



**TRƯỜNG ĐẠI HỌC FPT**

# Environmental Data Collection and Monitoring

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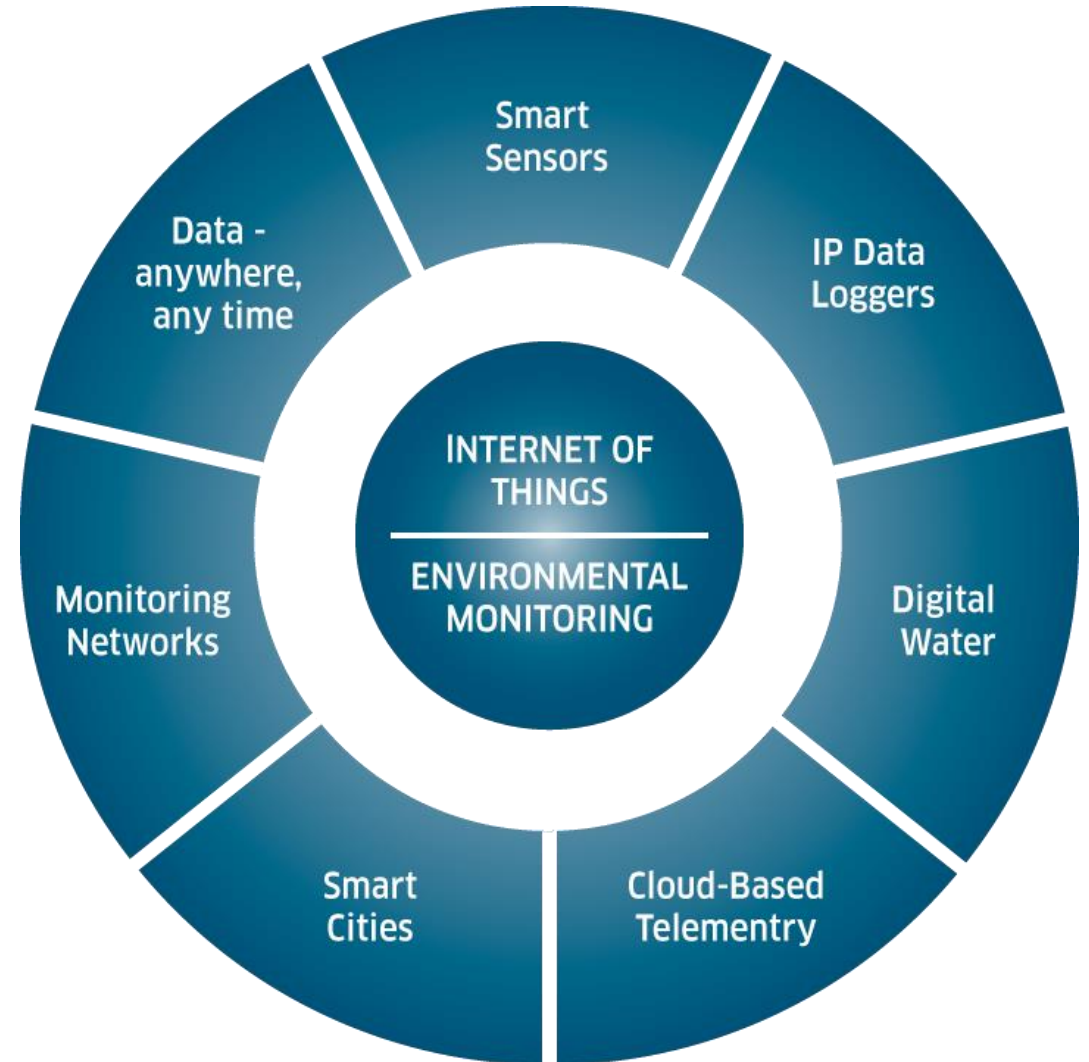
Pham Minh Thang

. Supervisor: Mr. Hoang Xuan Son

# Outline

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1. Introduction
2. NodeMCU
3. Sensors
4. Blynk
5. Project's Architecture
6. Project's Result
7. Conclusion & Future Plan



# Introduction

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## Environmental Pollution



Image: Google

# Introduction

## Environmental Monitoring

Environmental monitoring describes the processes and activities that need to take place to characterize and monitor the quality of the environment.

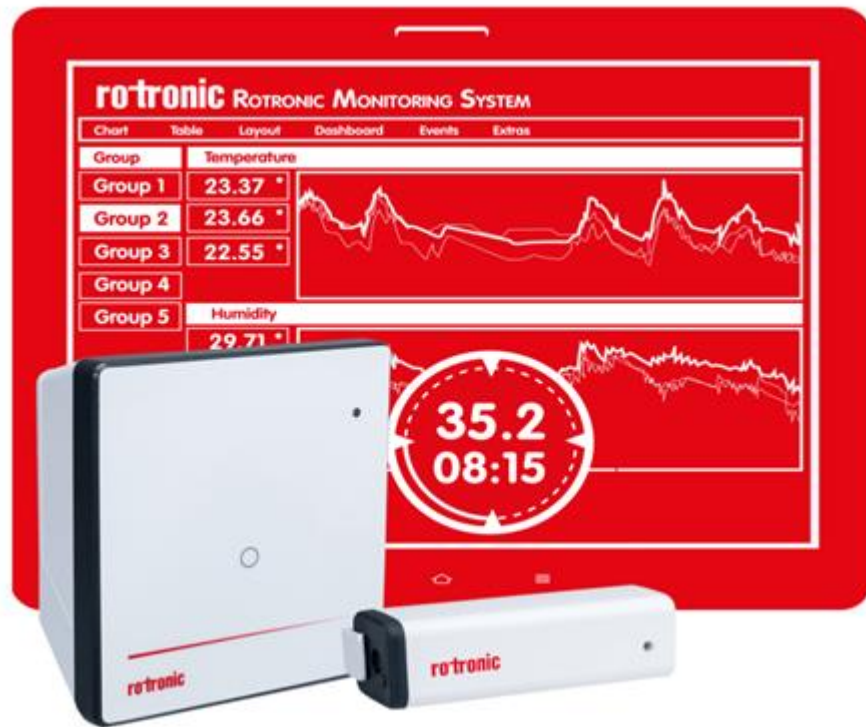
Environmental monitoring is used in the preparation of environmental impact assessments, as well as in many circumstances in which human activities carry a risk of harmful effects on the natural environment



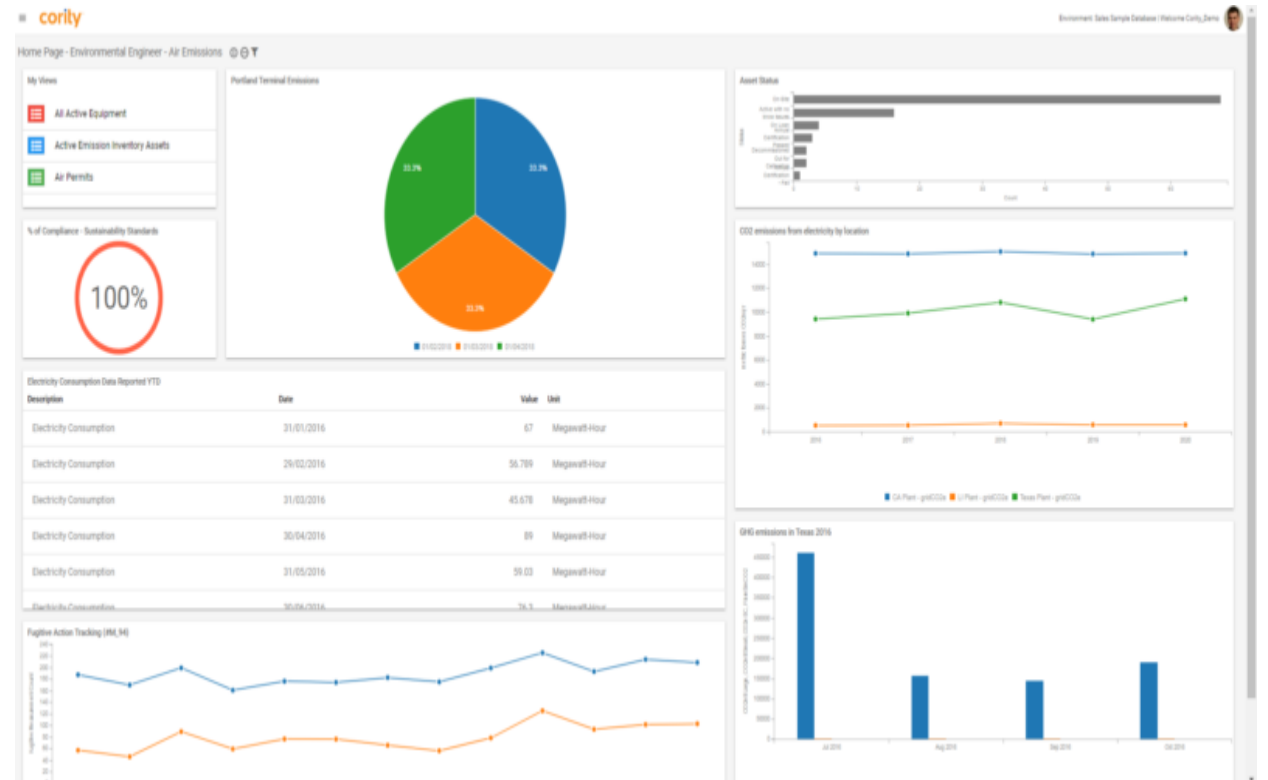
Image: Google

# Introduction

## Related Works



Rotronic RMS



Cority's Environmental Management System

# Introduction

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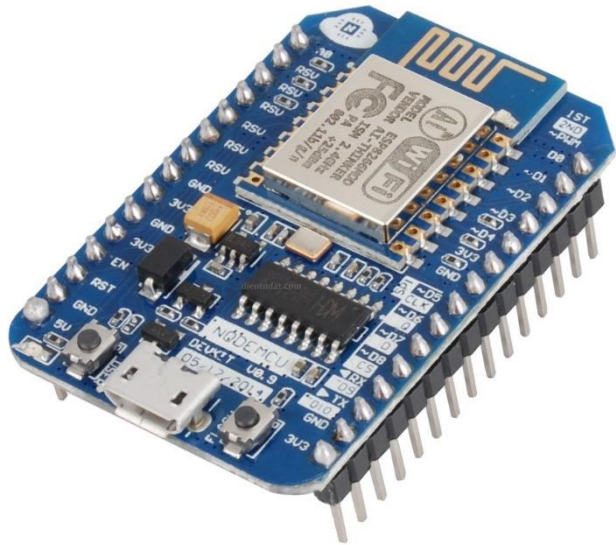
## **Main Features of Project**

- Collect environment's data
- Display and observe data collected real time on multiple devices
- Get alarm/notification when the data collected exceed designated threshold limit
- Export the collected data

# NodeMCU

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What is nodeMCU ?

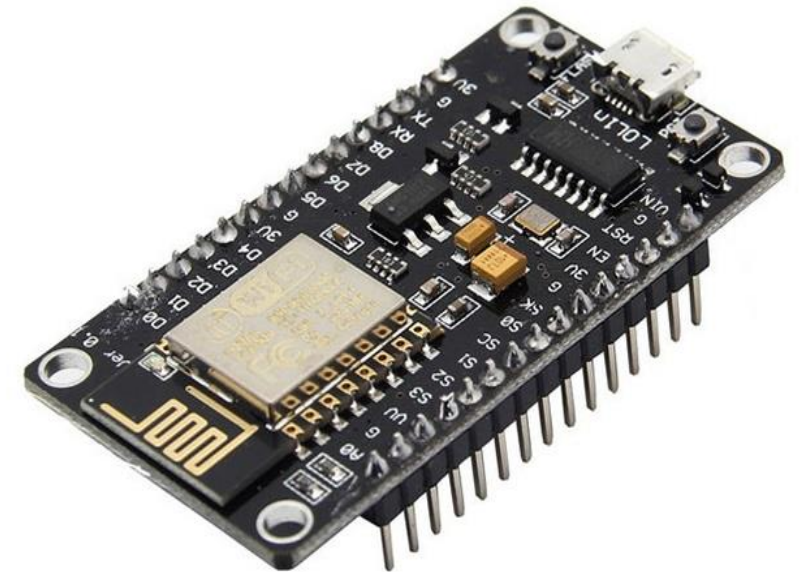


[dientudat.com](http://dientudat.com)

NodeMCU V0.9 (Version1)



NodeMCU V1.0 (Version2)

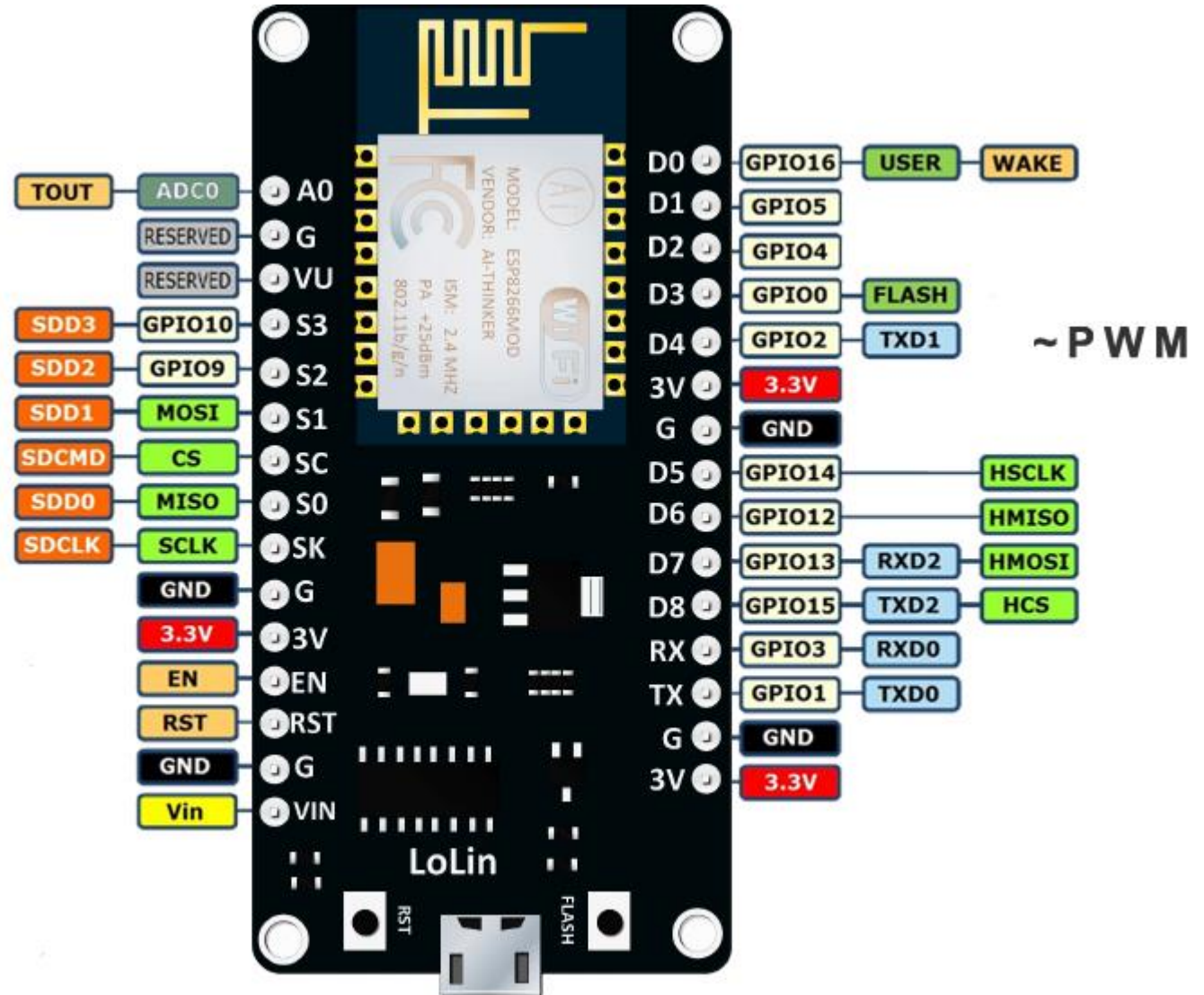


NodeMCU Lolin (Version3)

# NodeMCU

## NodeMCU V3 pinout and specification

- Microcontroller: Tensilica 32-bit RISC CPU Xtensa LX106
- Operating Voltage: 3.3V
- Input Voltage: 7-12V
- Digital I/O Pins (DIO): 16
- Analog Input Pins (ADC): 1
- UARTs: 1
- SPIs: 1
- I2Cs: 1
- Flash Memory: 4 MB
- SRAM: 64 KB
- Clock Speed: 80 MHz
- USB-TTL based on CH340 is included onboard, Enabling Plug n Play
- PCB Antenna

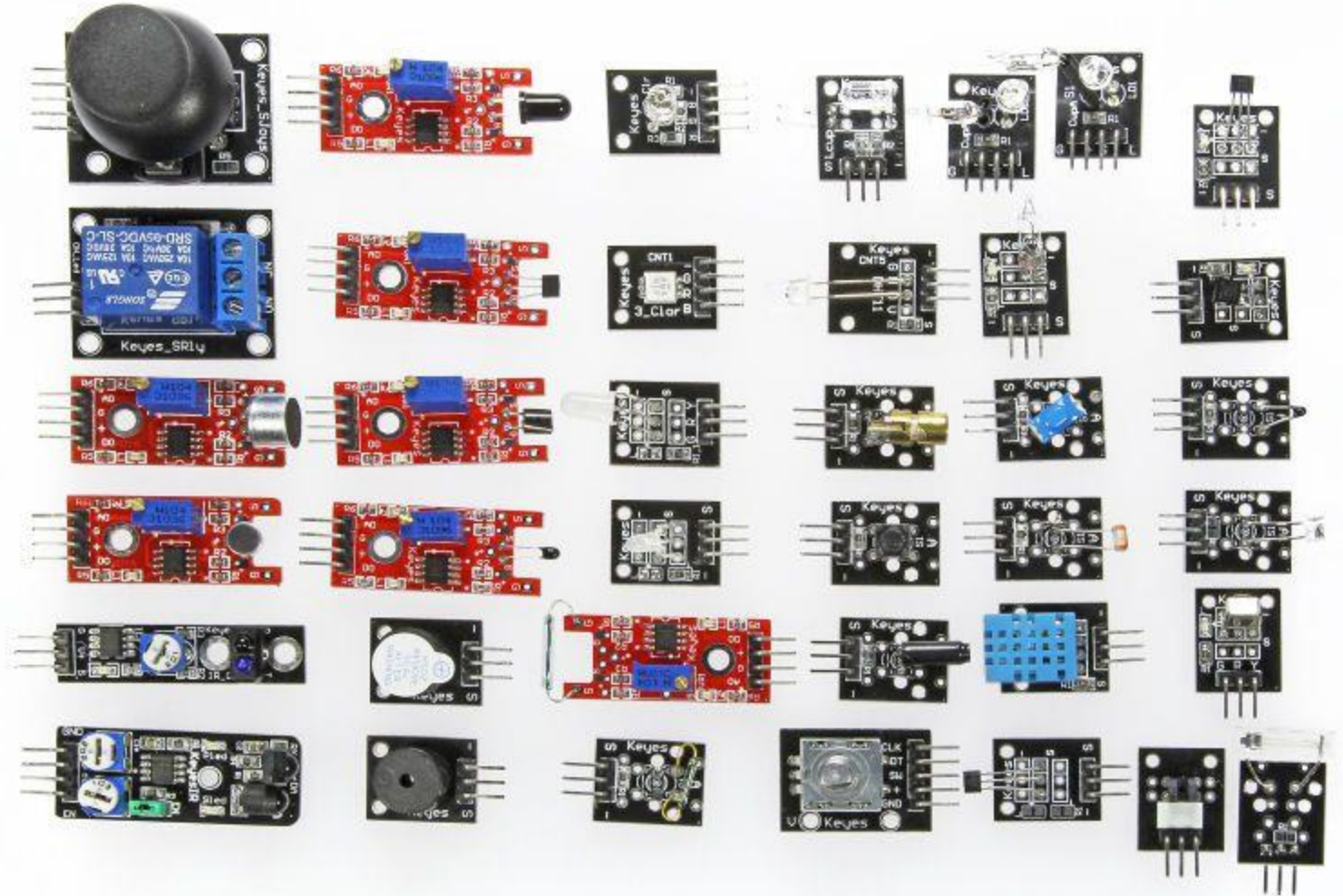




# Sensors

## What is sensors ?

A sensor is a device, module, machine, or subsystem that detects events or changes in its environment and sends the information to other electronics, frequently a computer processor.



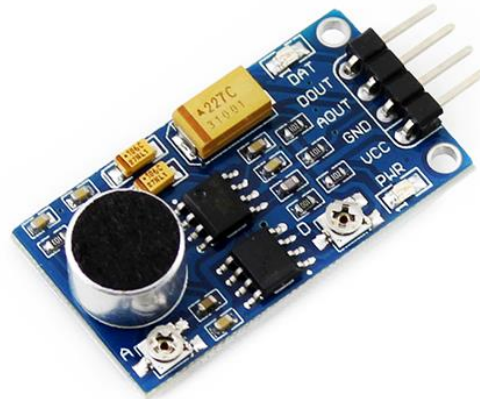
# Sensors

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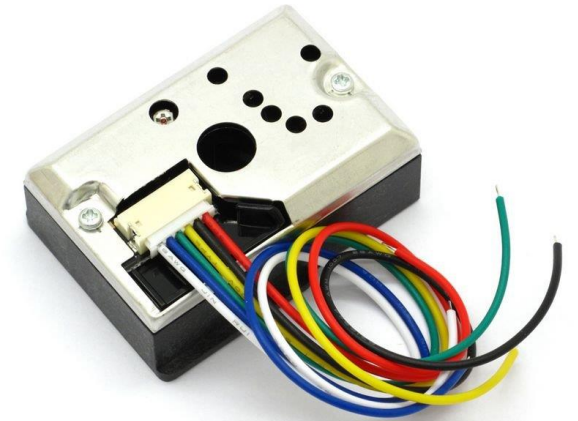
Some type of sensors use for environment monitoring



**Air-quality sensor**



**Sound sensor**

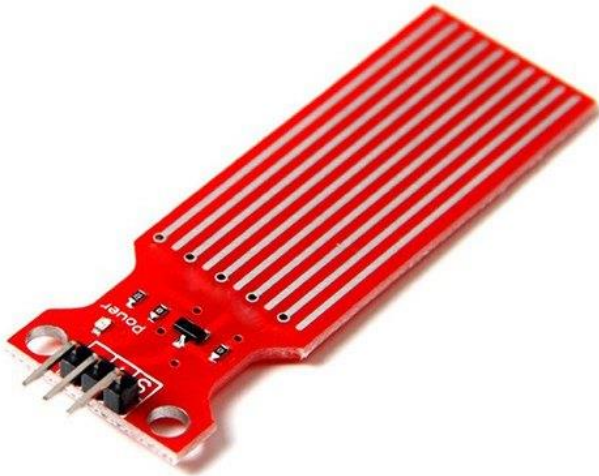


**Dust sensor**

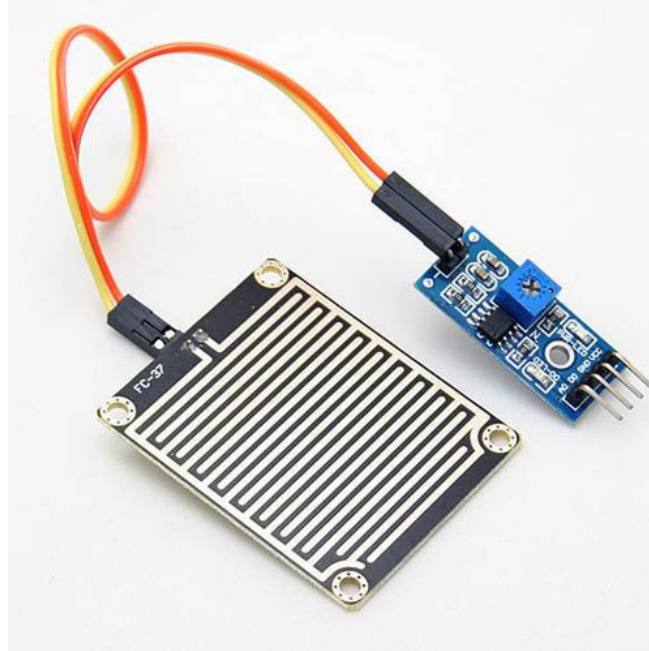
# Sensors

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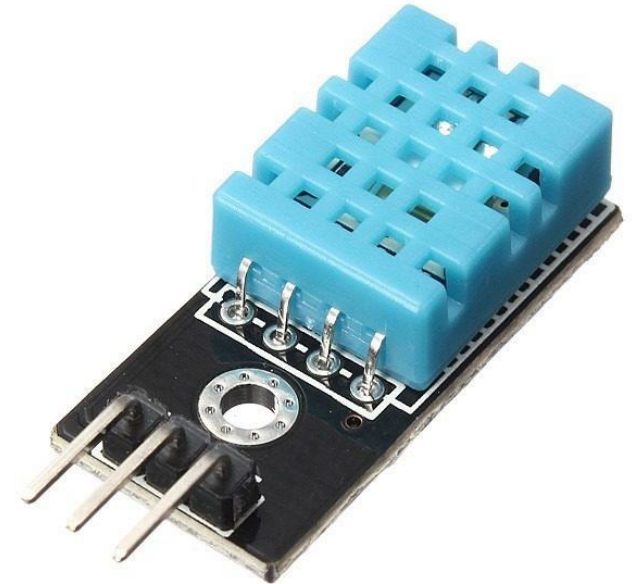
Some type of sensors use for environment monitoring



Water level sensor



Rain drop sensor



Temperature/Humidity sensor

# Blynk

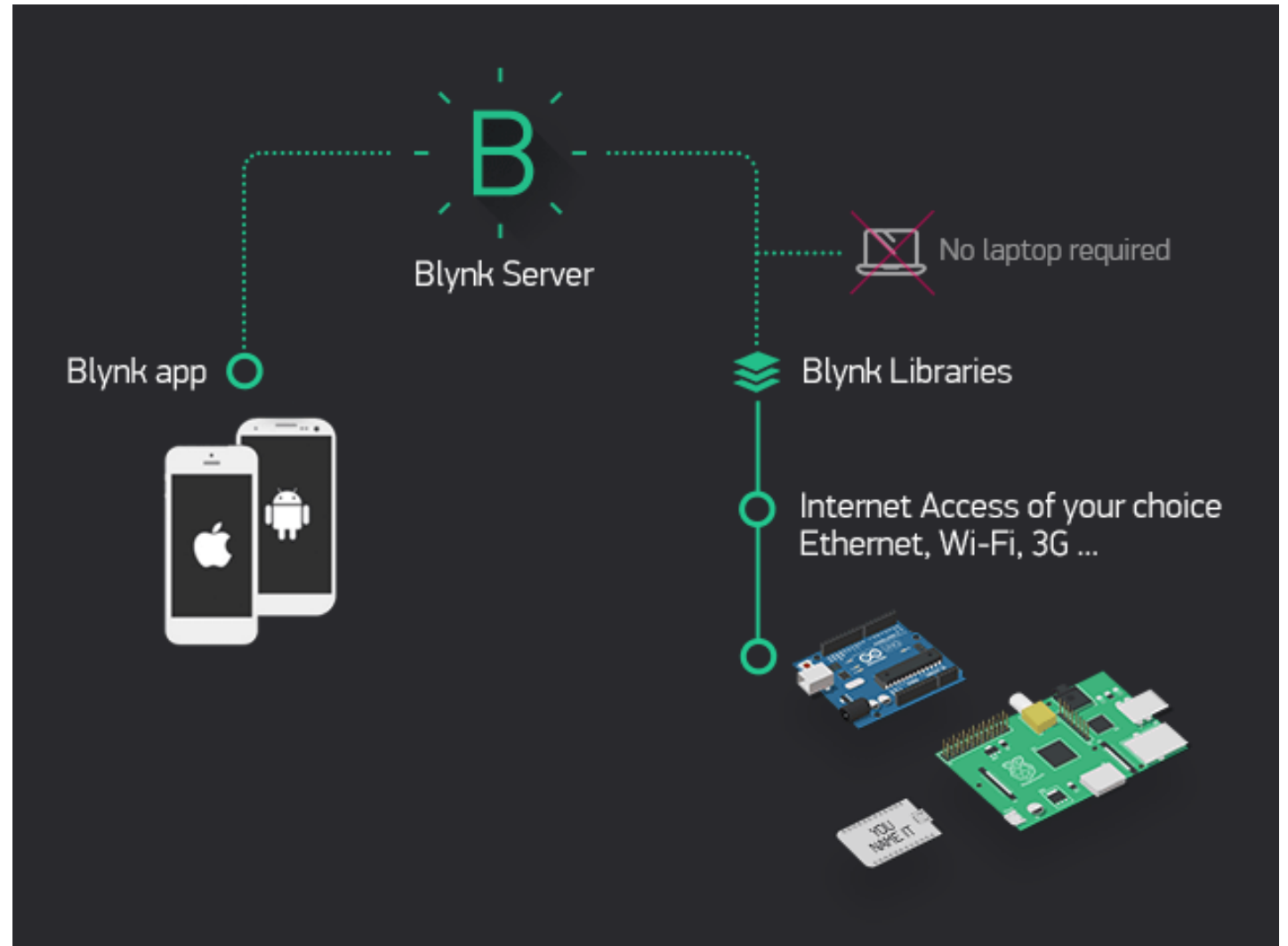


# Blynk

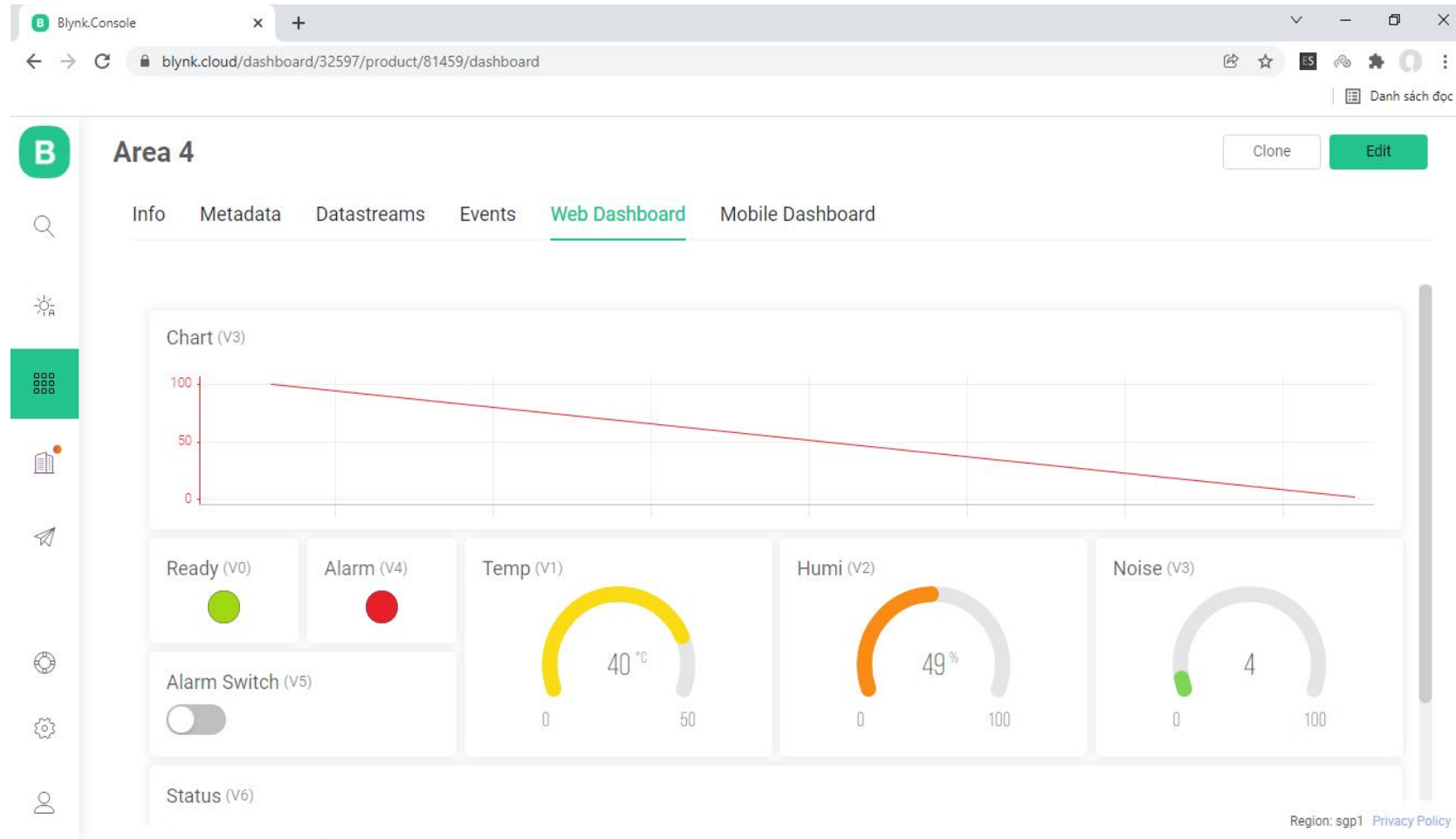
## How does Blynk work ?

Blynk allow us to:

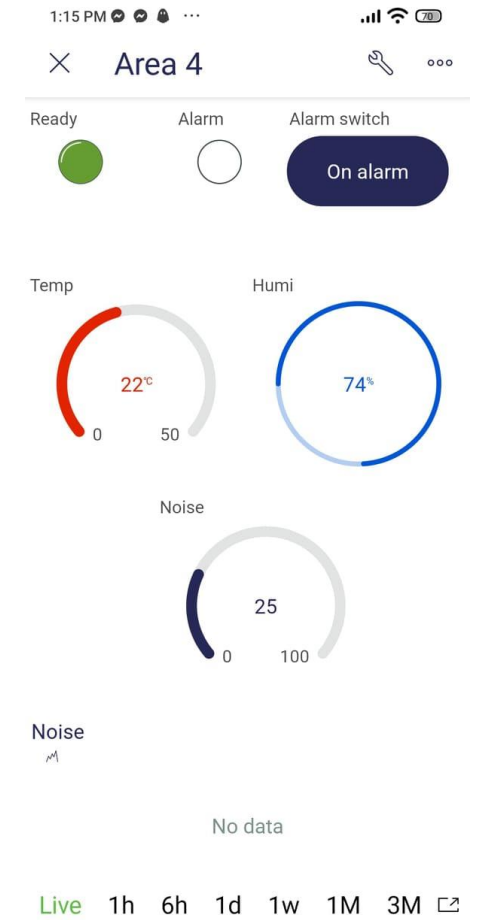
- Interact with Pins (Digital and Analog)
- Send and Receive data from Hardware with Widgets of 3 main types:
  - Controllers
  - Displays
  - Notifications & Others



# Blynk



**Blynk Web Dashboard**



**Blynk App Dashboard**

# Blynk and another IoT Platforms

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## Blynk's Alternative



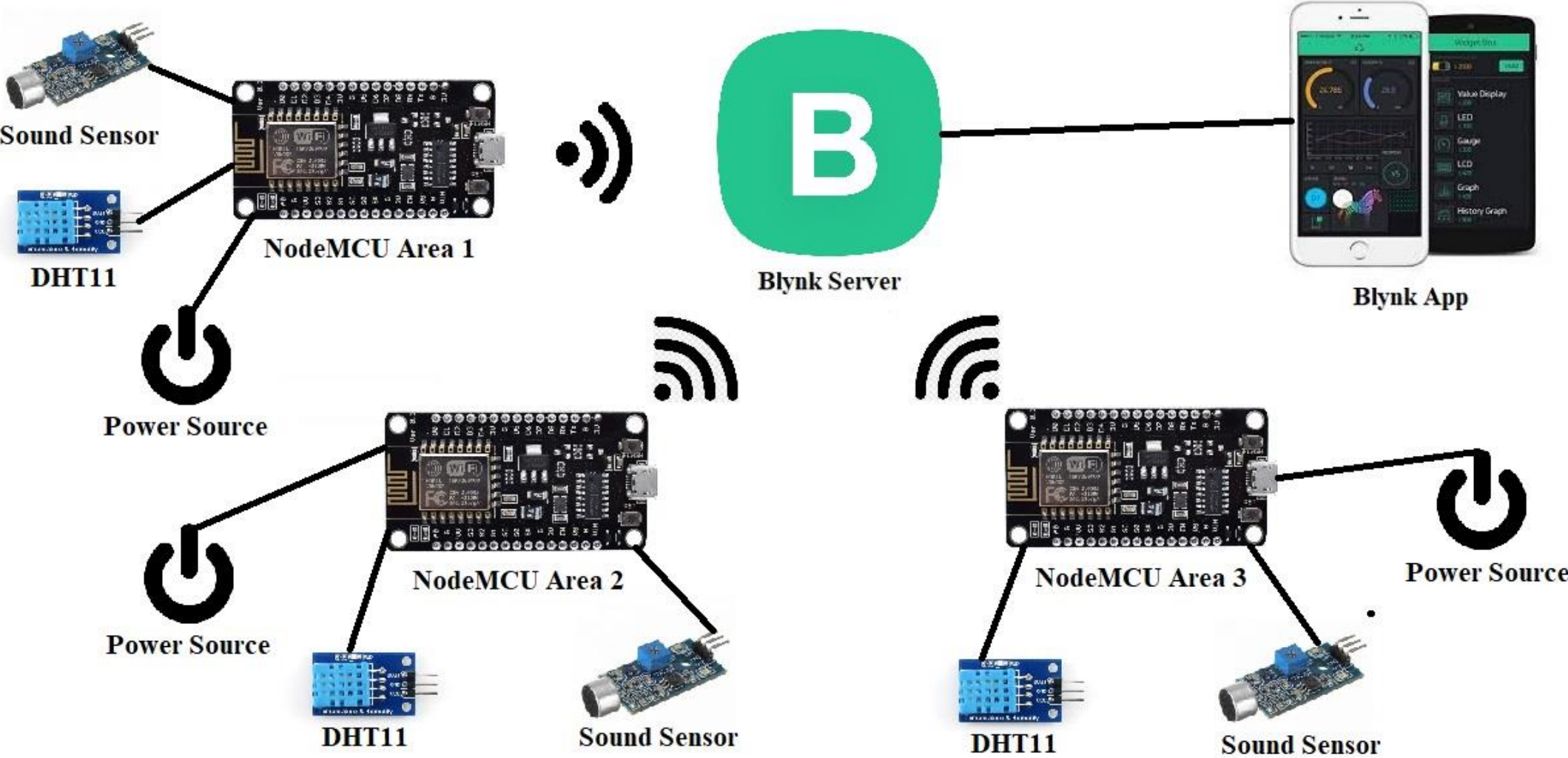
**IoT CLOUD**



Particle



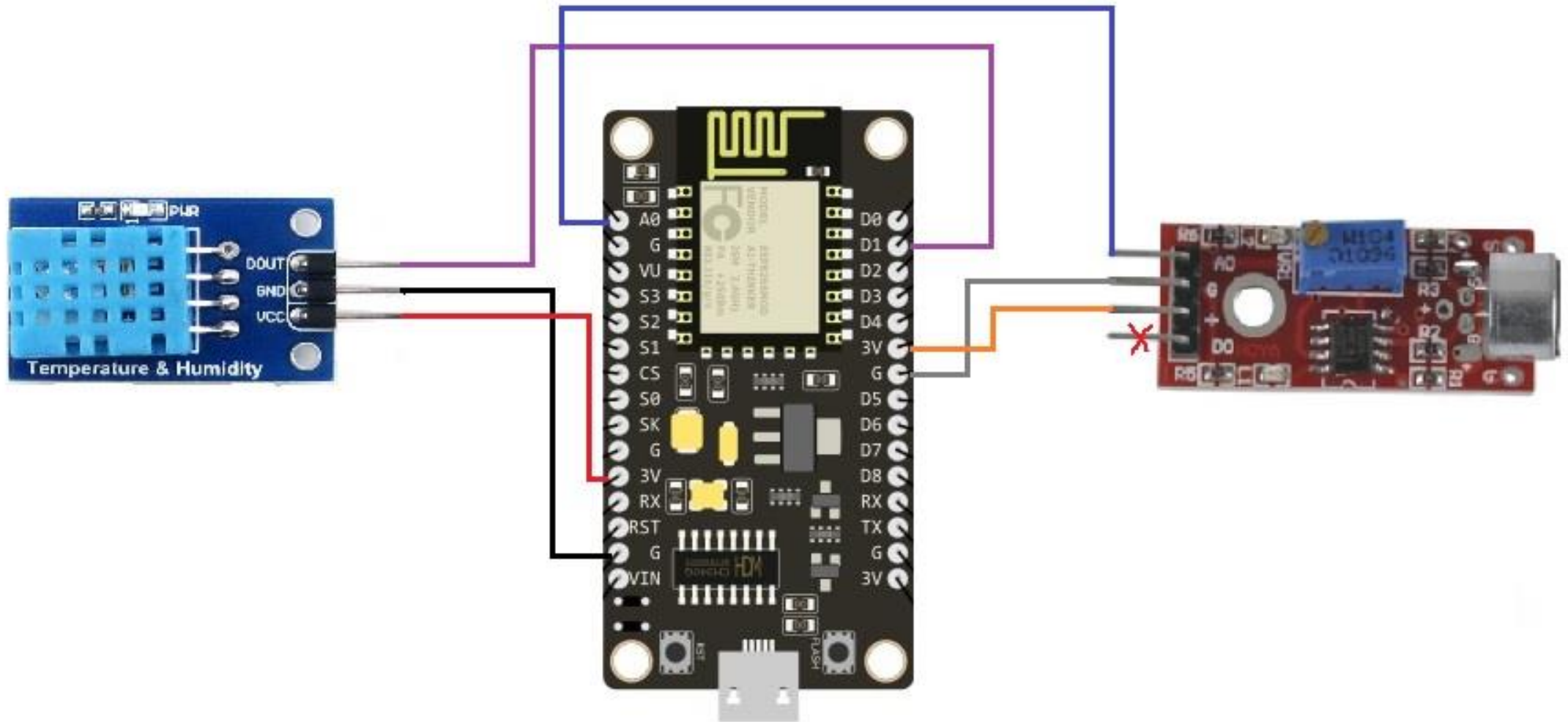
# Project Architecture





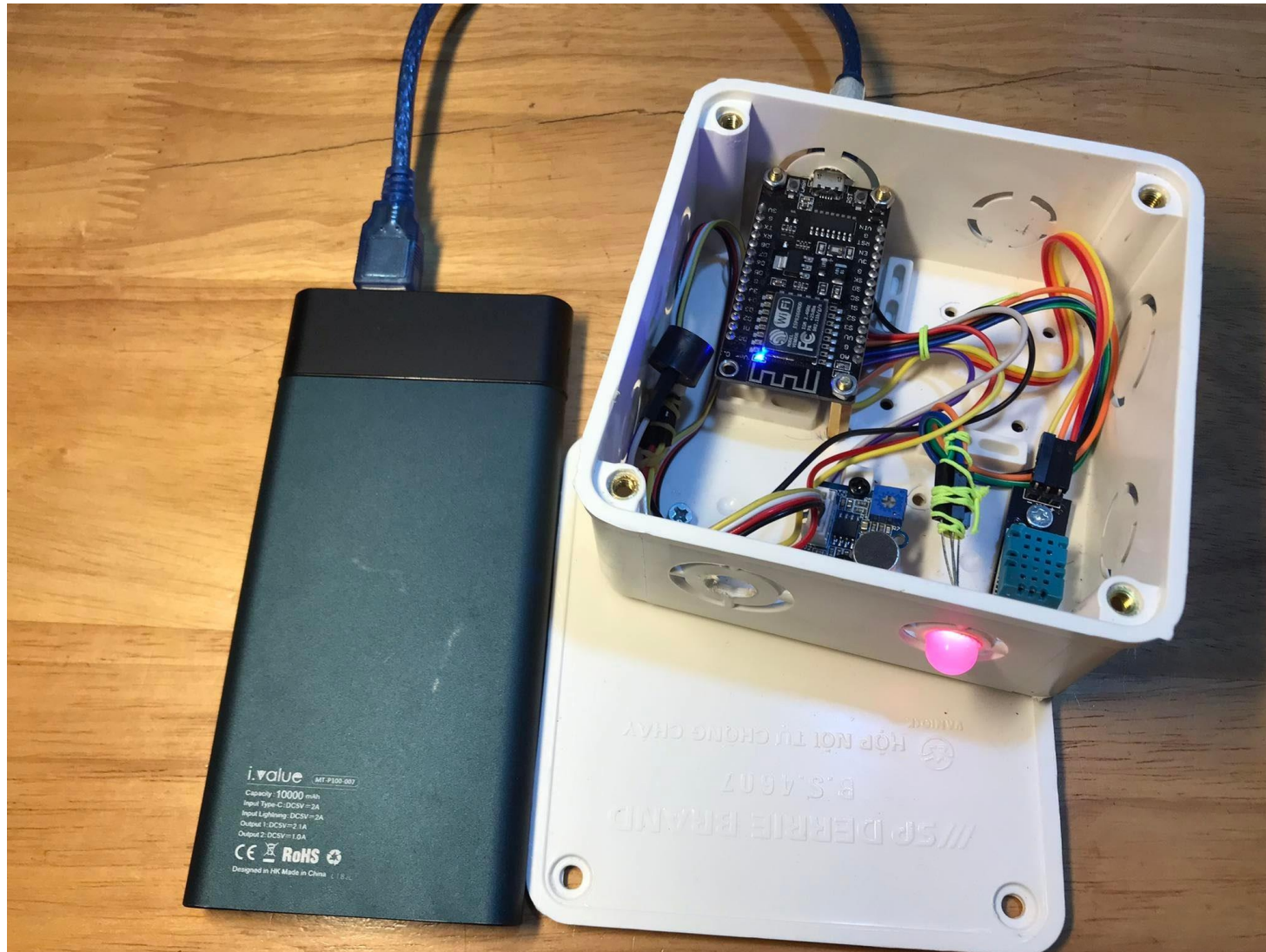
# Project's Basic Circuit diagram

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# Project Result

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# Project Result

The screenshot displays the Blynk Console interface for a device named 'Area 4'. The dashboard includes a navigation sidebar on the left with icons for home, search, settings, and user profile. The main content area shows the device's status as 'Online' and provides tabs for 'Dashboard', 'Timeline', 'Device Info', 'Metadata', and 'Service'. A 'Latest' data view is selected, showing a real-time graph of sensor data from 3:28 PM to 3:32 PM. Below the graph are four widget cards: 'Ready' (green), 'Alarm' (red), 'Temp' (yellow gauge showing 37°C), and 'Humi' (yellow gauge showing 0). An 'Alarm Switch' is also visible at the bottom left.

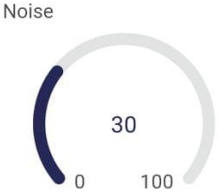
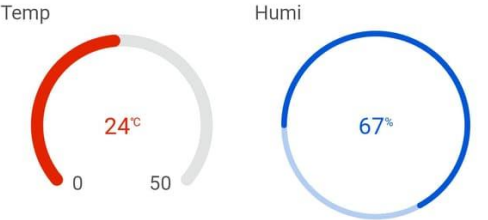
Overlaid on the right side is a terminal window titled 'COM5' displaying a stream of sensor data and error messages. The data includes temperature, humidity, and noise levels, along with Vietnamese warnings for high temperature. The terminal also features 'Autoscroll' and 'Show timestamp' checkboxes and a 'Newline' dropdown menu.

```
COM5
Temperature: 23.40°C - Humidity: 70.00% - Noise: 26% max.
Temperature: 23.40°C - Humidity: 70.00% - Noise: 27% max.
Temperature: 23.40°C - Humidity: 69.00% - Noise: 28% max.
Temperature: 23.80°C - Humidity: 71.00% - Noise: 28% max.
Failed to read from DHT sensor!
Không gian làm việc đang quá ồn!
Temperature: 24.10°C - Humidity: 69.00% - Noise: 32% max.
Nhiệt độ đang quá ngưỡng!
Temperature: 31.80°C - Humidity: 62.00% - Noise: 39% max.
Nhiệt độ đang quá ngưỡng!
Temperature: 43.50°C - Humidity: 37.00% - Noise: 29% max.
Nhiệt độ đang quá ngưỡng!
Temperature: 44.40°C - Humidity: 30.00% - Noise: 25% max.
Nhiệt độ đang quá ngưỡng!
Temperature: 43.50°C - Humidity: 27.00% - Noise: 30% max.
Nhiệt độ đang quá ngưỡng!
Temperature: 42.50°C - Humidity: 28.00% - Noise: 30% max.
Nhiệt độ đang quá ngưỡng!
Temperature: 40.10°C - Humidity: 28.00% - Noise: 30% max.
Nhiệt độ đang quá ngưỡng!
Temperature: 38.50°C - Humidity: 31.00% - Noise: 32% max.
Nhiệt độ đang quá ngưỡng!
Temperature: 37.40°C - Humidity: 33.00% - Noise: 29% max.
Autoscroll Show timestamp Newline
```

# Project Result

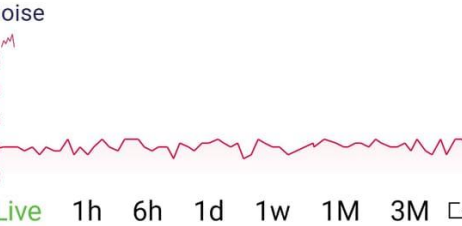
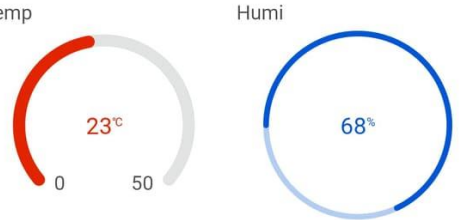
4:02 PM B B ...  
Area 4

Ready Alarm Alarm switch  
Off alarm



4:16 PM  
Area 4

Ready Alarm Alarm switch  
On alarm

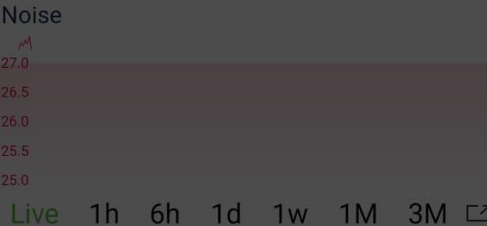


4:17 PM  
Area 4

Ready Alarm Alarm switch  
On alarm



Temperature Alarm  
Nhiệt độ quá cao!  
CLOSE



# Conclusion & Future plan

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- We studied about NodeMCU and Blynk for more individual friendly environmental monitoring solution with connection using WiFi.
- Although the project is finished, it have some disadvantage and still need a lot more improvement to be more completed.
- This project only suit using for research and study, since to be able to use practically it need a lot more.
- In the future, we can extend the uses of the project by adding more different type of sensors and new functions.

# Q&A session

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THANKS  
FOR  
LISTENING