# IoT - ESP8266

What is **IoT**?

Is it a
Device / System ?

In the simplest terms, the Internet of Things (IoT) is how we describe the digitally connected universe of everyday physical devices. These devices are embedded with internet connectivity, sensors and other hardware that allows to monitor physical factors
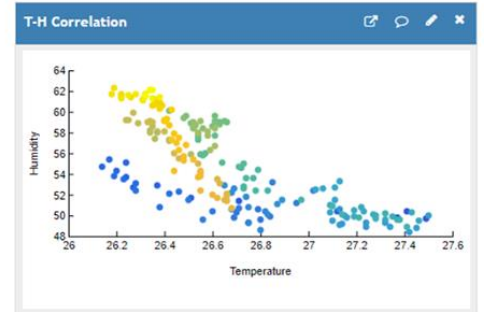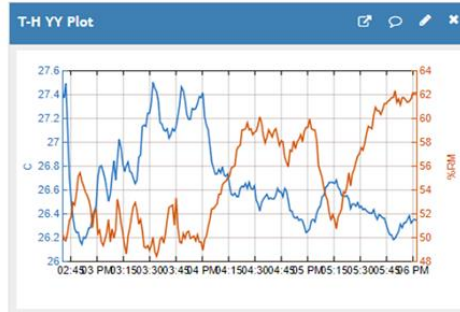
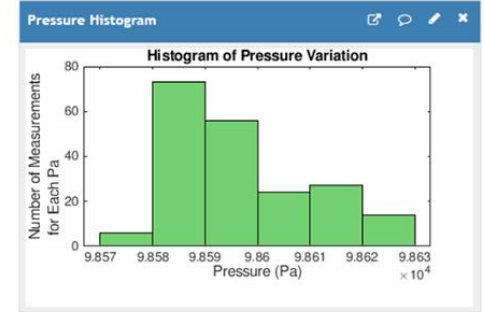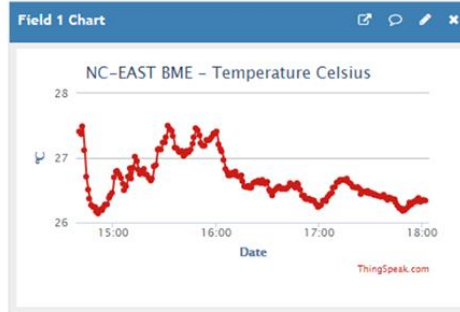# Components in IoT

Thing/Device → Gateway → Cloud → Analytics → User Interface
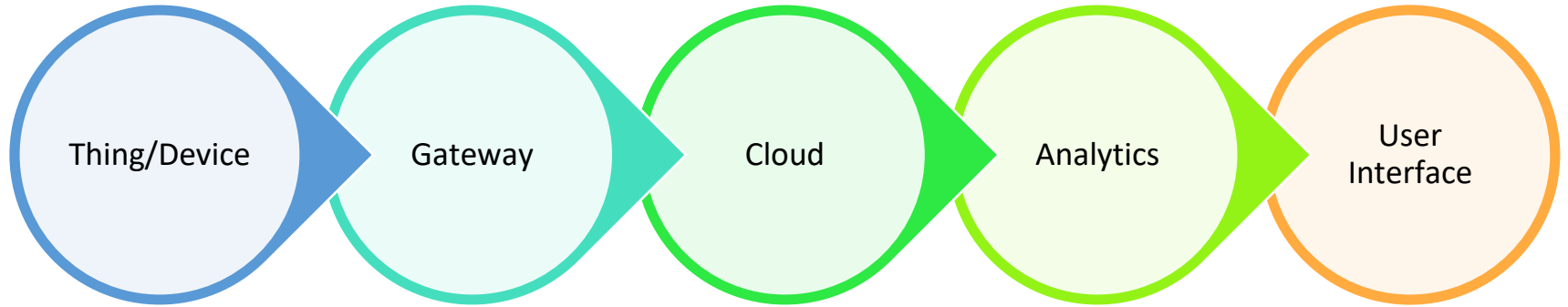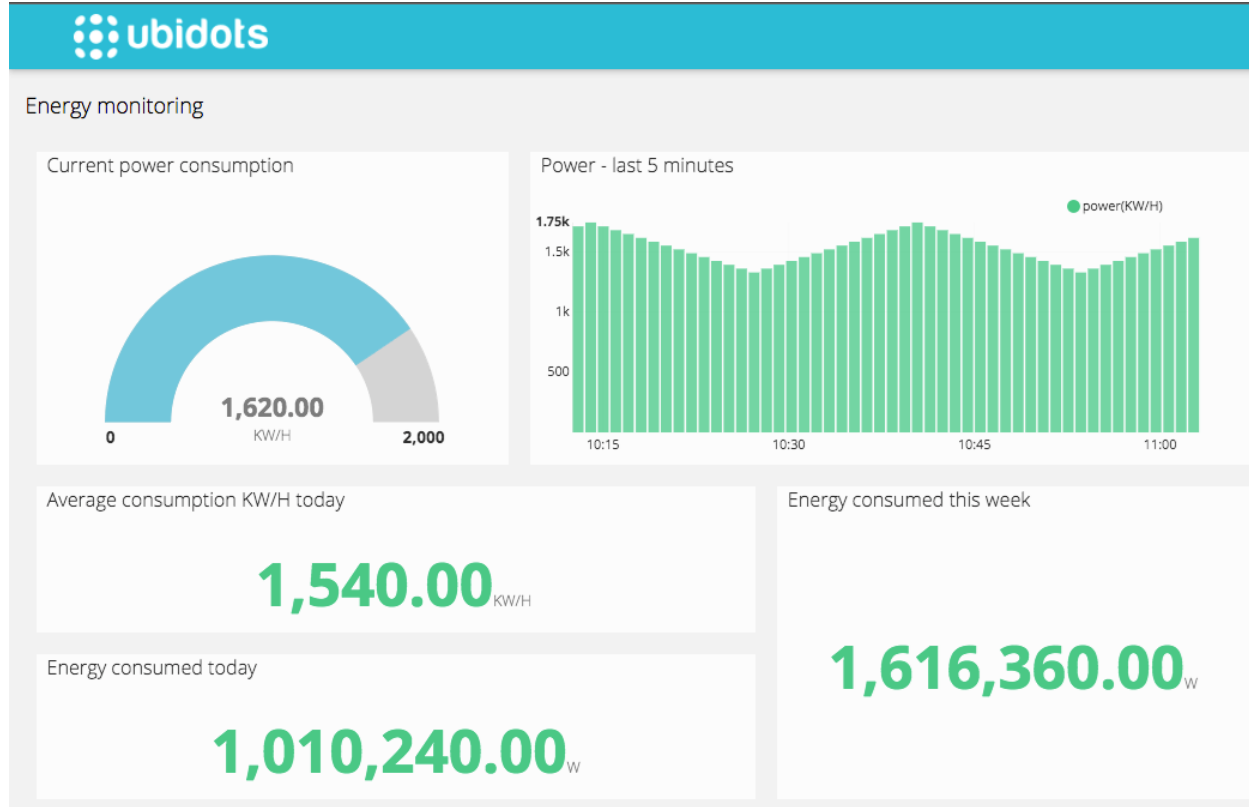
Thing/Device

GateWay/Connectivity

Cloud

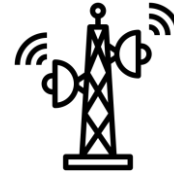# Analytics

User Interface

Different Connectivities

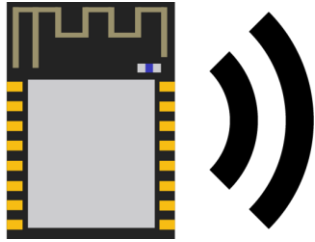WiFi - Wireless Fidelity

Bluetooth

Cellular

LPWAN
(Low Power Wide Area Network)

Satellite Coms - Iridium sat,
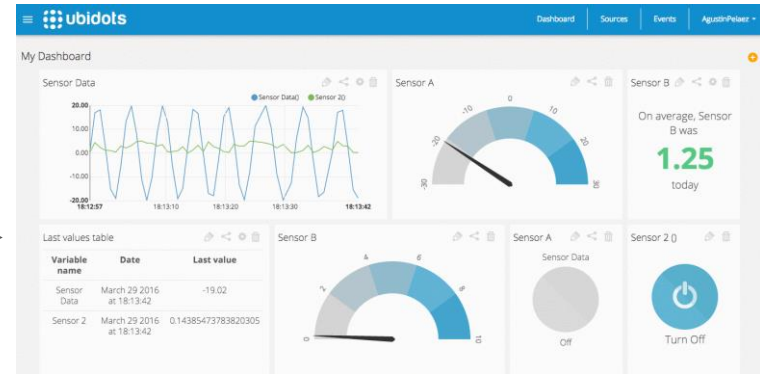Lacuna Space, etc.

We'll be learning

How to use an
ESP8266 with Arduino Platform,
Connecting it with WiFi, Data
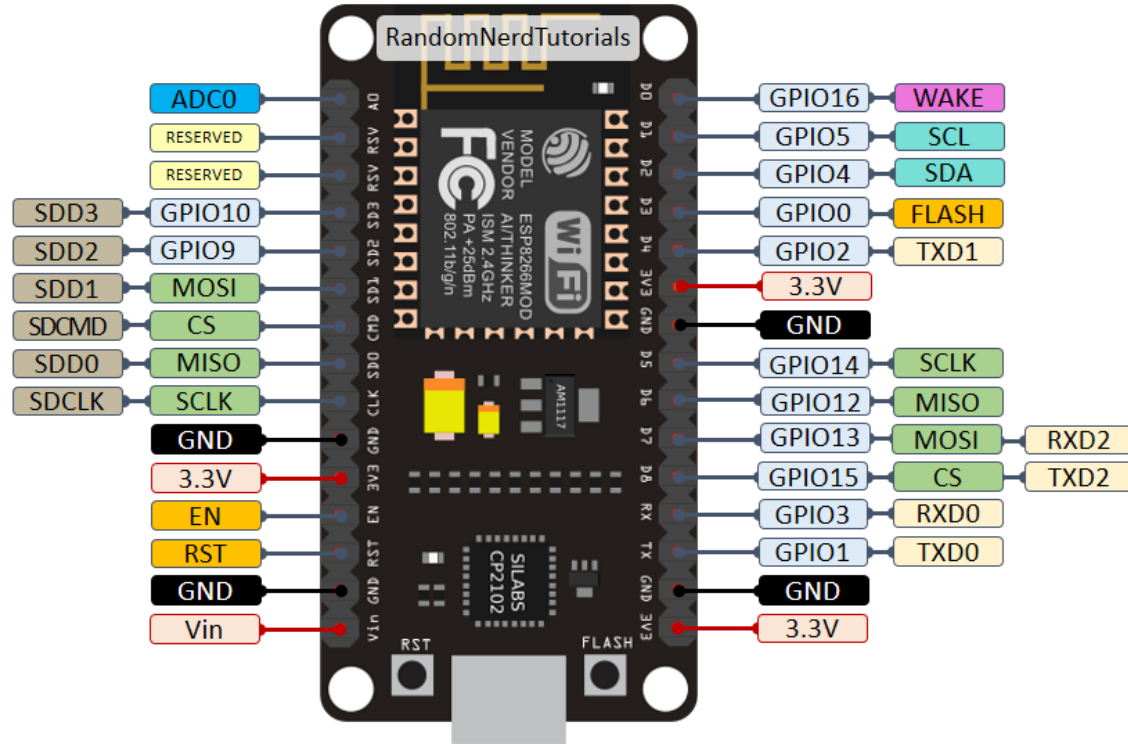Acquisition & Sending data to
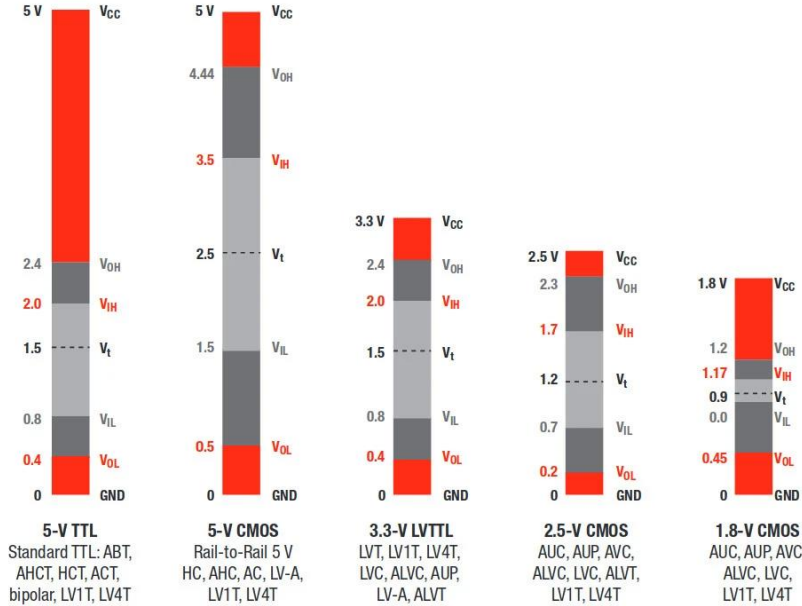cloud.

Creating account, Device
management

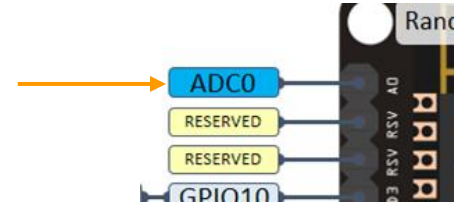Creating dashboard, adding
widgets, customizing widgets.

ESP8266

Things to keep in mind

Logic Level is 3.3v

Only one Analog Pin

Things to keep in mind……….

Strapping Pins:

GPIO15	GPIO0	GPIO2	Mode
0V	0V	3.3V	Uart Bootloader
0V	3.3V	3.3V	Boot sketch (SPI flash)
3.3V	x	x	SDIO mode (not used for Arduino)

GPIO	Function	State	Restrictions
0	Boot mode select	3.3V	No Hi-Z
1	TX0	-	Not usable during Serial transmission
2	Boot mode select TX1	3.3V (boot only)	Don't connect to ground at boot time Sends debug data at boot time
3	RX0	-	Not usable during Serial transmission
4	SDA (I²C)	-	-
5	SCL (I²C)	-	-
6 - 11	Flash connection	x	Not usable, and not broken out
12	MISO (SPI)	-	-
13	MOSI (SPI)	-	-
14	SCK (SPI)	-	-
15	SS (SPI)	0V	Pull-up resistor not usable
16	Wake up from sleep	-	No pull-up resistor, but pull-down instead Should be connected to RST to wake up

Let's get started.

Enough talking, let's play!

Installing Board - Boards Manager
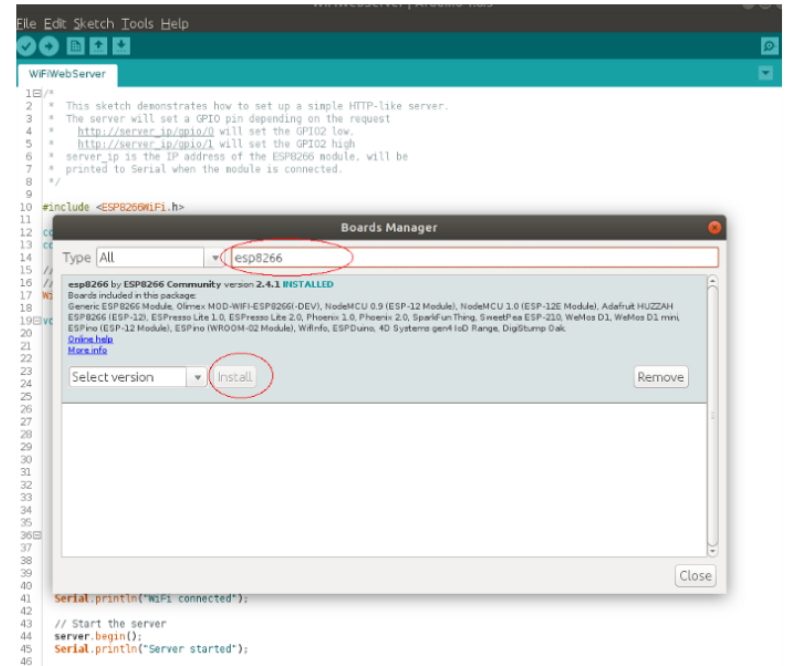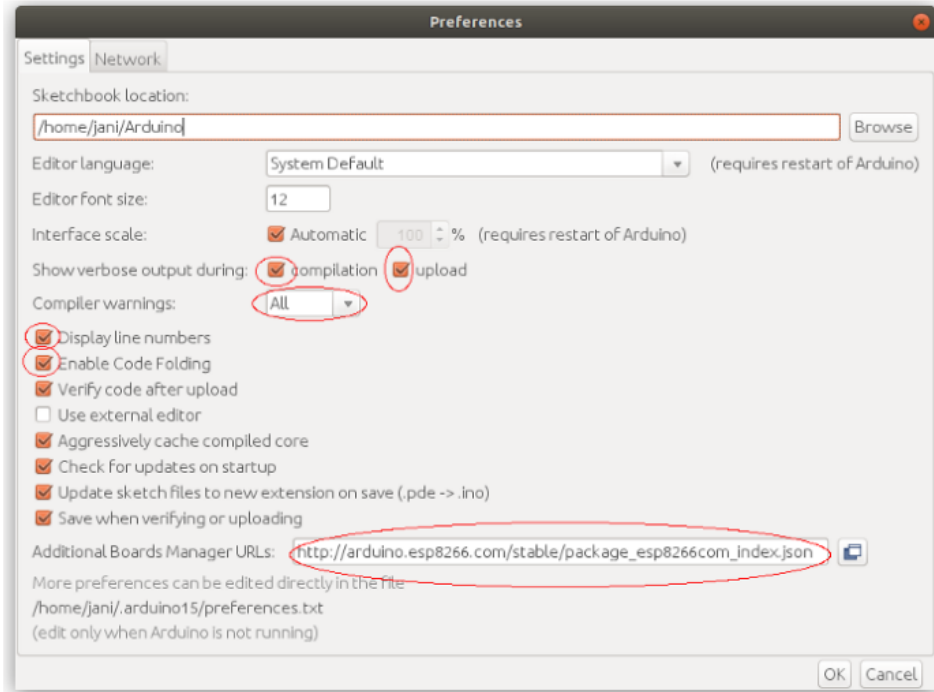
Installation guide link shared.

Let's Blink a LED first

Use the same code used in UNO. The Built-In or External LED can be used.

Creating an account in Ubidots
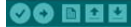(Please create a STEM account) *https://ubidots.com/stem/*

Understanding limits of STEM account

- Devices: Up to **10 devices**. First **3** devices free, then **$4.5** / device / month
- Variables: Up to **10 variables** per device.
- Plugins: Up to **1 plugin**, with **10,000** plugin executions per month.
- Data Ingestion: **4,000 dots** per day across all of your devices.
- Data Extraction: **500,000 dots** per day across all of your account.
- Data Rate: **1 request per second**, across all of your devices.
- Data Retention: **1 month.**
- Dashboards: Up to **3** dashboards, with up to **10** widgets each.
- SMS & Voice calls: **10** SMS and **1** Voice call for free per month (US & Canada only), then standard rates apply.
- Emails: 100 Emails for free per month, then standard rates apply.
- Uptime: No SLA - shared server resources across all STEM users. The speed and reliability is based on total platform requests at any given second.
- Support: Community-based, or self-service using our Help Center and API Docs.

Sending data to Ubidots


```
_1__Sending_Data_to_Ubidots | Arduino 1.8.16
File Edit Sketch Tools Help

_1__Sending_Data_to_Ubidots §

1  #include "Ubidots.h"
2
3
4  const char* UBIDOTS_TOKEN = "";  // Put here your Ubidots TOKEN
5  const char* WIFI_SSID = "";      // Put here your Wi-Fi SSID
6  const char* WIFI_PASS = "";      // Put here your Wi-Fi password
7  Ubidots ubidots(UBIDOTS_TOKEN, UBI_HTTP);
8
9  void setup()
10 {
11   Serial.begin(115200);
12   ubidots.wifiConnect(WIFI_SSID, WIFI_PASS);
13   //ubidots.setDebug(true);
14 }
15
16 void loop()
17 {
18   int value1 = random(0, 100);
19   int value2 = random(100, 300);
20
21   ubidots.add("Random_num_1", value1);
22   ubidots.add("Random_num_2", value2);
23
24   bool bufferSent = false;
25   bufferSent = ubidots.send();  S
26
27   if (bufferSent)
28   {
29     Serial.println("Values sent by the device");
30   }
```

Changing Credentials

```
const char* UBIDOTS_TOKEN = "";   // Put here your Ubidots TOKEN
const char* WIFI_SSID = "";       // Put here your Wi-Fi SSID
const char* WIFI_PASS = "";       // Put here your Wi-Fi password
Ubidots ubidots(UBIDOTS_TOKEN, UBI_HTTP);
```

Upload code once done!

Your serial monitor

COM15

[|] Send

```
17:43:34.635 -> ...........WiFi connected
17:43:40.377 -> IP address:
17:43:40.377 -> 192.168.233.127
17:43:40.377 -> ----------
17:43:40.377 -> payload:
17:43:40.377 -> {"Random_num_1":{"value":32},"Random_num_2":{"value":197}}
17:43:40.377 -> ----------
17:43:40.377 ->
17:43:40.377 -> Sending data...
```

☑ Autoscroll ☑ Show timestamp   No line ending ⌄ 115200 baud ⌄ Clear output

Take a look at your Ubidots account now.

These are called variables/bin.

Creating a dashboard

Name your dashboard

You can explore rest of the options.
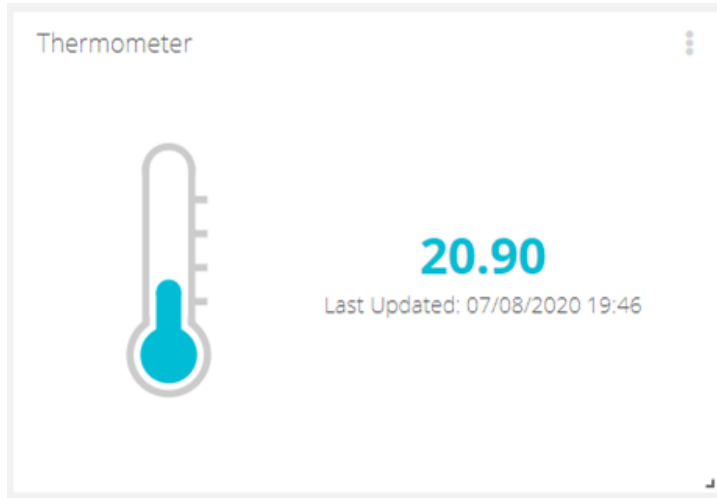
Lets measure Temperature

(Please create a STEM account) *https://ubidots.com/stem/*

DHT11

Vcc   NC   GND

Data Pin

A0
RSV
RSV
SD3
SD2
SD1
CMD
SD0
CLK
GND
3V3
EN
RST
GND
Vin

D0
D1
D2
D3
D4
3V3
GND
D5
D6
D7
D8
RX
TX
GND
3V3

RST

FLASH

MODEL ESP8266MOD
VENDOR AI-THINKER
ISM 2.4GHz
PA +25dBm
802.11b/g/n

WiFi

FC