SCIENCE NORTH SCIENCE NORD

Grade 5 Science - Conservation of Energy & Resources

Environmental monitoring systems

(temperature)

Introduction - Climate Tech

Discussion

What environmental or energy issues concern you the most?

What are some meaningful solutions?

Do you have any ideas that may not even exist yet?

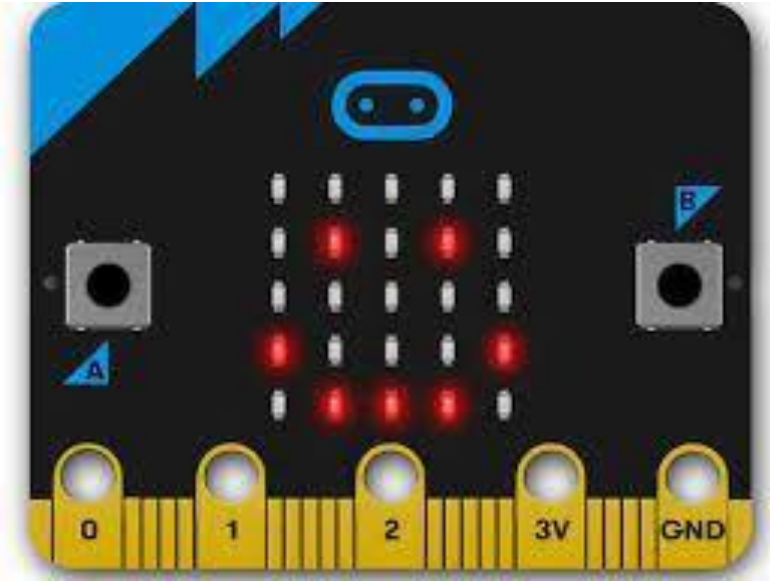
How can computational thinking help solve problems?

Beyond the Buzzword: What is Climate Tech?

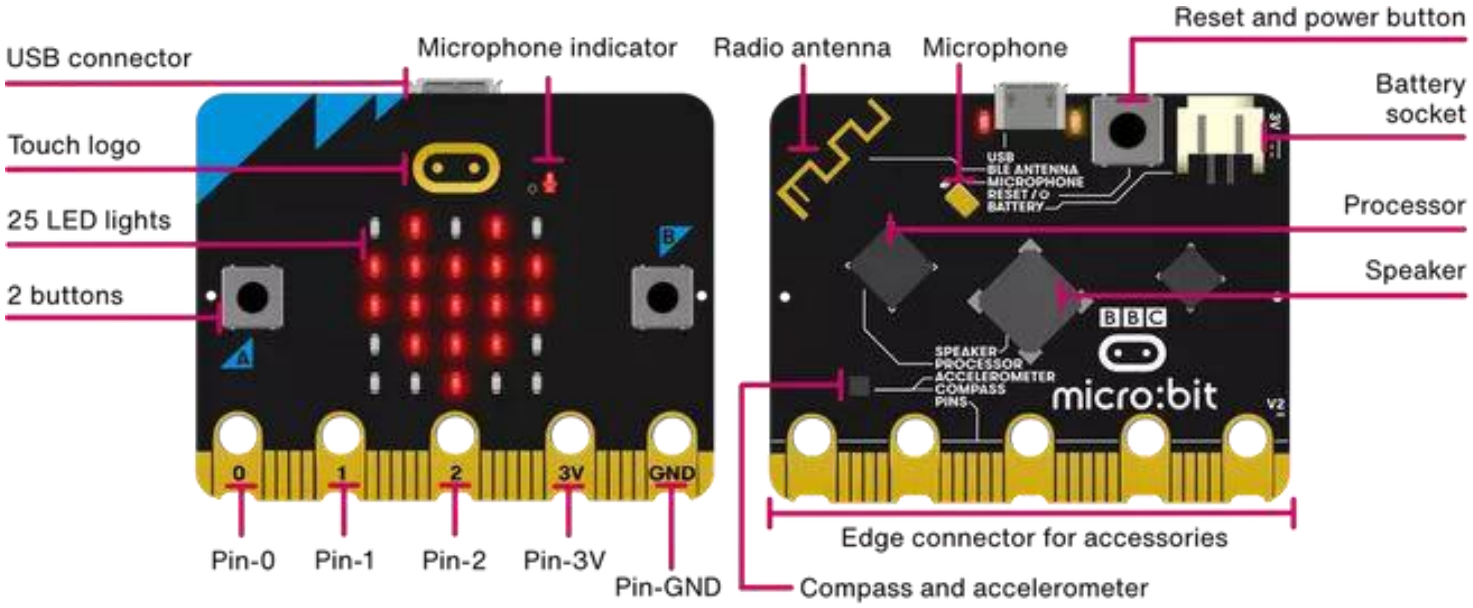
Introducing Micro:bits

Want to learn more?

1. Micro:bit introductory lessons "First Steps"
2. Teacher-Made Micro:bit guide & science lessons
3. Make Code - try out a few tutorials!



Computational thinking - Inputs & outputs



Micro:bits Inputs and Outputs

Action - Code for Climate

What can a Micro:bit sense? (INPUT)

- Buttons pressed
- Shake
- Pin (conductivity)
- Light level
- Compass heading
- Temperature
- Humidity
- Acceleration
- Bluetooth
- V2 (Sound level & Logo pressed)

BRAINSTORM!
What could you build to sense the climate?

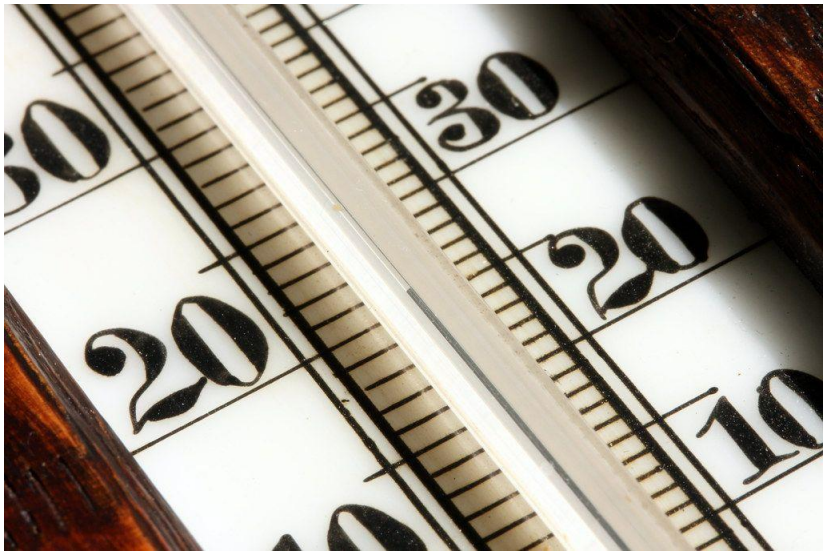
How can a Micro:bit respond? (OUTPUT)

- Light LEDs
  - Words, symbols, graph, arrow
- Pin (conductivity)
  - Stop/start various attachments
- Bluetooth
- Sounds/music (w speaker or V2

Environmental Monitoring & Automation

Temperature

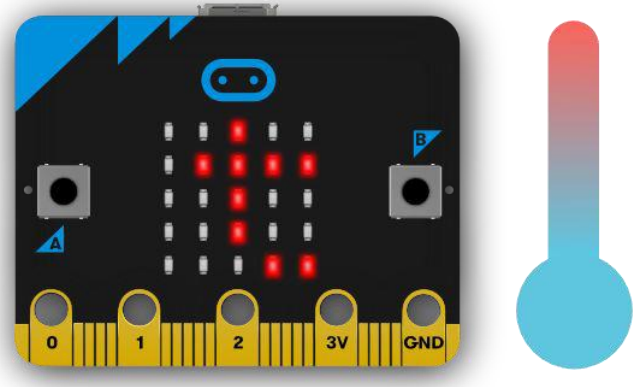
- Why would it be helpful to know the temperature of a place? Over time?
- How can we be more efficient with our energy/heat use?
- How would automation help?

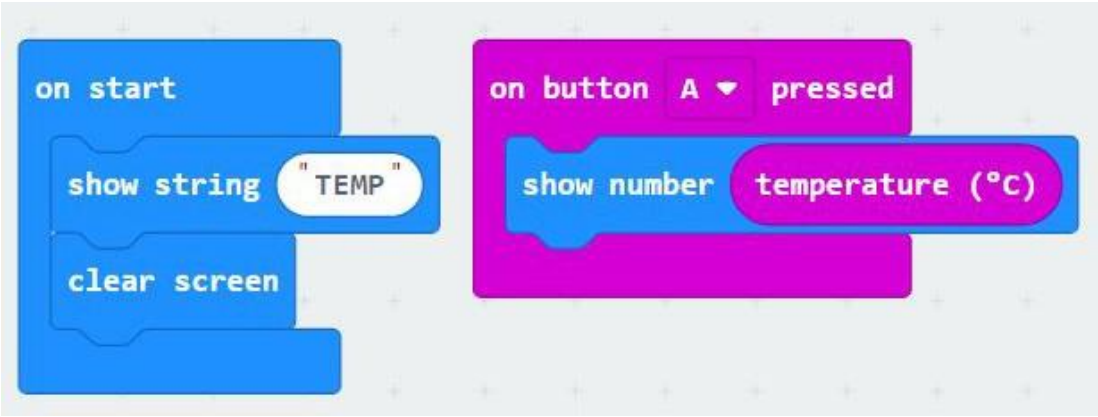


LET'S BUILD AN ENERGY EFFICIENT DEVICE

1. Temperature Sensor

Try out this simple code in MAKECODE!





Temperature Sensor, Thermometer Lesson, HEX FIles

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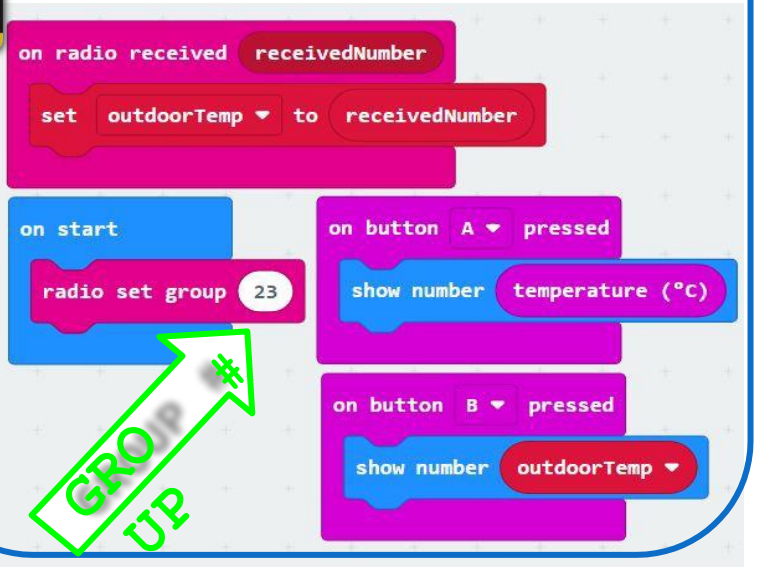
2. Radio Temperature

A - Outdoor sensor & transmitter

GROUP #

Perfect to measure the temperature inside of something!

B - indoor sensor & receiver



GROUP # UP

[Indoor Outdoor Thermometer](), [Hex Files]()

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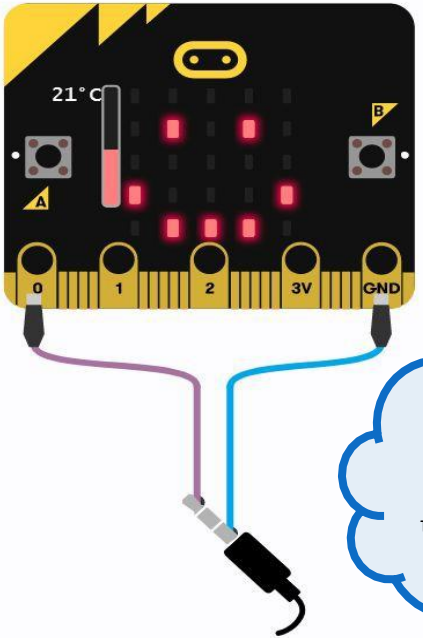
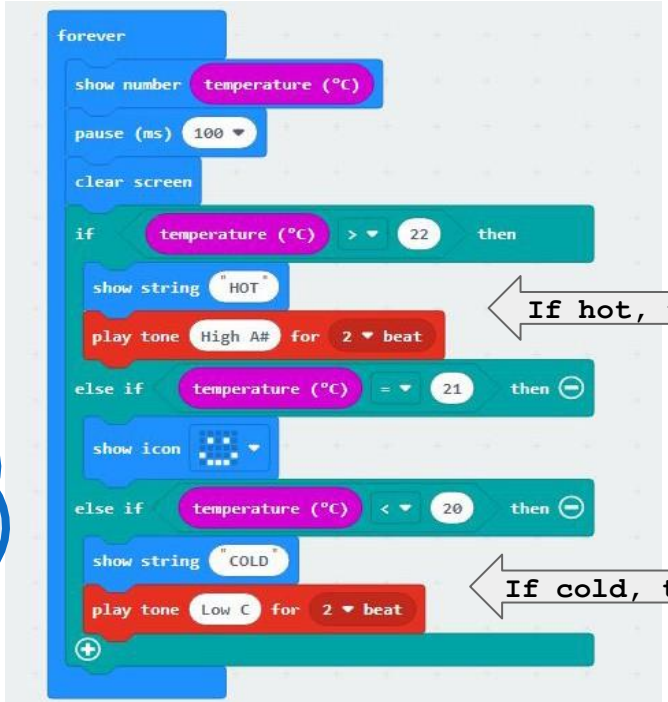
3. Temperature Alarm



Question?
How could this help us use less energy?



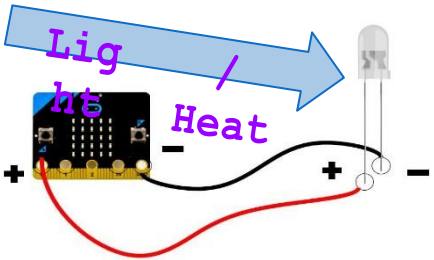
If hot, then alarm!

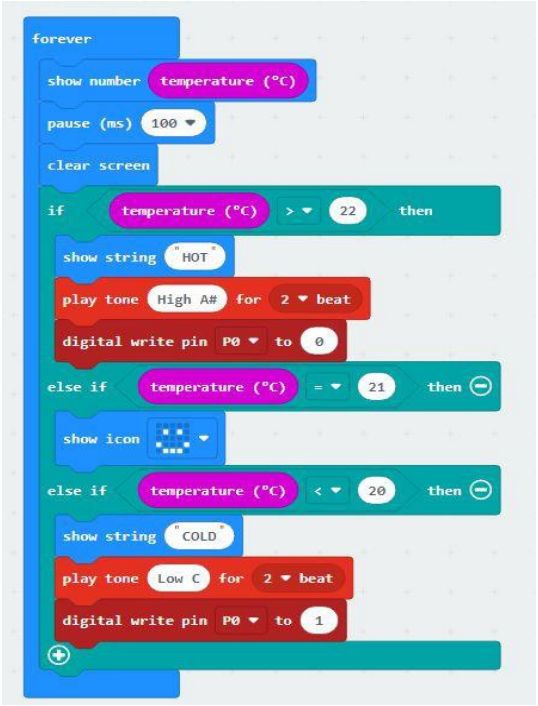
If cold, then alarm!

4. Advanced Temperature Alarm

automation!

- Use computational thinking to get the machine to monitor the environment and make changes.
- When it gets too hot, turn off the heat (light) or open a window (motor)!
- When it gets too cold, turn on the heat (a light) or close the window (motor)!
- This improves efficiency and energy use!





For this lesson you would need accessories like a motor and light bulb

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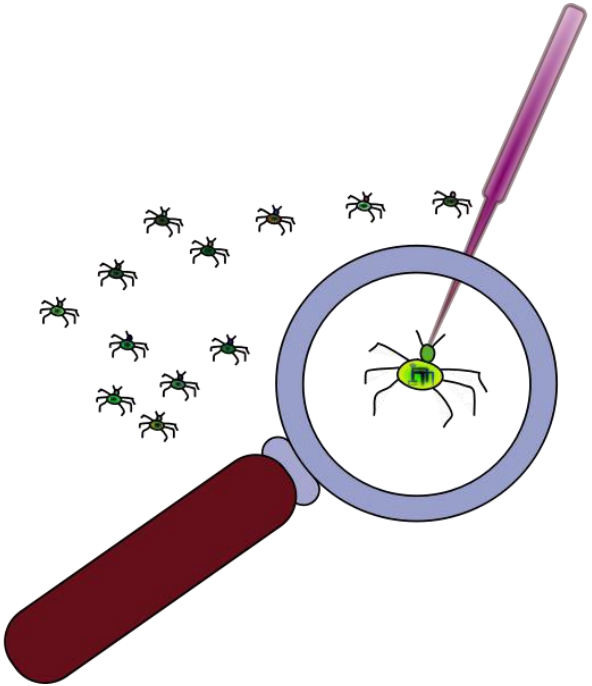
debugging



It doesn't work!

- A Micro:bit is only as good as the code! Go through it carefully and even restart from scratch if you have to.
- Think like a machine. Take it one step at a time and test out each step separately as you go.
- Collaboration is key! Ask a classmate for help.
- When in doubt, look it up online!

Consolidation

Reflection

- Why is it important to monitor our environment?
- How does this help us reduce energy use?
- Can you think of other ways to measure your environment?
- If you could build ANYTHING to help the environment, what would it be?

What else could you automate for energy & the environment?

Extension - Solar power!

Did you know?

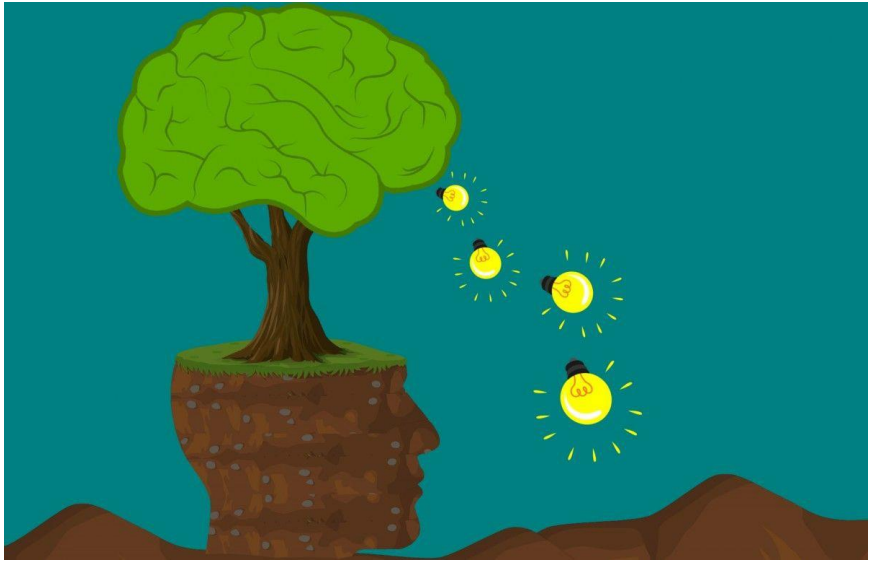
- You can make any Micro:bit solar powered!
- Solar energy is a renewable and sustainable resource!

Can you think of any other solar powered devices?

STEM Extension

Temperature shield design challenge!

- **Science** - temperature Sensor and climate
- **Technology** - coding with Micro:bits
- **Engineering** - design challenge: Build a sun shield!
- **Math** - chart temperature data



See this video and lesson plan

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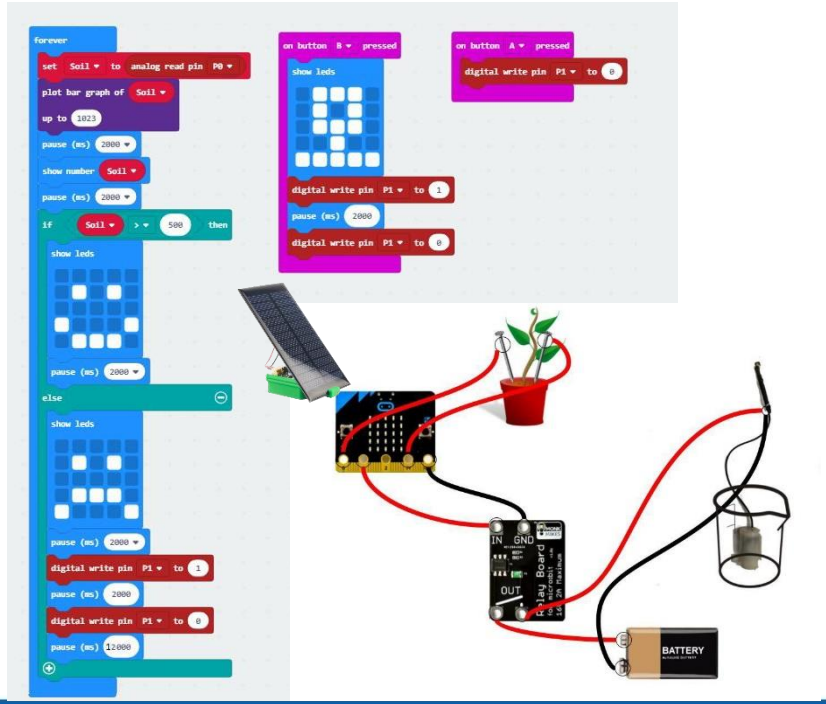
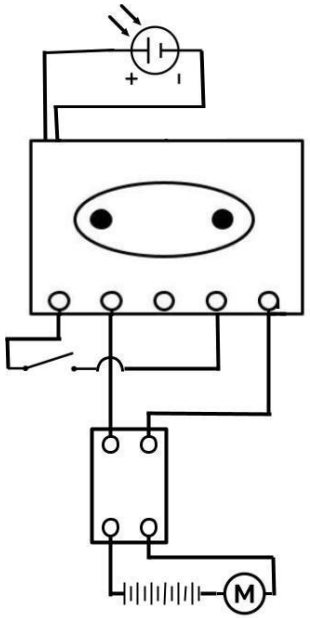
Extension - Energy Transformations!





Energy Transformations

SOLAR (solar panel)

⬇

Electrical (micro:bit, wires, across nails, relay)

⬇

Chemical (battery)

⬇

Electrical (wires)

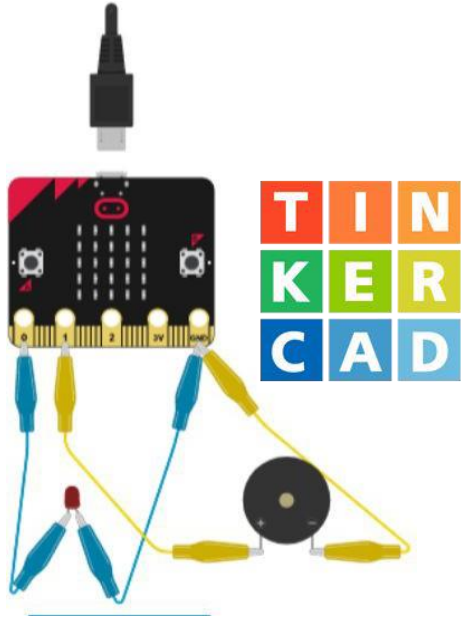
⬇

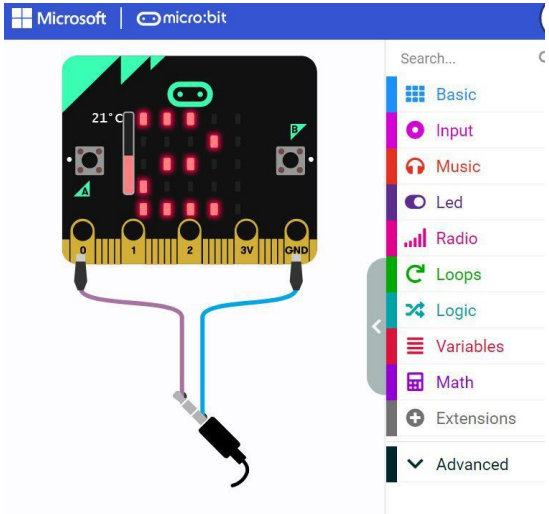
Mechanical (water pump)

⬇

Electrical (nails, wires)

Accommodations





No Micro:bit? No problem!

- You can still build, test, and debug using MakeCode!
- You can also build virtual Micro:bits in Tinkercad too!