

# Cooling the Concrete Jungle through building Low-Cost Sensors

# Reason

## Urban Heat Islands

Urban heat islands (UHIs) are localized areas within cities or urban environments that experience significantly higher temperatures compared to their surrounding rural areas. The phenomenon occurs due to the high concentration of buildings, roads, pavement, and other infrastructure materials that absorb and retain heat, creating a warmer microclimate.

Factors contributing to this include:

- Reduced vegetation cover
- High thermal mass of buildings and infrastructure
- heat generated by human activities

# Application

You can build a low-cost temperature and humidity sensor that logs data to explore the relationship between greenery and temperature regulation, developing the data that can be used to act.

For a more in-depth guide with this and more tutorials please scan the QR code at the front and we will send you a copy of all the links you would require to learn how to do this yourself!

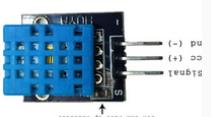
# Method

Begin with grabbing the following:

- ESP8226



- DHT 11 Sensor



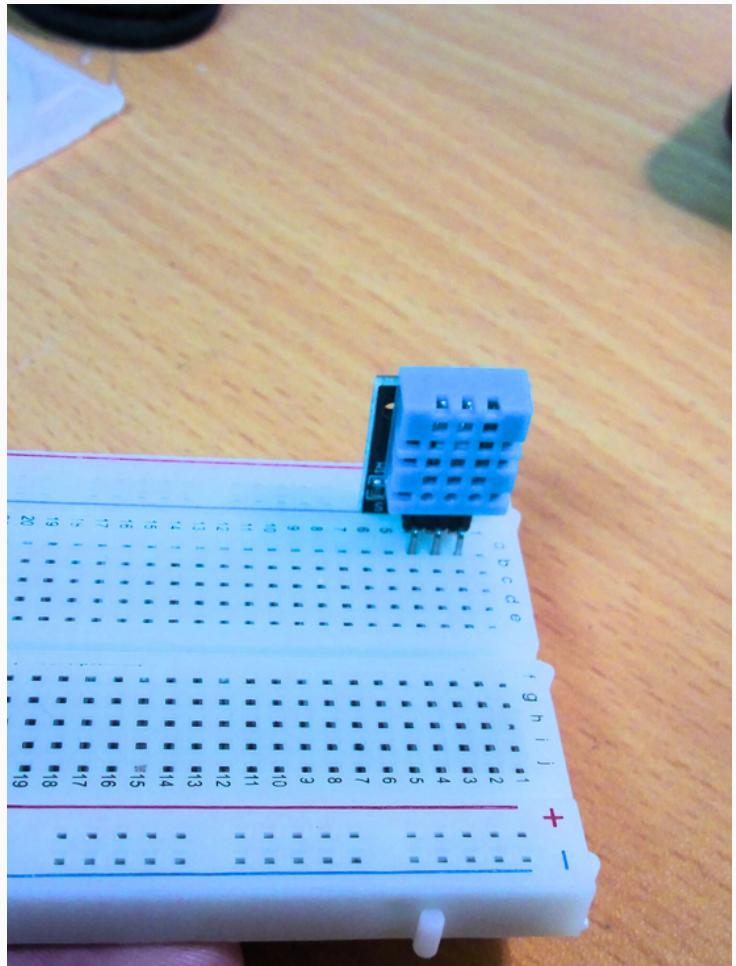
- Breadboard



- 3 Jumper Cables



Start by plugging in the Sensor into the edge of your breadboard (But not on the + and - Lines!):

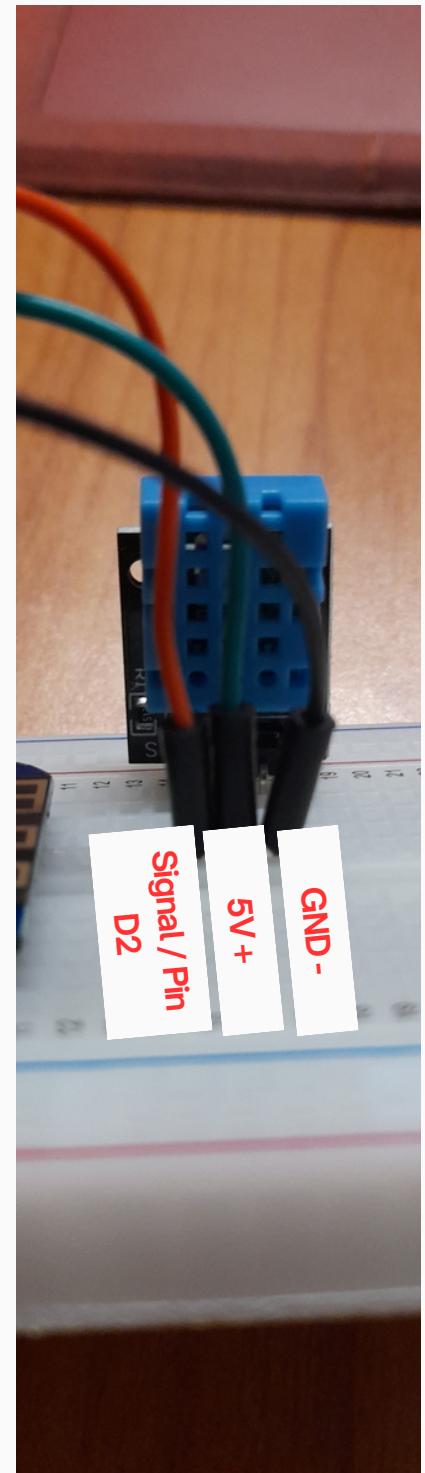
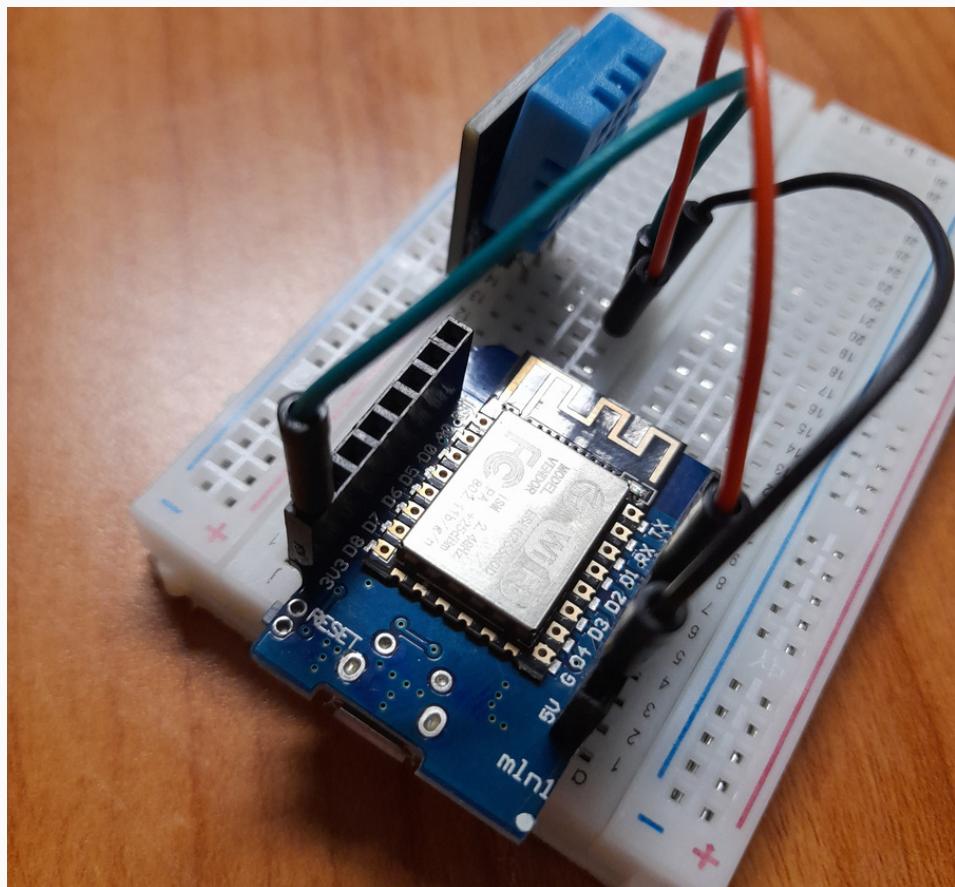


# Method

Plug the wires in as followed:

- S pin on the sensor goes to pin D2 on the Arduino
- Middle pin on the sensor goes to 5 volts on the Arduino
- Last pin on the sensor goes to G on the Arduino

**Please check above as shorting the board causes heat and potential shock.**



# Design

For your Microclimate Sensor, spend 10 to 15 minutes designing an enclosure to protect it from damage and also cause minimal disturbance in the environment.

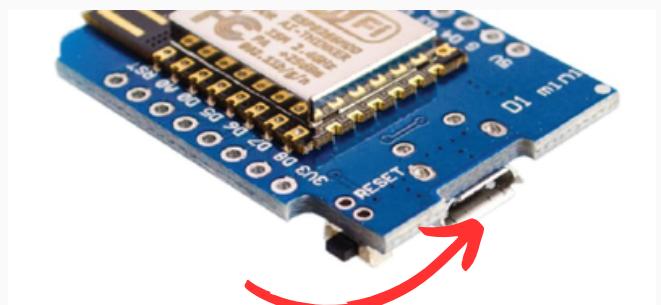
You would have the following materials / equipment:

- Hot Glue Gun
- Hot Glue
- Wooden Paddle Pop Sticks
- Paper Bowls
- Paper Plates
- Paper Straws
- Paper Cups

Plan around the following points:

- Insects
- Spiders
- Rain
- Reliability (Is the Temperature and Humidity sensor able to read the outside air?)
- Environmental Disturbance (Suitable Colours)
- Ventilation (Suitable airflow for cooling components)
- Heat Exposure (Colours that would minimise sunlight absorbed and shielded components)
- Sustainable Design
- Mounting or deployment (Zip tying around trees etc)
- **And make sure we can program it by accessing the cable insert!**

Some Inspiration:



# Evaluation

## Sensor, Strategy or Invention

Select an environmental challenge and design a sensor, strategy or invention on the butcher's paper!

Be creative and draw diagrams, designs, graphs or anything you think is relevant!

Some thinking points:

- How can we use data analyse and predict?
- What are some behaviours that have negative implications on our landscapes?
- What types of sensors can be developed to protect our wet and dry tropics?
- How can we create warning systems for environmental incidents?
- What is the importance of awareness and education around these areas?
- Air Pollution
- Air Quality Monitoring
- Water Pollution
- Noise Pollution
- Soil Optimisation
- Waste Management
- Light Pollution
- Microclimate Monitoring
- Chemical Exposure