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NOTE:

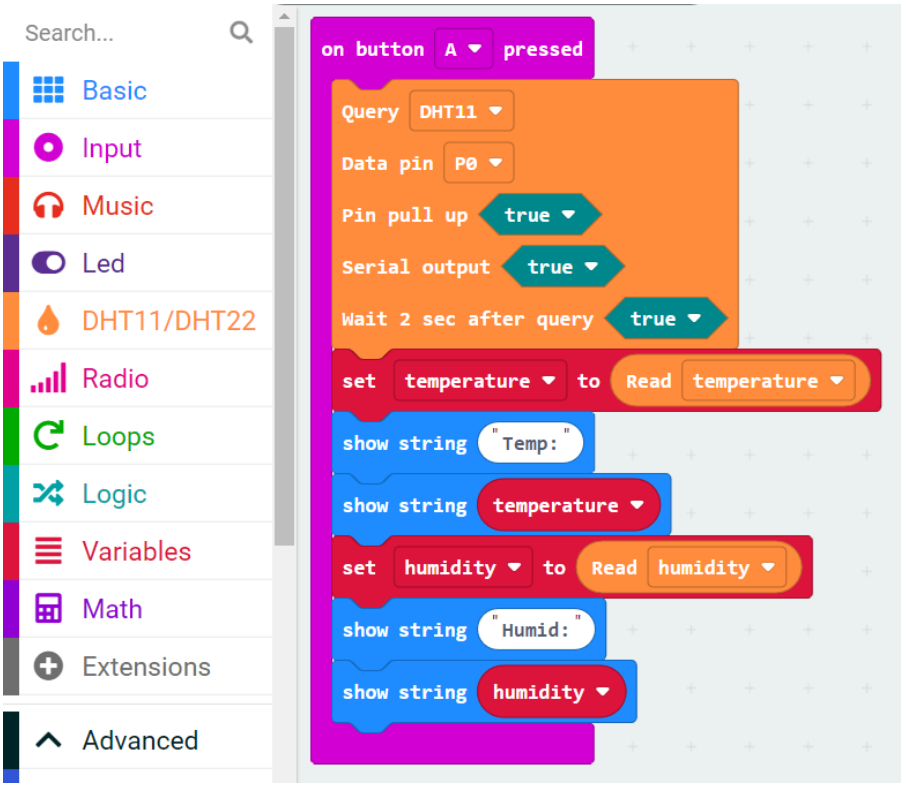
The block codes provided in this guide serve as foundational examples to help you get started with each project. While they are designed to demonstrate basic functionality, they might not be fully optimized and could contain minor errors. As you work through these projects, you may encounter situations where adjustments or troubleshooting are needed.

Feel free to experiment, explore, and modify the codes to suit your specific needs. If you have any questions, encounter issues, or need further assistance, don't hesitate to reach out at ***mandelli@pdx.edu***.

Happy exploring and coding!

1. Temperature and Humidity Monitor:

1. Add DHT11 and DHT22 extensions:
    - Click on the gear icon (settings) in the top right corner.
    - Select "Extensions."
    - In the search bar, type "DHT11" and select the DHT11/DHT22 extension to add it to your project.
2. Connect the DHT11/DHT22 Sensor:
    - Connect the DHT11 or DHT22 sensor to the micro:bit:
        - VCC to 3V
        - GND to GND
        - Data Pin (usually the middle pin) to one of the micro:bit's pins (e.g., P0).
3. Block Code:

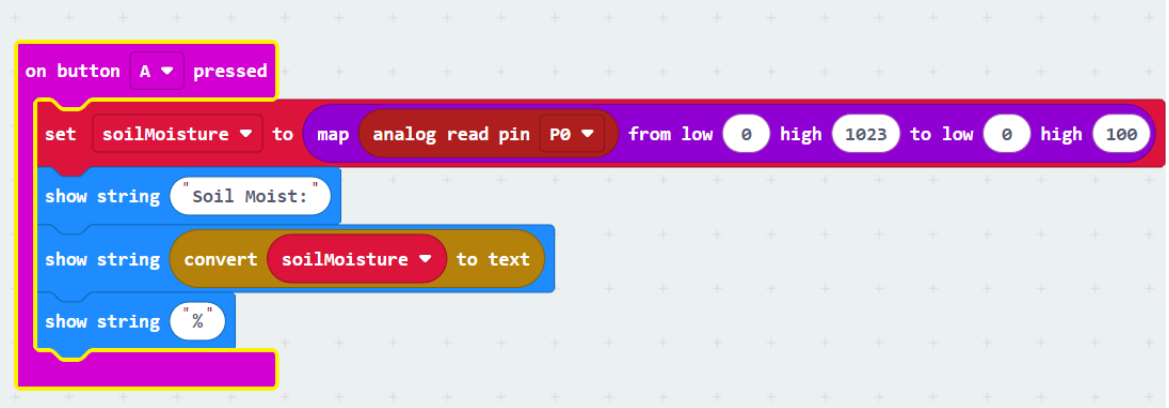


NOTE:

- The **DHT11** and **DHT22** are commonly used temperature and humidity sensors. They measure both temperature and humidity and provide digital outputs, which can be easily read by microcontrollers like the micro.
- The DHT11 is a basic, low-cost sensor, while the DHT22 offers better accuracy and a wider measurement range.
- Alternatively, we can use a basic thermistor for temperature measurement and a simple moisture sensor for humidity.

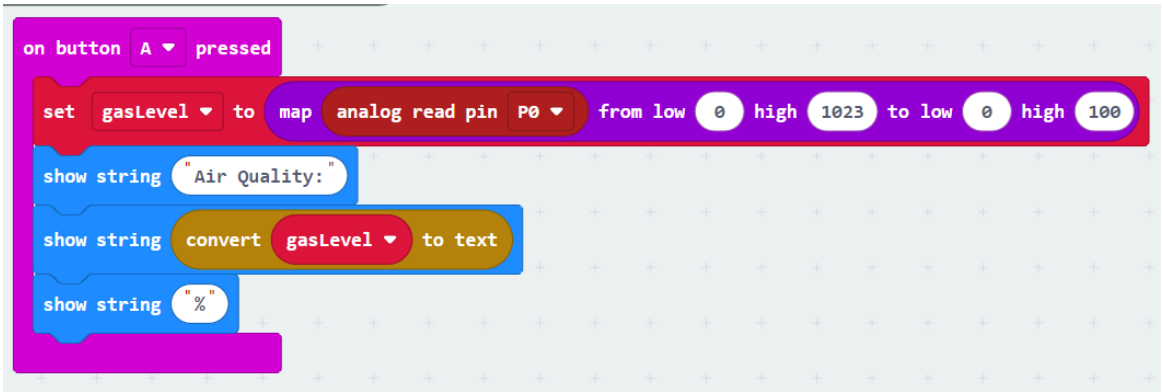
2. Soil Moisture Monitoring Sensor:

1. Connect the Soil Moisture Sensor:
    - Connect the soil moisture sensor to the micro:bit:
    - VCC to 3V
    - GND to GND
    - Analog Output Pin to one of the micro:bit's analog pins (e.g., P0).
2. Block code:



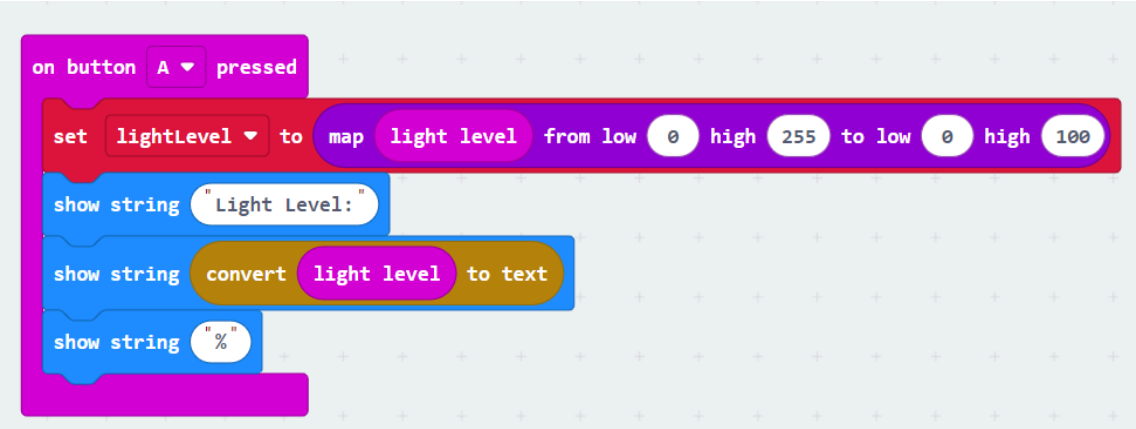
3. Air Quality Monitoring:

1. Connect the Gas Sensor:
    - Connect the gas sensor to the micro:bit:
        - VCC to 3V on the micro:bit
        - GND to GND on the micro:bit
        - Analog Output Pin of the gas sensor to P0 on the micro:bit
2. Base code:



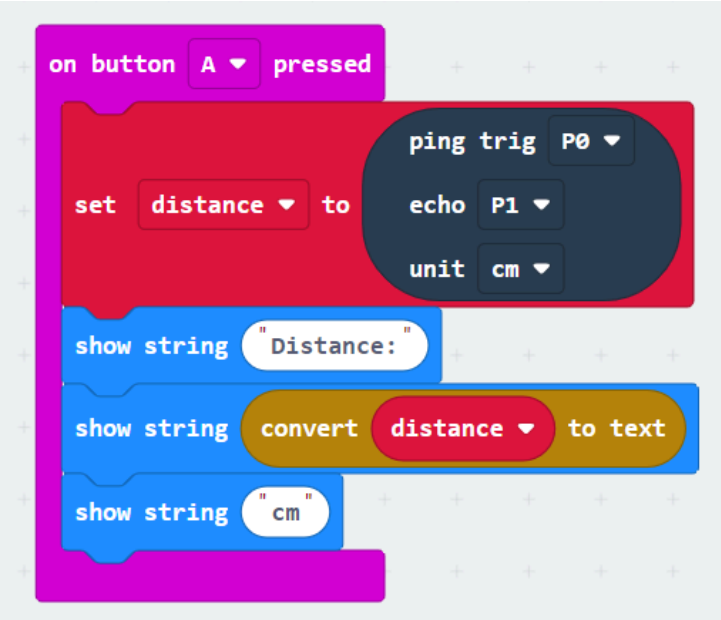
4. Light Pollution Detector:

1. Connect the Gas Sensor:
    - Connect the gas sensor to the micro:bit
    - VCC to 3V on the micro:bit
    - GND to GND on the micro:bit
    - Analog Output Pin of the gas sensor to P0 on the micro:bit
2. Base Code:



5. Smart Recycling Bin:

1. Connect the ultrasonic sensor to the micro:bit:
    - VCC to 3V on the micro:bit
    - GND to GND on the micro:bit
    - Trig Pin to P0 on the micro:bit
    - Echo Pin to P1 on the micro:bit
2. Add the Ultrasonic Sensor Extension:
    - Click on the gear icon (settings) in the top right corner of MakeCode.
    - Select "Extensions."
    - In the search bar, type "sonar" and select the "Sonar" extension to add it to your project. This extension allows the micro:bit to work with ultrasonic sensors.
3. Base Code:



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6. Solar-Powered Environmental Station:

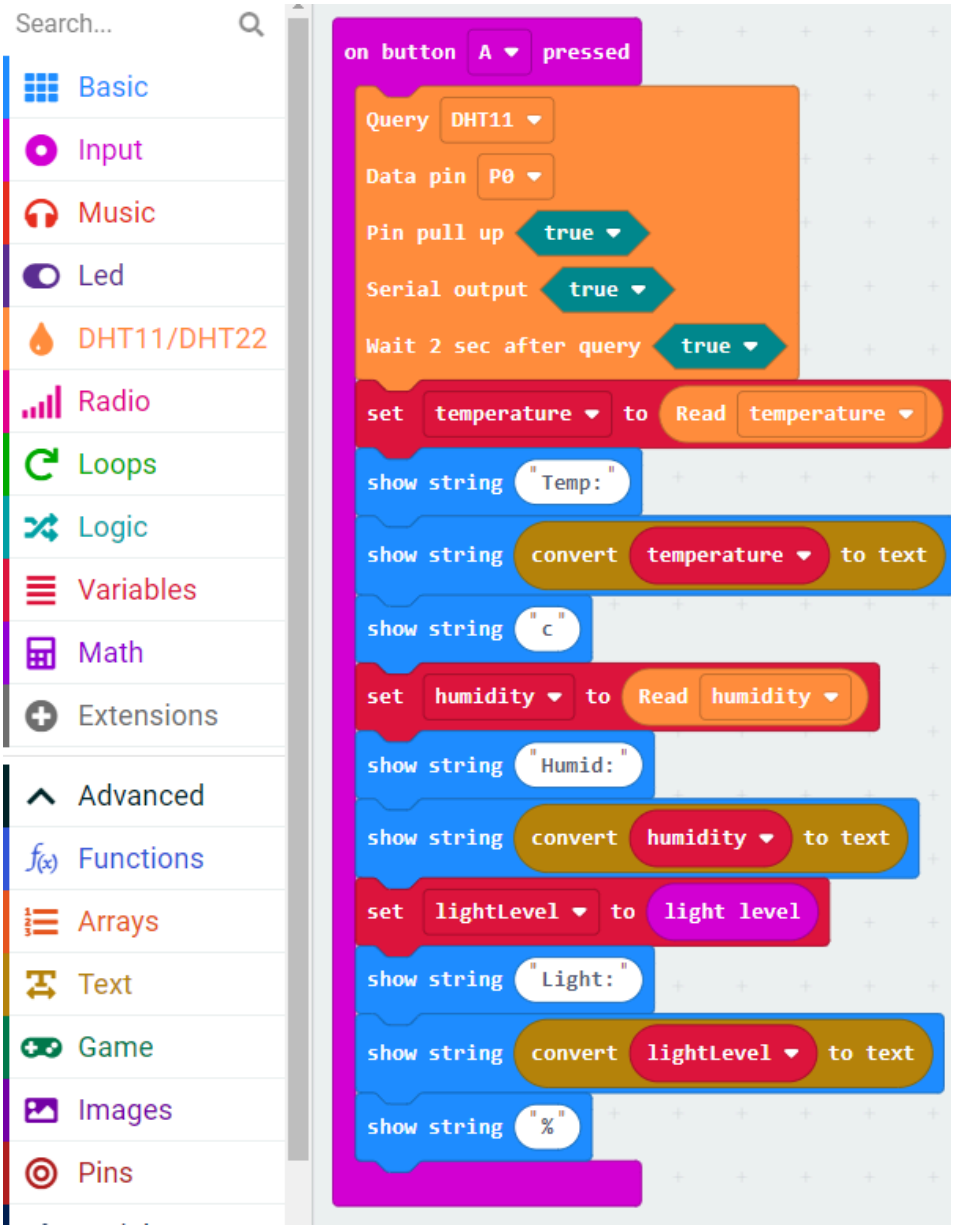
1. Add DHT11 and DHT22 extensions:
    - Click on the gear icon (settings) in the top right corner.
    - Select "Extensions."
    - In the search bar, type "DHT11" and select the DHT11/DHT22 extension to add it to your project.

2. Connect the Solar Panel:

    - Connect the solar panel to the micro
      ’s power input:
        - Positive terminal to the 3V pin.
        - Negative terminal to the GND pin.
        - (Optional) Connect the battery pack to store energy from the solar panel if needed.

3. Connect the DHT11/DHT22 Sensor:
    - Connect the DHT11 or DHT22 sensor to the micro:bit:
        - VCC to 3V
        - GND to GND
        - Data Pin (usually the middle pin) to one of the micro:bit’s pins (e.g., P0).

4. Base Code:


Search...
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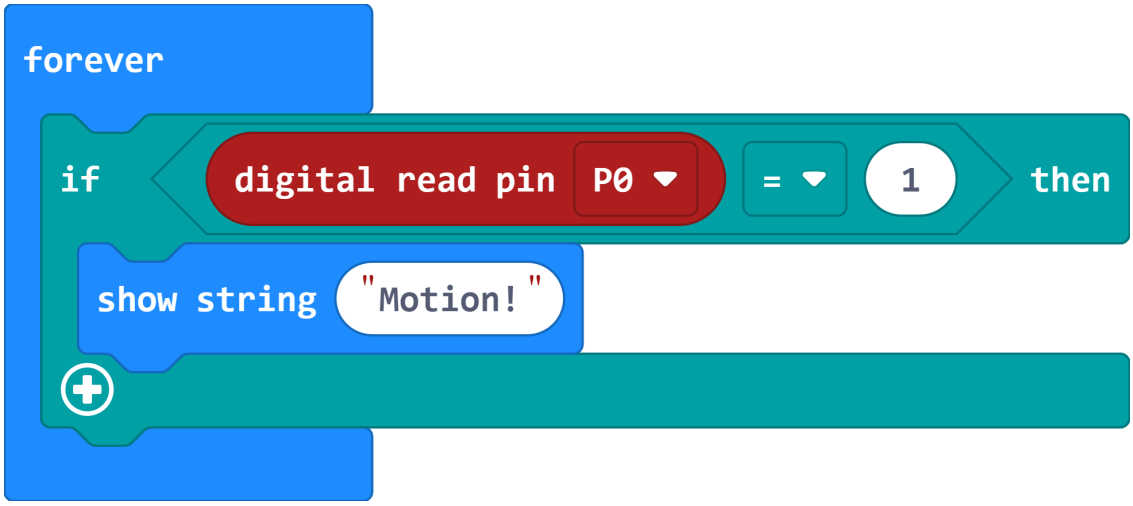
on button A pressed
Query DHT11
Data pin P0
Pin pull up true
Serial output true
Wait 2 sec after query true
set temperature to Read temperature
show string "Temp:"
show string convert temperature to text
show string "c"
set humidity to Read humidity
show string "Humid:"
show string convert humidity to text
set lightLevel to light level
show string "Light:"
show string convert lightLevel to text
show string "%"

7. Wildlife Activity Tracker:

1. Connect the PIR Motion Sensor:
    - Connect the PIR motion sensor to the micro:bit:
        - VCC to 3V on the micro
    - GND to GND on the micro:bit
    - Output Pin of the PIR sensor to one of the micro's pins (e.g., P0).

- (Optional) Connect a Camera:
    - If using a camera, connect it to trigger based on the PIR motion sensor output. This typically involves using a relay or similar trigger mechanism. (This step is optional and will not be covered in detail in this basic guide.)

2. Base Code:



NOTE:

- You won't need to create any variable if you're checking the pin value directly.
- If you have a camera connected and want to trigger it when motion is detected, you can add a block to trigger a relay or similar device. This will depend on your camera setup.

8. Reimagining Energy Production:

1. Connect the Wind Speed Sensor (For wind energy simulation):
    - VCC to 3V
    - GND to GND
    - Output Pin of the wind speed sensor to one of the micro:bit's pins (e.g., P0).

OR

Connect the Light Sensor (for Solar Energy Simulation):

- VCC to 3V on the micro:bit
- GND to GND on the micro:bit
- Output Pin of the light sensor to one of the micro:bit's pins (e.g., P0).

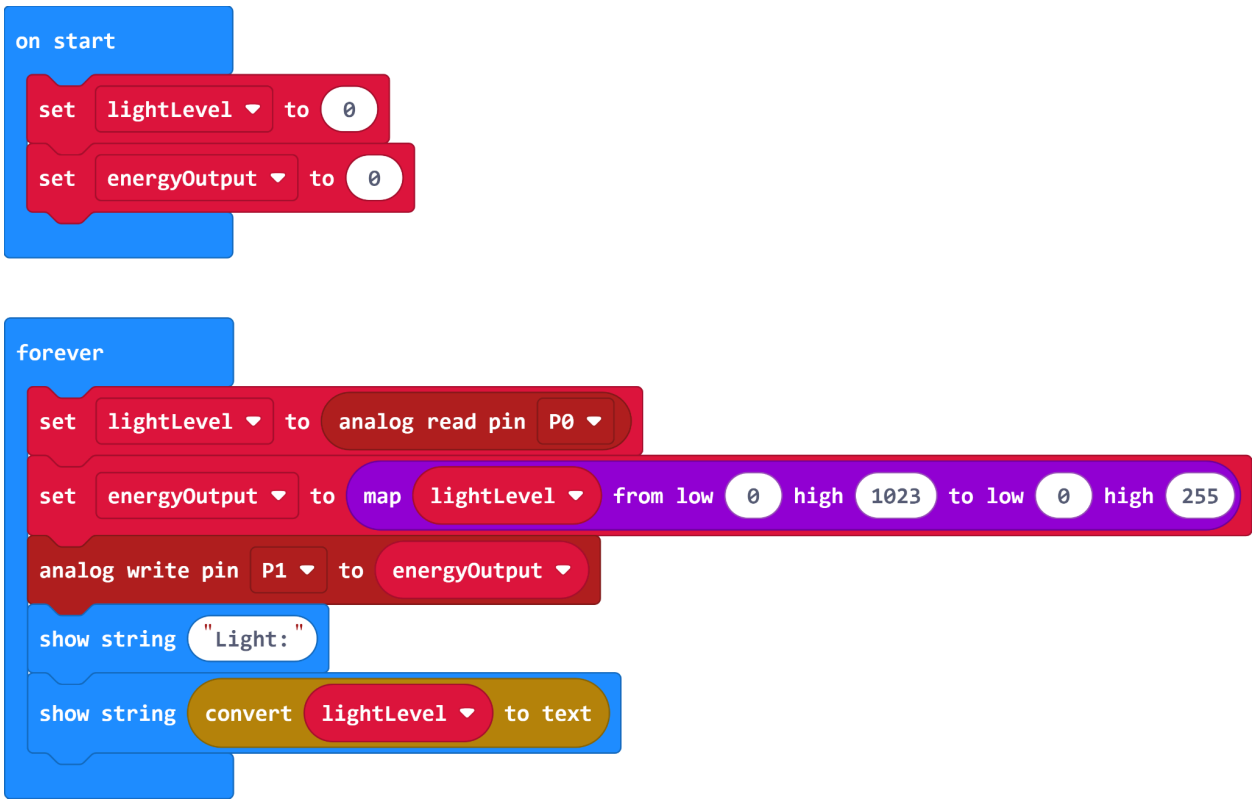
OR

Connect the Water Flow Sensor (for Hydroelectric Power Simulation):

- VCC to 3V on the micro:bit
- GND to GND on the micro:bit
- Output Pin of the water flow sensor to one of the micro:bit's pins (e.g., P0).

2. Connect the Energy Production Display:
    - For visual representation, connect an LED or servo motor to the micro:bit to simulate energy output:
        - VCC to 3V on the micro:bit
        - GND to GND on the micro:bit
        - Control pin (e.g., P1) connected to the micro:bit for controlling the LED or servo motor.

3. Base Code:

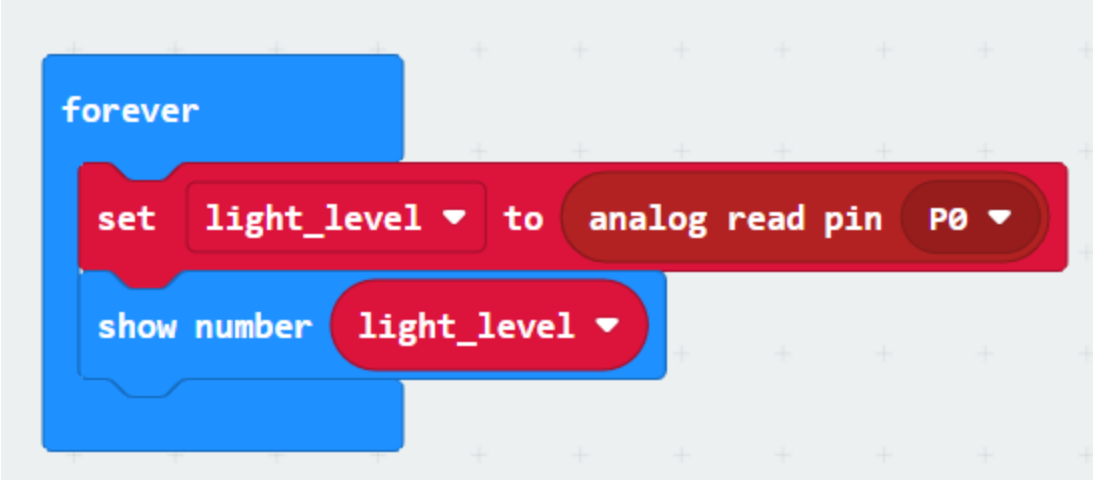


9. Photoresistor

Step-by-Step Guide to Create the Block Code

1. Connect the Photoresistor (LDR) to the Micro:bit

- One end of LDR → 3.3V (VCC)
- Other end → P1 (Analog Pin)
- Also connect a 10kΩ resistor between P1 and GND (to create a voltage divider)



Note: The resistor is required to form a voltage divider circuit, which allows the micro:bit to accurately read the light level from the photoresistor.

Bright Light → Low Resistance (~1kΩ)

Darkness → High Resistance (~1MΩ)