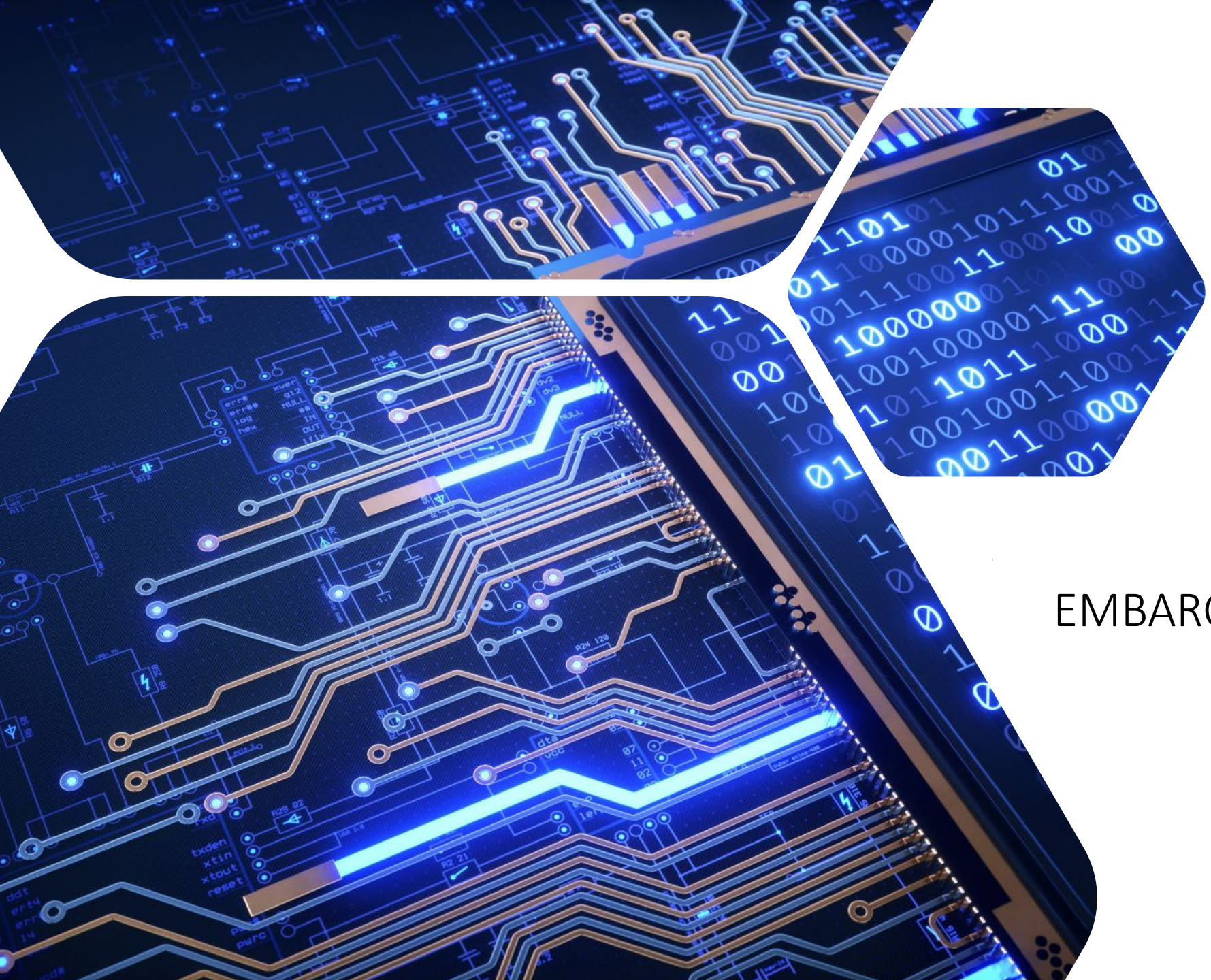


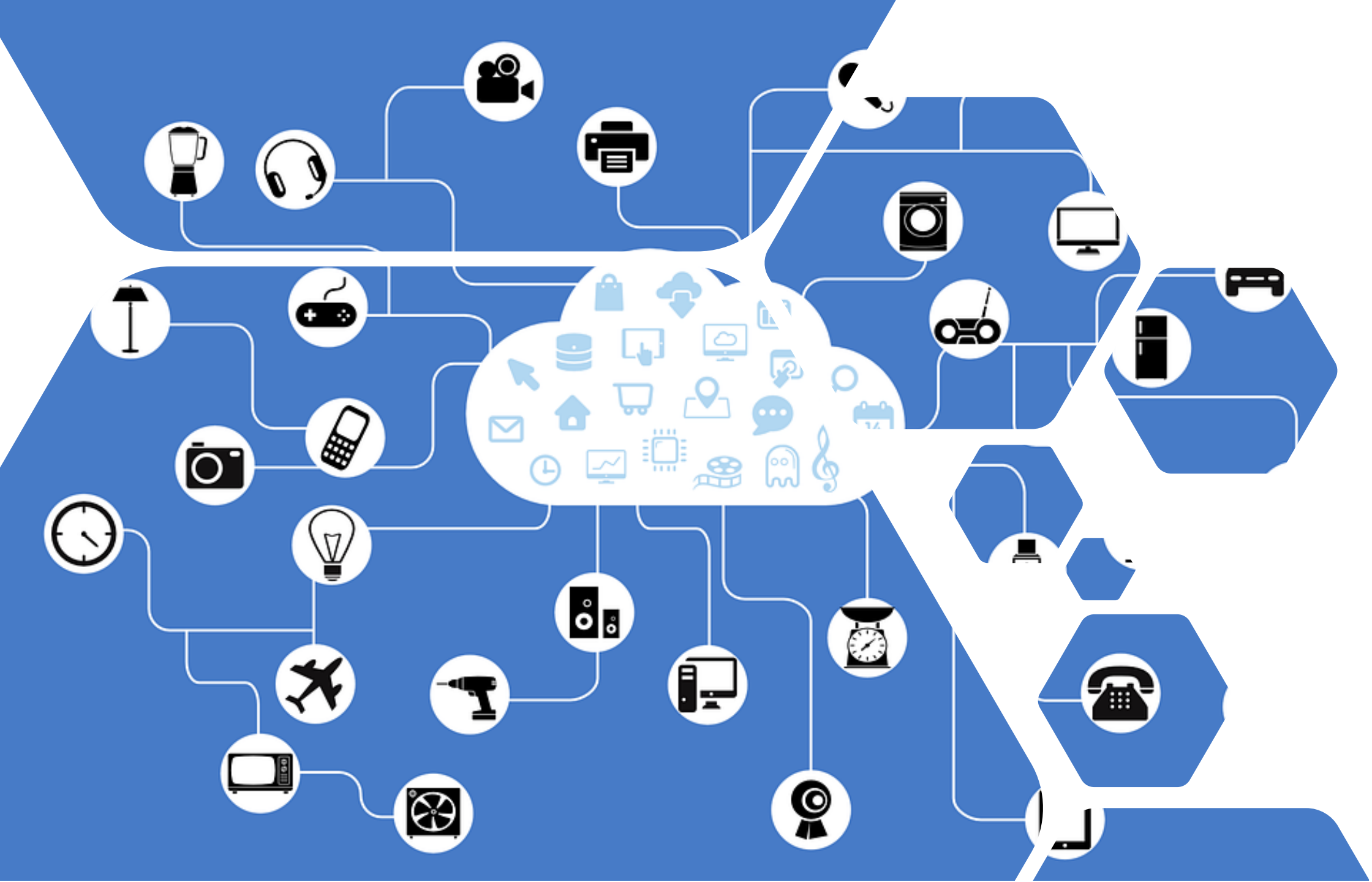
# PSI3542 SISTEMAS EMBARCADOS PARA IOT 2020 18/08/2020 1a. Aula

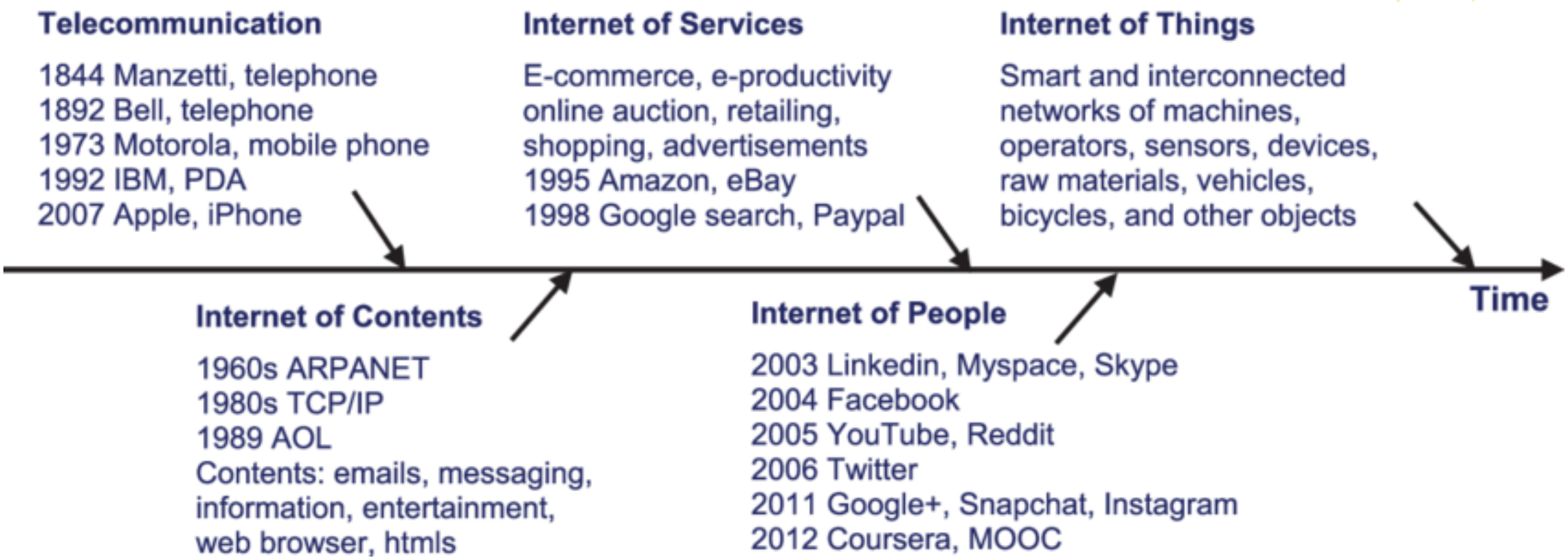
PROF. SERGIO TAKEO KOFUJI

PSI-EPUSP

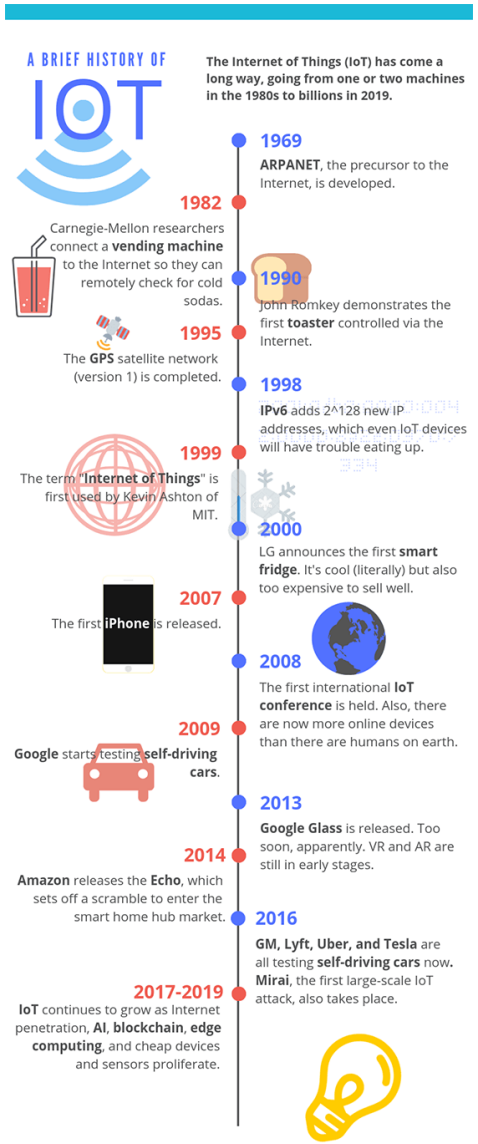
INTRODUÇÃO À DISCIPLINA

# AULA 01 – 01/08/2019

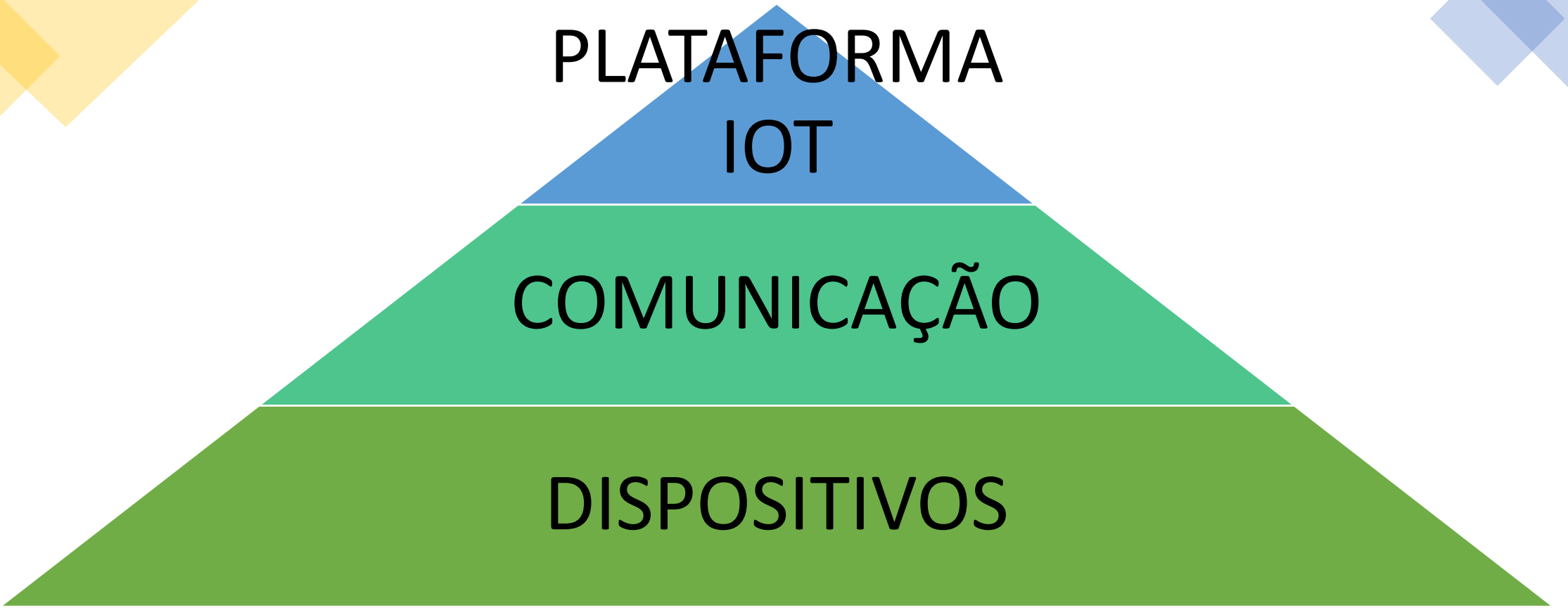




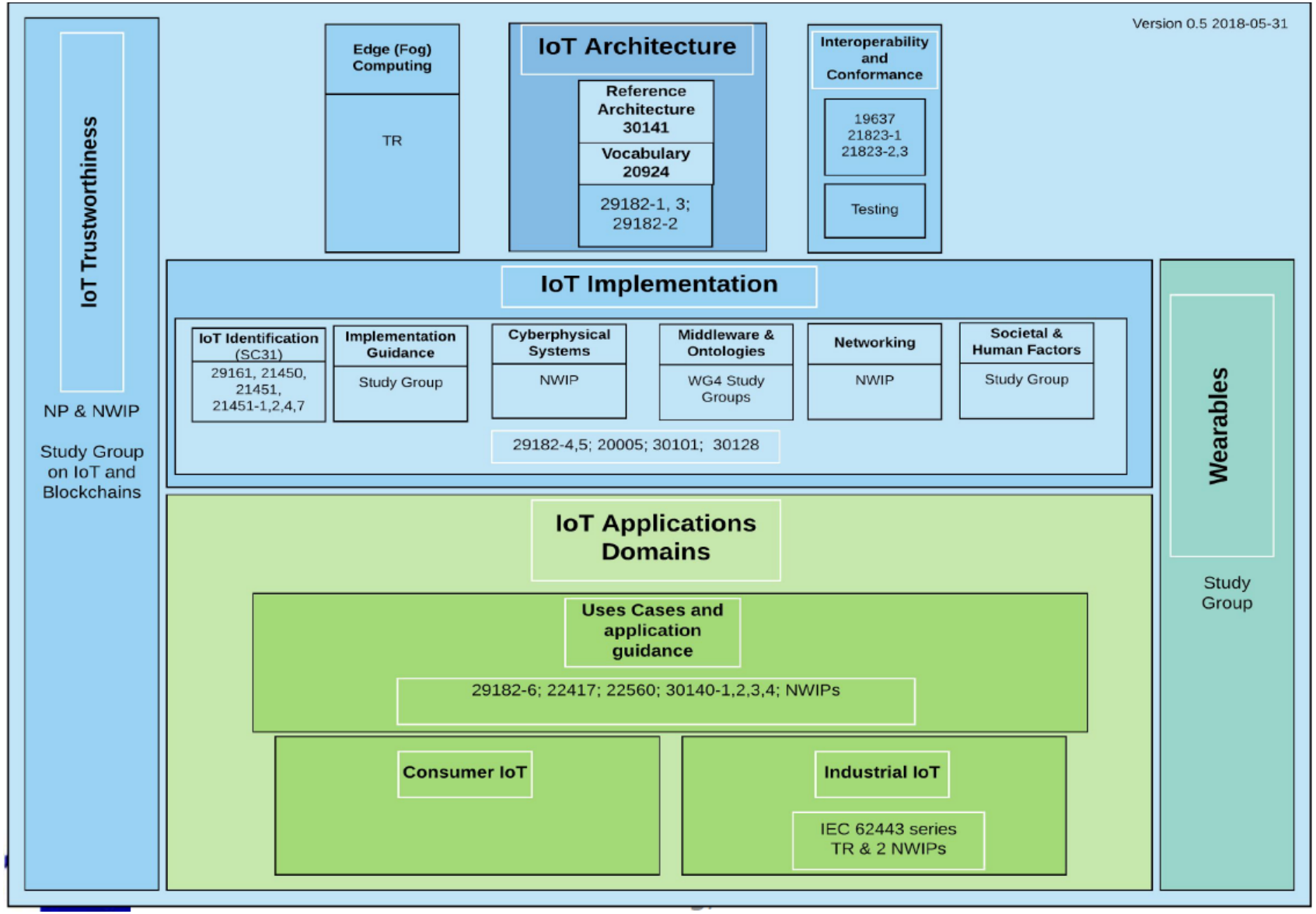

Yang, Hui & Kumara, Soundar & Bukkapatnam, Satish & Tsung, Fugee. (2019). The Internet of Things for Smart Manufacturing: A Review. IIE Transactions. 1-35. 10.1080/24725854.2018.1555383.




https://www.iottechtrends.com/history-of-iot/




PROPOSTA DA DISCIPLINA


Version 0.5 2018-05-31
IoT Trustworthiness
NP & NWIP
Study Group on IoT and Blockchains
Edge (Fog) Computing
TR
IoT Architecture
Reference Architecture 30141
Vocabulary 20924
29182-1, 3; 29182-2
Interoperability and Conformance
19637
21823-1
21823-2,3
Testing
IoT Implementation
IoT Identification (SC31)
29161, 21450, 21451, 21451-1,2,4,7
Implementation Guidance
Study Group
Cyberphysical Systems
NWIP
Middleware & Ontologies
WG4 Study Groups
Networking
NWIP
Societal & Human Factors
Study Group
29182-4,5; 20005; 30101; 30128
Wearables
Study Group
IoT Applications Domains
Uses Cases and application guidance
29182-6; 22417; 22560; 30140-1,2,3,4; NWIPs
Consumer IoT
Industrial IoT
IEC 62443 series
TR & 2 NWIPs

ISO

## DISPOSITIVOS

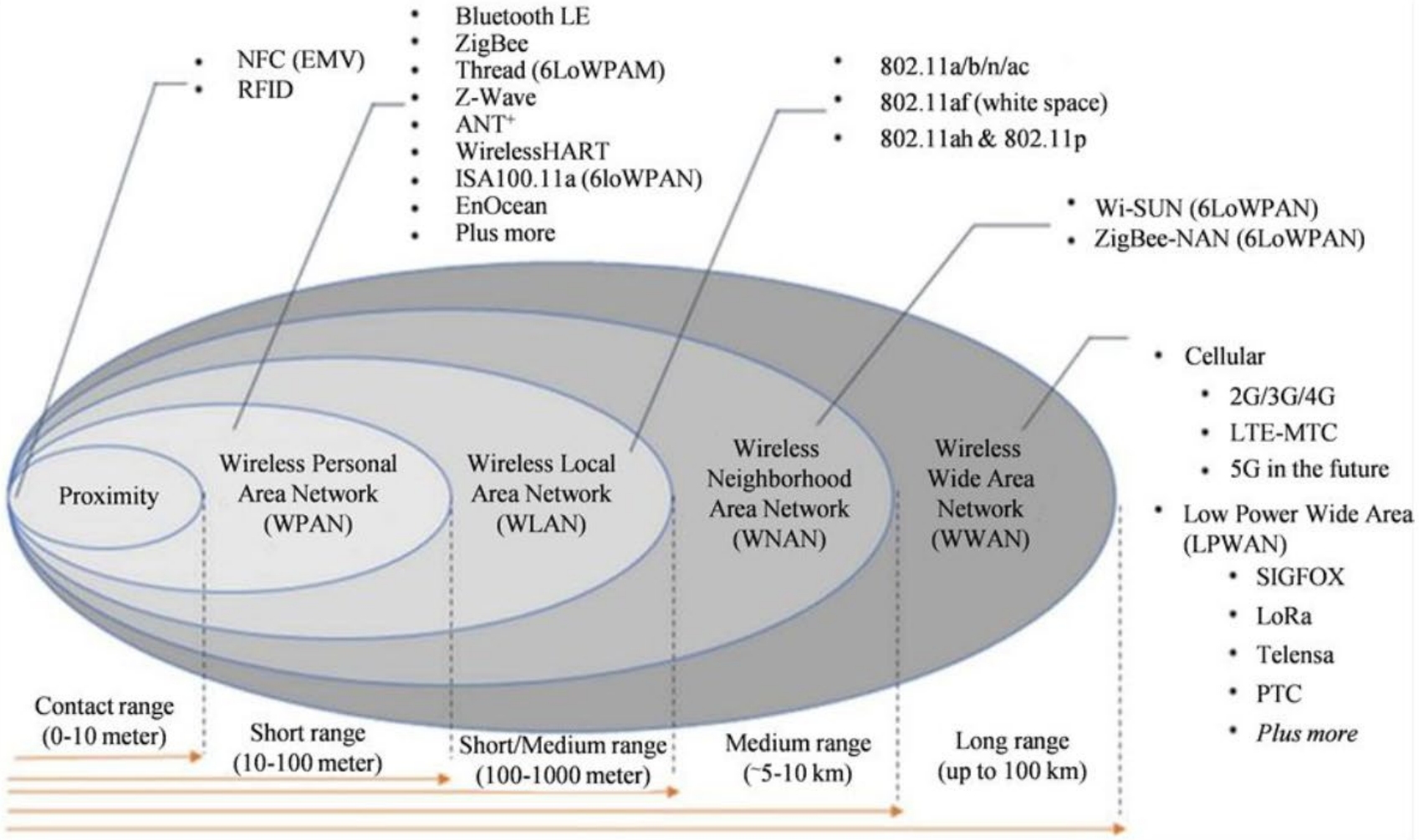
- FUNCIONALIDADE
  - SENSOR,ATUADOR
- COMPLEXIDADE
  - SIMPLES, SMART
- CAPACIDADE DE PROCESSAMENTO
  - BAIXA X ALTA
- CAPACIDADE DE COMUNICAÇÃO
- AUTONOMIA
  - BATERIA, ENERGIA SOLAR/EOLICA/VIBRACAO,  ALIMENTAÇÃO EXTERNA
- SISTEMA OPERACIONAL

## PARTE PRÁTICA

- RASPBERRY PI
- SMARTPHONE ANDROID

# DISPOSITIVOS IOT

http://file.scirp.org/Html/1-4000110_65802.htm
Advances in Internet of Things
Vol.06 No.02(2016), Article ID:65802,11 pages
10.4236/ait.2016.62002
A Study of Efficient Power Consumption Wireless Communication Techniques/ Modules for Internet of Things (IoT) Applications
Mahmoud Shuker Mahmoud, Auday A. H. Mohamad
Computer Technology Engineering Department, Al-Mansour University College, Baghdad, Iraq



# PROTOCOLOS DE COMUNICAÇÃO

MQTT

COAP

DDS

## PLATAFORMAS PROPRIETÁRIAS

- IBM WATSON
- MICROSOFT AZURE
- AMAZON
- GOOGLE

## PLATAFORMAS OPEN/FREE

- FIWARE

# PLATAFORMA DE IOT

## PARTE TEÓRICA – CONCEITOS DE IOT E SISTEMAS EMBARCADOS PARA IOT

- O QUE DISTINGUE UM SISTEMA EMBARCADO CONVENCIONAL DE UM SISTEMA EMBARCADO PARA IOT?

## PARTE PRÁTICA

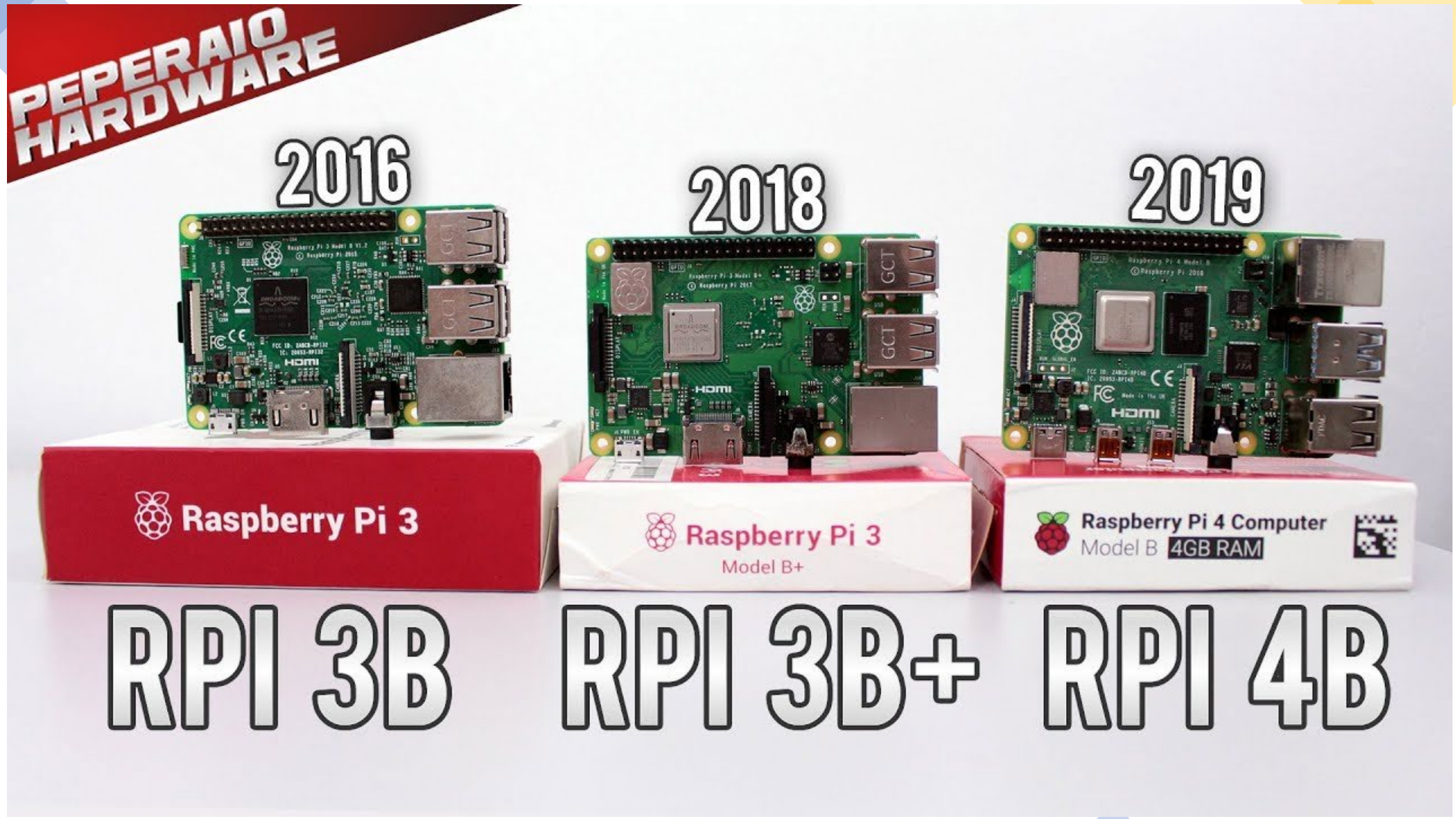
- UTILIZAÇÃO DE PLATAFORMAS EM NUVEM E FERRAMENTAS
  - FREEBOARD
  - NODERED
  - IBM WATSON, MICROSOFT AZURE, ETC
  - FIWARE, HELIX
- COMPUTADOR, SMARTPHONE, RASPBERRY PI, ESP32

## APLICAÇÕES E ESTUDOS DE CASOS

- DOMÓTICA
- ASSISTENTE PESSOAL COM INTERFACE HUMANO-MAQUINA POR VOZ

## PROJETO FINAL

# TOPICOS A SEREM ABORDADOS


PEPERAIO HARDWARE
2016
2018
2019
Raspberry Pi 3
Raspberry Pi 3
Model B+
Raspberry Pi 4 Computer
Model B 4GB RAM
RPI 3B
RPI 3B+
RPI 4B

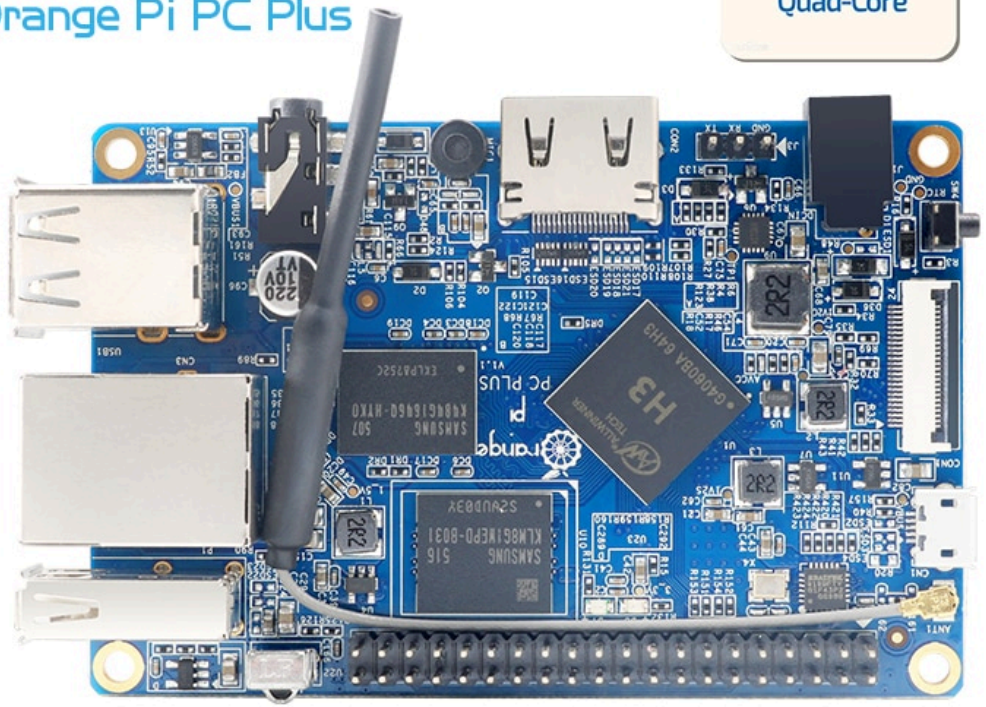
Orange pi

Orange Pi PC Plus

ALLWINNER TECH

H3

Quad-Core



Onboard microphone

Quad core processor

1G running memory

Onboard storage

HDMI video

CSI Camera interface

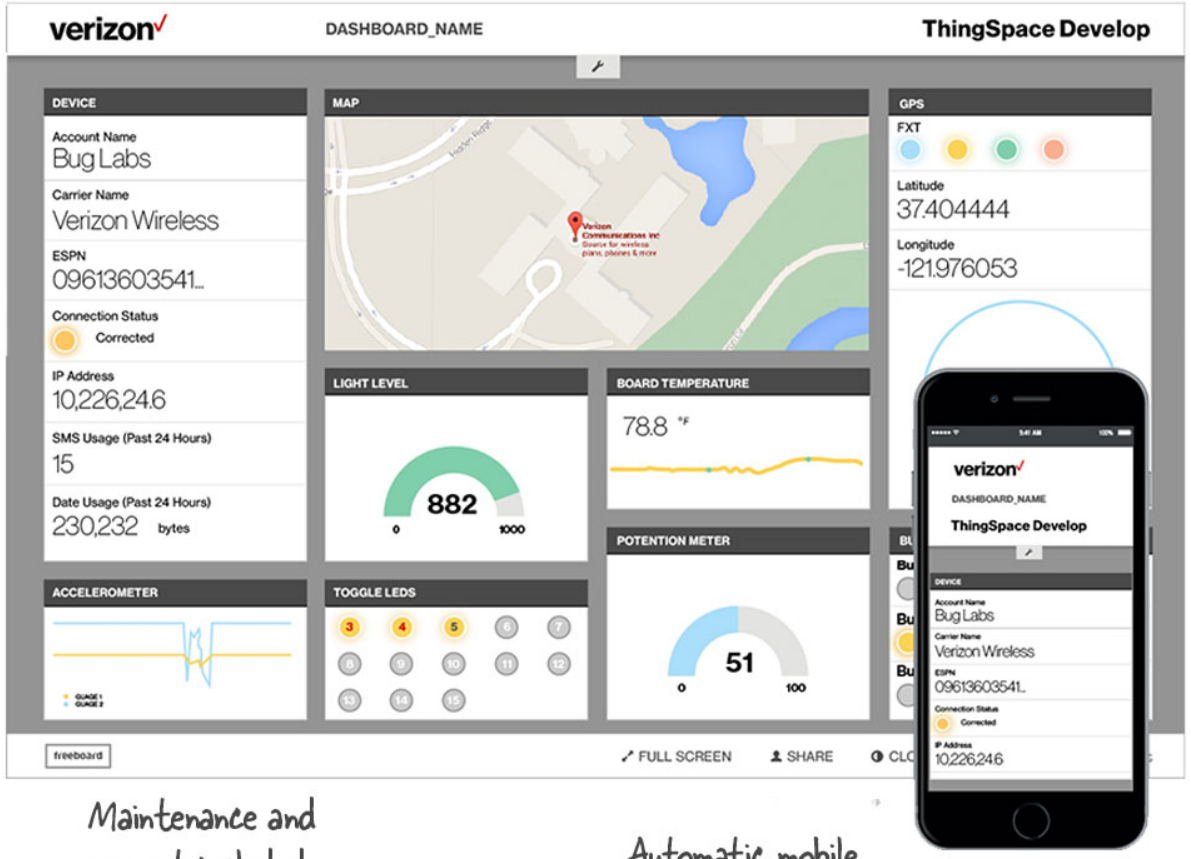
Onboard network

# ESP32 vs ESP8266

Set up your logo.

Match your branding.

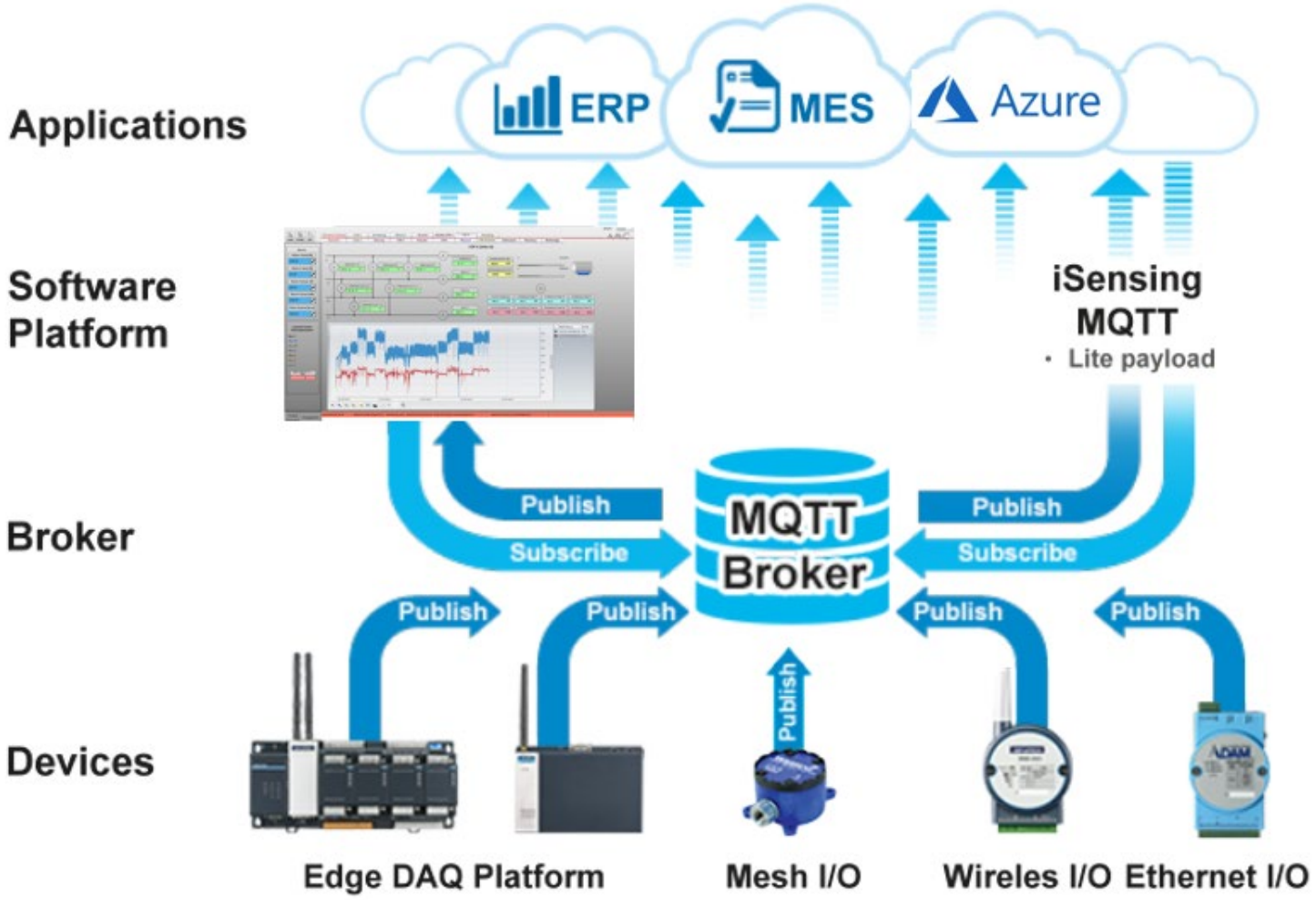
Define your look & feel.




Maintenance and support included.

Automatic mobile support – iOS & Android.

# FreeBoard io


Applications
ERP
MES
Azure
Software Platform
iSensing MQTT
• Lite payload
Broker
Publish
Subscribe
MQTT Broker
Publish
Subscribe
Publish
Publish
Publish
Publish
Publish
Devices
Edge DAQ Platform
Mesh I/O
Wireles I/O
Ethernet I/O

# AVALIAÇÃO

- TRABALHOS EM CLASSE (GRUPO)
- PROJETO FINAL (EM GRUPO)

- NF = 40%TRABALHOS + 60% TRABALHO FINAL

# PLATAFORMAS DE ENSINO

- MOODLE
  - FORMA OFICIAL DE COMUNICAÇÃO DA DISCIPLINA
- SLACK

# Parte Prática (Demonstração e Trabalho)

1)Experimentos com Smartphone

- Smartphone + Freeboard
- Smartphone + MQTT BROKER + FRED (NODE-RED)
- Smartphone + IBM WATSON
- Smartphone + HELIX

# Parte Prática Cont...

2) PC (NODE-RED) + MQTT BROKER  + FRED (NODE-RED)

3) RASPBERRY PI (NODE-RED)  + MQTT BROKER + FRED (NODE-RED)

-sensores e atuadores básicos

-reconhecimento de fala e síntese de fala

-processamento local

-processamento na Cloud

-IBM WATSON

-GOOGLE

4) ESP32 + RASPBERRY PI (NODE-RED) +....

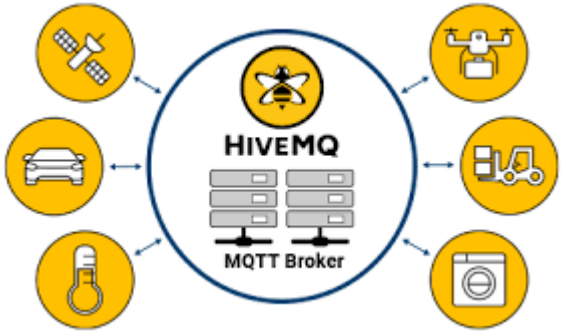
# Prática…

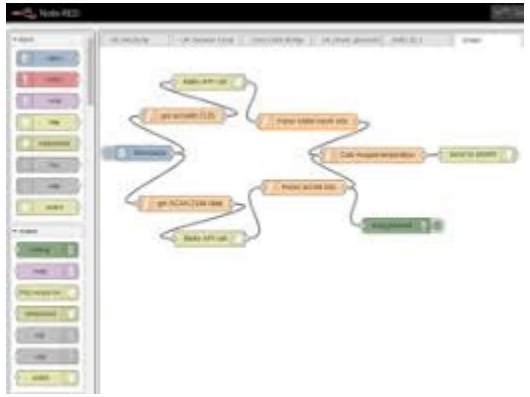
172.16.5.31/env_charts_ifrm.html
CE-HOME Environment Chart
ATMOSPHERIC PRESSURE INFO
AMBIENT INFO
TEMPERATURES
Inside Temperature
21
Outside Temp (OWM)
7.41
AMBIENT PRESSURES
Ambient Pressure MSL
1036
Ambient Pressure ABS
1021.39
OUTSIDE PRESSURES
Outside Pressure MSL (OWM)
1036
Outside Pressure SL (OWM)
1036
CAL-CLOCK
DATE
30-12-2016
TIME
16:40:54
DAYLIGHT
SUNRISE
7:03:07 AM UTC Time
SUNSET
3:49:29 PM UTC Time
DAYLIGHT TIME
08:46:22 Hours
CHRONY TIME SERVER
Precision
152
OFFSET
-9.366
ENERGY MONITOR
ACTIVE ENERGY
312.522 kWh
REACTIVE ENERGY
112.136 kVARh
POWER MONITOR 2
Power
70.05
SUN & MOON MAP
POWER MONITOR 1
Voltage
222.73
Current
0.36
Frequency

# Prática

HIVEMQ

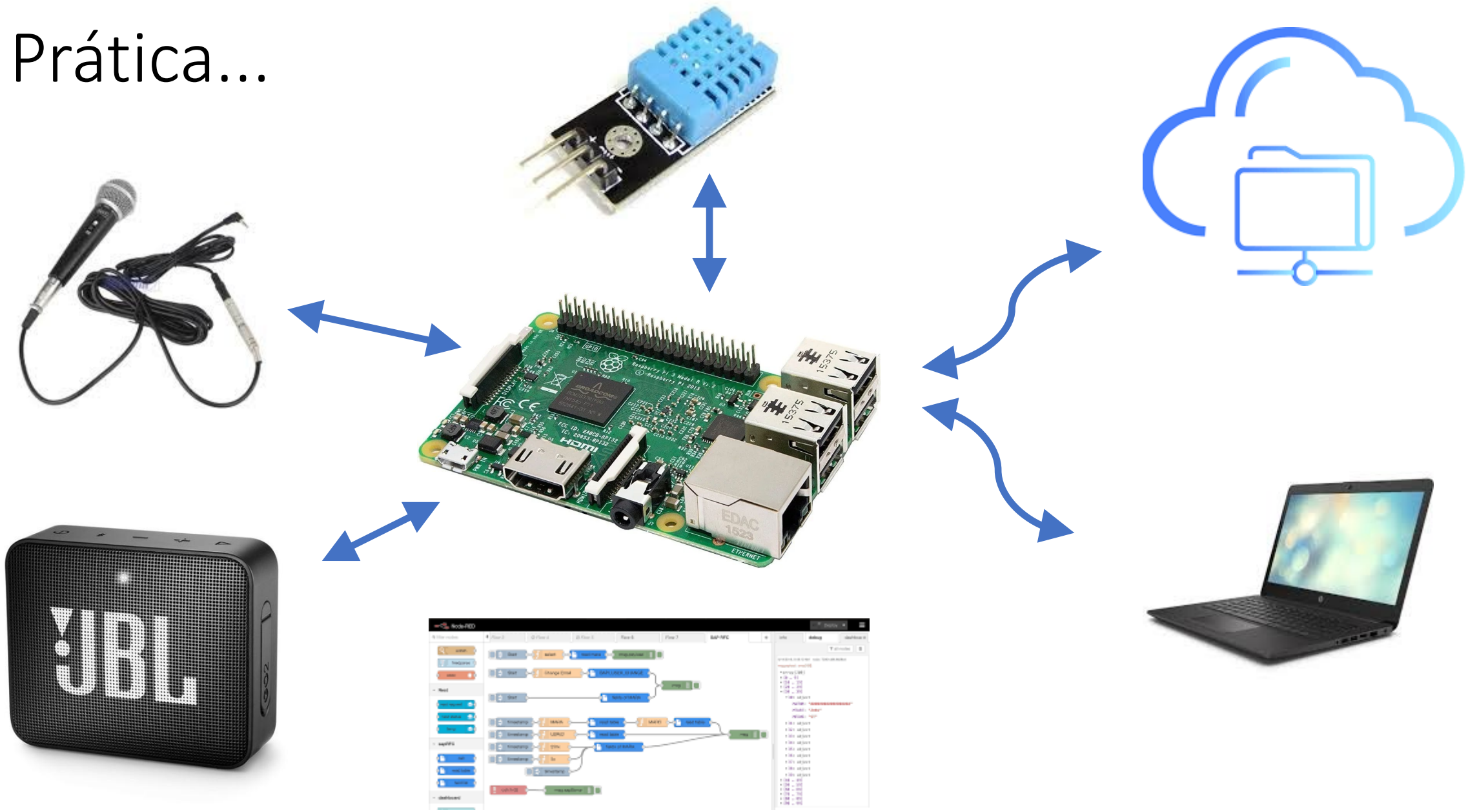
FRED



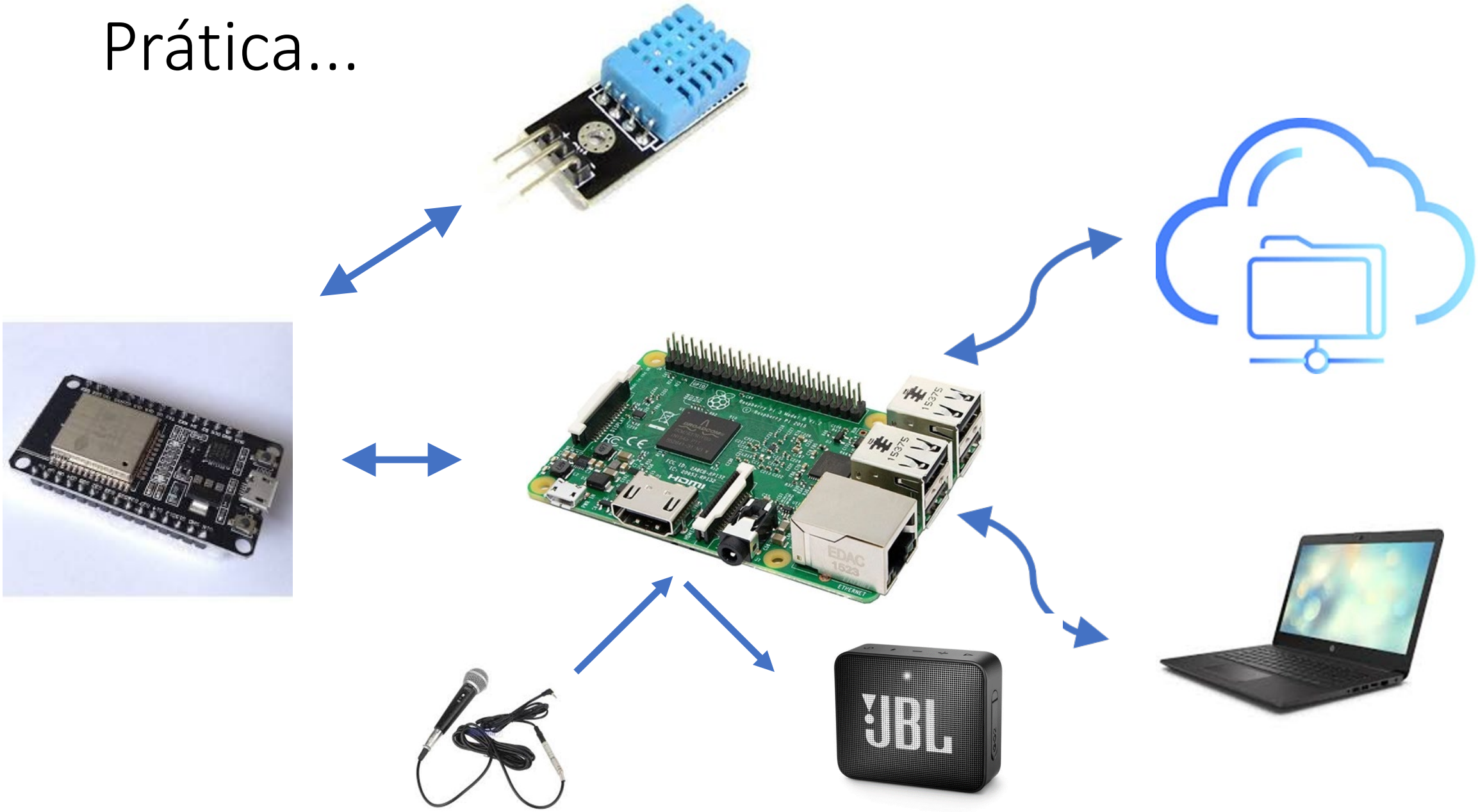



# Prática...

# Prática...



# Prática...



# Trabalho Final

ASSISTENTE DOMÓTICO

KOFUJI@USP.BR

# DUVIDAS?