ESP32 IoT Board with Thingsboard cloud

STEI-ITB

Pusat Mikroelektronika
Microelectronics Center

Telkom University

IOT PENGENALAN

Ada apa dengan IoT

INSTITUT TEKNOLOGI BANDUNG 1920
STEI-ITB
PUSAT MIKROELEKTRONIKA
MICROELECTRONICS CENTER
jagad creative
JAGADMEDIA

APA ITU IOT?

Internet of Things

Dari **sensor** ke **cloud**, integrated circuits yang mampu secara akurat mengambil, memproses dan mengirim data sensor secara pintar.

APLIKASI DARI IOT

Building and home automation

Automasi gedung dan rumah
Power management, AC, Deteksi gas bocor, Motion sensor, Smart Lock

Smart cities

Pengaturan konsumsi daya seperti pada lampu jalan, CCTV, menggunakan koneksi jarak jauh (LoRa/NB-IoT), biasanya dikontrol secara centralized

APLIKASI DARI IOT

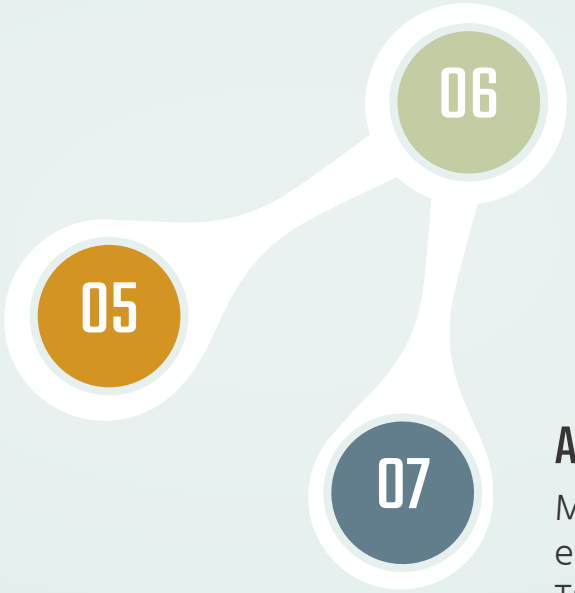
Smart manufacturing

Smart factory dan Industri 4.0, system yang membutuhkan desain security dan robust. Untuk mencapai lingkungan factory/pabrik yang smarter, safer, dan more efficient

Automotive

Teknology otomotif yang pintar, mulai dari OBC, Head unit, Telementry kontrol.

APLIKASI IOT



HEALTCARE

Revolusi kesehatan, monitoring pasien, telehealth system

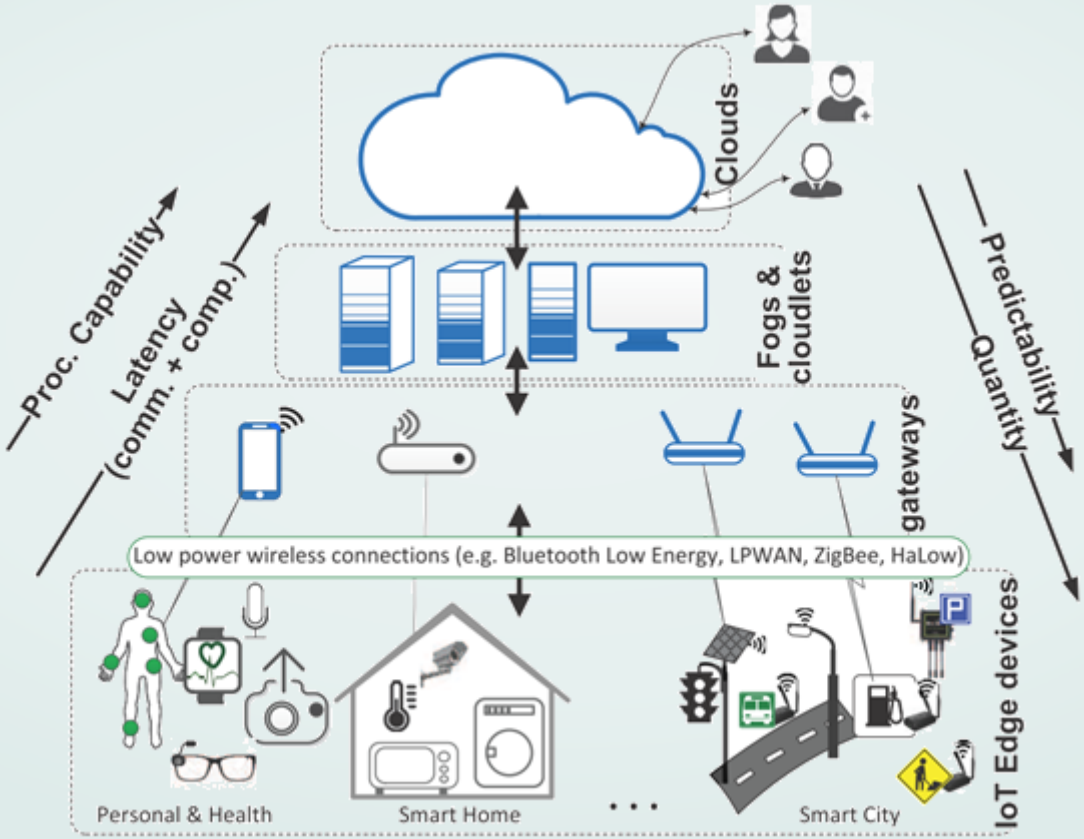
WEARABLES

Ultra low power untuk wearable device

AGRICULTURE

Mempercepat process dan efisiensi pertanian. Transport, drone/Survey, automasi

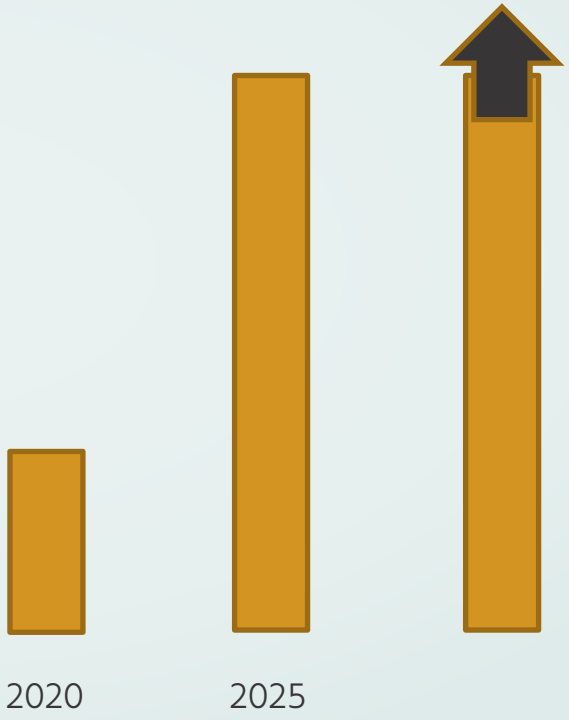
IoT System


Clouds
Fogs & cloudlets
gateways
Proc. Capability
Latency (comm. + comp.)
Predictability
Quantity
Low power wireless connections (e.g. Bluetooth Low Energy, LPWAN, ZigBee, HaLow)
Personal & Health
Smart Home
Smart City
IoT Edge devices

PERTUMBUHAN IOT

Cisco merilis bahwa telah ada 31 *billion* connected devices di tahun 2020 dan akan menjadi 75 *billion* devices by 2025.

31,000,000,000 - 2020



IOT MANUFAKTUR

02

Teknologi manufaktur untuk
mendukung IoT

REQUIREMENT UNTUK MANUFAKTUR

POWER MANAGEMENT

Supply Daya menggunakan baterai, energy harvesting.

COMPLEXITY

Kemudahan desain dan development

CONNECTIVITY

Banyak standar koneksi yang biasa digunakan tergantung dari kebutuhan

SECURITY

Hardware security dan protokol yang aman/secure.

RAPID EVOLUTION

Flexibilitas bisa digunakan di berbagai aplikasi

DESAIN

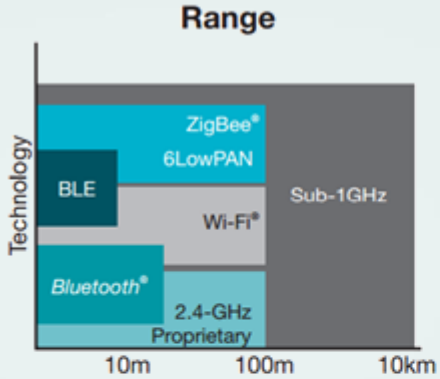
Desain Hardware dan Software
IoT Low power

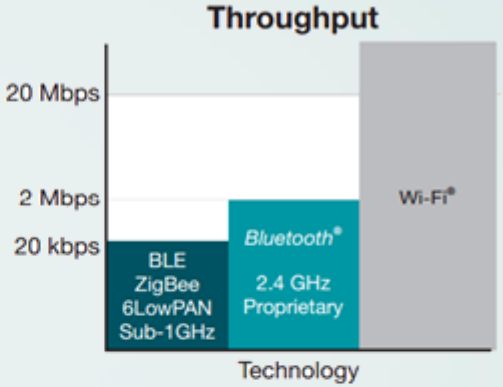
DESAIN METRIC

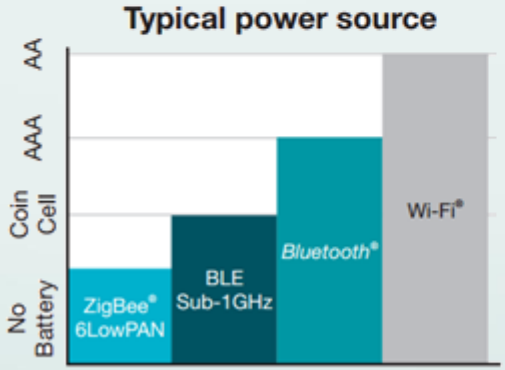
METRIC (1- 5)	PRIORITY	ADVANTAGES	DISADVANTAGES
CONNECTIVITY	3	Low power	Lambat dan jarak dekat
POWER MANAGEMENT	5	Small battery	Low performance
SECURITY	2	Low cost	Unsecure
COMPLEXITY	3	Mudah digunakan	Terbatas
RAPID EVOLUTION	1	Arduino support	Terbatas

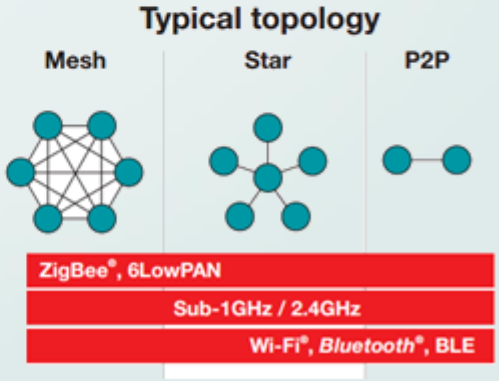
PARAMETER CONNECTIVITY

1. Range
2. Throughput
3. Power source
4. Topology

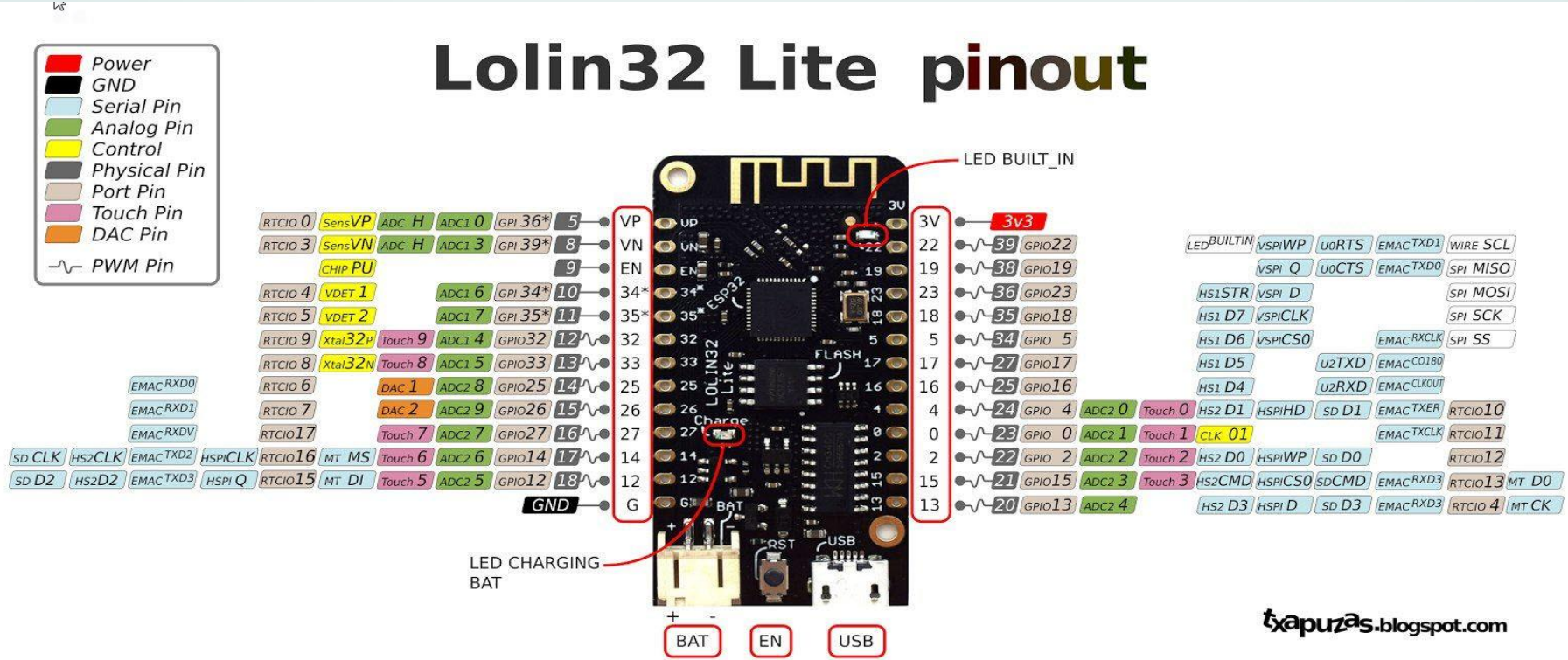








ESP32 as IoT Node



Thingsboard Dashboard

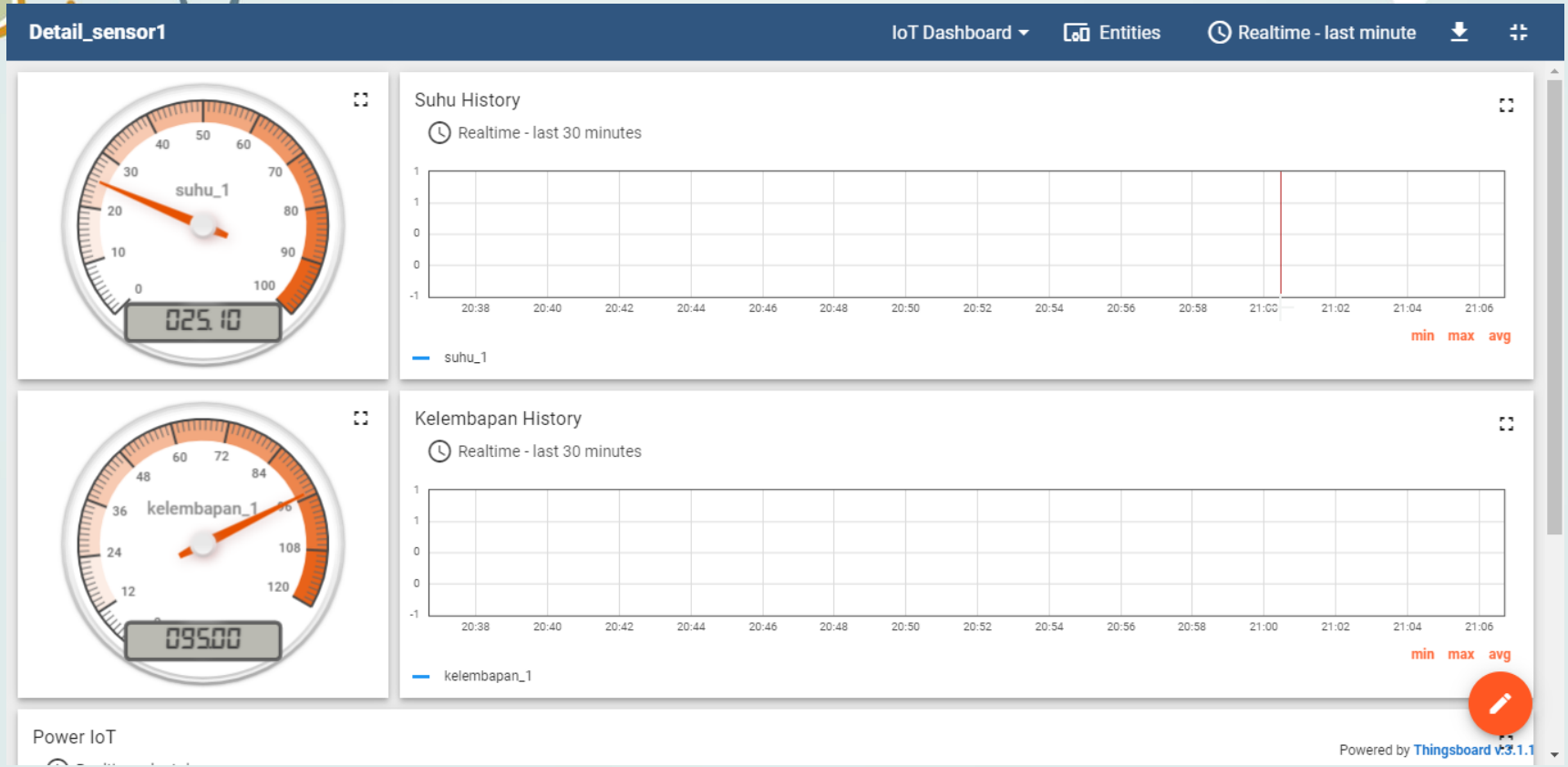
ThingsBoard is an open-source server-side platform yang memungkinkan untuk monitor dan control perangkat IoT. Gratis untuk digunakan secara personal dan commercial dan dapat digunakan dimana saja

Fitur dari ThingsBoard

1. **Provision** perangkat, aset, dan pelanggan serta menentukan hubungan di antara mereka.
2. **Kumpulkan dan visualisasikan** data dari perangkat dan aset.
3. **Menganalisis** telemetri yang masuk dan memicu alarm dengan pemrosesan peristiwa yang kompleks.
4. **Kontrol** perangkat Anda menggunakan remote produce call(RPC).
5. Buat **alur kerja** berdasarkan life cycle perangkat, event, REST API, RPC request, dll
6. Desain **dasbor** dinamis dan responsif serta telemetri perangkat atau aset dan wawasan terkini kepada pelanggan Anda
7. Aktifkan fitur khusus kasus penggunaan menggunakan **rule-chain** yang dapat disesuaikan.
8. **Push** data perangkat ke sistem lain.

demo.thingsboard.io/

ThingsBoard



“Turning Lab Prototype in to massproduction is our objective.”

Electronics Manufacturing Lab

04

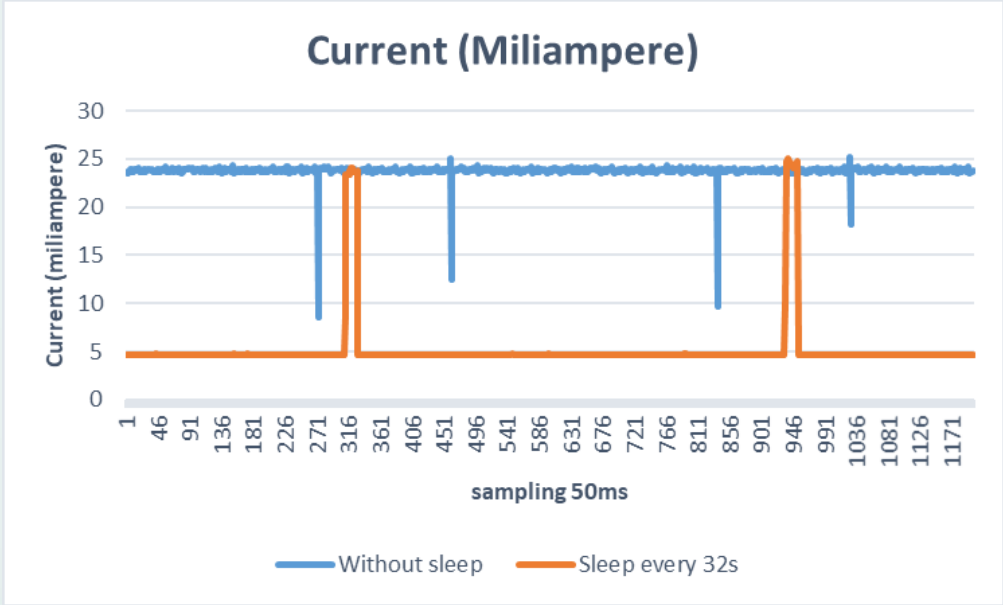
IOT LOW POWER

STEI-ITB

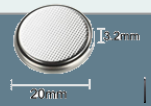
Power analysis

Power analysis digunakan untuk menentukan kebutuhan baterai + energy harvester

Power analysis	Min power (mW)	Max power (mW)	average power (mW)	average current (mA)
without sleep	43	125	116.2	23.7
10s sleep	48	121	118.6	24.4
32s sleep	20	123	26	5.3
Hardware optimalization with 32 sleep cycle				
no power led	2	97	2.3	0.97
no regulator 4.2v	2	67	2.7	0.46
no regulator 3.8v	0	64	1.53	0.4



Power analysis

With regulator			
Battery	Average power consumtion (mAh)	 Li-ion (220mAh)	 Li-po (1500mAh)
30s sleep	1.07	6 days 21 hours	46 days 22 hours
60s sleep	0.79	9 days 2 hours	63 days 10 hours
5m sleep	0.56	13 days 3 hours	89 days 13 hours
1 hour sleep	0.5	14 days 12 hours	99 days
Without regulator direct 3V			
Battery	Average power consumtion (mAh)	 CR2032 (220mAh)	CR123 (1500mAh)
30s sleep	0.55	13 days 8 hours	91 days 3 hours
60s sleep	0.48	15 days 10 hours	105 days 4 hours
5m sleep	0.42	17 days 15 hours	120 days 9 hours
1 hour sleep	0.4	18 days 6 hours	124 days 14 hours

www.of-things.de/battery-life-calculator.php

Battery safety discharge 20%

05

DEMO

You could enter a subtitle here
if you need it

PUBLIC VIEW 1 SENSOR

https://demo.thingsboard.io/dashboard/95788790-27cb-11ea-89ae-9f1678b85ed8?publicId=24b3a7d0-28a5-11ea-8ddd-390ddd94abf9

http://bit.ly/IoTlowpowerDemo

THANKS

Do you have any questions?

hasbiida@gmail.com
+6285222290417