

Shake that Micro:Bit

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Vocabulary

Algorithm: a set of steps that describe a method of solving a problem. More formally, an algorithm is a well-ordered sequence of unambiguous and effectively computable operations that produces a result and halts in a finite amount of time.

Chip: An integrated circuit that packs millions of transistors and other parts into a tiny package.



Code: A set of commands, written by a human, which can be used to make a computer solve some problem. The code implements one or more algorithms.

Computer: A computer is a machine that takes simple actions in response to commands. The commands can be stored, to be used over and over.

CPU (central processing unit): The part of the computer that actually executes commands. In modern computers, it is a small chip.

Input device: Anything that can provide data to a computer program. Keyboards, mice, and microphones are examples of input devices.

Machine language: A language of only ones and zeros (binary digits, or *bits*) that can be used directly by the CPU.

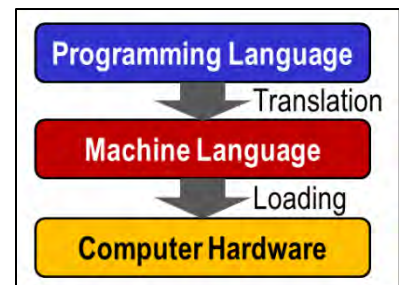
Memory: Electronic storage connected directly to the CPU. The running program and its data are stored in memory. Also called “main memory” or “RAM (random access memory.” The contents of memory are lost when power is turned off.

Micro:Bit: A tiny computer with CPU, memory, storage, input devices, and output devices.

Output device: Anything to which a computer program can send data. Screens, printers, and speakers are examples of input and output devices.

Program: A set of stored commands that can be run on a computer as often as needed.

Programming language: A structured, but human-readable language that is used to write programs for computers. The programs must be translated to machine language before the CPU can use them. There are many programming languages, including Python, Java, JavaScript, and Makecode.



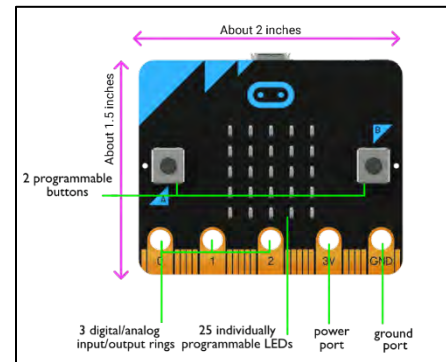
Storage: Electronic or magnetic storage that holds programs and data that can be loaded into main memory when needed. A storage device is *both* an input device and an output device. Also called “hard disk.” Flash drives and solid state disks are storage. The contents of storage are *not* lost when power is turned off.

Exploring the Micro:Bit

The top of the battery case *slides off* in the direction of the two wires.

There are 25 programmable LEDs and two programmable buttons on the circuit board. The Micro:Bit was designed to have many other kinds of devices connected to it using the pins and rings at the bottom edge.

The Micro:Bit comes pre-loaded with a program that can be used to explore the on-board features. However, it can hold only one program at a time, so loading your own program wipes out the pre-loaded one.



Writing Your Own Program

Write out the *algorithm* (in English) first.

- Go here: <https://makecode.microbit.org/>
- Click the “New Project” box.
- Give your project a name. It will be there when you come back, but *only on the same computer*.
- Drag blocks into the workspace to assemble a program according to your algorithm.

You can test your program with the simulator on the right of the screen. Click the “Refresh” arrows, which look like a recycle symbol.

Save the finished program on your laptop by clicking the “download” button on the web page. That translates the program and sends a .hex file to your computer. The Micro:Bit looks like a flash drive to the computer. Load your program into the Micro:Bit by dragging the .hex file to the Micro:Bit “drive.”

Challenges

What happened to the program we explored at the beginning of class?

Why didn't we need a battery for the Smile program?

Could you change your program so that button B shows a frowny face? *Hint:* You will need two button blocks. Place them side by side in the workspace



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