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New Jersey CSPDWeek

This material is based upon work supported by the National Science Foundation under Award No. 2607763.

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Exploring Physical Computing with Young Learners

By Michelle Velho

New Jersey CSPDWeek

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https://tinyurl.com/kv8fs62y

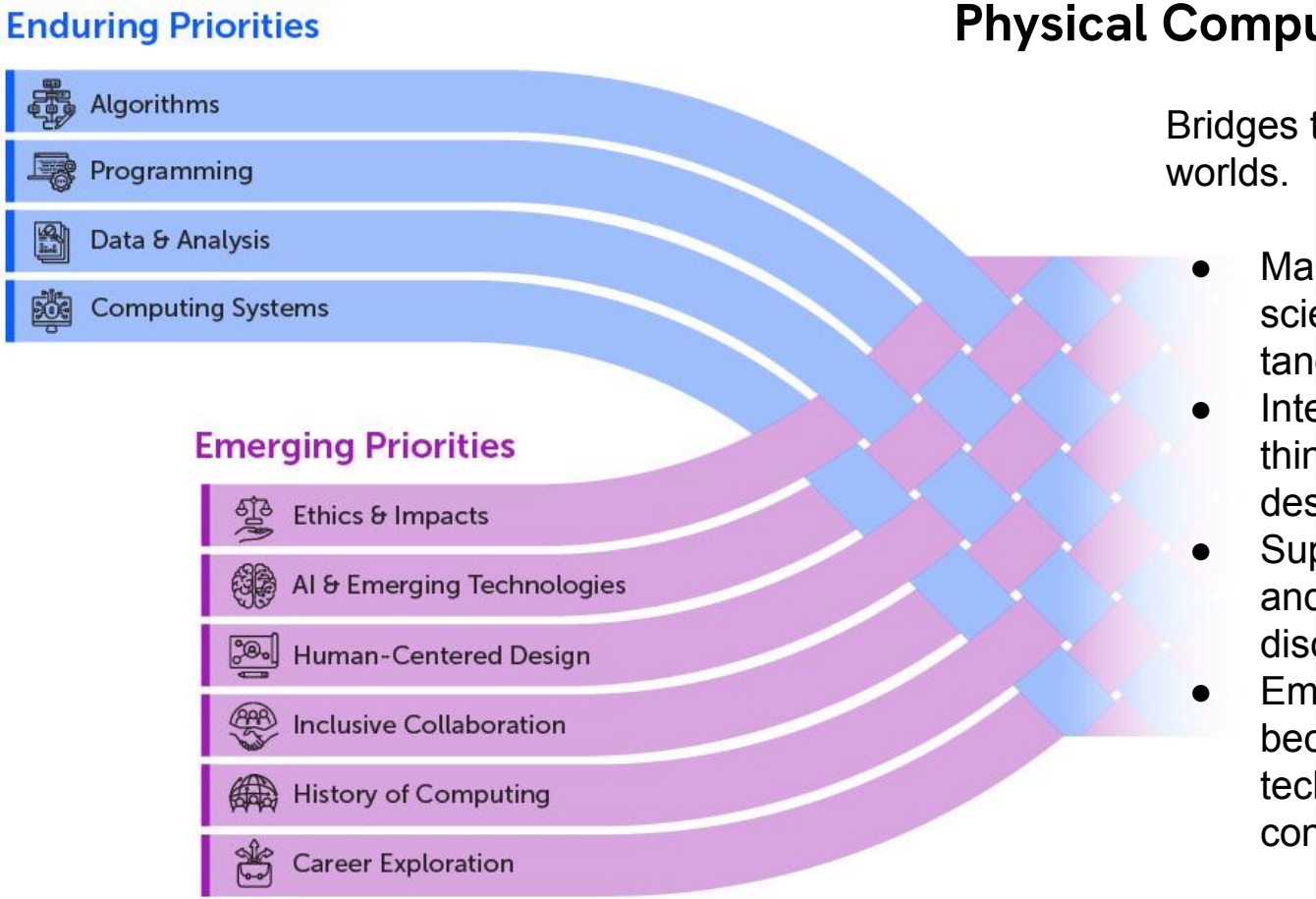
Physical Computing

The study, design, and creation of interactive physical systems that can sense and respond to the physical world. This involves the use of software and hardware components like sensors, actuators, and microcontrollers.

Physical Computing System

A combination of hardware and software that uses sensors to receive information, processes that information with a programmable controller, and uses outputs or actuators to respond to people or the physical environment.

Physical Computing



Bridges the digital and physical worlds.

- Makes abstract computer science concepts visible and tangible.
- Integrates computational thinking with engineering design.
- Supports inquiry, creativity, and problem-solving across disciplines.
- Empowers students to become creators of technology, not just consumers.

Unplugged

- Open up a device
- KLEWS
- Call and response game

Hello Ruby

- KLEWs
- Read a chapter
- Follow up activity

Makey Makey

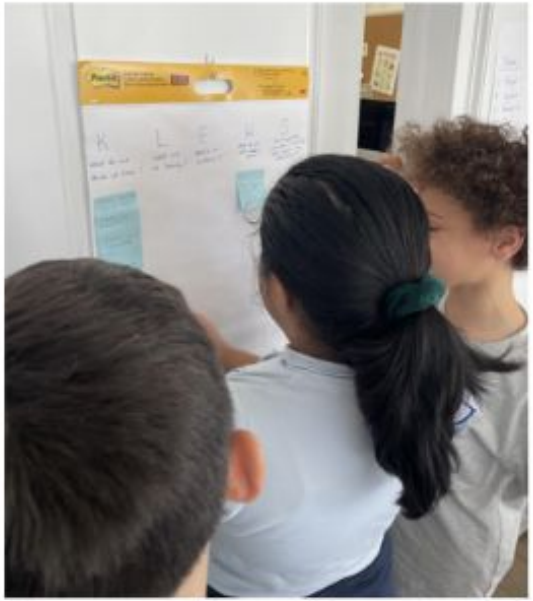
- Closed Circuit
- Interactive Circuit
- Introduction to Block Coding

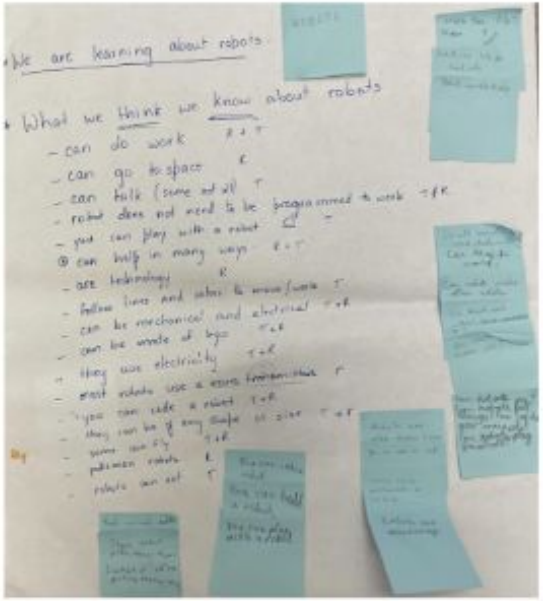
Microbit

- Microcontroller parts
- Compare with Makey Makey
- Introduction to block coding

What do you think this is?

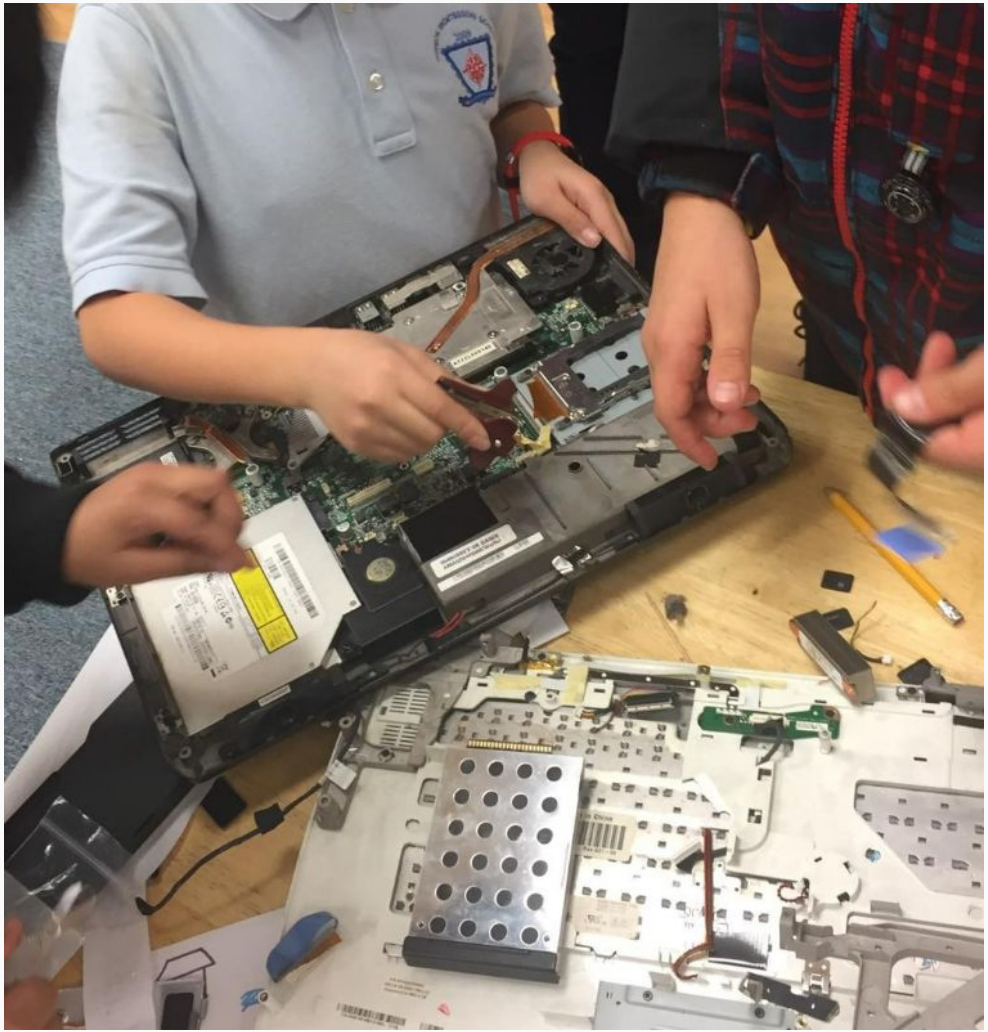
What Do You Notice? What Do You Wonder ?





Driving/Lesson Question:

K What we think we know about the phenomenon	L What we are learning	E Evidence (from our data)	W Wonderings	S Scientific Concepts and Words

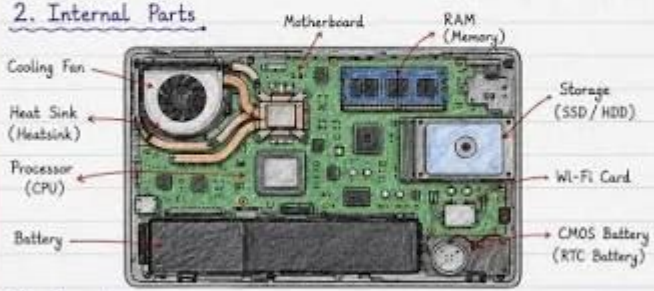


Laptop Parts

A laptop is a portable computer that has many hardware components working together.

1. External Parts

2. Internal Parts



3. Functions

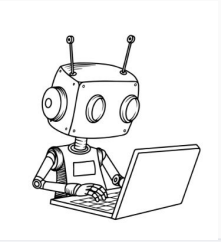
- Display shows the output.
- Keyboard and Touchpad are used for input.
- Processor (CPU) is the brain of laptop.
- RAM helps in temporary data storage.
- Storage stores our data permanently.
- Battery provides power to the laptop.

Note :

All these parts work together to make a laptop useful and portable. ☺

★ @ Mastercode.sagar ★

Human vs. Computing Systems



Input

Biological Analogy

Senses (Eyes, Skin)

Computer/ Robot

Sensors

Automated Example

Temperature sensor reading room heat

Processing

Biological Analogy

Brain (Thinking)

Computer/ Robot

Microcontroller / CPU

Automated Example

Calculating whether to turn on AC

Memory

Biological Analogy

Memory (Short/Long-term)

Computer/ Robot

RAM / Flash / EEPROM

Automated Example

Storing target temperature setpoints and past log data

Output

Biological Analogy

Muscles (Actions)

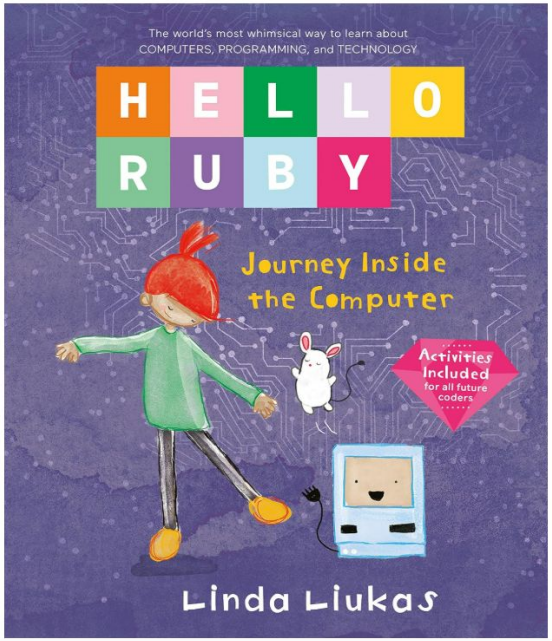
Computer/ Robot

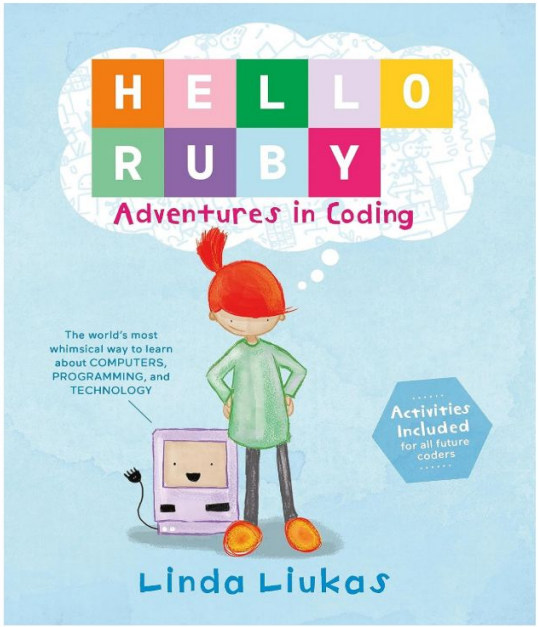
Actuators

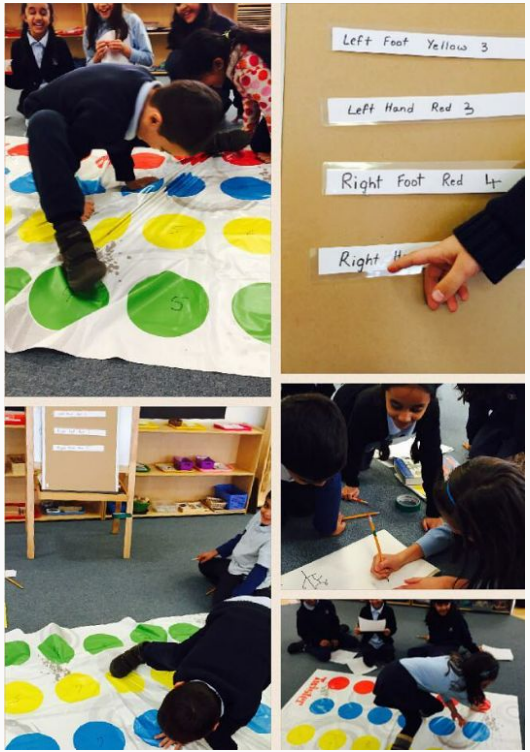
Automated Example

Motor spinning the fan blade

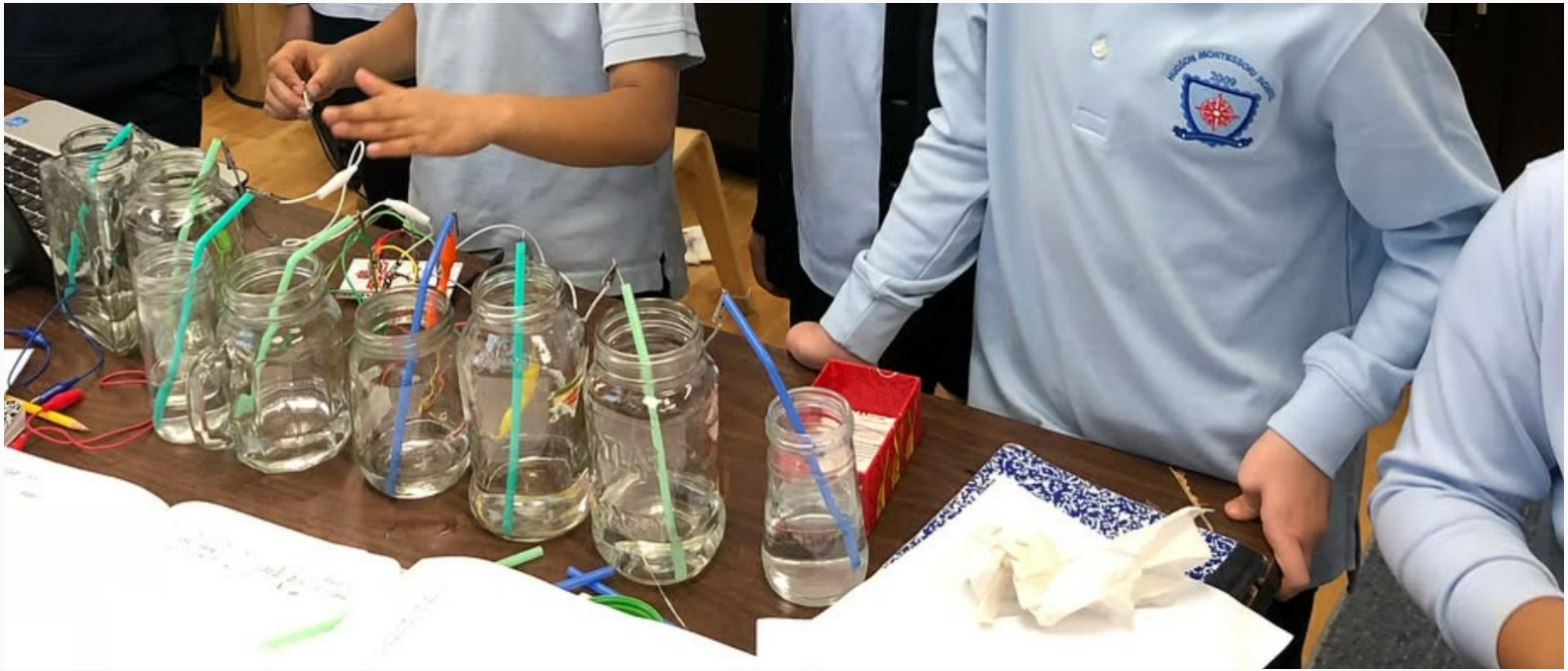
Hook With a Book

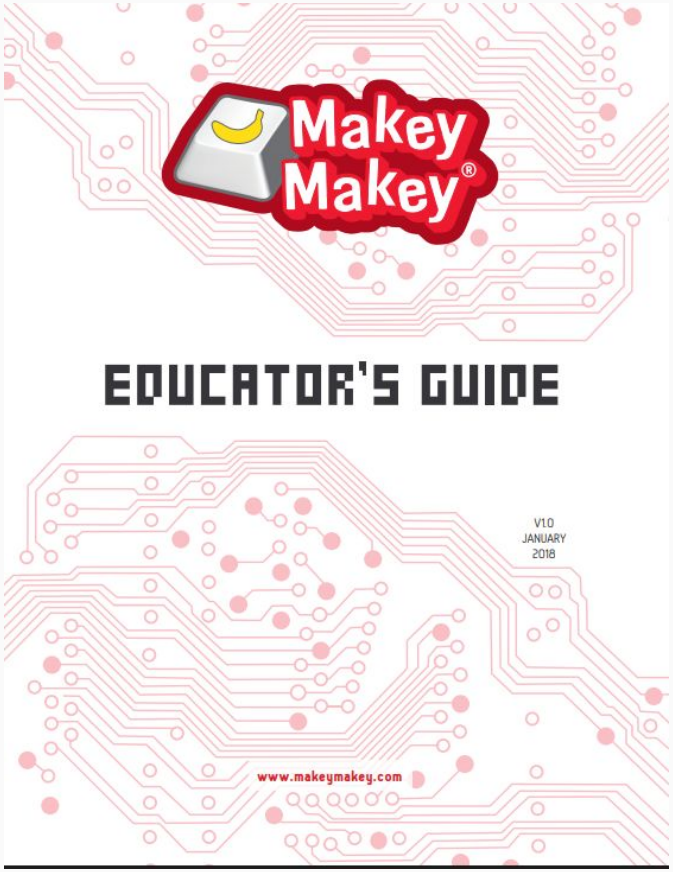

The world's most whimsical way to learn about
COMPUTERS, PROGRAMMING, and TECHNOLOGY
HELLO
RUBY
Journey Inside the Computer
Activities Included for all future coders
Linda Liukas


HELLO
RUBY
Adventures in Coding
The world's most whimsical way to learn about COMPUTERS, PROGRAMMING, and TECHNOLOGY
Activities Included for all future coders
Linda Liukas


Left Foot Yellow 3
Left Hand Red 3
Right Foot Red 4
Right H

Make With Makey Makey

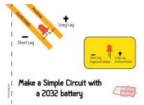




LEARNING AT HOME WITH MAKEY MAKEY

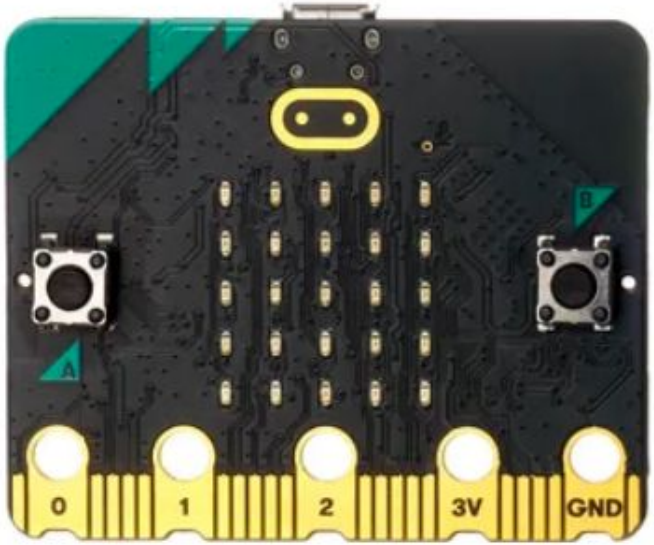
Makey Makey®

STEM activities created with kids in mind to encourage playful learning, tinkering, creativity, and invention for everyone at home.

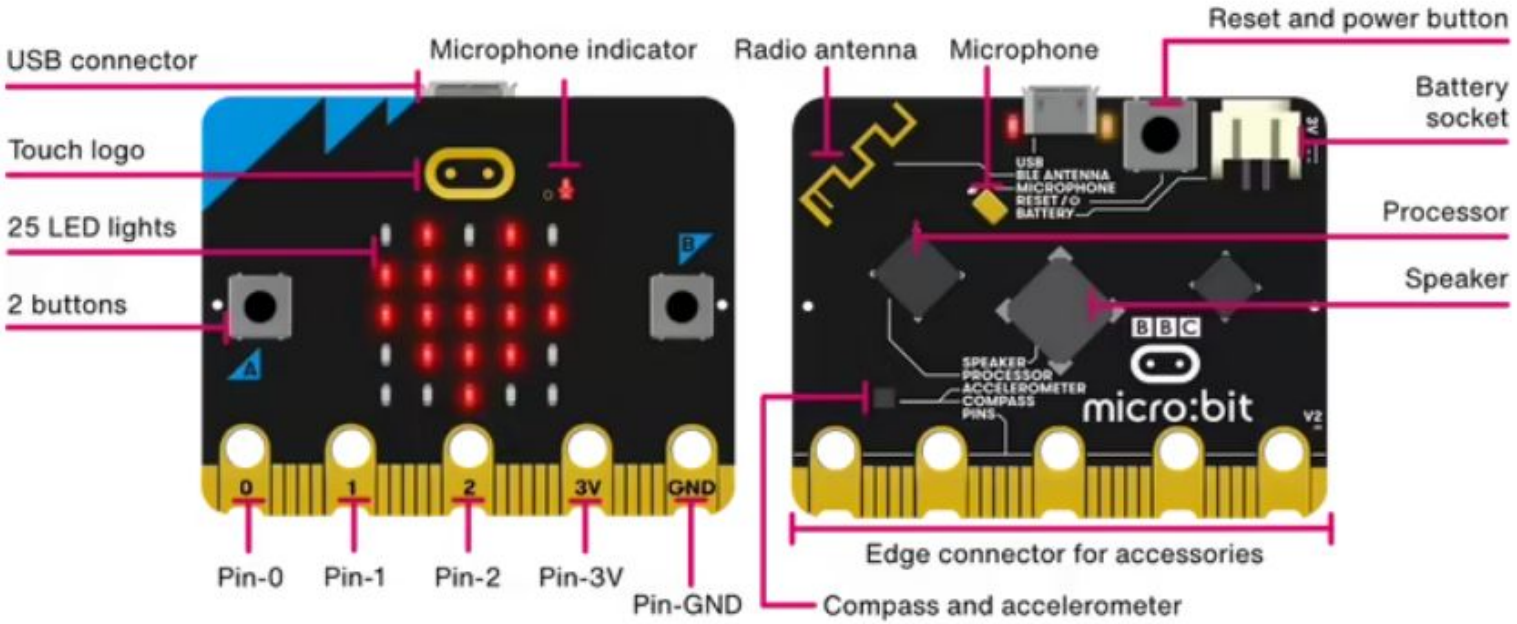
Get a Makey Makey for home	Lesson Description	At Home Learning Link	Learning Objective
Lesson 1: Craft a Circuit	Learn how to hack a tea light to craft a simple paper circuit! 	https://makeymakey.com/blogs/how-to-instructions/lesson-one-simple-circuit	Learn how things work by taking something apart and building your own circuit to light up an LED!
Lesson 2: Hands on!	Make a simple sketch of Makey Makey and build a human circuit. 	https://makeymakey.com/blogs/how-to-instructions/lesson-two-hands-on-a-makey-makey	Understand how Makey Makey works, so you can start building and coding your own inventions.
Lesson 3: What is Conductive?	Create a conductivity testing board so you can ideate materials for inventing! 	https://makeymakey.com/blogs/how-to-instructions/lesson-three-what-is-conductive	Create a science experiment with things around your house. Make observations that energy can be transferred from place to place by electric currents.

Make more with Micro:Bit

Look closely at the Micro:Bit.
What do you notice?
What do you wonder?

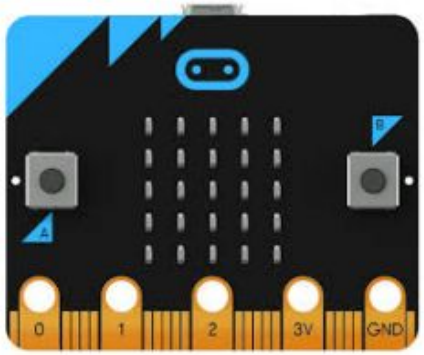


micro:bit V2



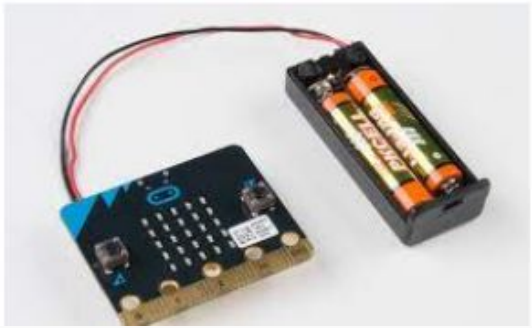
Bottom edge is bumpy

https://microbit.org/projects/make-it-code-it/



Micro:bit

Data cord
(usb/micro cable)

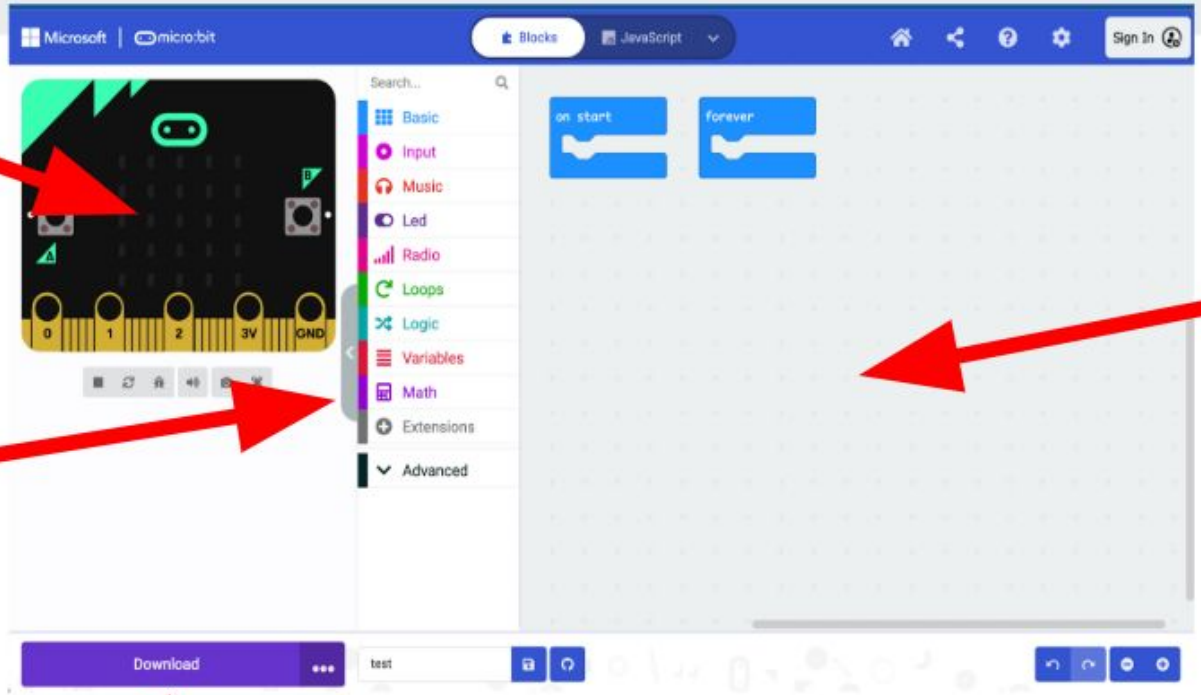


Battery
pack

Micro:bit simulator

Code block categories

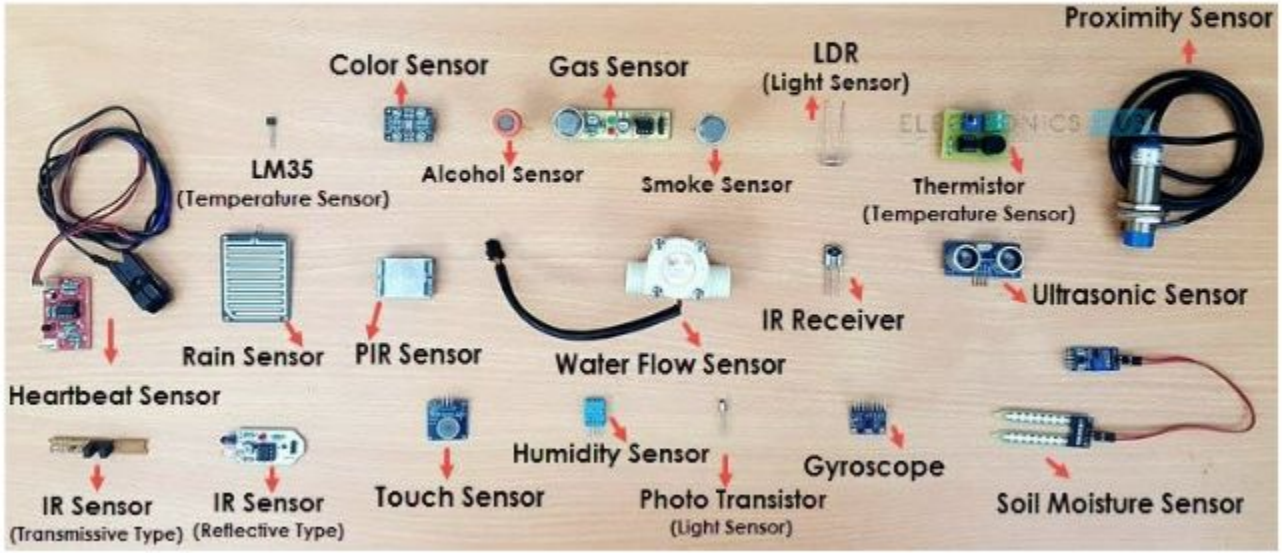
Coding space

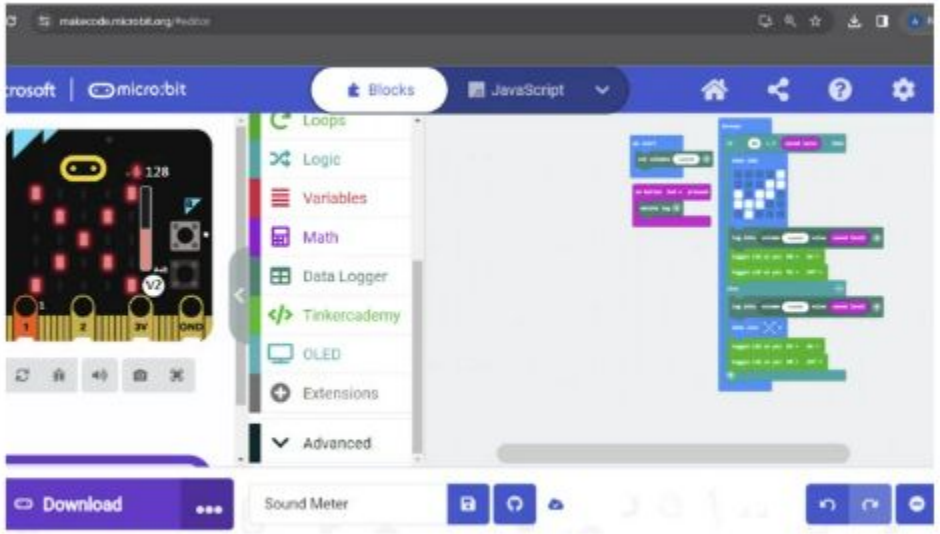


Download to Micro:bit

Humans

Machines




Blocks
JavaScript
micro:bit
Loops
Logic
Variables
Math
Data Logger
Tinkercademy
OLED
Extensions
Advanced
Download
Sound Meter

9. MOISTURE SENSOR