- **Set date and time:** We use this block to set the current date and time. In this case, we start the time from the beginning of the program, so the time needs to be set exactly the same as your local time, or you can set it faster because you need time to upload the program, otherwise the clock may be inaccurate.

- **And:** It is a logic **and** block. This combines two logical statements into one statement that returns true when both of the other statements are true and only true. In this experiment, when hour equal to 7 and minute less than 2, then if run the code inside if statement. Otherwise, the code inside if statement will not run.

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

Result

After uploading the program, the buzzer will start playing music for 2 minutes. Then, if you don't stop powering the micro: bit, the buzzer will play the "alarm" for 2 minutes every day starting from 7 am.

Can you display the time on the micro: bit's matrix LEDs in the format we see every day?

Experiment 15 – Distance display

Instruction

It takes too much time to scroll the messages on the micro: bit's matrix LEDs, which makes viewing very inconvenient. But don't worry, you will learn a better way to display messages or data from this experiment. It does not require you to spend time waiting for the information to scroll. You can see all the messages and data at a glance. This method is to use OLED for display.

Target

- Learn how OLED works and use it to make a monitor with ultrasonic ranging sensor to show distance that detected by the ultrasonic ranging sensor.
- Learn how to show number and string on OLED.

Required Parts

- Micro:bit x1
- Crowtail-Base shield for Micro:bit x1
- Crowtail-Ultrasonic Ranging Sensor x1
- Crowtail-OLED x1
- Crowtail-Cable x2
- USB cable x1

Hardware learning and connection

Crowtail- OLED is constructed from the 128 x 64 dot-matrix OLED module. The display offers high brightness, self-emission, high contrast ratio, slim/thin outline, wide viewing angle, wide temperature range and low power consumption. You can almost display anything with this OLED module, such as text and pictures! This kind of OLED is very suitable to use in your project which needs a small display to show data or pictures.
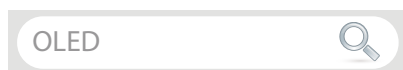
Connect Crowtail-Ultrasonic Ranging Sensor and Crowtail-OLED to P13&P15 and I2C ports of Crowtail-Base shield for Micro:bit.The hardware connections are as follows:
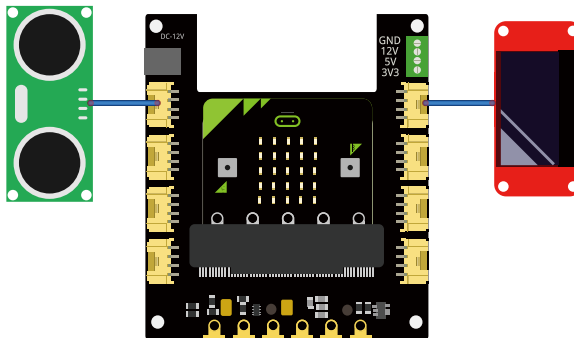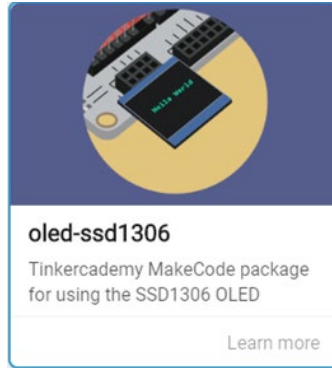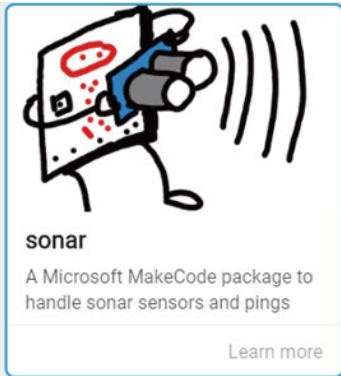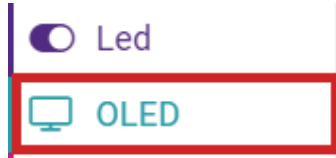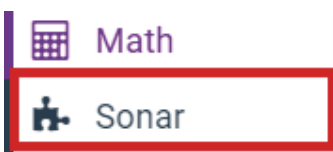
Programming and note

We need to add two extensions package before we use OLED(SSD1306) and ultrasonic ranging sensor, Follow the steps below to add extension packages of them.

- **Step1**: Click on the Extensions, then search "OLED" and "sonar" in the search bar.

sonar

OLED

sonar

A Microsoft MakeCode package to handle sonar sensors and pings

Learn more

oled-ssd1306

Tinkercademy MakeCode package for using the SSD1306 OLED

Learn more

- *Step2*: Add sonar and OLED packages to your Makecode and you can see it.

- **Initialize OLED with width…height…:**
  This block is used to set up the OLED display and is ready for micro: bit use. In order to use our 128 x 64 dot matrix OLED module, we need to initialize the OLED according to the hardware, setting the width to 128 dots and the height to 64 dots.

- **Clear OLED display:** This block is used to clears the OLED display. In this case, every time we cycle, we will display on a clear OLED screen.

- **Show(without newline) number:** Displays a number on the OLED module without a newline. Note that the next line(" cm") is on the same line as this block display.

- **Show string:** Displays a string on the OLED module with a newline. If nothing is filled in this block, nothing will be displayed. This can be used for a blank line.

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

Result

When the distance detected by the ultrasonic ranging sensor is less than 10 cm, the distance and warning("Danger!" and "Keep distance!") will be displayed on OLED. Otherwise, the distance and Security Information("Safe distance") will be displayed on OLED.

Can OLED be used to make a more comprehensive display, showing all the data and information we need on the OLED, such as time, light, temperature and humidity?

Experiment 16 – Wireless communication

Instruction

Wireless communications are everywhere in our daily life, such as mobile phones we most often see and use. Wireless communication brings us a lot of conveniences. It enables us to communicate with each other even thousands of miles apart. Thanks to the radio/Bluetooth module on the micro: bit board, wireless communication can also be achieved between our two micro: bits or communicate with the phone.

Target

● Learn how radio work on micro:bit and use it to communicate between 2 micro:bits.
● Learn how to send and receive numbers between 2 micro:bits.

Required Parts

● Micro:bit x2
● Crowtail-Base shield for Micro:bit x2
● Crowtail-Buzzer x1

● Crowtail-Cable x1
● USB cable x1

Hardware learning and connection

Micro: bit has two wireless communication methods, one is radio communication and the other is Bluetooth communication. These two hardware modules are embedded in the upper left position behind the micro: bit, as shown in the figure. In this experiment, we will learn the standard radio on micro:bit which allows you to communicate between two or more micro:bits.