Microbit Robotics Beginner Level 1

Lesson 1

Makecode Programming

Presented by Advanced Superlogic Team

Today's Topic

1. Introduction of Trainer
2. Introduction to Microbit
3. Events vs response
4. Basic LED Programming
5. Display text on LED
6. Input vs Output
7. Send message through radio

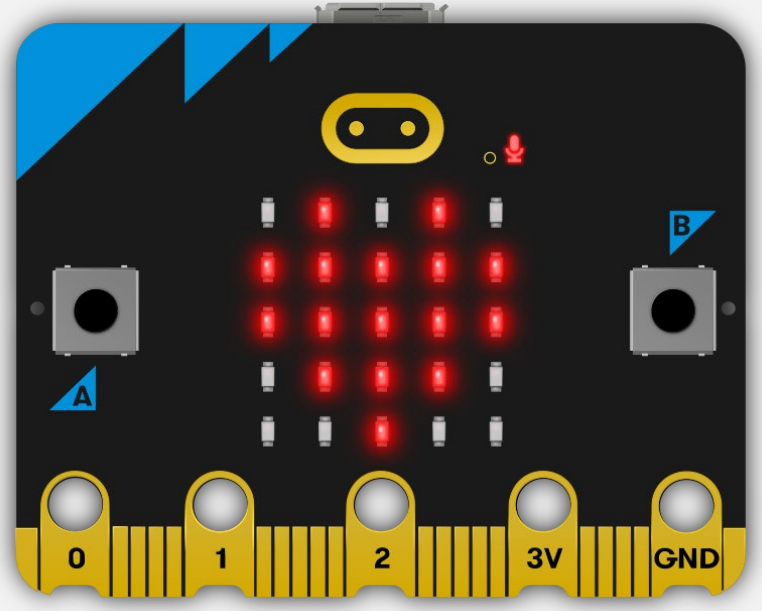
Learning Outcome

1. Understand basic function of Microbit
2. Understand the difference between “On Start” & “Forever”
3. Able to perform LED programming on Microbit
4. Able to program input and output for Microbit
5. Able to send message via radio from Microbit to Microbit

Introduction to today's Trainer

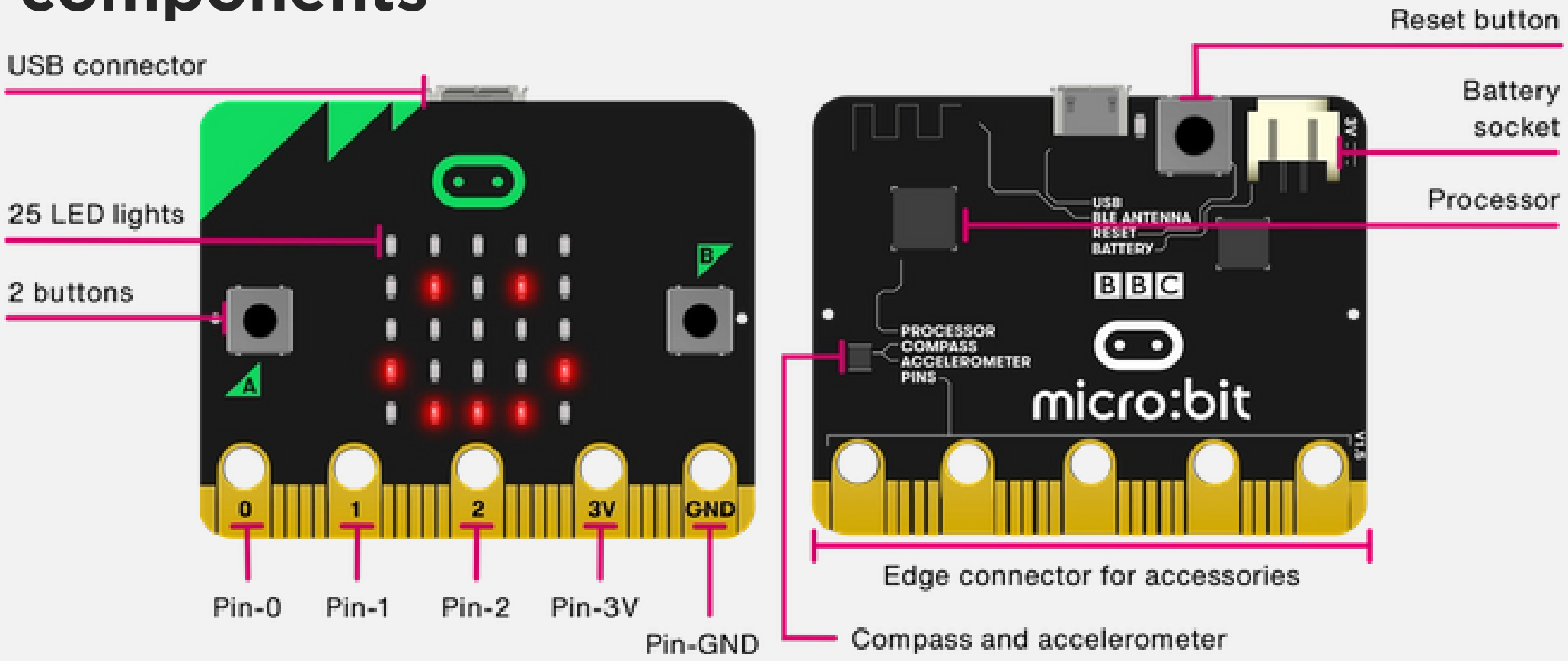
Introduction to Microbit

What is a Microbit?



The BBC micro:bit is **a pocket-sized computer that introduces you to how software and hardware work together**. It has an LED light display, buttons, sensors and many input/output features that, when programmed, let it interact with you and your world.

The Microbit Hardware and electronic components

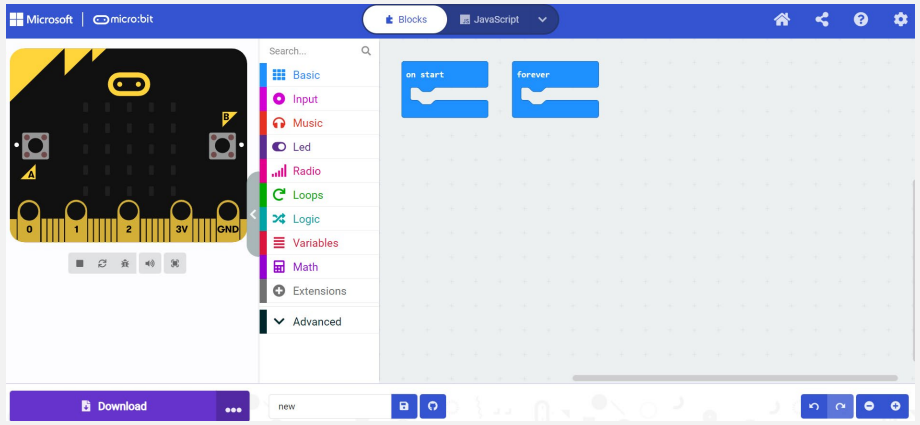


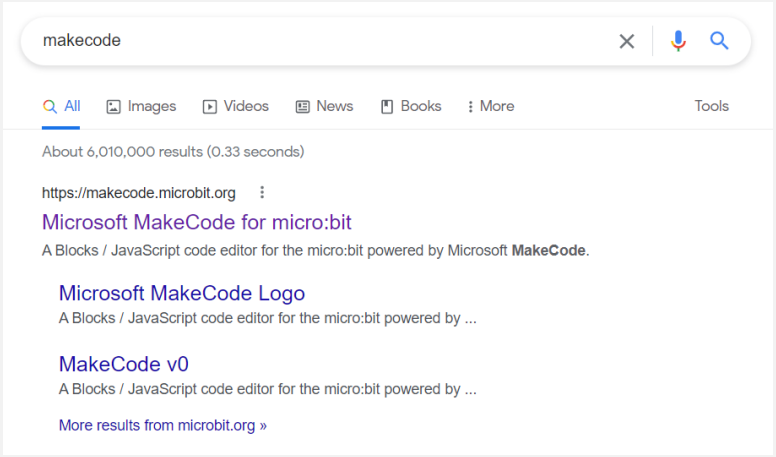
How to program our Microbit?

It is not possible to program directly on the micro:bit.

Instead, **a program is created on another computer and then uploaded to the micro:bit using a USB cable or wirelessly using Bluetooth**.

Makecode – Visual block programming



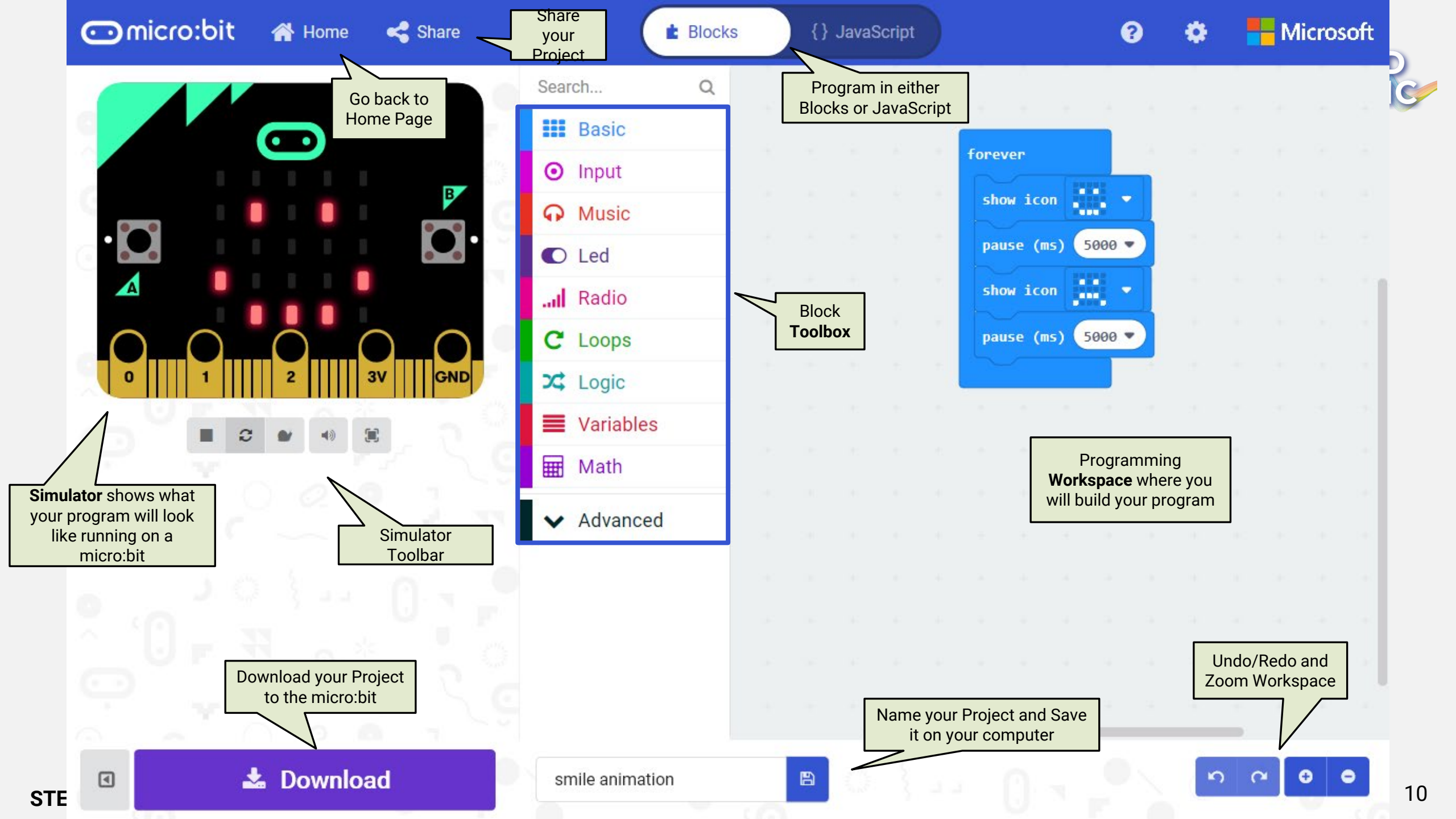


You can open your browser (Google Chrome) and search for

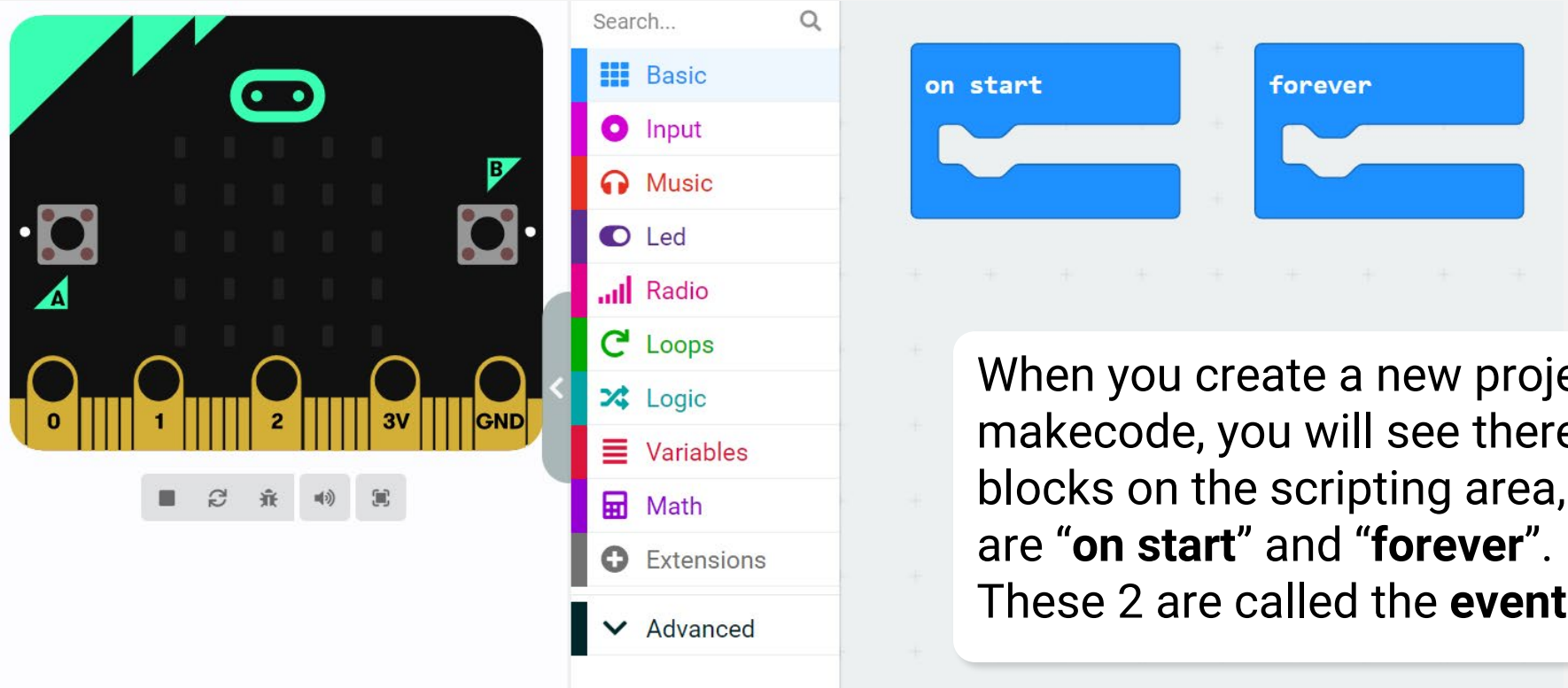
“Makecode”

on Google.

The first link is the link to makecode.

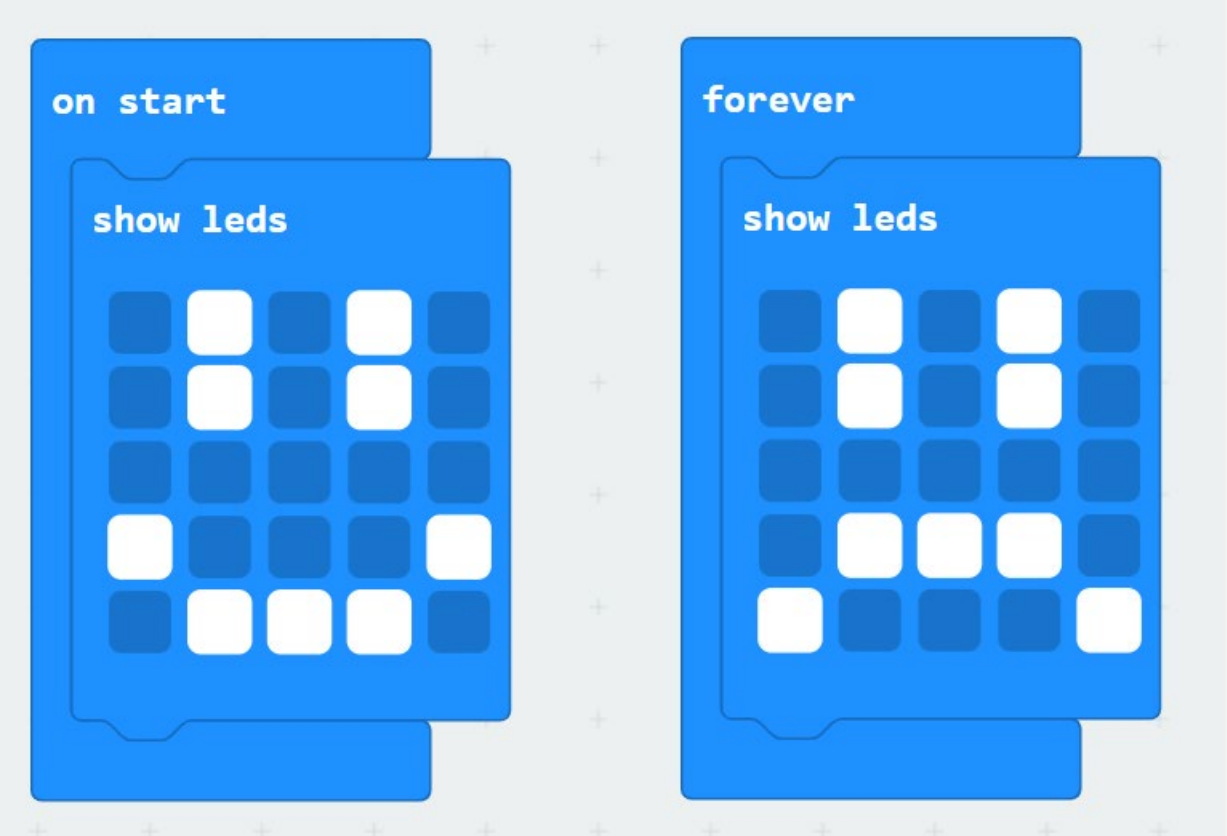

micro:bit
Home
Share
Share your Project
Blocks
{ } JavaScript
Microsoft
Go back to Home Page
Search...
Basic
Input
Music
Led
Radio
Loops
Logic
Variables
Math
Advanced
Program in either Blocks or JavaScript
Block Toolbox
forever
show icon
pause (ms) 5000
show icon
pause (ms) 5000
Simulator shows what your program will look like running on a micro:bit
Simulator Toolbar
Programming Workspace where you will build your program
Download your Project to the micro:bit
Download
Name your Project and Save it on your computer
smile animation
Undo/Redo and Zoom Workspace

Event & Response



When you create a new project in makecode, you will see there are 2 blocks on the scripting area, which are “**on start**” and “**forever**”. These 2 are called the **events**.

Event & Response

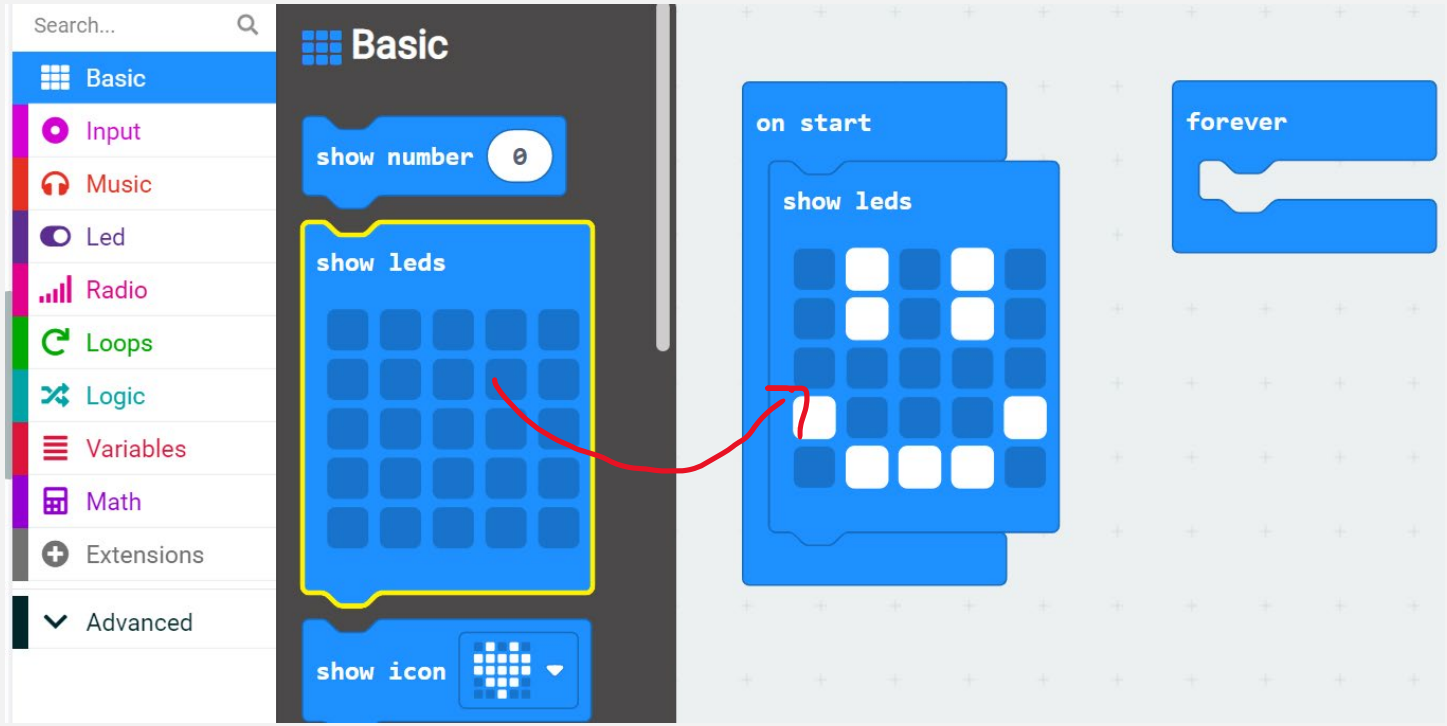


[on start]

This program is run only once after your microbit is powered up.

[forever]
This program is run in a forever loop without stopping once your microbit is powered up.

Event & Response

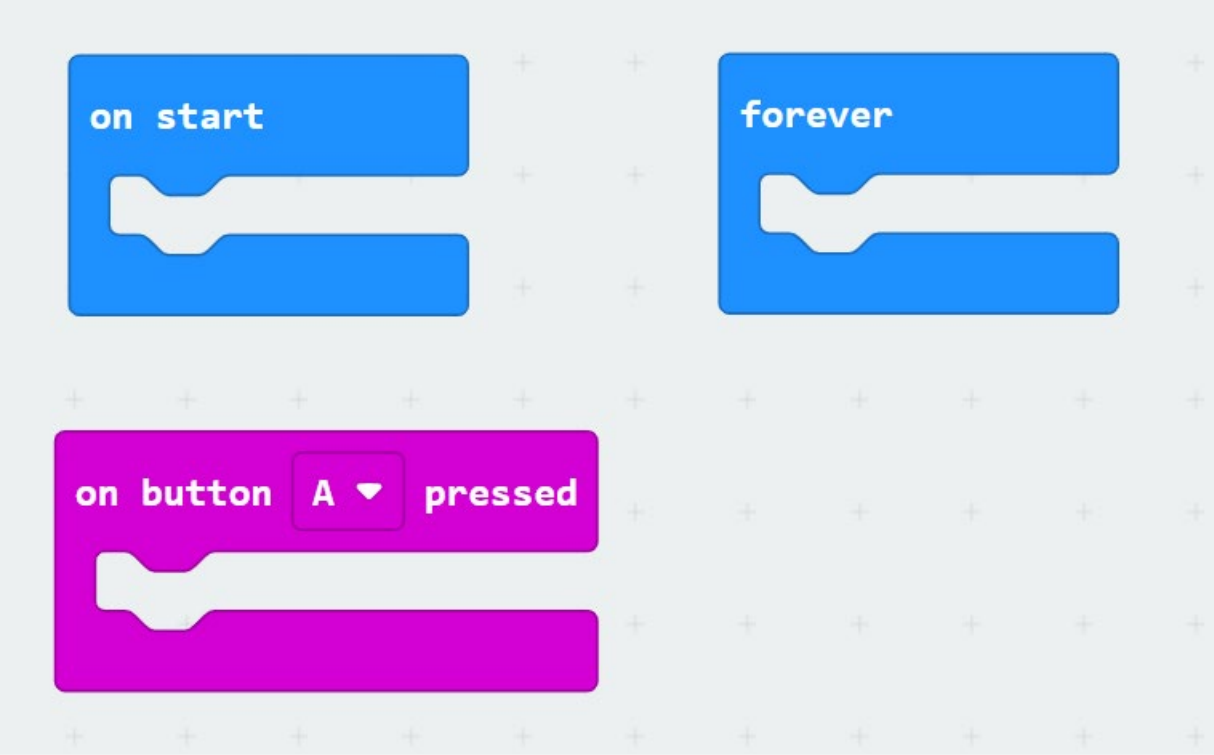


At the left column you will see the block pallet that consists of different functions including events and response.

We can go to the basic category and drag a show leds block into the “on start” block.

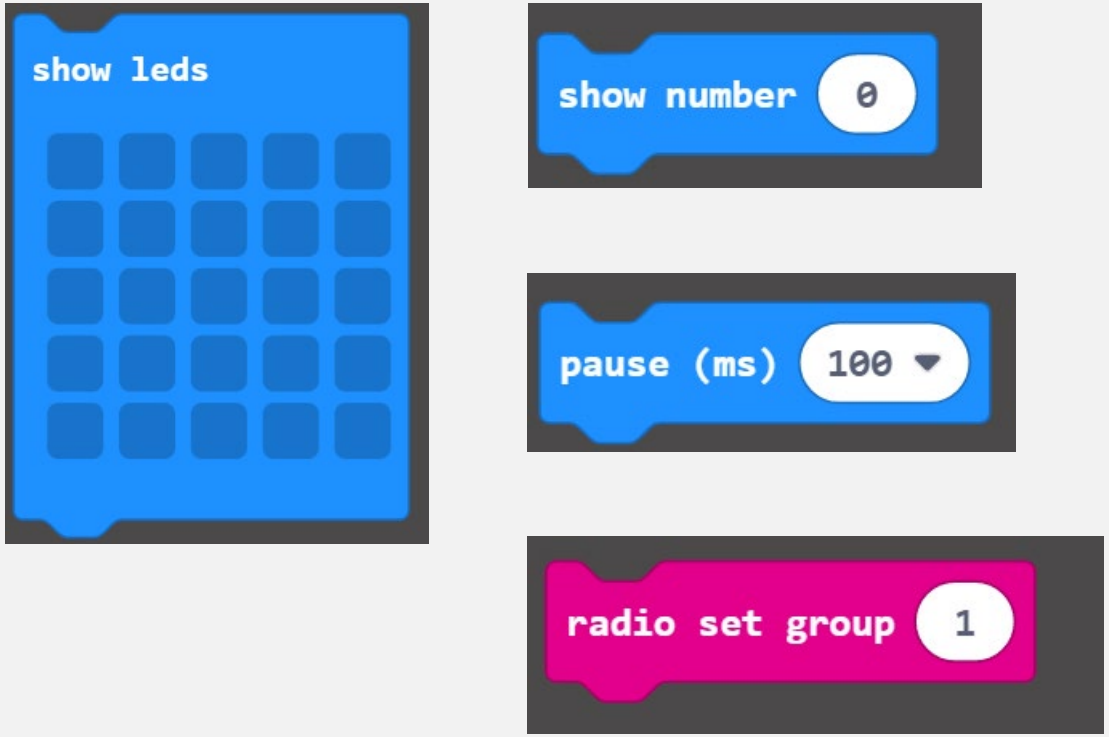
Whatever scripts that are inside the events are call responses.

Event & Response



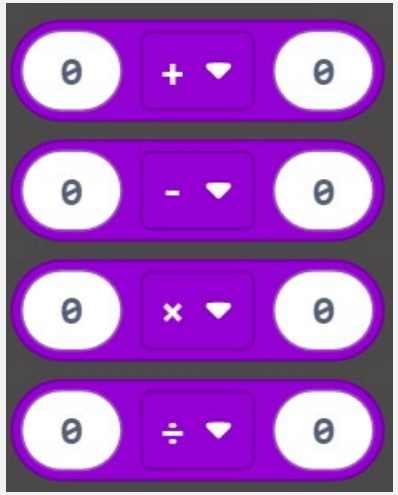
Events block type & pattern.

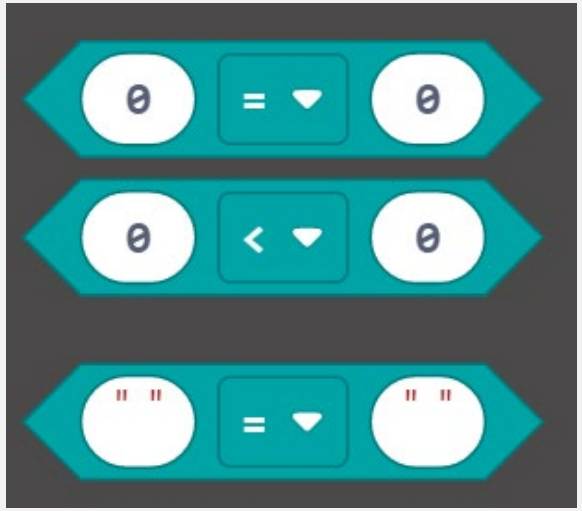
Event & Response

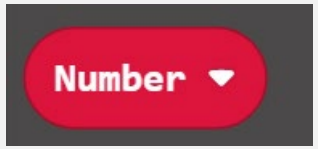


Response block type & pattern.

Event & Response







These are operators blocks or variable blocks

Basic LED Programming

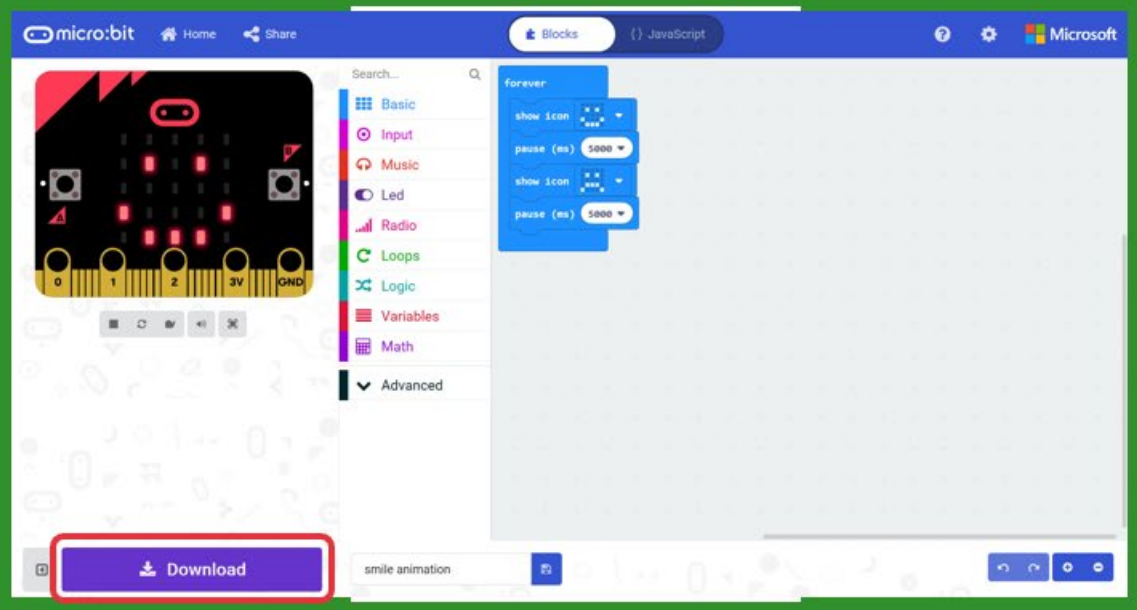
Basic LED Programming

You can program the LED using show icon or show leds blocks with the pause blocks.

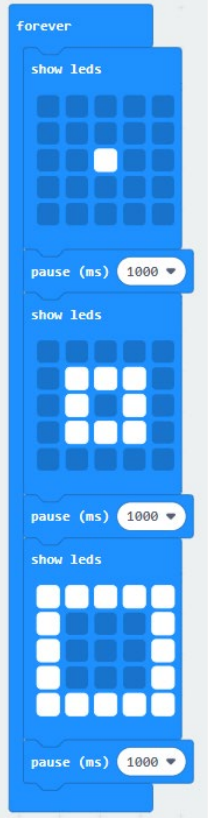
How to download your program?

Download a MakeCode program to micro:bit

1. Connect the micro:bit to your computer using the micro-USB cable
2. In the open MakeCode project, select Download
3. Move the downloaded **.hex** file to the MICROBIT drive



Basic LED Programming

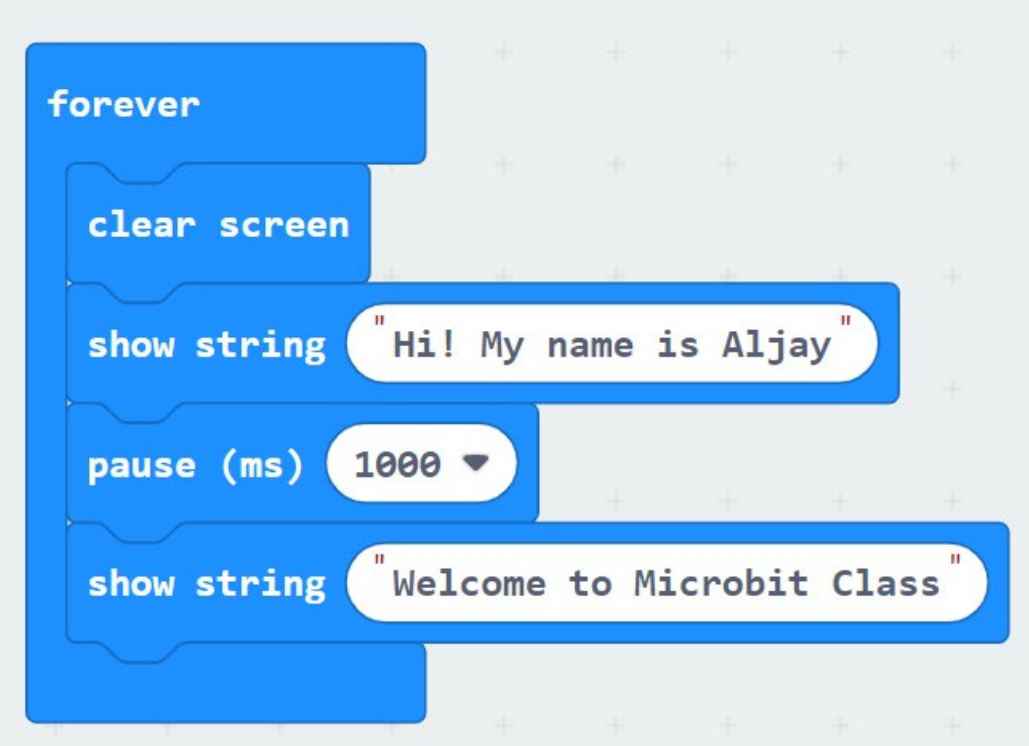


Let’s try and design your own animation on your microbit board

Let’s see who is the most creative guy…

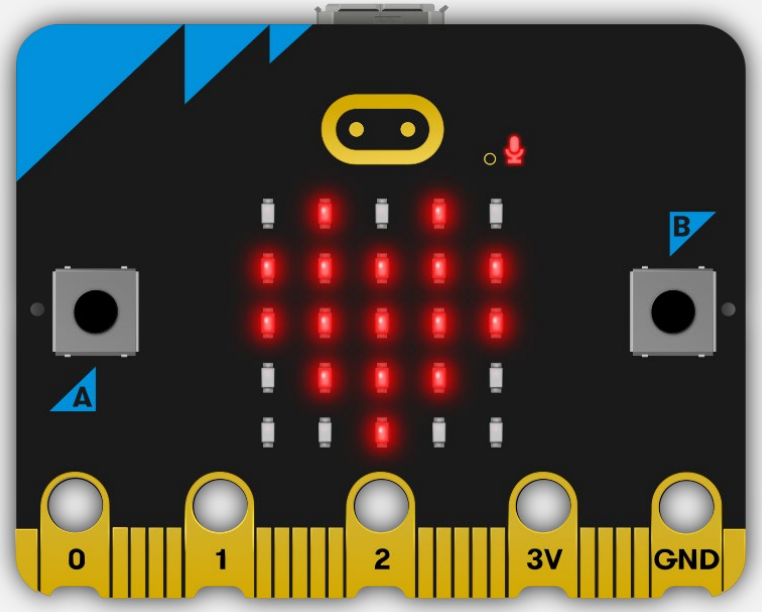
It’s time for a break (5

Basic LED Programming – Show strings and numbers



We can use show string or show number to display the words and numbers we want on the LED.

Basic LED Programming – Challenge

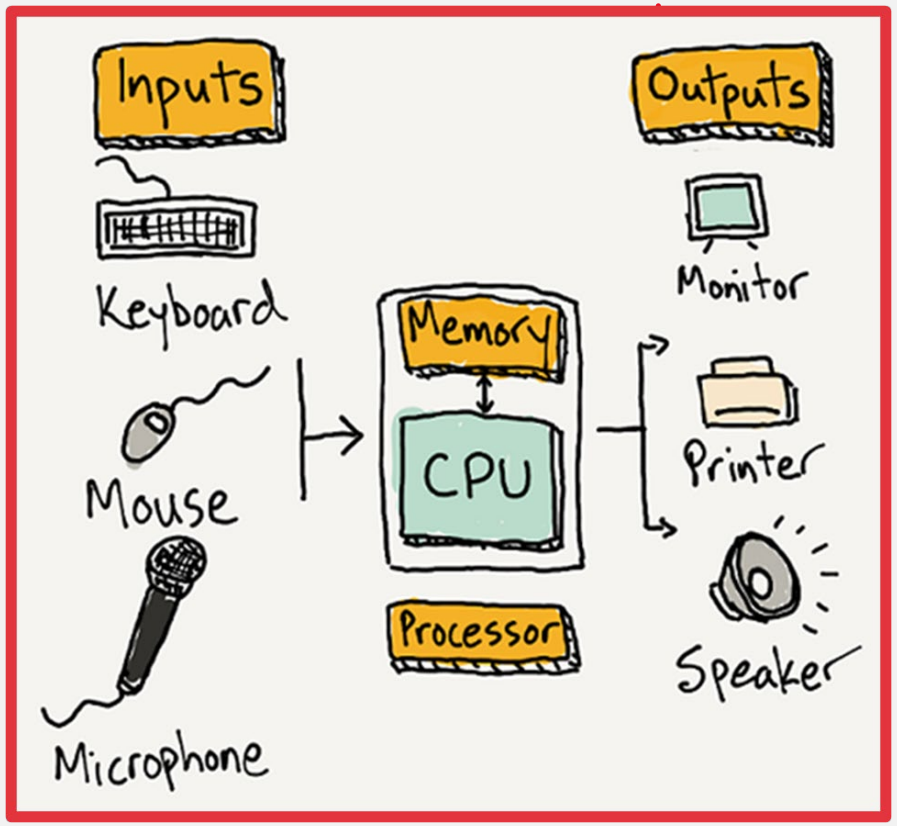


Can you use your microbit to display:

1. Your name
2. Your age
3. Your height
4. Your weight
5. Your birth date

Input vs Output

Input vs output - What is a computer?

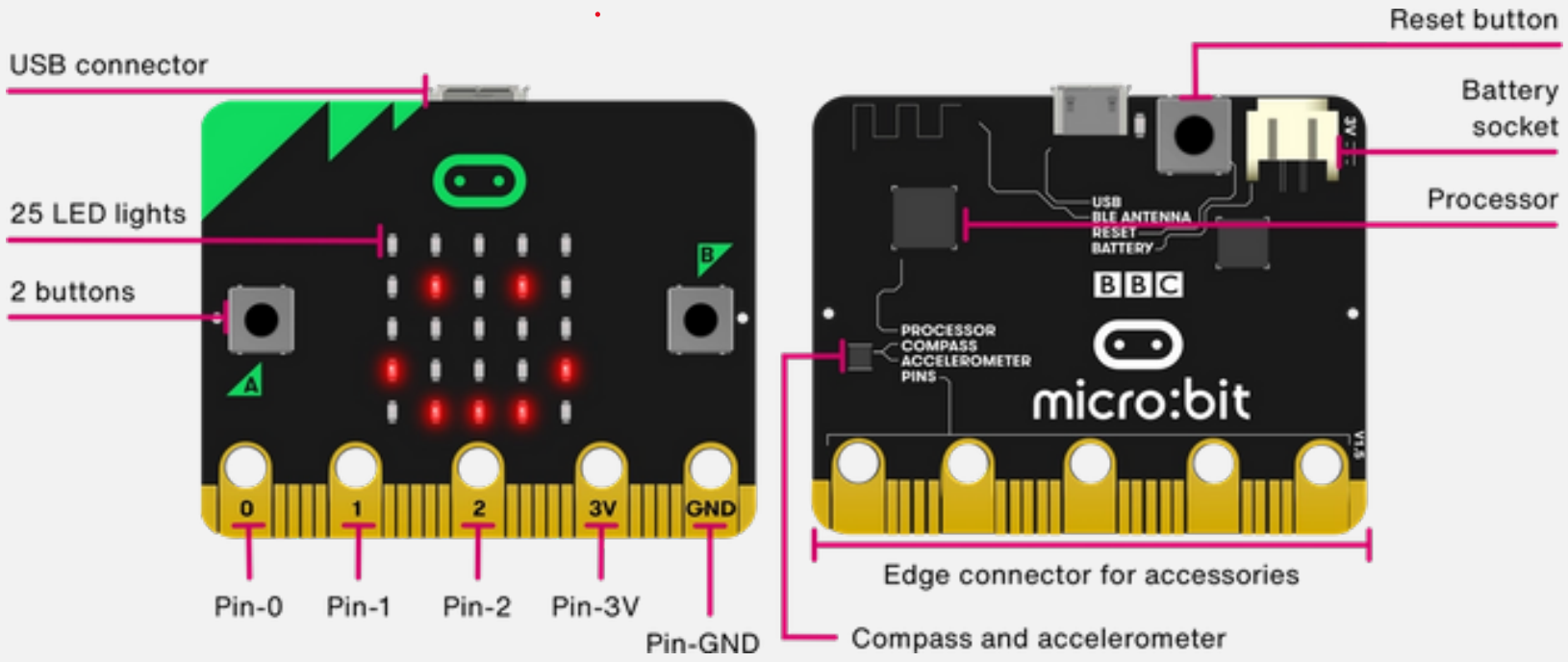


There are four main parts to a computer:
Processor: It's what the computer uses to process and transform information. Also known as the CPU (central processing unit).
Memory: How the computer remembers things. There are two types of memory:

- **RAM (random access memory)** -The computer's short-term memory
- **Storage (hard drive)** - The computer's long-term memory

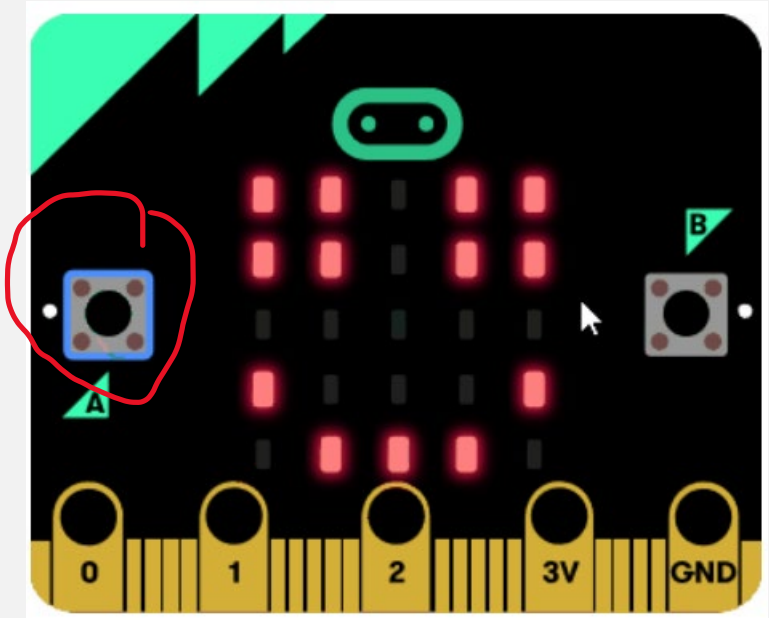
Inputs: How a computer takes in information from the world.
Outputs: How a computer displays or communicates information.

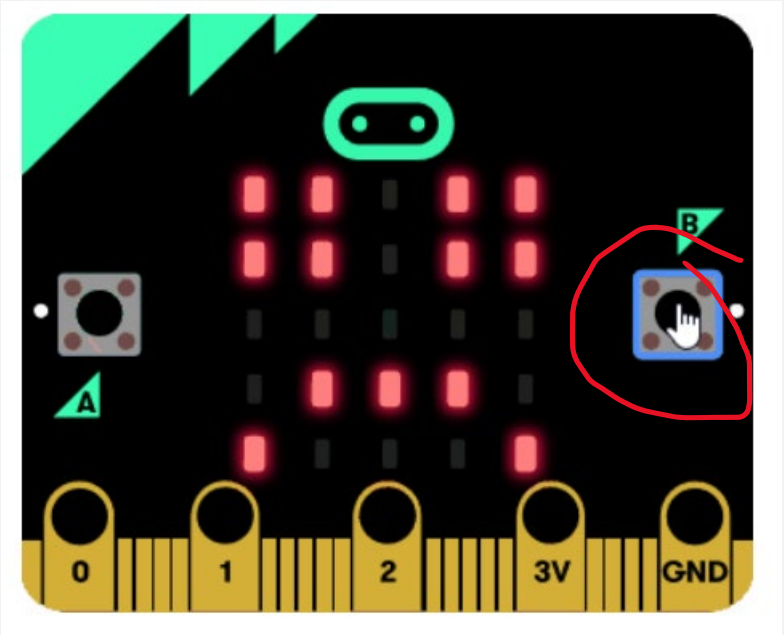
Input vs output



Which parts of microbit are input and which parts of microbit are outputs?

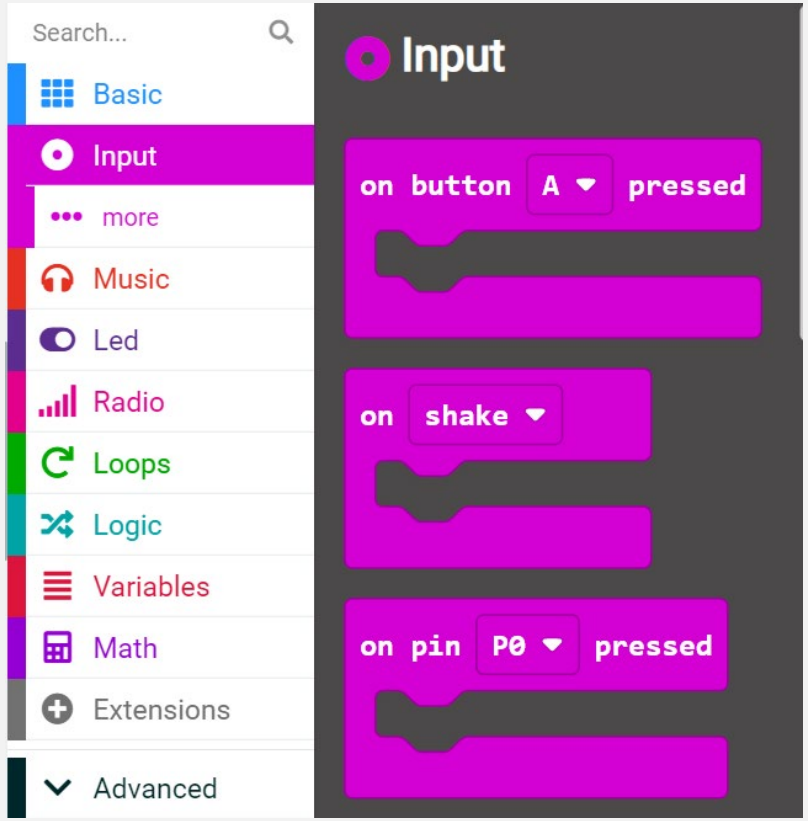
Input vs output





Now we want to do a smiley face challenge, when we press button A, it will show a smiley face, but when we press button B, it will show a sad face,

Input vs output



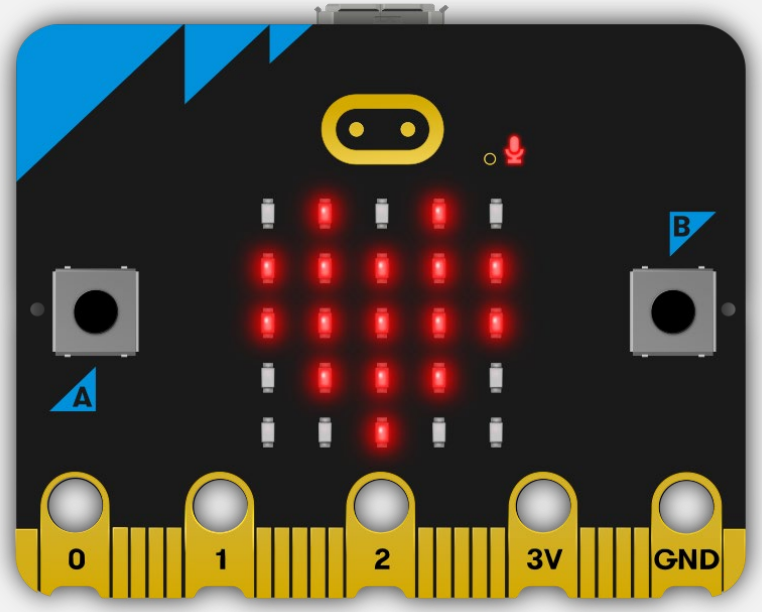
From the input category, you can see that there is a “On button A pressed”.

We are going to use this as the events to trigger to show either Smiley or sad face.

Input vs output – Different input method

On the second block, there is one block called “On shake”, we can try different events to trigger different responses and show different displays.

Input vs output – Challenge

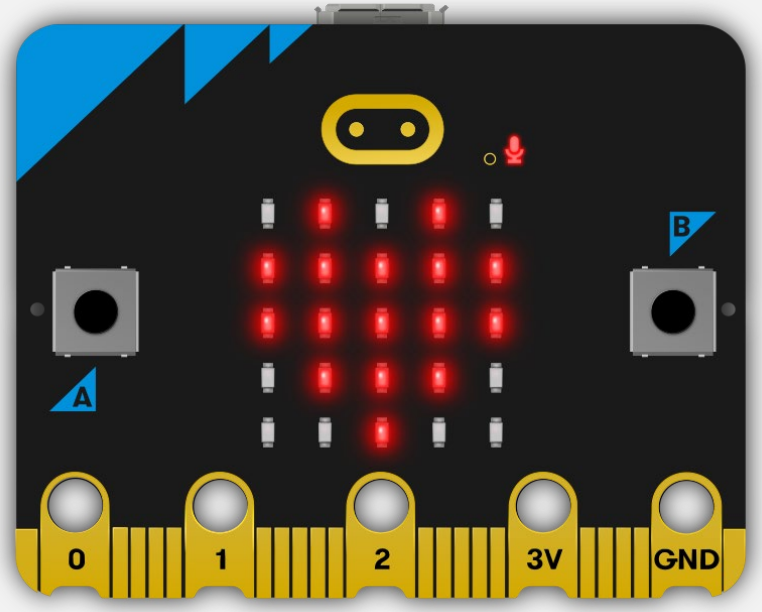


Can you program at least 10 different events to show different display?

*Show different number for different events.

Send message via Radio

Send message via Radio – from Microbit to Microbit

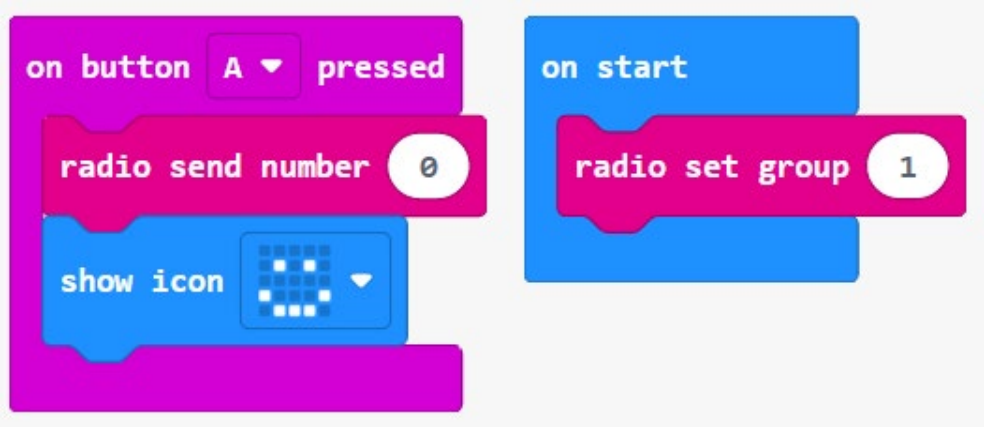


Radio – wave frequency can be sent and received from microbit, hence, we can use this function to communicate between microbit.

Mood Radio Project

This project uses the radio to share your mood with other micro:bits. When you press A, your friends will see a smiley face. When you press B, they will see a frowny face.

Mood Radio Project

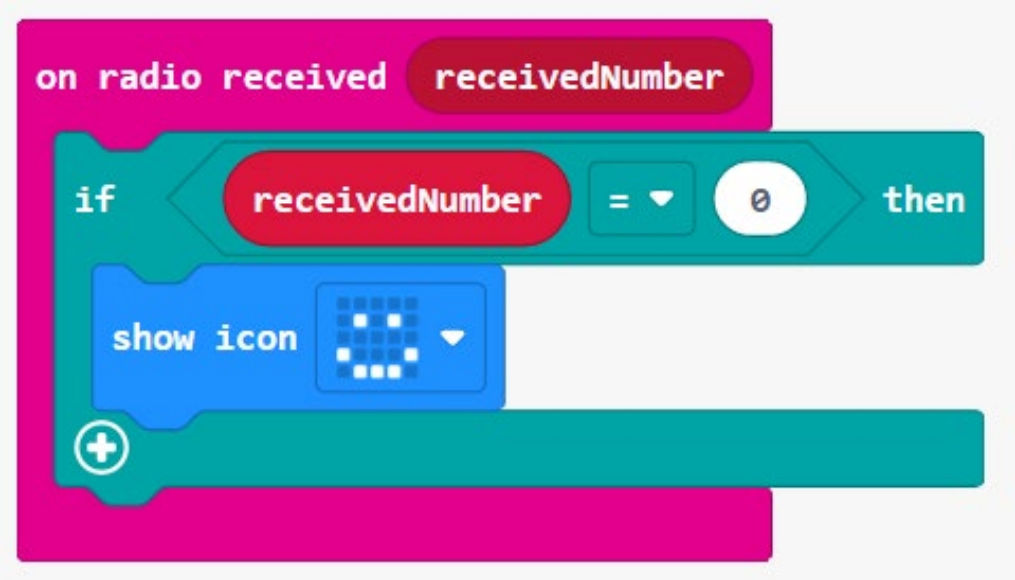


Sending a smiley

The micro:bit can't understand mood but it is pretty good with numbers. In fact, it can send numbers between micro:bits using the radio antenna, just like a phone can send text messages.

Let's add blocks that send a number when button A is pressed. We assume that 0 is the "mood code" to send for smiley.

Mood Radio Project



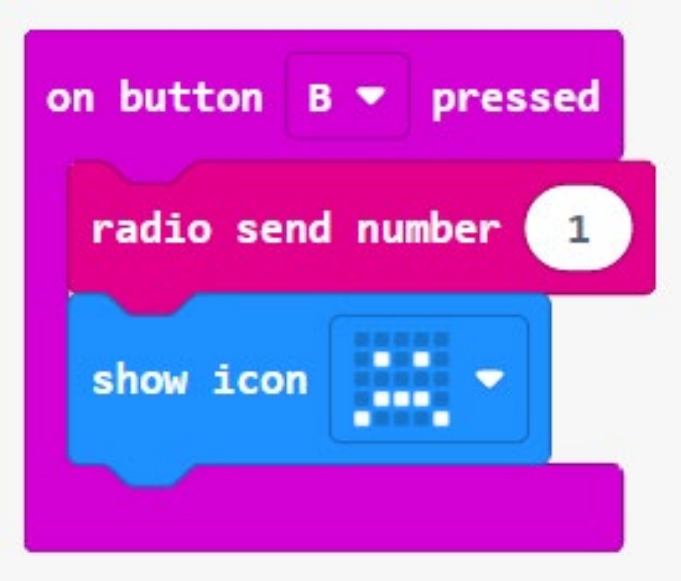
Receiving a smiley

We add a on received number block that will run code whenever a new “mood” message comes in.

The receivedNumber variable contains the numeric value that was sent.

Since we’ve decided that 0 is smiley, we add a conditional if then statement to show this icon.

Mood Radio Project – Sending Frowny



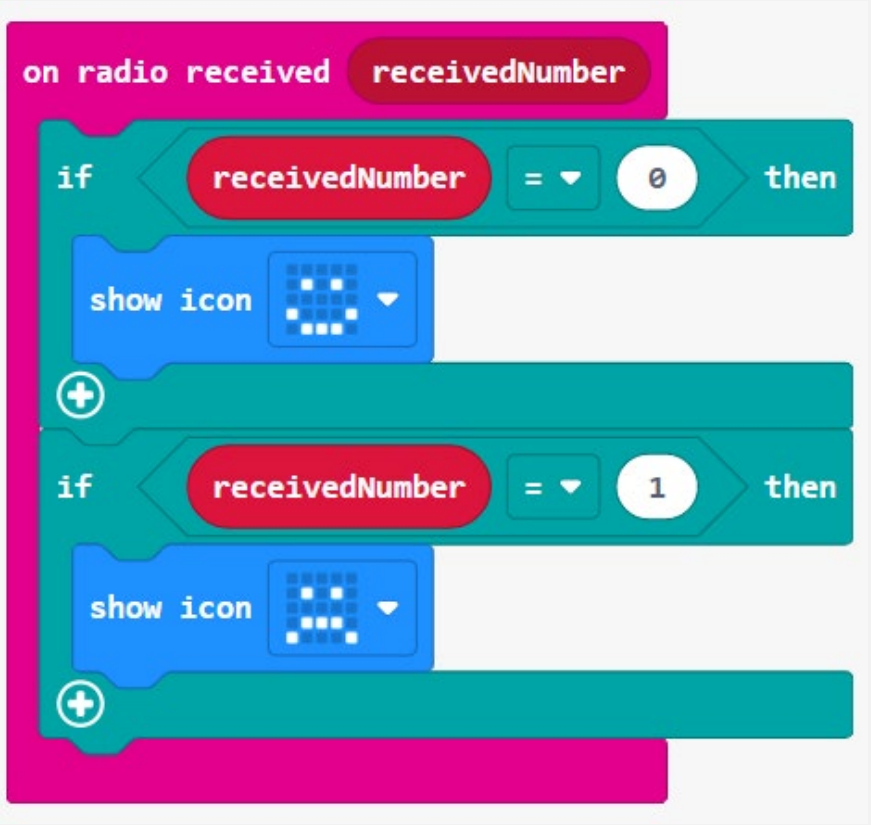
Sending a frowny

Adding another mood to our messaging app done in a similar way.

We decide that the “mood code” of 1 means frowny.

We can add a B button event that sends that code.

Mood Radio Project – Finalizing



If the on received number block, we add another conditional if then statement to handle the frowny “mood code”.

Mood Radio Project – Download and try it

Yay you have completed your program, faster download and try it with your friend.

Do a quick self-check of your learning outcome...

1. Do you understand basic function of Microbit?
2. What is the difference between “On Start” & “Forever”?
3. What is event and what is response?
4. How to program the 5 x 5 LED on Microbit?
5. What is input and output on Microbit?
6. How to send message via radio from Microbit to Microbit?

Any Questions?

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Thank you :)