KONTROL ESP32 DENGAN THINGSBOARD

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01

PENGENALAN

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GOAL

- Memahami sistem Platform Thingsboard dan metode koneksinya
- Membuat program sensor dan kontrol ESP32 melalui Thingsboard
- Memulai dengan ESP-NOW

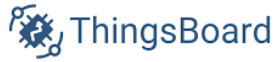# IOT PLATFORM VS DASHBOARD

A Dashboard can Usually

Display data
Control devices

However an IOT platform can Usually

Collect data from various sources
Store data
Control Devices
Display Data
Run Tests
Deploy device updates
Manage device Inventory

PLATFORM IOT

ThingsBoard — Thingsboard -open-source IoT platform for device management, data collection, processing and visualization

thingstream — Thingstream -provides low power, low cost, ubiquitous IoT connectivity via MQTT over GSM.

thingworx — ThingWorx–powerful industrial IoT applications and augmented reality (AR) experiences.

ThingSpeak — Thingspeak -ThingSpeak is the open IoT platform with MATLAB analytics.

wolkabout — Wolkabout – Combines different devices and services into a complete IoT solution.

openremote — OpenRemote – 100% open source IoT platform running in Docker. It can be installed on local hardware, starting with RaspberryPi4, or hosted servers.

OTHER IOT PLATFORM

IOTgo -IoTgo is an open source IoT platform, like WordPress, ZenCart

kaa -Kaa is an open-source IoT platform

datacake – Low cost, low code IOT platform also offering node-red hosting.

DASHBOARD (MQTT)

Node-Red – Open source Node js based platform for flow based programming. Device management using the node-red UI.

Freeboard.io – Open source -Very popular but doesn't currently support MQTT out of the box

DASHBOARD (ANDROID BASED)
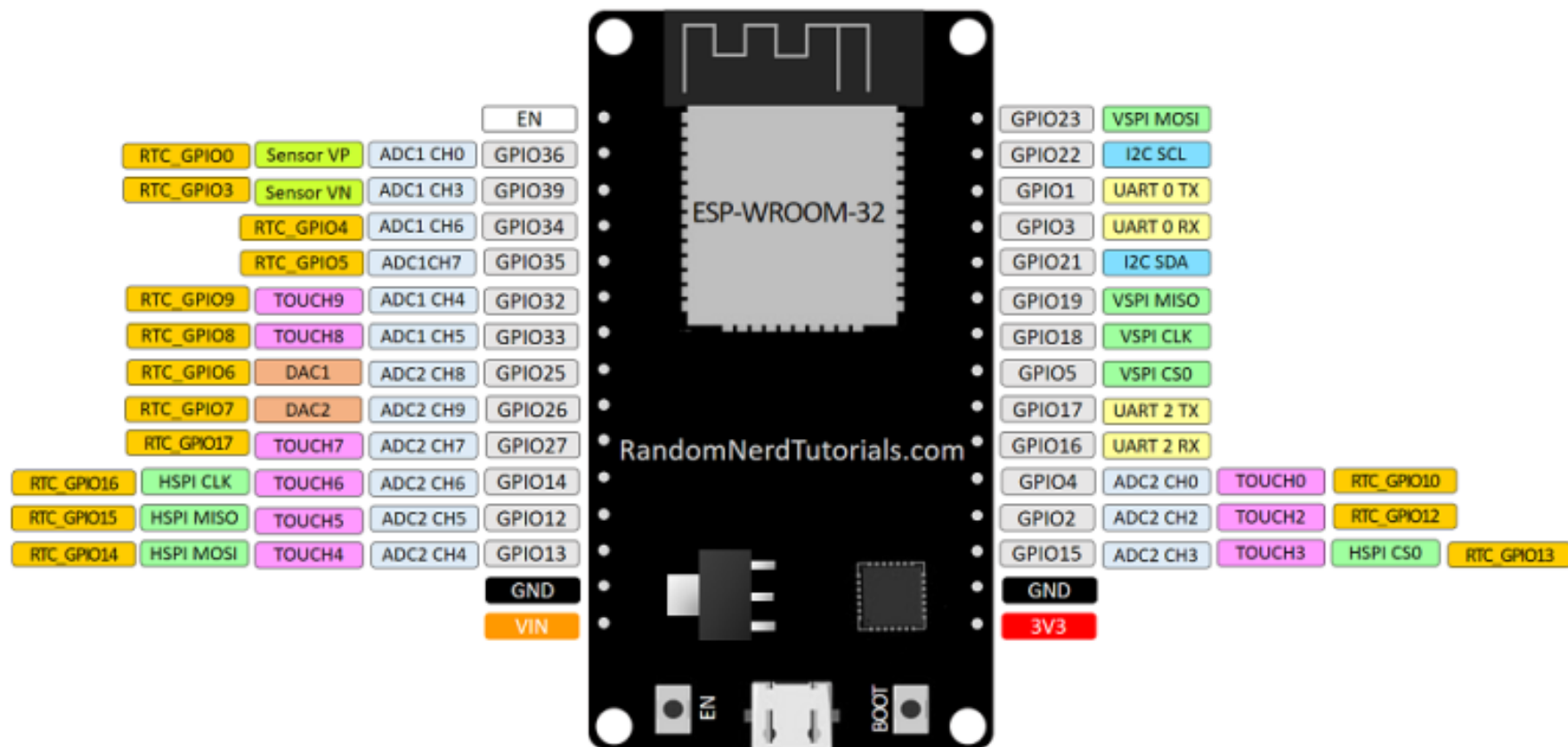
MQTT Dashboard
MQTT Dash

Mqtt Dashboard

Control IoT devices, Node-RED and more using MQTT messaging protocol.

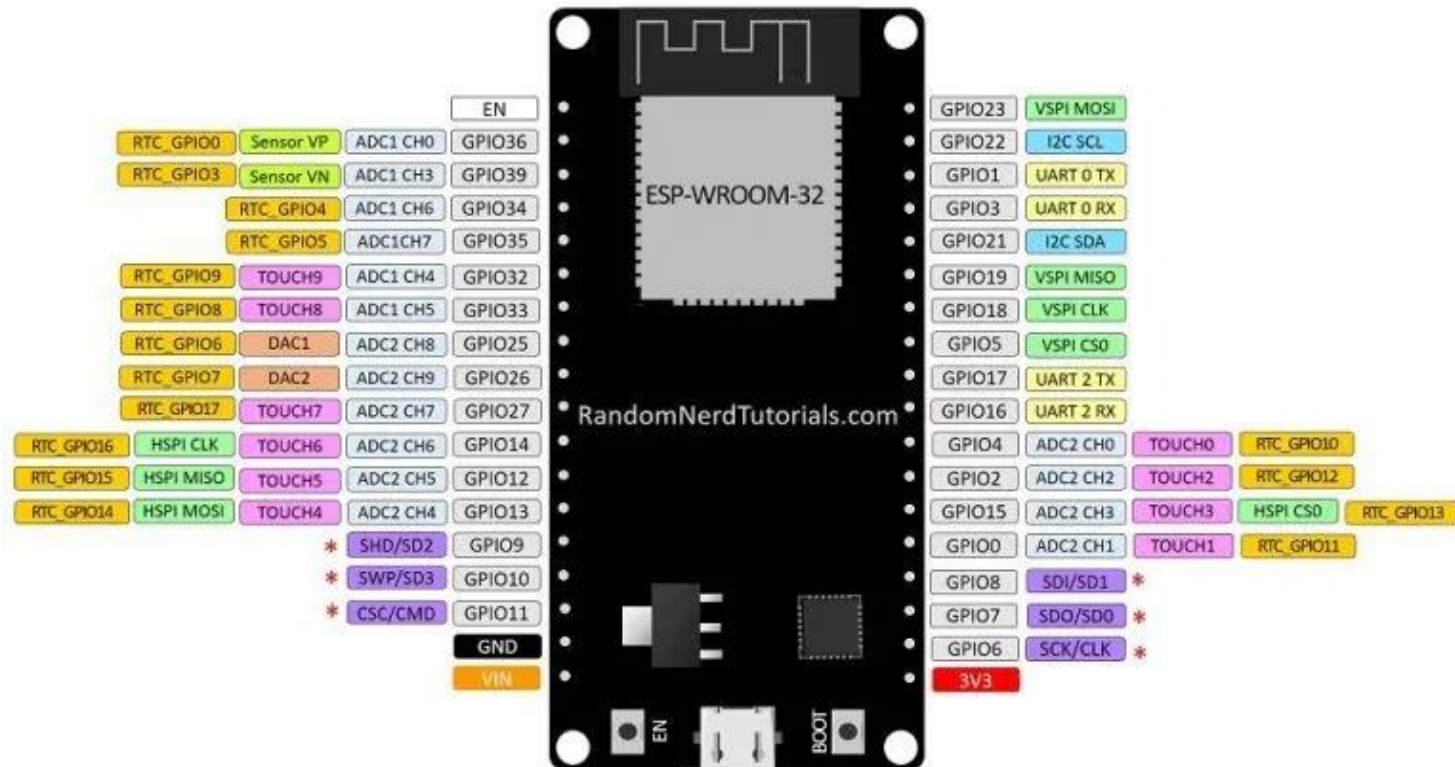# Thingsboard Rpi

Tentang Thingsboard

WROOM32

PINOUT

ver 1 rev 0

Legend:

- Power
- GND
- Serial Pin
- Analog Pin
- Control
- Physical Pin
- Port Pin
- Touch Pin
- DAC Pin
- PWM Pin

ANT1

U1

U2

U3

C7 C6 C12 C11 C5 C10 C9 C8 C18 R7 C2 C16 C15 R1

Left side pins:

| GND |
| 3.3V |
| Chip PU |
| ChipPU · 9 |
| ADC PA · RTCIO0 · ADC1_0 · SensVP · GPIO36 · 5 |
| ADC PA · RTCIO3 · ADC1_3 · SensVN · GPIO39 · 8 |
| RTCIO4 · ADC1_6 · VDET1 · GPIO34 · 10 |
| RTCIO5 · ADC1_7 · VDET2 · GPIO35 · 11 |
| XTAL32 · Touch9 · RTCIO9 · ADC1_4 · GPIO32 · 12 |
| XTAL32 · Touch8 · RTCIO8 · ADC1_5 · GPIO33 · 13 |
| DAC_1 · RTCIO6 · ADC2_8 · EMAC RXD0 · GPIO25 · 14 |
| DAC_2 · RTCIO7 · ADC2_9 · EMAC RXD1 · GPIO26 · 15 |
| Touch7 · RTCIO17 · ADC2_7 · EMAC RXDV · GPIO27 · 16 |
| HS2CLK · SDCLK · HSP1CLK · MTMS · Touch6 · RTCIO16 · ADC2_6 · EMAC TXD2 · GPIO14 · 17 |
| HS2DATA2 · SDDATA2 · HSP1Q · MTDI · Touch5 · RTCIO15 · ADC2_5 · EMAC TXD3 · GPIO12 · 18 |

Right side pins:

| GND |
| 36 · GPIO23 · VSP1D · HS1STROBE |
| 39 · GPIO22 · EMAC TXD1 · U0RTS · VSP1WP |
| 41 · GPIO1 · EMAC RXD0 · U0TXD · CLKOUT3 |
| 40 · GPIO3 · U0RXD · CLKOUT2 |
| 42 · GPIO21 · EMAC TXEN · VSP1HD |
| NC |
| 38 · GPIO19 · EMAC TXD0 · U0CTS · VSP1Q |
| 35 · GPIO18 · VSP1CLK · HS1DATA7 |
| 34 · GPIO5 · EMAC RXCLK · VSP1CS0 · HS1DATA6 |
| 27 · GPIO17 · EMAC CLKOUT180 · U2TXD · HS1DATA5 |
| 25 · GPIO16 · EMAC CLKOUT · U2RXD · HS1DATA4 |
| 24 · GPIO4 · EMAC TXER · ADC2_0 · RTCIO10 · Touch0 · HSP1HD · SDDATA1 · HS2DATA1 |
| 23 · GPIO0 · EMAC TXCLK · ADC2_1 · RTCIO11 · Touch1 · CLKOUT1 |

PROGRAM Port

Bottom pins:

| GND |
| HS2DATA3 · SDDATA3 · HSP1ID · MTCK · Touch4 · RTCIO14 · ADC2_4 · EMAC RXER · GPIO13 · 20 |
| SDDATA2 · HS1DATA2 · U1RXD · SPIHD · GPIO9 · 28 |
| SDDATA3 · HS1DATA3 · U1TXD · SPIWP · GPIO10 · 29 |
| SDCMD · HS2CMD · U1RTS · SPICS0 · GPIO11 · 30 |
| 22 · GPIO2 · HSP1WP · ADC2_2 · RTCIO12 · Touch2 |
| 21 · GPIO15 · EMAC RXD3 · ADC2_3 · RTCIO13 · Touch3 · MTDO · HSP1CS0 · SDCMD · HS2CMD |
| 33 · GPIO8 · SPID · U2CTS · HS1DATA1 · SDDATA1 |
| 32 · GPIO7 · SPIQ · U2RTS · HS1DATA0 · SDDATA0 |
| 31 · GPIO6 · SPICLK · U1CTS · HS2CLK · SDCLK |

ESP32 DEVKIT V1 – DOIT

version with 30 GPIOs

			EN
RTC_GPIO0	Sensor VP	ADC1 CH0	GPIO36
RTC_GPIO3	Sensor VN	ADC1 CH3	GPIO39
	RTC_GPIO4	ADC1 CH6	GPIO34
	RTC_GPIO5	ADC1CH7	GPIO35
RTC_GPIO9	TOUCH9	ADC1 CH4	GPIO32
RTC_GPIO8	TOUCH8	ADC1 CH5	GPIO33
RTC_GPIO6	DAC1	ADC2 CH8	GPIO25
RTC_GPIO7	DAC2	ADC2 CH9	GPIO26
RTC_GPIO17	TOUCH7	ADC2 CH7	GPIO27
RTC_GPIO16	HSPI CLK	TOUCH6	ADC2 CH6	GPIO14
RTC_GPIO15	HSPI MISO	TOUCH5	ADC2 CH5	GPIO12
RTC_GPIO14	HSPI MOSI	TOUCH4	ADC2 CH4	GPIO13
			GND
			VIN

ESP-WROOM-32

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GPIO23	VSPI MOSI
GPIO22	I2C SCL
GPIO1	UART 0 TX
GPIO3	UART 0 RX
GPIO21	I2C SDA
GPIO19	VSPI MISO
GPIO18	VSPI CLK
GPIO5	VSPI CS0
GPIO17	UART 2 TX
GPIO16	UART 2 RX
GPIO4	ADC2 CH0	TOUCH0	RTC_GPIO10
GPIO2	ADC2 CH2	TOUCH2	RTC_GPIO12
GPIO15	ADC2 CH3	TOUCH3	HSPI CS0	RTC_GPIO13
GND	
3V3	

EN

BOOT

ESP32 DEVKIT V1 – DOIT
version with 36 GPIOs

RTC_GPIO0	Sensor VP		ADC1 CH0	GPIO36
RTC_GPIO3	Sensor VN		ADC1 CH3	GPIO39
	RTC_GPIO4		ADC1 CH6	GPIO34
	RTC_GPIO5		ADC1CH7	GPIO35
RTC_GPIO9	TOUCH9		ADC1 CH4	GPIO32
RTC_GPIO8	TOUCH8		ADC1 CH5	GPIO33
RTC_GPIO6	DAC1		ADC2 CH8	GPIO25
RTC_GPIO7	DAC2		ADC2 CH9	GPIO26
RTC_GPIO17	TOUCH7		ADC2 CH7	GPIO27

EN

GPIO23 — VSPI MOSI
GPIO22 — I2C SCL
GPIO1 — UART 0 TX
GPIO3 — UART 0 RX
GPIO21 — I2C SDA
GPIO19 — VSPI MISO
GPIO18 — VSPI CLK
GPIO5 — VSPI CS0
GPIO17 — UART 2 TX
GPIO16 — UART 2 RX

RTC_GPIO16	HSPI CLK	TOUCH6	ADC2 CH6	GPIO14
RTC_GPIO15	HSPI MISO	TOUCH5	ADC2 CH5	GPIO12
RTC_GPIO14	HSPI MOSI	TOUCH4	ADC2 CH4	GPIO13
		* SHD/SD2		GPIO9
		* SWP/SD3		GPIO10
		* CSC/CMD		GPIO11

GND

VIN

ESP-WROOM-32

RandomNerdTutorials.com

GPIO4	ADC2 CH0	TOUCH0	RTC_GPIO10
GPIO2	ADC2 CH2	TOUCH2	RTC_GPIO12
GPIO15	ADC2 CH3	TOUCH3	HSPI CS0	RTC_GPIO13
GPIO0	ADC2 CH1	TOUCH1	RTC_GPIO11
GPIO8	SDI/SD1 *
GPIO7	SDO/SD0 *
GPIO6	SCK/CLK *

3V3

* Pins SCK/CLK, SDO/SD0, SDI/SD1, SHD/SD2, SWP/SD3 and SCS/CMD, namely, GPIO6 to GPIO11 are connected to the integrated SPI flash integrated on ESP-WROOM-32 and are not recommended for other uses.

Raspberry Pi

Raspberry Pi Boards

Raspberry Pi Zero

Raspberry Pi 4 Model B

Raspberry Pi 3 Model A+

Raspberry Pi 3 Model B+

Raspberry Pi 3 Model B

Raspberry Pi 2 Model B

Raspberry Pi 1 Model B+

Raspberry Pi 1 Model A+

Raspberry Pi Zero W

Raspberry Pi 3
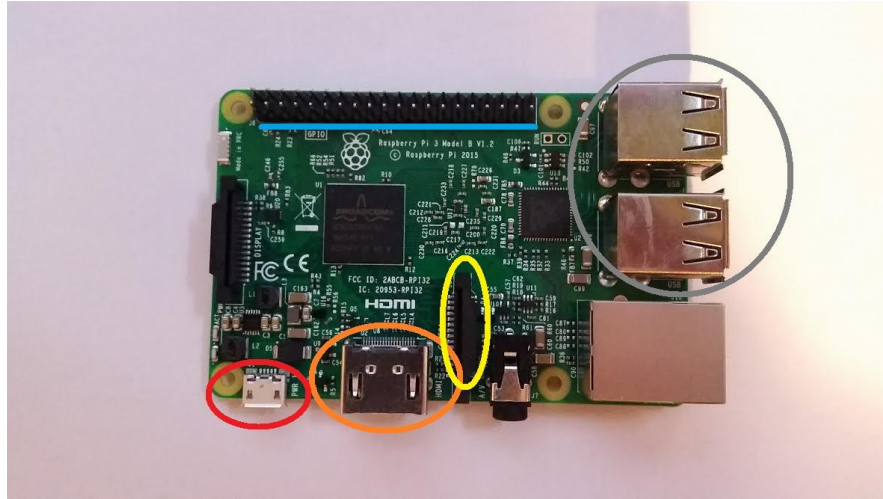
Mico sd

4x USB
Power micro usb
HDMI display
Camera interface
Ethernet
GPIO

THINGSBOARD DASHBOARD

ThingsBoard is an open-source server-side platform yang memungkinkan untuk monitor dan control perangkat IoT. Gratis untuk digunakan secara personal dan commercial dan dapat digunakan dimana saja

Thingsboard user

- **System Administrator**: sysadmin@thingsboard.org / sysadmin
- **Tenant Administrator**: tenant@thingsboard.org / tenant
- **Customer User:** customer@thingsboard.org / customer

Asset dan customer
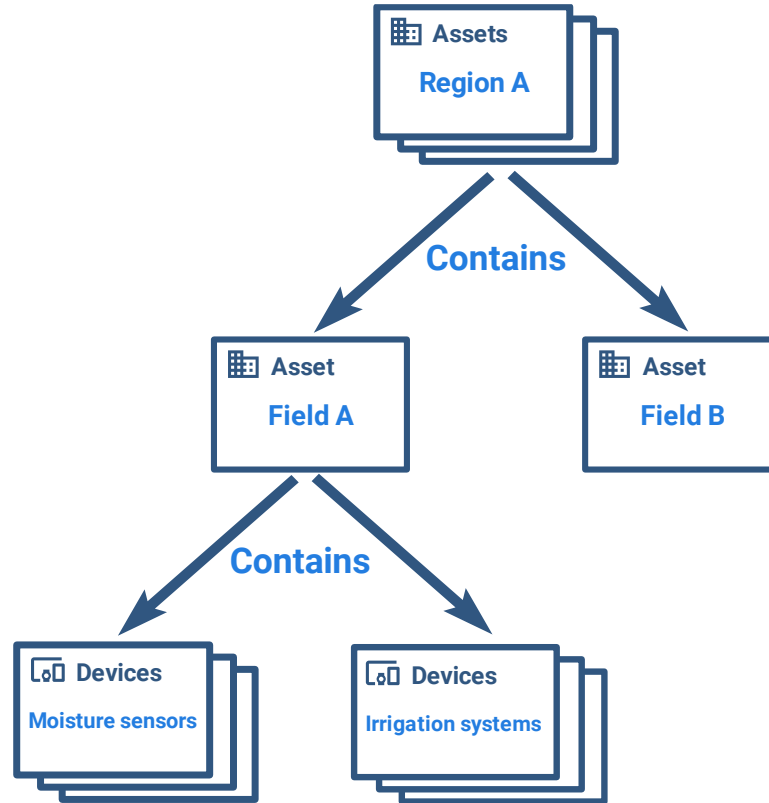
Telemetri data

- **Collect** data from devices using various protocols and integrations;

- **Store** time series data in SQL (PostgreSQL) or NoSQL (Cassandra or Timescale) databases;

- **Query** the latest time series data values or all data within the specified time range with flexible aggregation;

- **Subscribe** to data updates using WebSockets for visualization or real-time analytics;

- **Visualize** time series data using configurable and highly customizable widgets and dashboards;

- **Filter and analyze** data using flexible Rule Engine;

- **Generate** alarms based on collected data;

- **Forward** data to external systems using External Rule Nodes (e.g. Kafka or RabbitMQ Rule Nodes).

JSON DATA POINT

```
{
"temperature": 42.2,
"humidity": 70,
"hvacEnabled": true,
"hvacState": "IDLE",
"configuration": {
            "someNumber": 42,
            "someArray": [1,2,3],
            "someNestedObject": {"key": "value"}
            }
}
```

DEVICE CONNECTION PROTOCOL

HTTP	**MQTT**	**MQTT**	**CoAP**
Linux, macOS or Windows	Linux or macOS	Windows	Linux or macOS

Other Protocols
Modbus, SNMP, LoRaWAN, etc
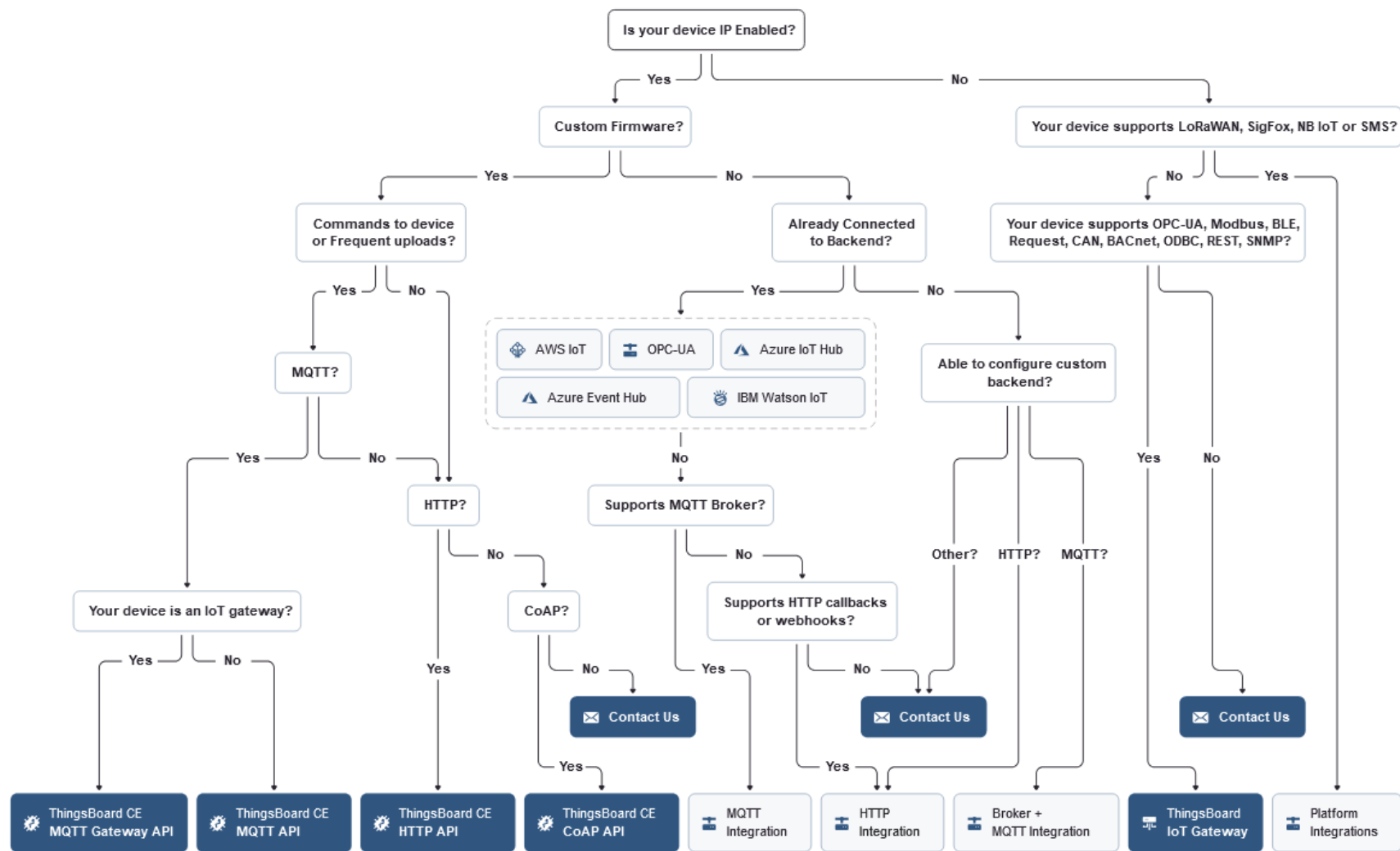
ESP32 CONNECTION

Buat project baru pada Platform IO
Koneksikan sensor yang akan di ambil data
Buat koneksi Wi-Fi
Kirim data menggunakan library thingsboard

```
lib_deps =
    thingsboard/ThingsBoard@^0.5
    knolleary/PubSubClient@^2.8
    arduino-libraries/ArduinoHttpClient@^0.4.0
    bblanchon/ArduinoJson@^6.18.5
    beegee-tokyo/DHT sensor library for ESPx@^1.18
    ottowinter/ESPAsyncWebServer-esphome@^2.0.1
monitor_speed = 115200
```

KONFIGURASI DEVICE

Provision Perangkat (device)
Provision Asset
Provision Dashboard data

ESP 32 MULTI KONEKSI

PROFILE

Unik Device profile
Unik Asset (Create Relation)
Provision Dashboard data
Membuat state khusus

ESP-NOW

Connectionless communication protocol developed by espressif

Short packet transmission (up to 250 bytes)

Komunikasi tanpa menggunakan Wi-Fi

Mirip komunikasi 2.4Ghz perangkat low power seperti mouse wireless

System menggunakan pairing tanpa hand shake

Maksimum 20 node open dan 10 node jika dengan enskripsi

No router atau dhcp server

No overhead

No lost time to connect

THANKS

Do you have any question?

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