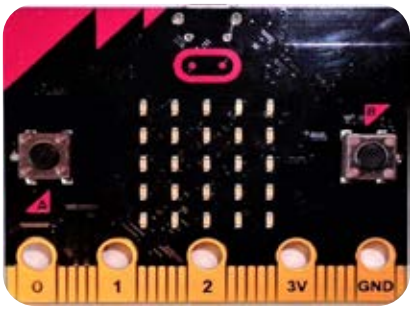
1 Activity 1

First Program: Hello World

The Microbit

Let's look at the different parts of the Micro:bit and explain the purpose of each.

Front



5x5 grid of LEDs – used as a display; each light can be programmed to be on or off and have varying intensities of light

A & B Buttons – buttons that can be programmed to respond to a press or a release

3 Input/Output (I/O) rings – to attach sensors and send signals to/from the Micro:bit

3V and GND rings – to provide power to the external devices that use I/O pins

Back

Antenna – for Bluetooth connection with other devices

CPU – to run programs; acts as the "brain" of the Micro:bit

Micro-USB – to attach to computer; transfers data and power to Micro:bit

Battery Connector – to attach battery pack for portable power

Accelerometer – detects shaking, tilting, and other motion of Micro:bit

Compass – detects magnetic fields and direction Micro:bit is moving/facing

Edge Pins – allow users to slot Micro:bit into edge connector for greater I/O capabilities

Reset Button – press to restart the Micro:bit and its current program

"Hello World" Program

The "Hello World" program is believed to have first been used in 1974 by Bell Labs technicians as they were trying to show their counterparts how the computer can be programmed to interact with humans. Since then, it has become widely accepted as the first program new programmers use to learn a new programming language or test a new device.

"Hello World" is widely used for its simplicity, to familiarize users with the coding environment they will be using, and to introduce printing (a useful tool in every programming language).

Copyright © 2020 Cyber Innovation Center
All Rights Reserved. Not for Distribution.

Block Coding

Navigate to the MakeCode online editor at https://makecode.microbit.org, then walk through the two code blocks.

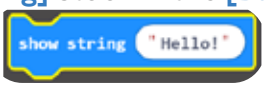
The **[on start]** block: This block of code executes the blocks inside of it when the microbit starts. The blocks inside of the **[on start]** block are executed only once from top to bottom, unless programmed to do otherwise.

The **[forever]** block: This block executes the blocks inside of it forever. The internal blocks are executed from top to bottom, then they are repeated from top to bottom until the microbit is powered off, reset, or otherwise programed to do stop.

Alter the program so that the micro:bit display shows the string of characters **"Hello, World!"** and shows an **icon** of a heart for **2 seconds.** Also the program should repeat this sequence **forever**.

1. Since we want everything in the program to repeat forever, we do not need the **[on start]** block. Delete the **[on start]** block by dragging it to the block types panel. A trash can will appear to indicate that the block will be deleted when the mouse button is released.

2. Find the **[show string]** block in the **[Basic]** block types.



3. Drag it into the **[forever]** block.

Copyright © 2020 Cyber Innovation Center
All Rights Reserved. Not for Distribution.

4. Change the string of characters “Hello!” to “**Hello, World**”.

5. Find the **[show icon]** block in the **[Basic]** block types. Place it inside of the existing **[forever]** block so that it is below the existing **[show string]** block.

6. Find the **[pause (ms)]** block in the **[Basic]** block types. Place it inside the **[forever]** block so that it is below the **[show icon]** block.

The **[pause (ms)]** block causes the program to pause for a specified number of milliseconds (thousandths of a second). The default value is 100 ms, or 100 thousanths of a second, or a tenth of a second.

Since we want the program to pause for 2 seconds, we need this value to be 2000 since there are 2000 milliseconds in 2 seconds. Change the value to 2000 ms by clicking and typing 2000, or select 2 seconds from the dropdown.

Name your program. At the bottom of your editor, change the name of your file from "Untitled" to "Hello World". It is important to give each program you create a unique name before saving or downloading to prevent previous programs from being overwritten or confused.

Download the .hex file that contains the program for the micro:bit. There are two methods for downloading your program.

Copyright © 2020 Cyber Innovation Center
All Rights Reserved. Not for Distribution.

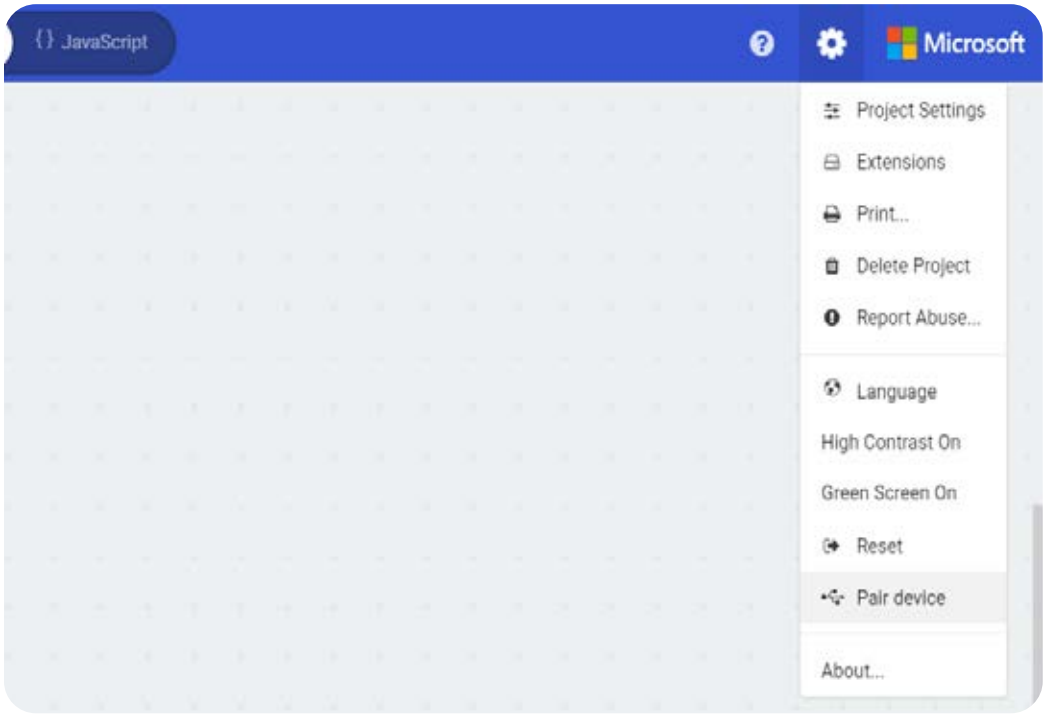
Downloading a program

Microsoft MakeCode offers two methods of downloading your program to the micro:bit. Either can be used depending on your preference. Make certain your micro:bit is plugged into your device.

Option 1 (Preferred)

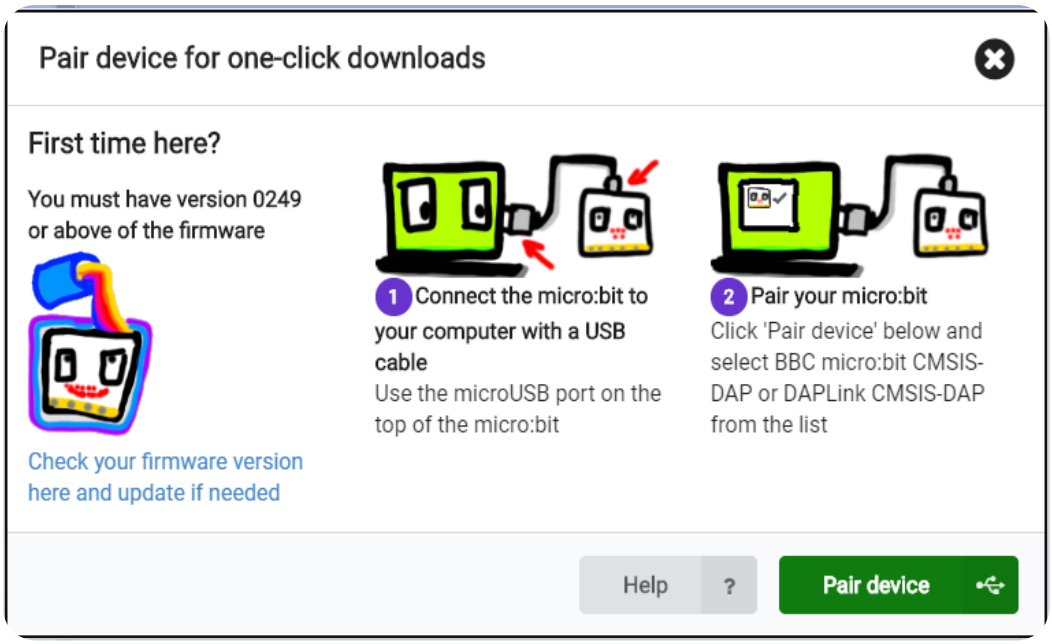
The first option is to pair your device so that program scan be downloaded directly to the micro:bit with one click. Your micro:bit's firmware must be up to date in order to use this option.

1. Click on the Settings icon at the top right of the screen. A drop down window will appear. Click on "Pair device"

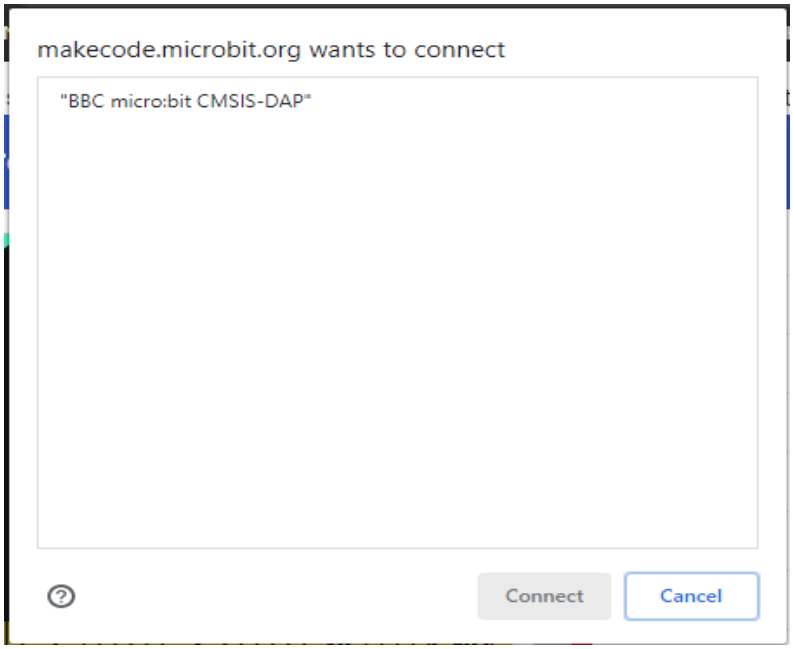


2. A pop up will appear that instructs you to connect your micro:bit and pair your device. There is also a link to the firmware update page if you have not checked it already.
3. Click the green "**Pair device**" box.

Copyright © 2020 Cyber Innovation Center
All Rights Reserved. Not for Distribution.



4. A second window will appear with your micro:bit listed at the top. If it is not listed, check your firmware version and update.
5. Click on your micro:bit's name then click "Connect."
6. Your device is now ready. Programs you write will be loaded directly to the micro:bit when you click the "Download" button in the editor.



Copyright © 2020 Cyber Innovation Center
All Rights Reserved. Not for Distribution.

Option 2

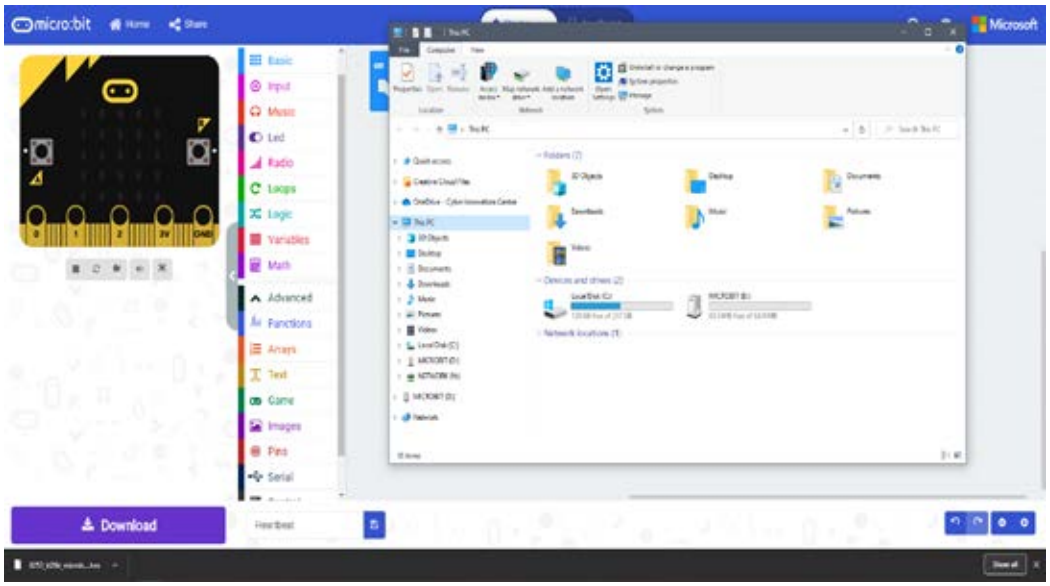
If your micro:bit cannot pair with the device you are using, there is another method for getting your programs to the micro:bit.

1. When you are ready to download your program, click the "Download button on the bottom left of the screen.
2. A bar should appear at the bottom of the screen showing your .hex file.

Note: if the downloads bar does not appear, you can check the "Downloads" folder using your File Explorer.

Mac users : Finder > Downloads

3. You should see your micro:bit listed under the File Explorer (Finder for Mac). Drag the .hex file to the micro:bit.
4. A yellow light should begin flashing on the micro:bit to indicate that the download is in progress. When the flashing stops, your program is ready to use.

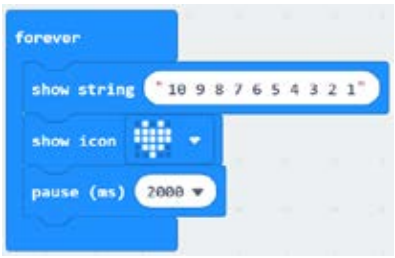


Additional Challenges

Copyright © 2020 Cyber Innovation Center
All Rights Reserved. Not for Distribution.

1. Alter the code to scroll your own name in place of "world."

2. Create a timer that counts down from 10. This can be done by adding a space between each number.



*Legal Note

MICROSOFT AND/OR ITS RESPECTIVE SUPPLIERS MAKE NO REPRESENTATIONS ABOUT THE SUITABILITY OF THE INFORMATION CONTAINED IN THE DOCUMENTS AND RELATED GRAPHICS PUBLISHED AS PART OF THE SERVICES FOR ANY PURPOSE. ALL SUCH DOCUMENTS AND RELATED GRAPHICS ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND. MICROSOFT AND/OR ITS RESPECTIVE SUPPLIERS HEREBY DISCLAIMALL WARRANTIES AND CONDITIONS WITH REGARD TO THIS INFORMATION, INCLUDING ALL WARRANTIES AND CONDITIONS OF MERCHANTABILITY, WHETHER EXPRESS, IMPLIED OR STATUTORY, FITNESS FOR A PARTICULAR PURPOSE, TITLE AND NON-INFRINGEMENT. IN NO EVENT SHALL MICROSOFT AND/OR ITS RESPECTIVE SUPPLIERS BE LIABLE FOR ANY SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES WHATSOEVER RESULTING FROM LOSS OF USE, DATA OR PROFITS, WHETHER IN AN ACTION OF CONTRACT, NEGLIGENCE OR OTHER TORTIOUS ACTION, ARISING OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF INFORMATION AVAILABLE FROM THE SERVICES.

THE DOCUMENTS AND RELATED GRAPHICS PUBLISHED ON THE SERVICES COULD INCLUDE TECHNICAL INACCURACIES OR TYPOGRAPHICAL ERRORS. CHANGES ARE PERIODICALLY ADDED TO TEH INFORMATION HEREIN. MICROSOFT AND/OR ITS RESPECTIVE SUPPLIERS MAY MAKE IMPROVEMENTS AND/OR CHANGES IN THE PRODUCT(S) AND/OR THE PROGRAM(S) DESCRIBED HEREIN AT ANY TIME.

Copyright © 2020 Cyber Innovation Center
All Rights Reserved. Not for Distribution.