# plan to build a plant disease detection device with a camera and soil sensors

## Steps to Build the Device:

**1. Setup Raspberry Pi Zero W:**

**- Install Raspbian OS on the MicroSD card.**

**- Connect the Raspberry Pi to a power source and configure it.**

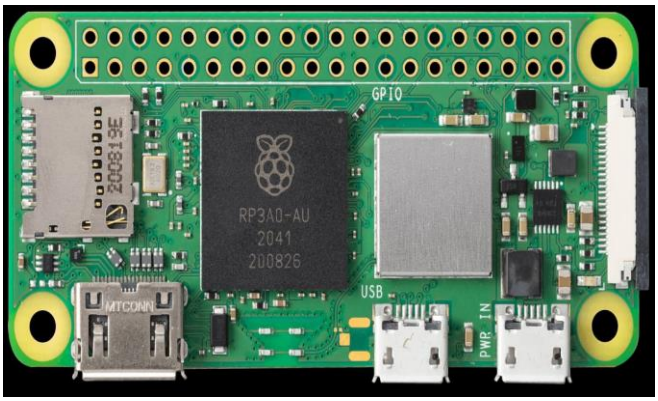


**Figure [Setup Raspberry Pi Zero W*]**

**2. Connect the Camera Module:**

**- Attach the camera module to the Raspberry Pi's CSI port.**

**- Enable the camera interface in the Raspberry Pi configuration settings**

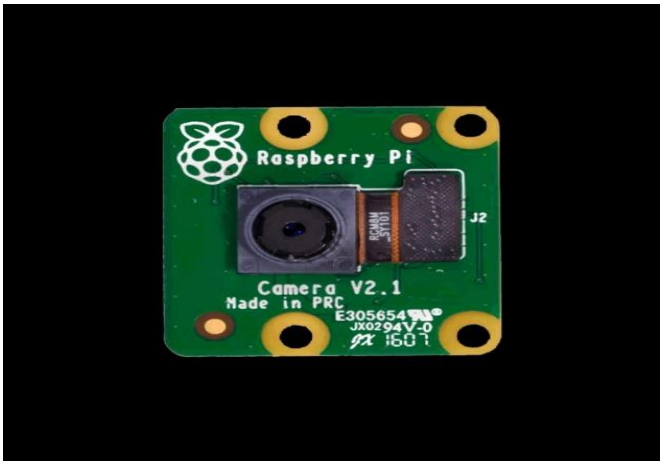


**Figure [Raspberry Pi Camera Module V2]**

**3. Install Soil Sensors:**

**- Connect the DFRobot Capacitive Soil Moisture Sensor to the Raspberry Pi's GPIO pins.**

**- Connect the NPK Soil Sensor similarly, possibly using an ADC (analog-to-digital converter) if needed.**

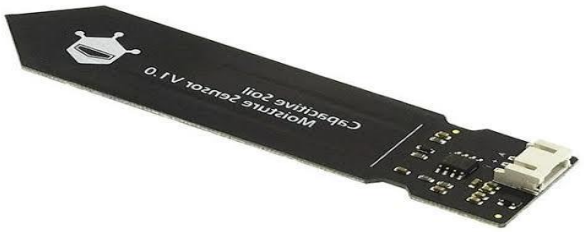


**Figure [DFROBOT soil sensor]**

**4. Integrate BME680 Sensor:**

**- Connect the BME680 to the Raspberry Pi using I2C communication.**


**Figure [BME680 sensor]**

**5. Connect ESP32:**

**- Setup the ESP32 for additional processing or to act as a Wi-Fi module.**

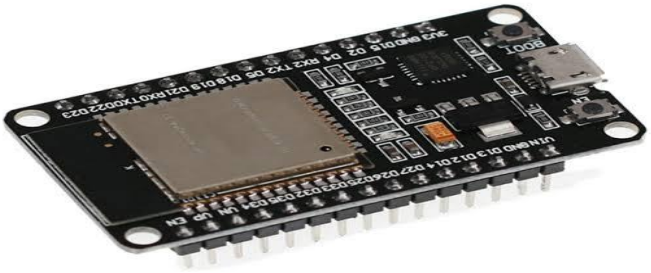

**Figure [ESP32 Wi-Fi and Bluetooth Module ]**

**6. Programming:**

**- Write a Python script to capture images with the camera.**

**- Write code to read data from the soil sensors and BME680.**

**- Use machine learning models (e.g., TensorFlow Lite) to analyze images and detect plant diseases.**

**- Store sensor data and disease detection results locally or on a cloud service.**

**7. Develop Mobile App:**

**- Use Flutter or React Native to create a mobile app that displays the data and alerts users about detected plant diseases.**

**- Integrate the disease detection model into the app using TensorFlow Lite.**

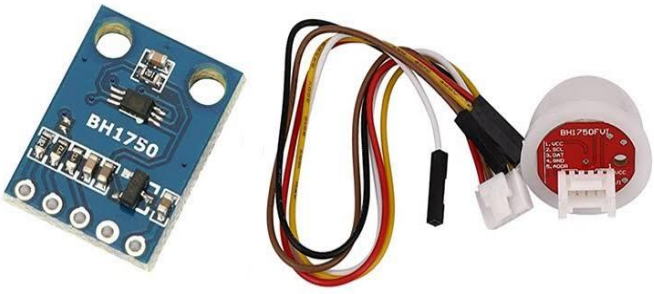


**Figure [BH1750 Light Intensity Sensor]**

**8. Dashboard and Website:**

**- Create a web dashboard using React.js or Angular to visualize the data.**

**- Build a website with sections for your research paper, app download, and real-time data from the device.**

**The measurements of your device will depend on the components and how you assemble them. Here's a rough estimate based on the components you've mentioned**

| Components | Approximate Sizes |
|---|---|
| **1. *Raspberry Pi Zero W*:** | **- Dimensions: 65mm x 30mm x 5mm** |
| **2. *Raspberry Pi Camera Module*:** | **25mm x 24mm x 9mm** |
| **3. *DFRobot Capacitive Soil Moisture Sensor*:** | **99mm x 16mm x 4mm** |
| **4. *NPK Soil Sensor*:** | **150mm x 20mm x 20mm** |
| **5. *BME680 Sensor*:** | **3.3mm x 3.3mm x 1mm** |
| **6. *ESP32 Module*:** | **25mm x 18mm x 2.8mm** |

## Assembly Considerations:

- **Enclosure:** You might want to use a project box to house these components. A box measuring around **200mm x 100mm x 50mm* should provide enough space for all components, wiring, and allow for some ventilation.

- **Mounting**: Ensure that the sensors are mounted in a way that they can interact with the soil and environment effectively. For example, the soil moisture sensor needs to be inserted into the soil, while the camera should have a clear line of sight to the plants.