Crowtail-Linear Potentiometer x1
- Crowtail-LED(Green) x1
- Crowtail-Cable x2
- USB cable x1

Hardware learning and connection

The Crowtail- Linear Potentiometer module uses a linear variable resistor with a maximum resistance of 10KΩ. When you move the slider from one side to the other, its output voltage will range from 0 V to the VCC you applied. The panel mount design makes this module easy to be installed in projects.

Connect Crowtail-Linear Potentiometer and Crowtail-LED to P0, P1 ports of Crowtail-Base shield for Micro:bit. The hardware connections are as follows:
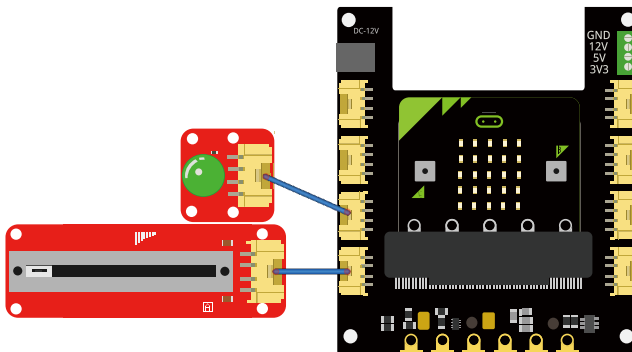
Programming and note

- **Set to:** You can use this `set to` block to set the value for a variable that selected from a list of the variables you create. You can create variables by click Variables→Make a Variable and then naming it.

- **Analog write:** Just like the `analog read` block, the `analog write` block deals with a range of values, but instead of reading a pin as an input, the `analog write` block outputs an analog value to a pin. In this case, we use this block to set the brightness of the LED, but it could be a tone for a buzzer, a motor speed and etc.

- **Map:** This is a mathematical method used to map values from one interval to values from another interval.The mapped value range will be reduced or enlarged by a certain proportion. Here we need to map the potentiometerValue(value between 0 and 1023) to value (between 0 and 255) and write it to P1 port. For example, if the value of potentiometerValue is 240, then after mapping, we get the value is 60 and write it to port P1. The reason we use this mapping function is that the LED has a brightness level of 256 (0-255). When the brightness level is greater than 255, the brightness of the LED will not change.

- **Download the program to micro:bit to see what happens.**

Result

Toggle the potentiometer and you will find that the LED light will become brighter or dimmer depending on the position of the potentiometer. When you turn the potentiometer to the far left, the LED light goes out, and when you turn to the right, the LED light is the brightest.

Since the brightness of the lamp can be adjusted in this way, is the sound volume of the stereo adjusted in this way?