



# Uma demo de IOT com Power Platform

João Lucindo  
TECH SPECIALIST

Waldemir Cambiucci  
TECH SALES | MTC LEAD

20 de maio de 2021



# Our Agenda

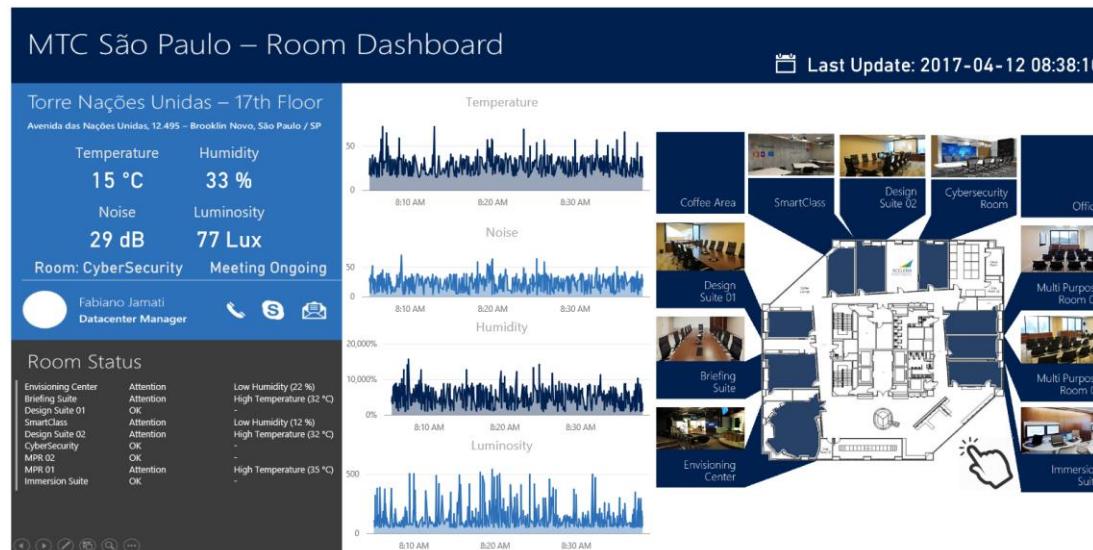
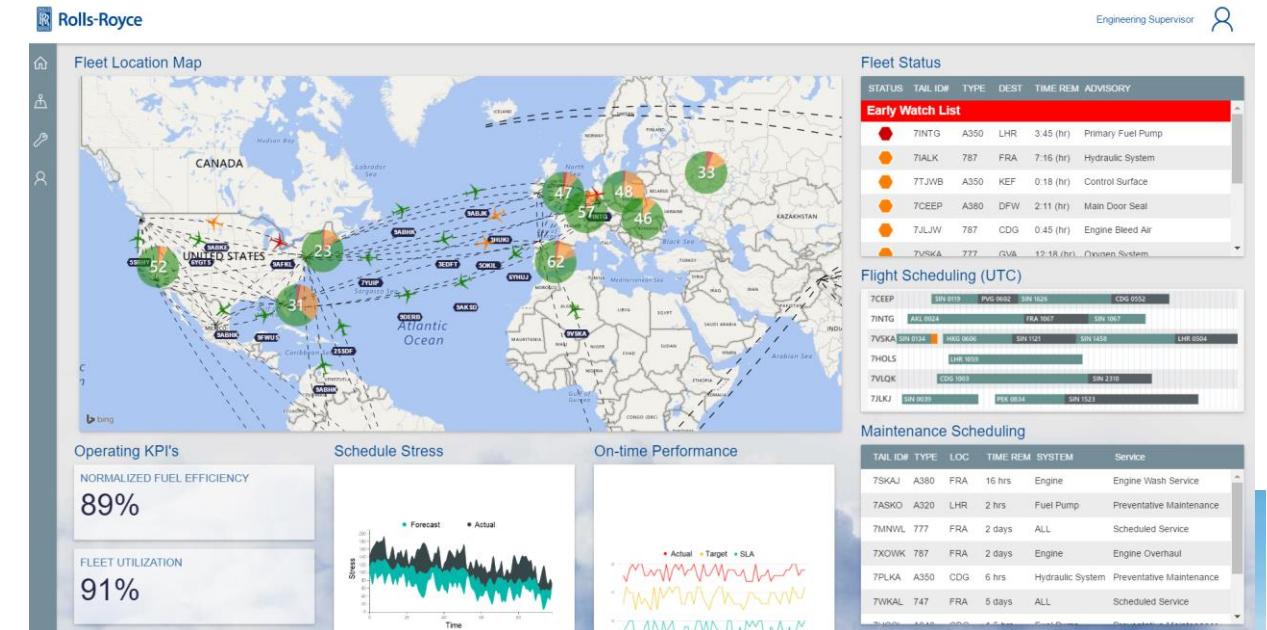
- Relembrando IOT
- Relembrando Power Platform
- Um cenário de comando CLOUD-TO-DEVICE
- Considerações
- Q&A



# Our Agenda

- Relembrando IOT
- Relembrando Power Platform
- Um cenário de comando CLOUD-TO-DEVICE
- Considerações
- Q&A







# Azure IoT DEMO MEGAMAP



Industry &  
Solutions



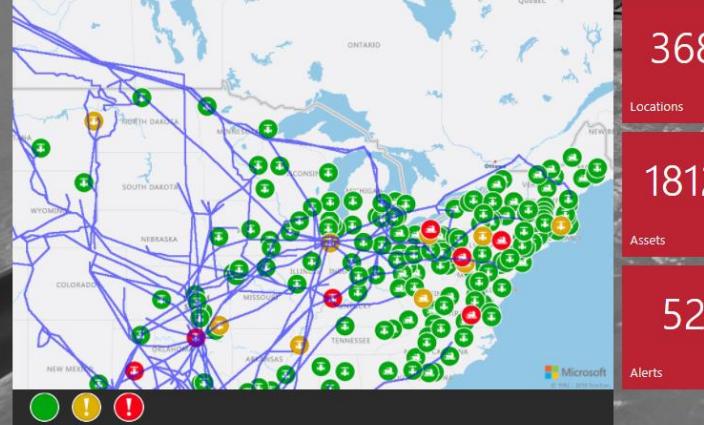
Rolls-Royce



- Home
- Extraction
- Logistics
- Refining
- Retail
- Admin

## Logistics Dashboard

### Map

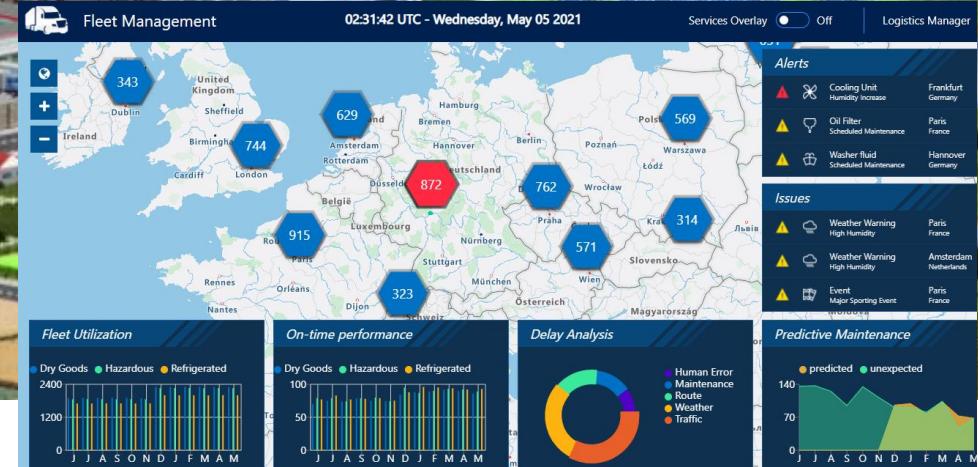


### Alerts

Type	Severity	Location	Alert
! Sensor	Critical	Trans-Alaska	Flow Rate
! ML Predicted	Critical	Colonial	API Gravity
! Trending	Critical	Enbridge	Amps Load
! Trending	Critical	Bakken	BS&W%
! Sensor	Critical	Ruby	API Gravity
! ML Predicted	Critical	Seaway	Flow Rate
! Sensor	Warning	Yellowstone	Temp
! ML Predicted	Warning	Unv	Tank Level
! Sensor	Warning	Jawkhawk	Air Filter
! Sensor	Warning	Keystone	Flow Rate
! Sensor	Warning	Bakken	BS&W %
! ML Predicted	Warning	Ruby	H25%
! Trending	Warning	Seaway	Flow Rate



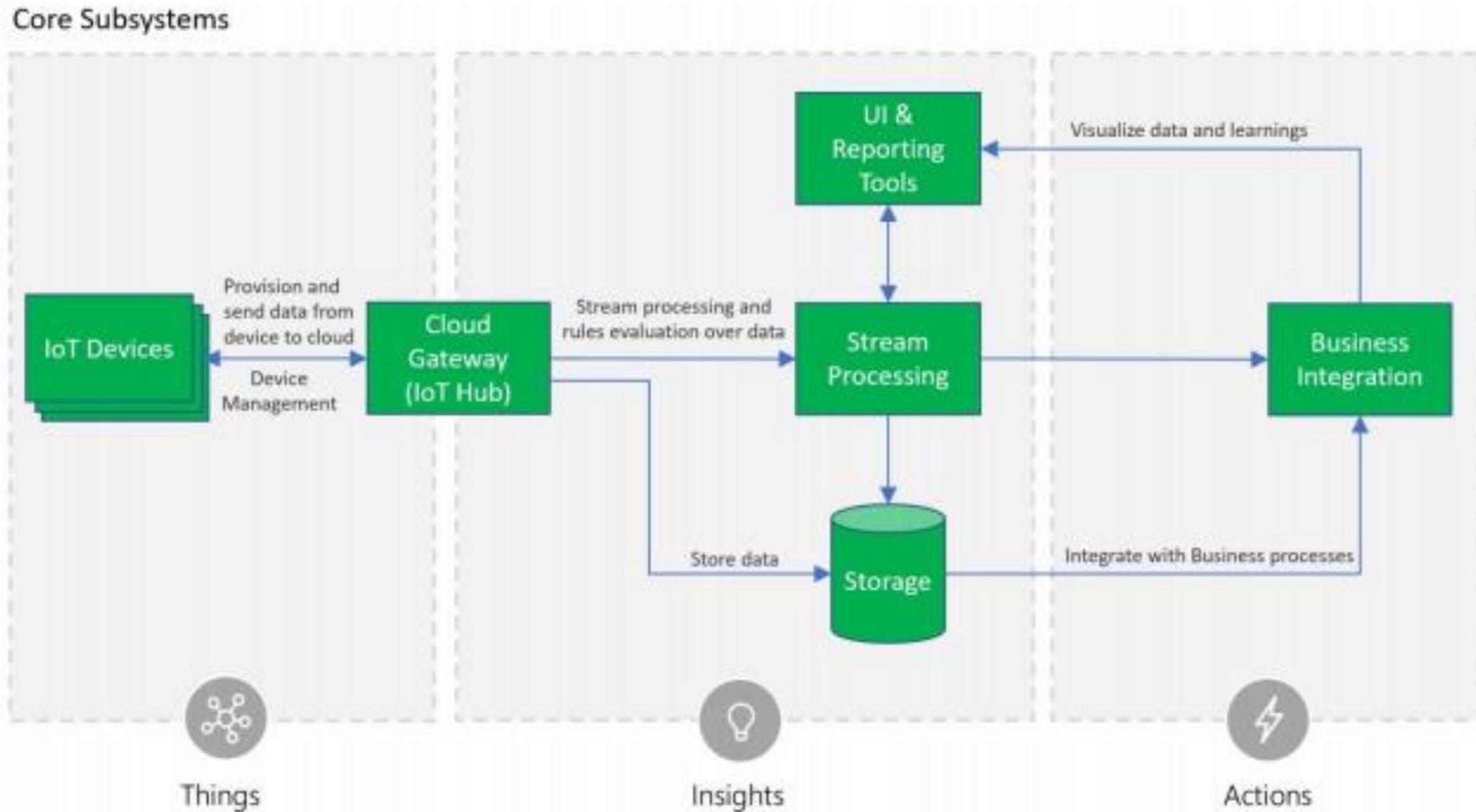
### Fleet Management



# Um projeto de IOT pode ser complexo

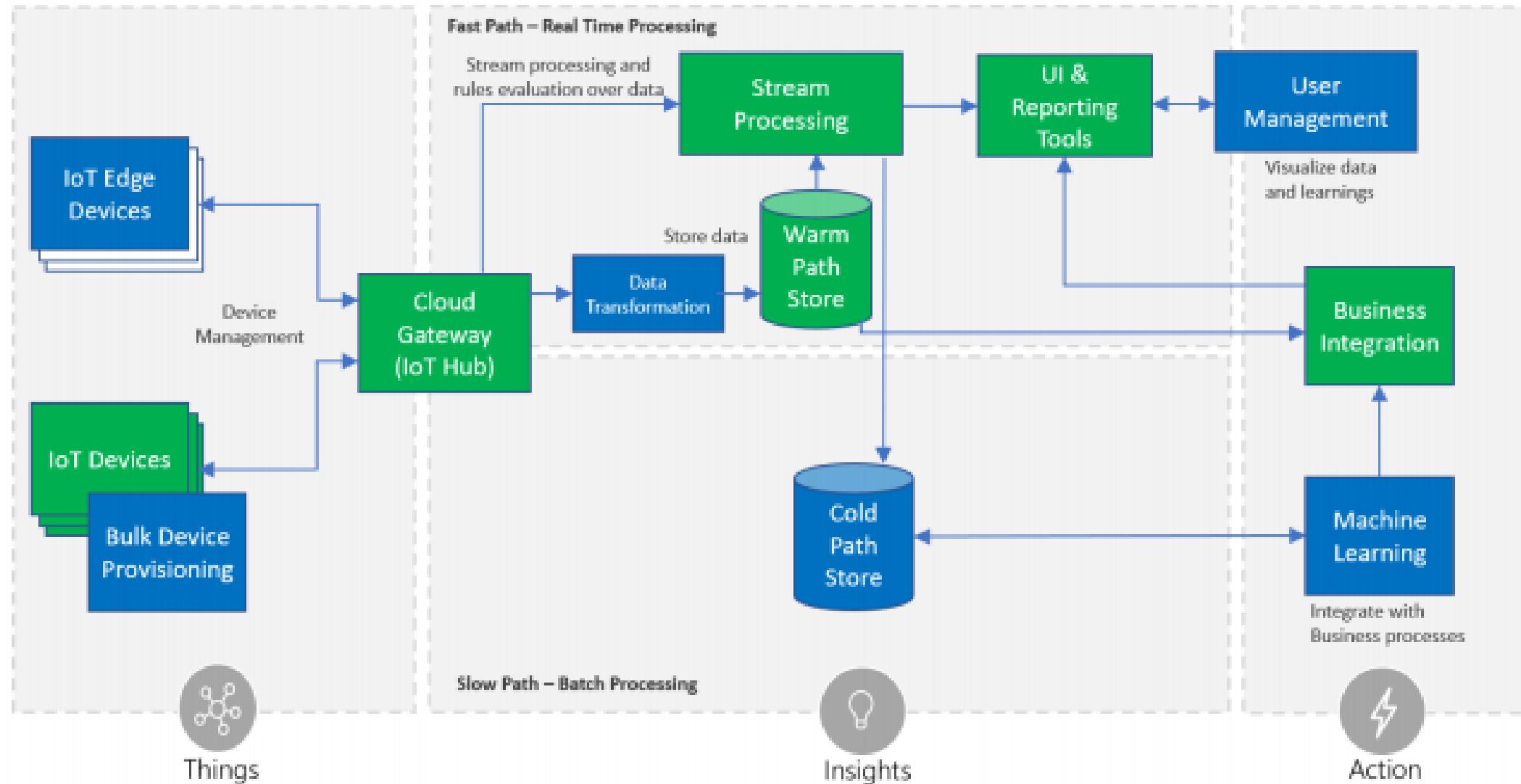


# Um projeto de IoT pode ser complexo



# Um projeto de IoT pode ser complexo

All Subsystems – Lambda Architecture



All Subsystems and Cross-Cutting needs

Security

Deployment

Security Aspects

SLA, High Availability, D&R

High Availability and Disaster Recovery

IoT Edge Devices

Business integration

Device Provisioning

IoT Edge Devices

IoT Devices

Bulk Device Provisioning



Things

Device Management

Cloud Gateway (IoT Hub)

Stream processing and rules evaluation over data

UI & Reporting Tools

User Management

Visualize data and learnings

Stream Processing

Business Integration

Data Transformation

Store data

Warm Path Store

Cold Path Store

Machine Learning

Integrate with Business processes



Insights

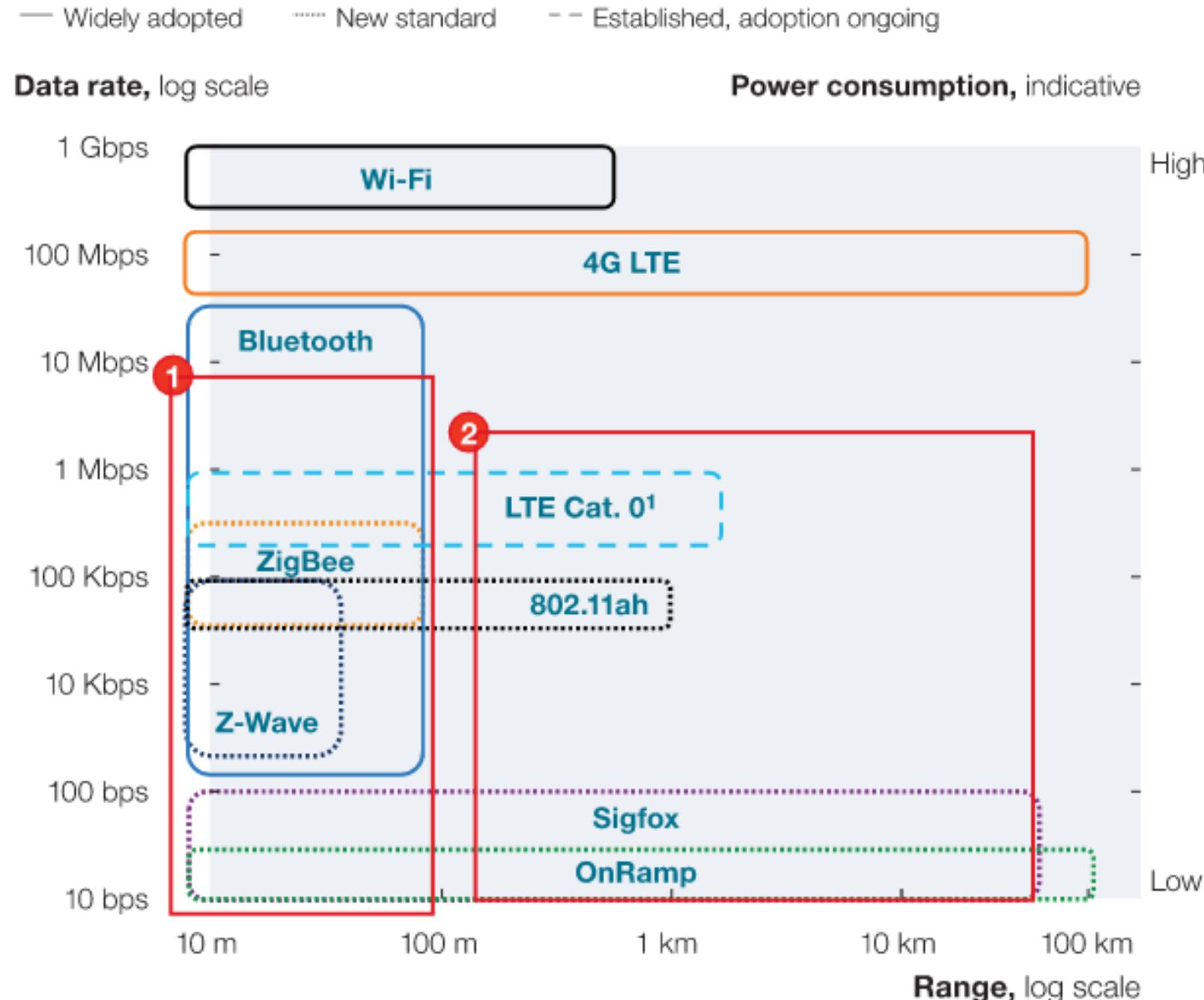


Action

Machine Learning

# Conectividade

- ① Many competing standards for low-range, medium-low data rate hinder growth for many IoT applications
  - Interoperability missing
  - Consortia wars might be emerging
  - Additional incompatibilities in higher communication layers, eg, 6LoWPAN vs ZigBee
  
- ② Standard white space for low-data-rate, low-power, high-range applications such as smart grid
  - Wi-Fi and LTE have high power consumption
  - Alternatives with low power and wide range (eg, LTE Cat. 0, 802.11ah, Sigfox, and OnRamp) are in very early stages and compete against each other



# Microsoft Azure IoT Reference Architecture

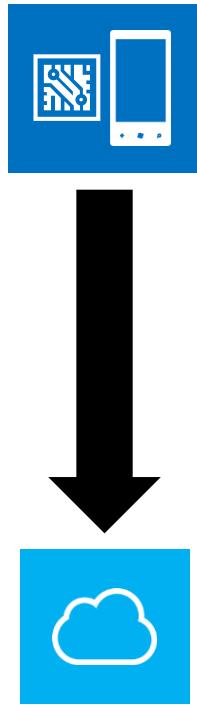


[https://download.microsoft.com/download/A/4/D/A4DAD253-BC21-41D3-B9D9-87D2AE6F0719/Microsoft\\_Azure\\_IoT\\_Reference\\_Architecture.pdf](https://download.microsoft.com/download/A/4/D/A4DAD253-BC21-41D3-B9D9-87D2AE6F0719/Microsoft_Azure_IoT_Reference_Architecture.pdf)

## Contents

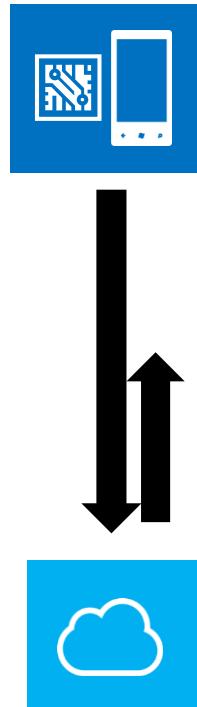
1. Overview .....	3
1.1 Architecture Overview .....	4
1.2 Core Subsystems .....	4
1.3 Optional Subsystems .....	5
1.4 Cross-Cutting IoT application needs .....	6
2. Foundational principles and concepts .....	8
2.1 Principles .....	8
2.2 Data concepts .....	8
3. Architecture Subsystem Details .....	11
3.1 Devices, Device Connectivity, Field Gateway (Edge Devices), Cloud Gateway .....	11
3.2 Device identity store .....	16
3.3 Topology and entity store .....	17
3.4 Device provisioning .....	20
3.5 Storage .....	21
3.6 Data flow and stream processing .....	26
3.7 Solution User Interface .....	31
3.8 Monitoring and Logging .....	33
3.9 Business System Integration and Backend Application Processing .....	42
3.10 Machine Learning (At-rest data analytics) .....	45
4. Solution design considerations .....	46
5. Appendix .....	65
5.1 Terminology .....	65
5.2 References .....	67
5.3 SaaS, PaaS, and IaaS Guidance .....	69

# Exemplos de mensagens para IOT



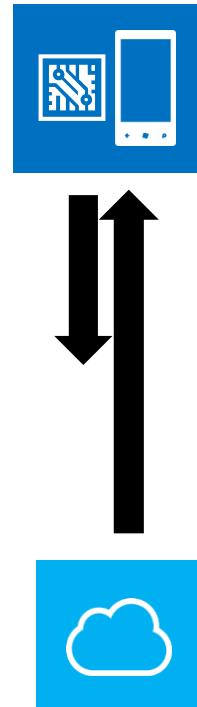
## Telemetria

Captura de dados do ambiente a partir do dispositivo para outros sistemas, gerando alertas, telemetria, monitoração



## Consultas

Solicitações a partir do dispositivos para disparo de ações, sinalização ou mudança de estados



## Comandos

Comandos de outros sistemas para um dispositivo para disparo de tarefas a partir de triggers ou thresholds de negócio



## Notificações

Informações fluindo de outros sistemas para um dispositivo ou grupo de dispositivos para a mudanças de status ou sinalização

# Our Agenda

- Relembrando IOT
- **Relembrando Power Platform**
- Um cenário de comando CLOUD-TO-DEVICE
- Considerações
- Q&A





Power BI



Power Apps



Power Automate



Power Virtual Agents



Power BI



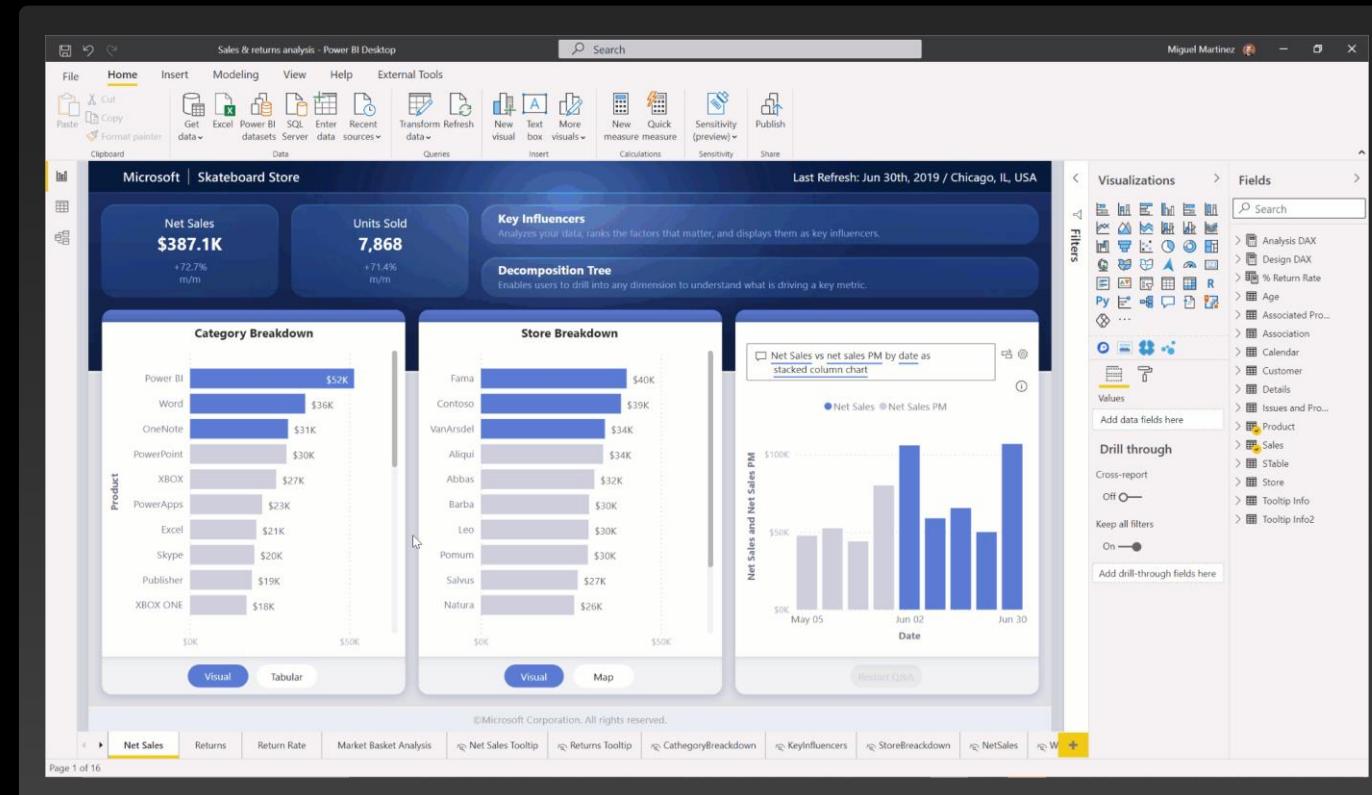
Power Apps



Power Automate



Power Virtual Agents





Power BI



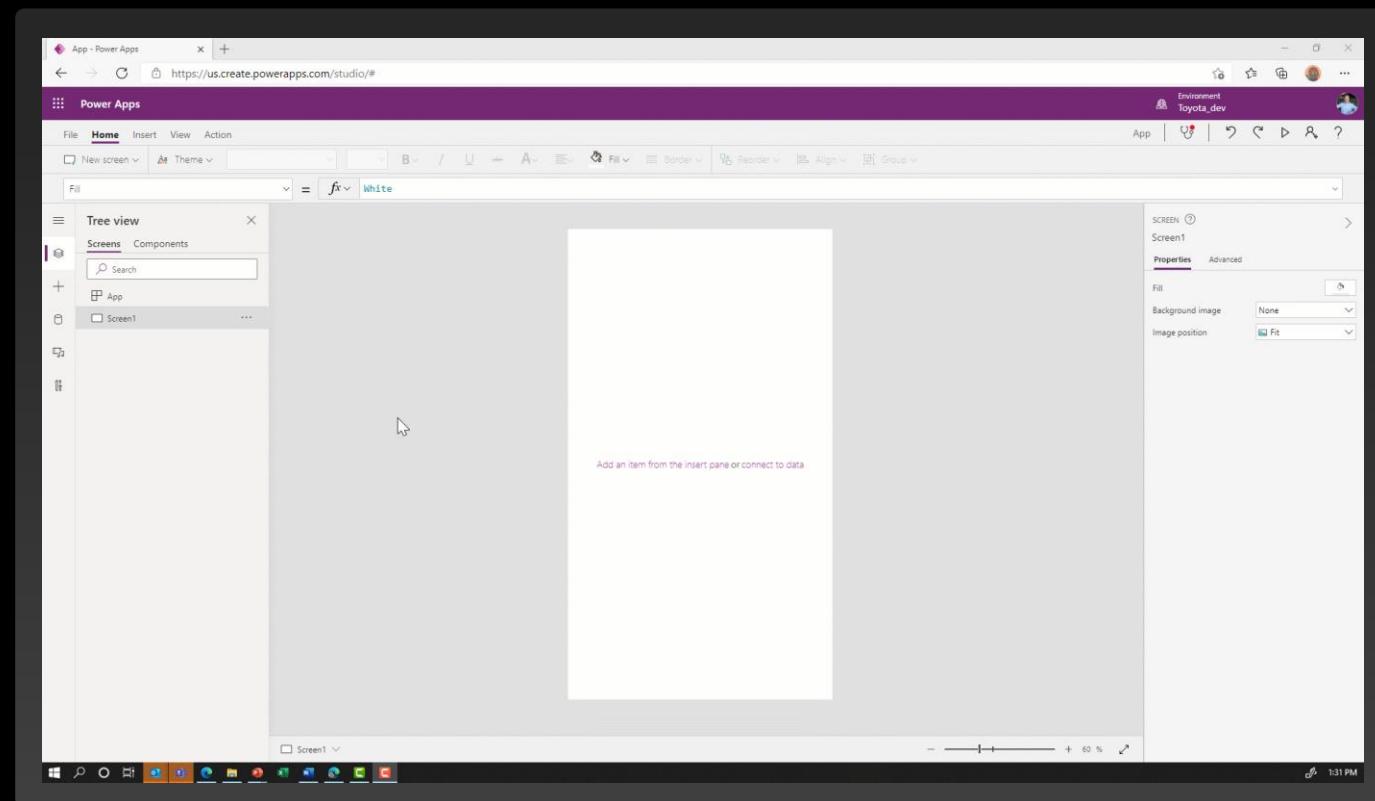
Power Apps



Power Automate



Power Virtual Agents





Power BI



Power Apps



Power Automate



Power Virtual Agents

The screenshot shows the Microsoft Power Automate web interface. On the left is a navigation sidebar with options like Home, Action items, My flows (which is selected), Create, Templates, Connectors, Data, Monitor, AI Builder, Process advisor (preview), Solutions, and Learn. The main workspace is titled "IV Per Diem Trigger". At the top right, there's a search bar, a "Save" button, a "Flow checker" button, and a "Test" button. The main area displays a single step: "When a file is created in a folder". This step has two inputs: "Site Address" set to "Coe-Contoso - https://pmgevents.sharepoint.com/sites/Coe-C...", and "Folder Id" set to "/Shared Documents/IV Orders". There are "Show advanced options" and "New step" buttons at the bottom of this step card.



Power BI



Power Apps



Power Automate



Power Virtual Agents

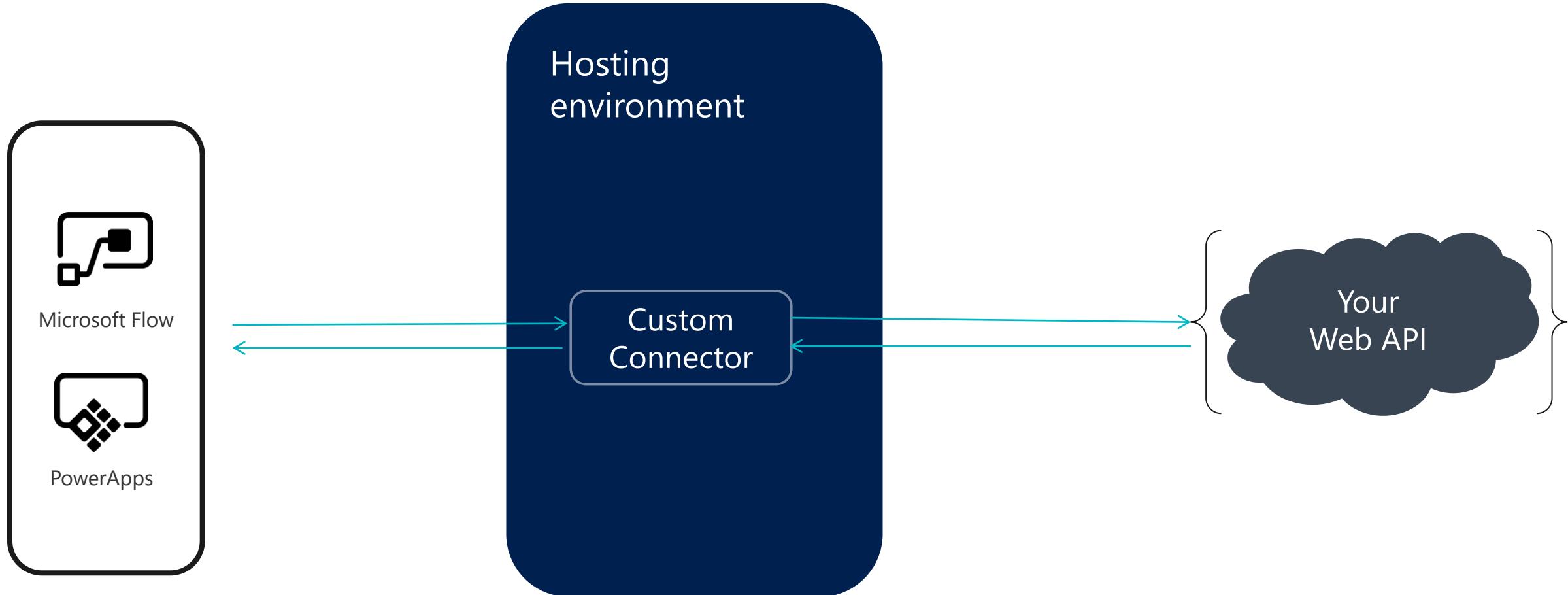
The screenshot shows the Microsoft Power Virtual Agents platform interface. At the top, there's a header bar with the title "Power Virtual Agents Contoso bot". Below the header, on the left, is a sidebar titled "Test chat" which includes a toggle switch for "Track between topics" and a list item "Contoso Bot". On the right, the main workspace is titled "SmartPrinter X troubleshooter". The workspace contains a large, empty white area for testing. Along the bottom edge of the workspace are several small icons: a magnifying glass, a double arrow, a circular arrow, and a document icon. At the very bottom of the interface, there's a text input field with the placeholder "Enter your response here" and a send button icon.

# Conectores



+450 conectores  
(incluindo on-prem)

# Extendendo a plataforma

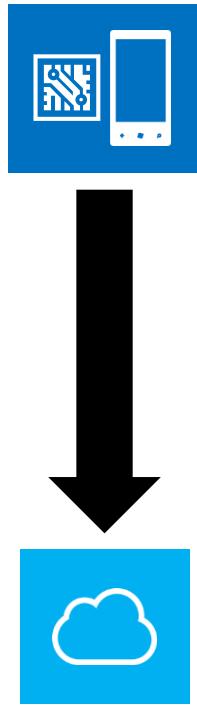


# Our Agenda

- Relembrando IOT
- Relembrando Power Platform
- **Um cenário de comando CLOUD-TO-DEVICE**
- Considerações
- Q&A

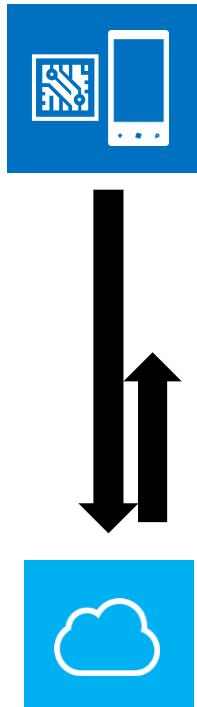


# Exemplos de mensagens para IOT



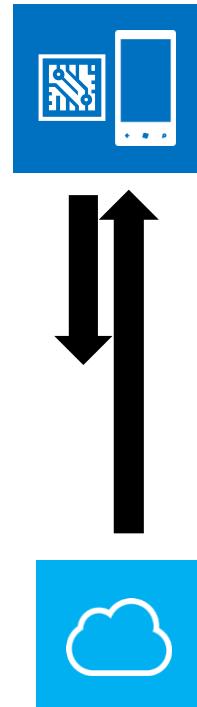
## Telemetria

Captura de dados do ambiente a partir do dispositivo para outros sistemas, gerando alertas, telemetria, monitoração



## Consultas

Solicitações a partir do dispositivos para disparo de ações, sinalização ou mudança de estados



## Comandos

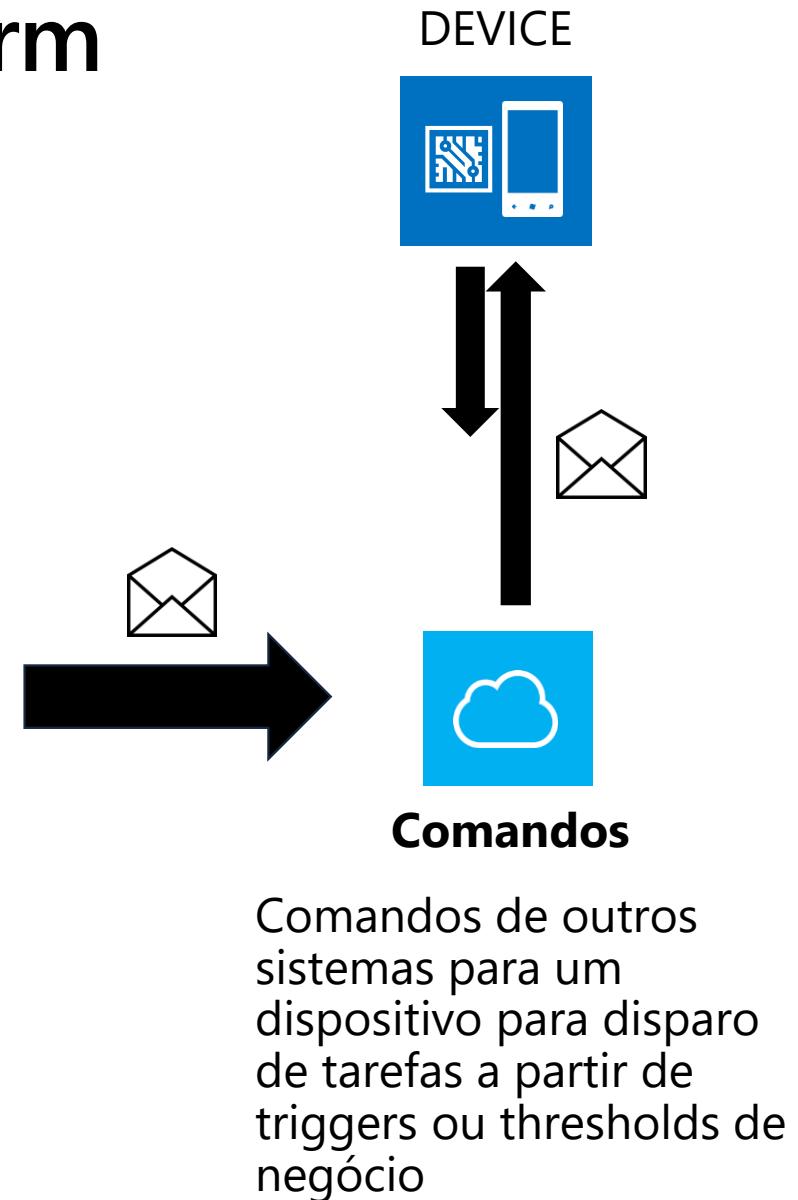
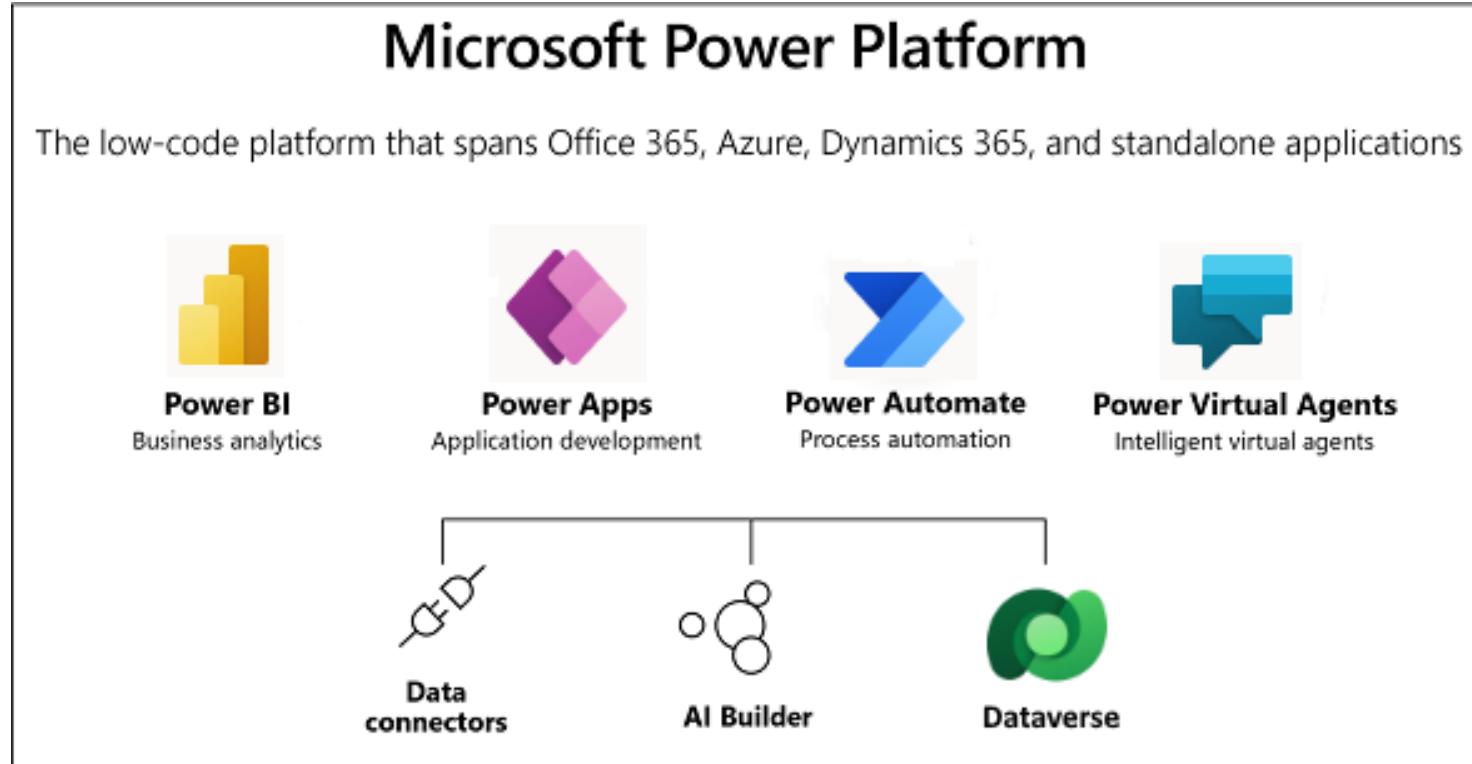
Comandos de outros sistemas para um dispositivo para disparo de tarefas a partir de triggers ou thresholds de negócio



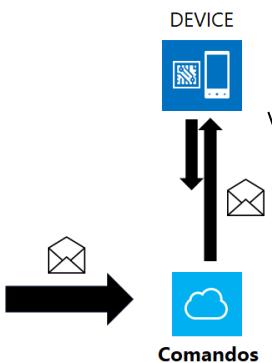
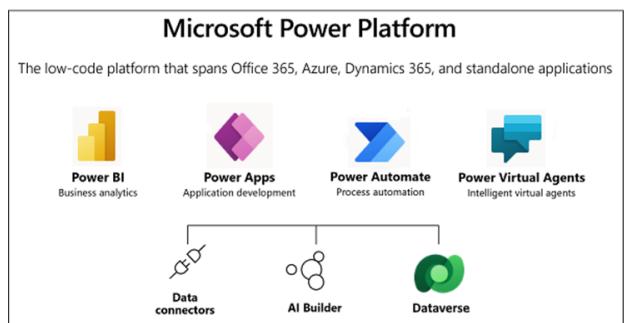
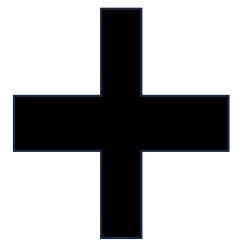
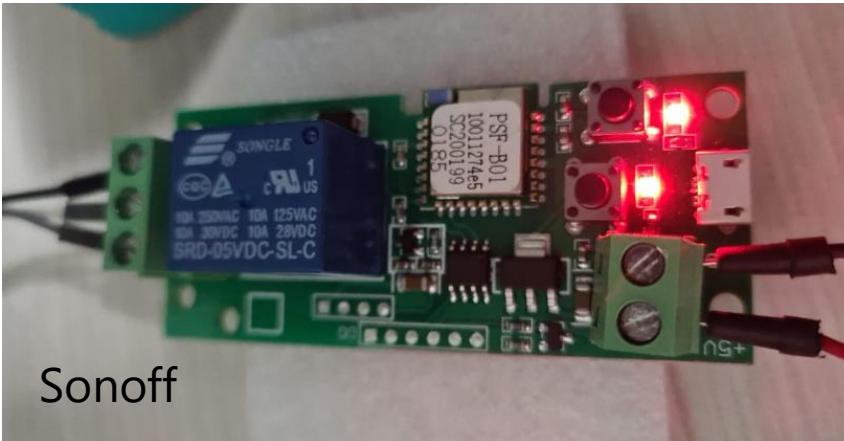
## Notificações

Informações fluindo de outros sistemas para um dispositivo ou grupo de dispositivos para a mudanças de status ou sinalização

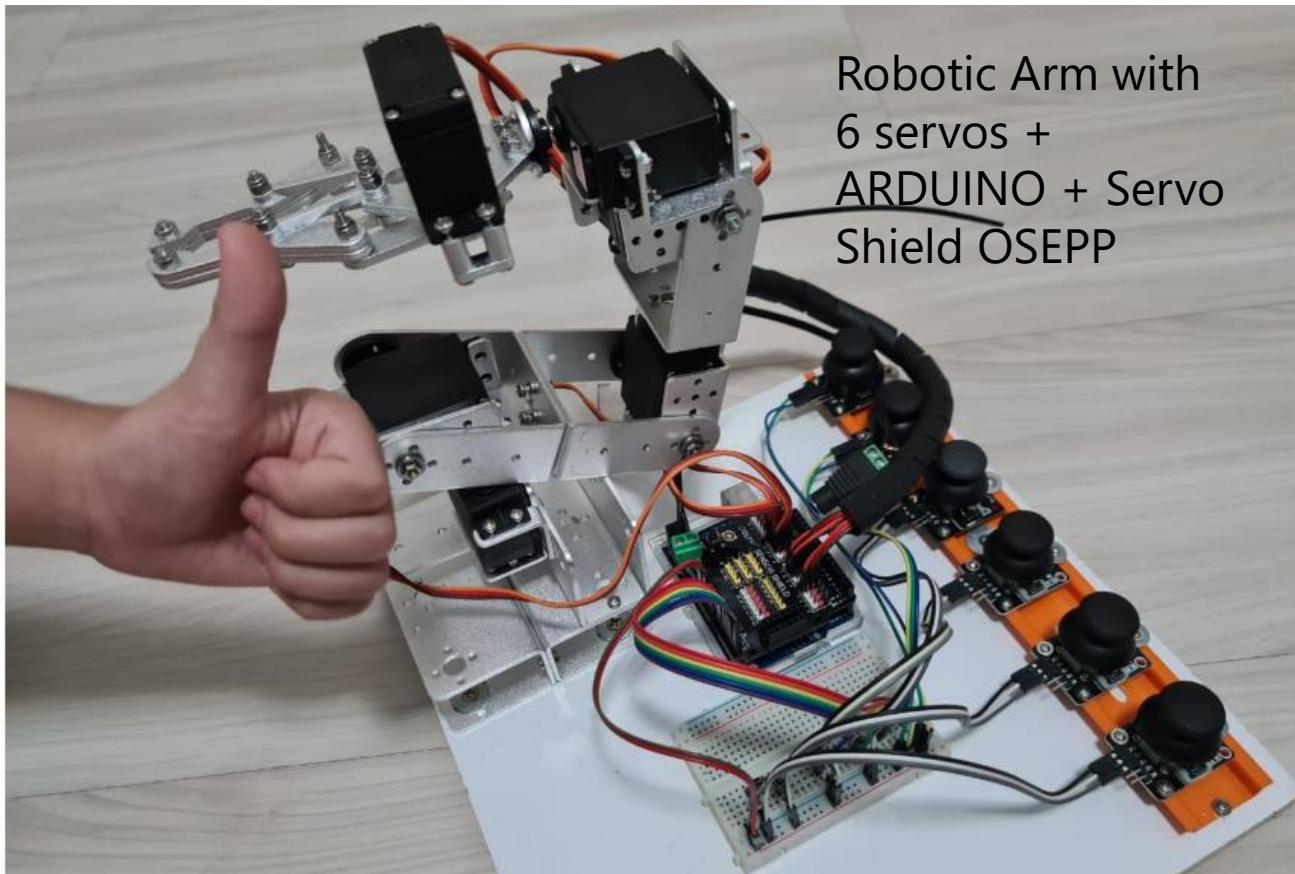
# Uma demo de comando a partir de um trigger de negócio disparado via Power Platform

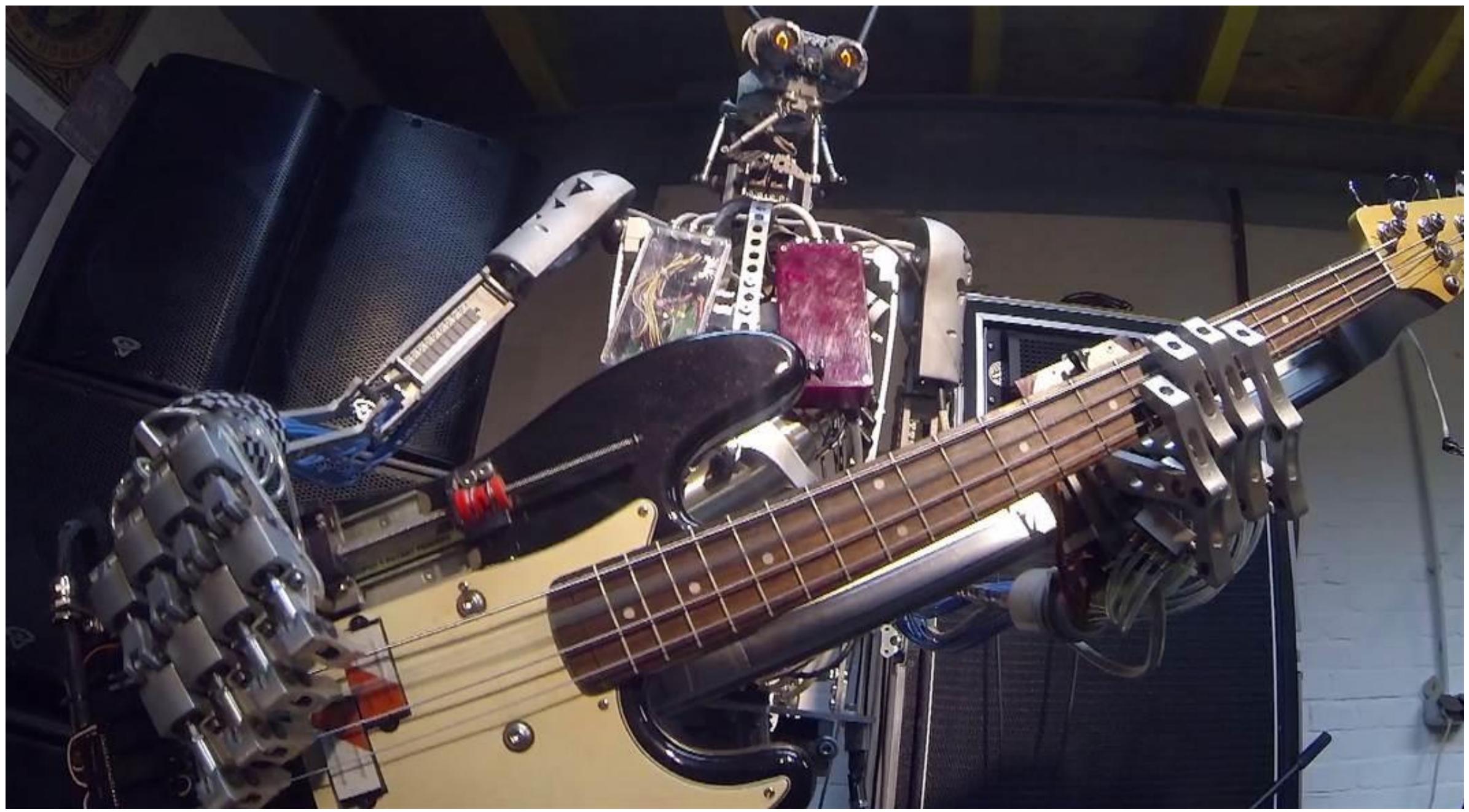


# Na ponta, um device conectado via placa de relê wifi SONOFF



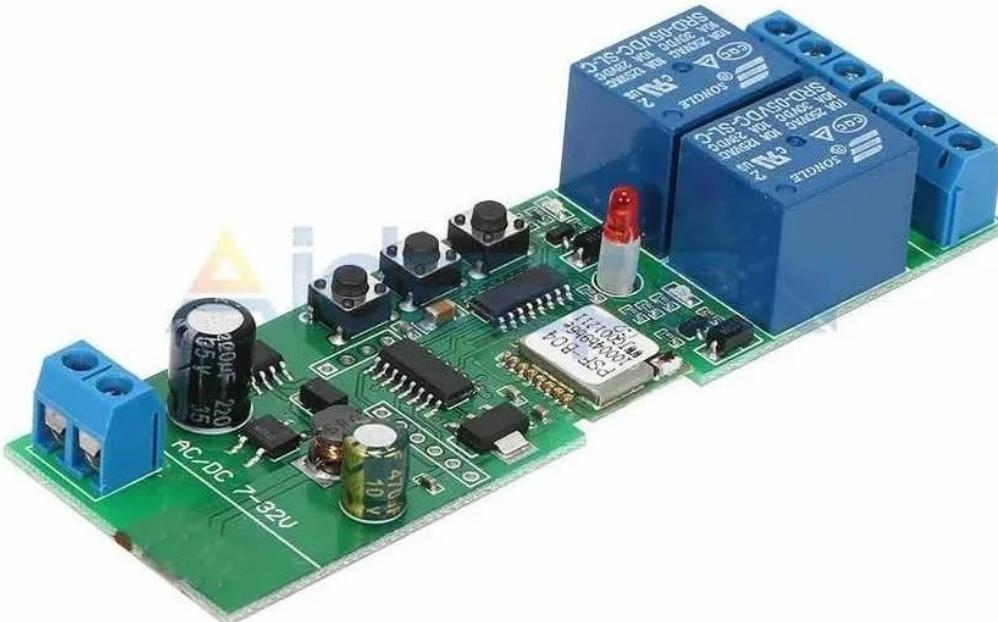
Comandos de outros sistemas para um dispositivo para disparo de tarefas a partir de triggers ou thresholds de negócio





# Passo 1

- Configuração de um Sonoff Wifi Módulo Relé Dc 5v  
Função Pulso E Travado,  
acessando o device via App eWeLink.



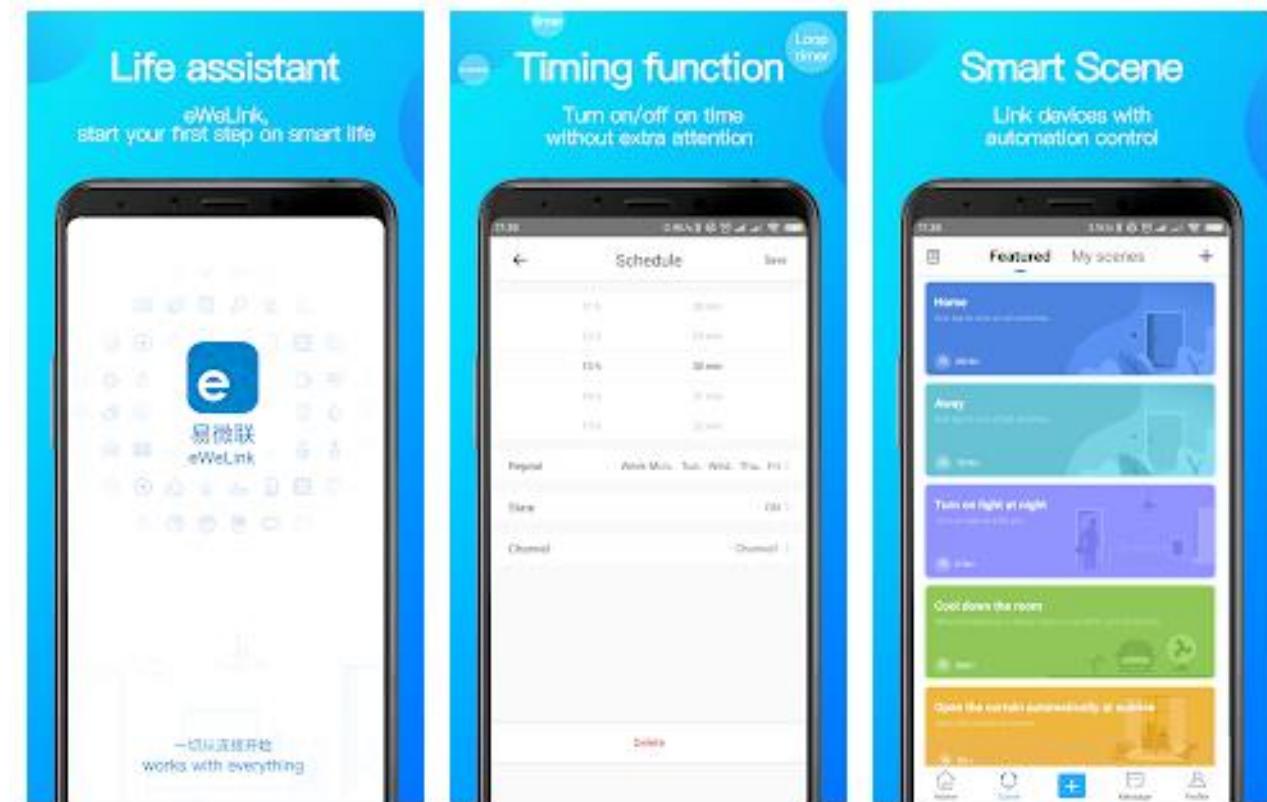
eWeLink - Smart Home

CoolKit Technology Estilo de vida

E Todos

⚠ Você não tem dispositivos

+ Adicionar à lista de desejos



# Passo 1

- Configuração de um Sonoff Wifi Módulo Relé Dc 5v  
Função Pulso E Travado,  
acessando o device via App  
eWeLink.



eWeLink - Smart Home

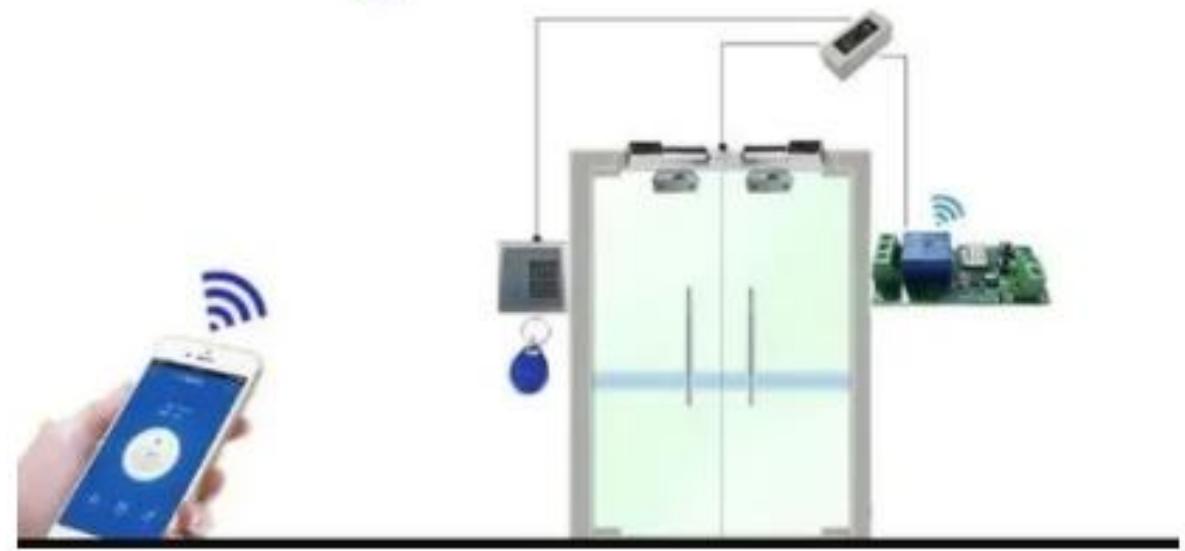
CoolKit Technology Estilo de vida

E Todos

⚠ Você não tem dispositivos

+ Adicionar à lista de desejos

Sonoff



# Passo 1

- Configuração de um Sonoff Wifi Módulo Relé Dc 5v Função Pulso E Travado, acessando o device via App eWeLink.



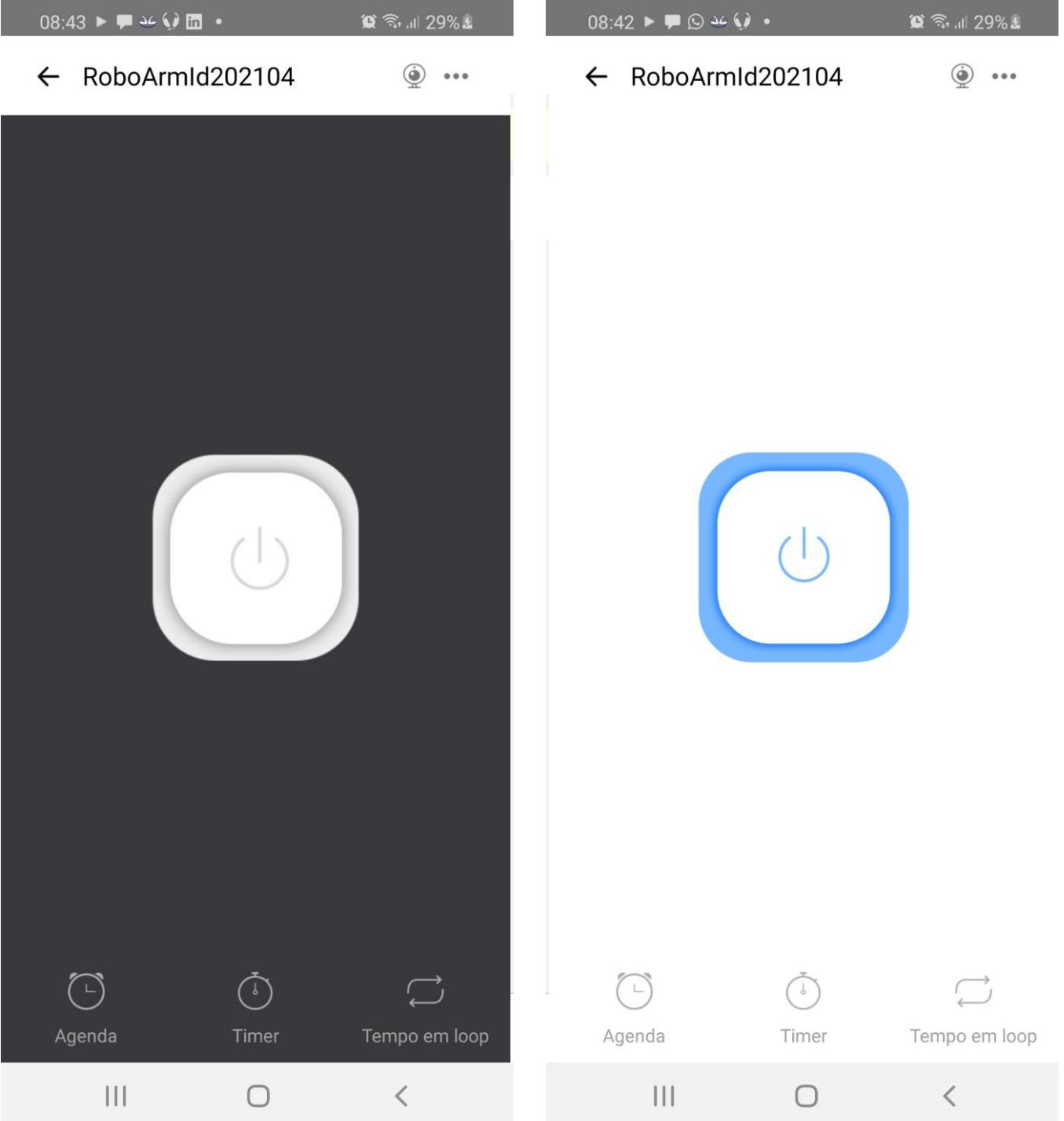
eWeLink - Smart Home

CoolKit Technology Estilo de vida

E Todos

⚠ Você não tem dispositivos

+ Adicionar à lista de desejos



# Demo

Disparando diversos SONOFFs  
a partir do aplicativo eWelink

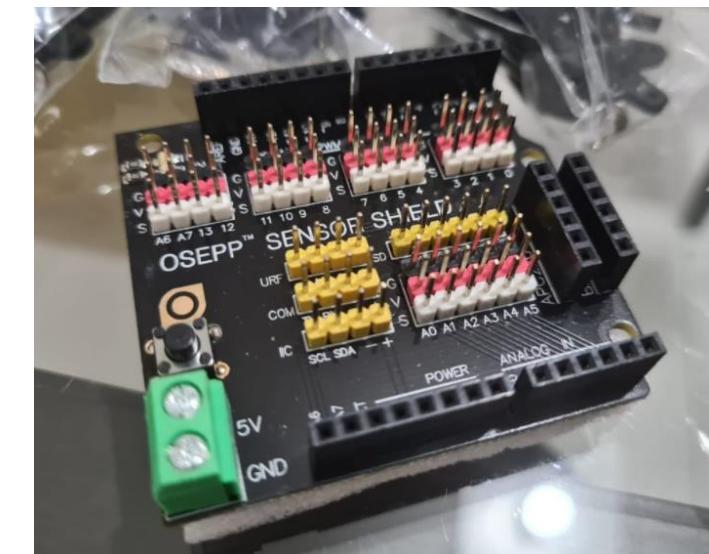
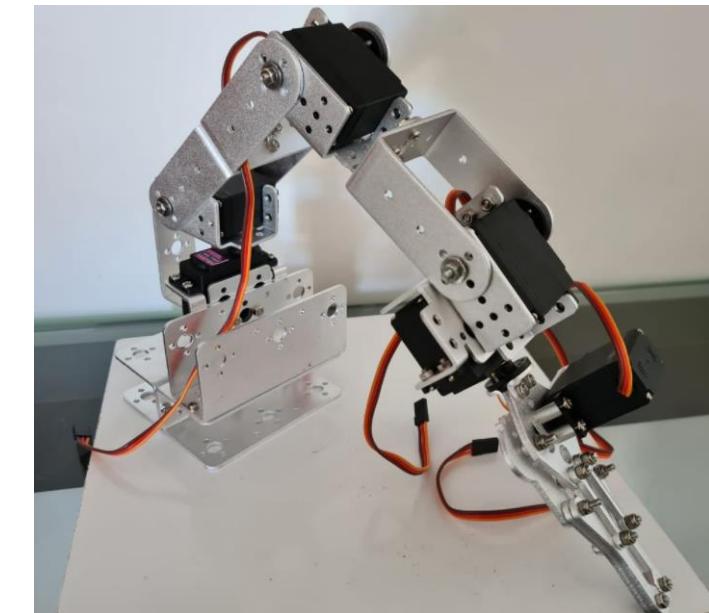


# Passo 2

- Conectar o Sonoff Wifi Módulo Relé Dc 5v Função Pulso E Travado com um protótipo de braço robótico de 6 servos MG996-R controlados por Arduino UNO R3, com sensor shield OSEPP

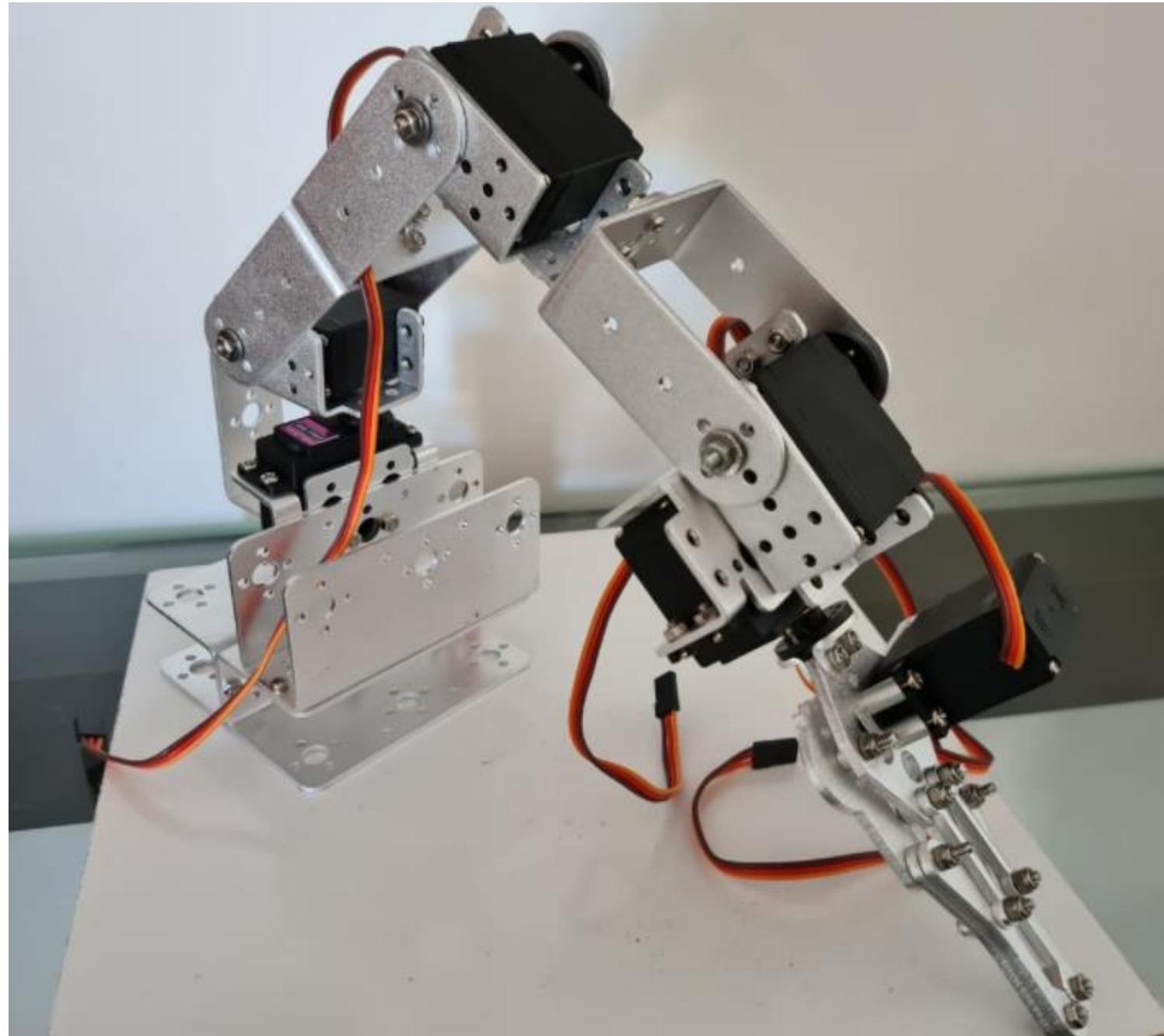


```
RoboGongo_v2 | Arduino 1.8.13
Arquivo Editar Sketch Ferramentas Ajuda
RoboGongo_v2
49 */
50 void setup() {
51   Serial.begin(9600);
52   Serial.println("Starting setup.");
53
54 // Attaching servos and joysticks to consecutive pins
55 for(int i=0; i<6; i++)
56 {
57   Serial.println("Attaching myServo[i] : " + String(i));
58   myServo[i].attach(pinServo[i]);
59   delay(100);
}
Compilando sketch...
"C:\Program Files (x86)\Arduino\hardware\tools\avr/bin/avrdude -C C:\Program Files (x86)\Arduino\hardware\tools\avr\etc\avrdude.conf -c usbtiny -p m328p -U flash:w:C:\Users\Thiago\Documents\Arduino\RoboGongo_v2.ino:hex
Compiling core...
Arduino Uno em COM13
```



## Passo 2

- Conectar o Sonoff Wifi Módulo Relé Dc 5v Função Pulso E Travado com um protótipo de braço robótico de 6 servos MG996-R controlados por Arduino UNO R3, com sensor shield OSEPP



# Passo 2

- Exemplo de código com máquina de estados.

The screenshot shows the Arduino IDE interface with the following details:

- Title Bar:** RoboArmld202105\_v2 | Arduino 1.8.13
- Menu Bar:** Arquivo, Editar, Sketch, Ferramentas, Ajuda
- Toolbar:** Includes icons for Save, Run, Upload, and Download.
- Code Editor:** Displays the code for 'RoboArmld202105\_v2'. The code defines an array of servo pins and several macros for ARM states.

```
15 int pinServo[6] = {3, 5, 6, 9, 10, 11};  
16 /*  
17 * Capture the trigger  
18 */  
19 int pinTriggerRun = 2;  
20 int stateARM = 0;  
21 /*  
22 * States for the ARM  
23 */  
24 #define ARM_SETUP_SERVO 0  
25 #define ARM_WAIT_TRIGGER 1  
26 #define ARM_PLAY_PRESET 2  
27 #define ARM_STOP_PRESET 3
```

- Compile Output:** Shows the compilation results.

```
Compilação terminada.  
Usando a biblioteca Servo na versão 1.1.7 na pasta: C:\Users\wcamp\OneDrive - MICO  
"C:\Program Files (x86)\Arduino\hardware\tools\avr/bin/avr-size" -A "C:\Users\wcamp\OneDrive - MICO\RoboArmld202105_v2.ino"  
O sketch usa 6134 bytes (19%) de espaço de armazenamento para programas. O máximo  
Variáveis globais usam 638 bytes (31%) de memória dinâmica, deixando 1410 bytes r
```
- Status Bar:** Arduino Uno em COM13

# Passo 2

- Movendo os servos com um preset de posições

The screenshot shows the Arduino IDE interface with the sketch titled "RoboArmld202105\_v2". The code defines a global variable "totPreSet" and an array "posPreSet" containing 12 sets of three values each, likely representing servo positions. The compilation output at the bottom indicates the sketch uses 6134 bytes of program memory and 638 bytes of dynamic memory, leaving 1410 bytes available.

```
31 */  
32 int totPreSet = 12;  
33 int posPreSet[12][2] = {  
34     {4, 30 },  
35     {4, 100 },  
36     {4, 90},  
37     {2, 60 },  
38     {2, 90 },  
39     {1, 30 },  
40     {1, 20 },  
41     {4, 30 },  
42     {4, 100 },  
43     {4, 90 },
```

Compilação terminada.  
Usando a biblioteca Servo na versão 1.1.7 na pasta: C:\Users\wcamp\OneDrive - MICO  
"C:\Program Files (x86)\Arduino\hardware\tools\avr/bin/avr-size" -A "C:\Users\wcamp\OneDrive - MICO\RoboArmld202105\_v2.ino"  
O sketch usa 6134 bytes (19%) de espaço de armazenamento para programas. O máximo  
Variáveis globais usam 638 bytes (31%) de memória dinâmica, deixando 1410 bytes r

42

Arduino Uno em COM13

# Passo 2

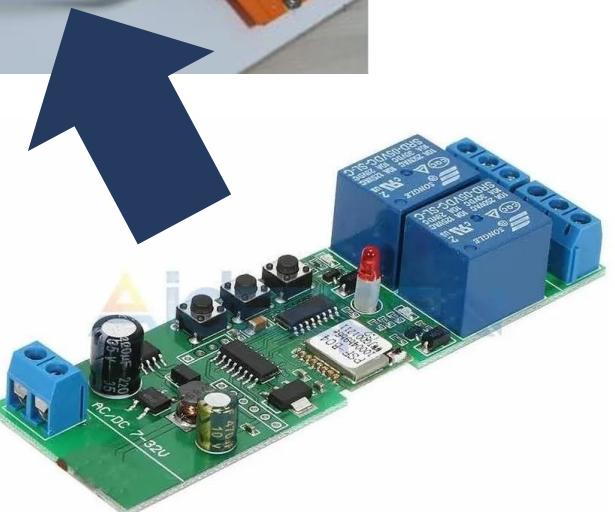
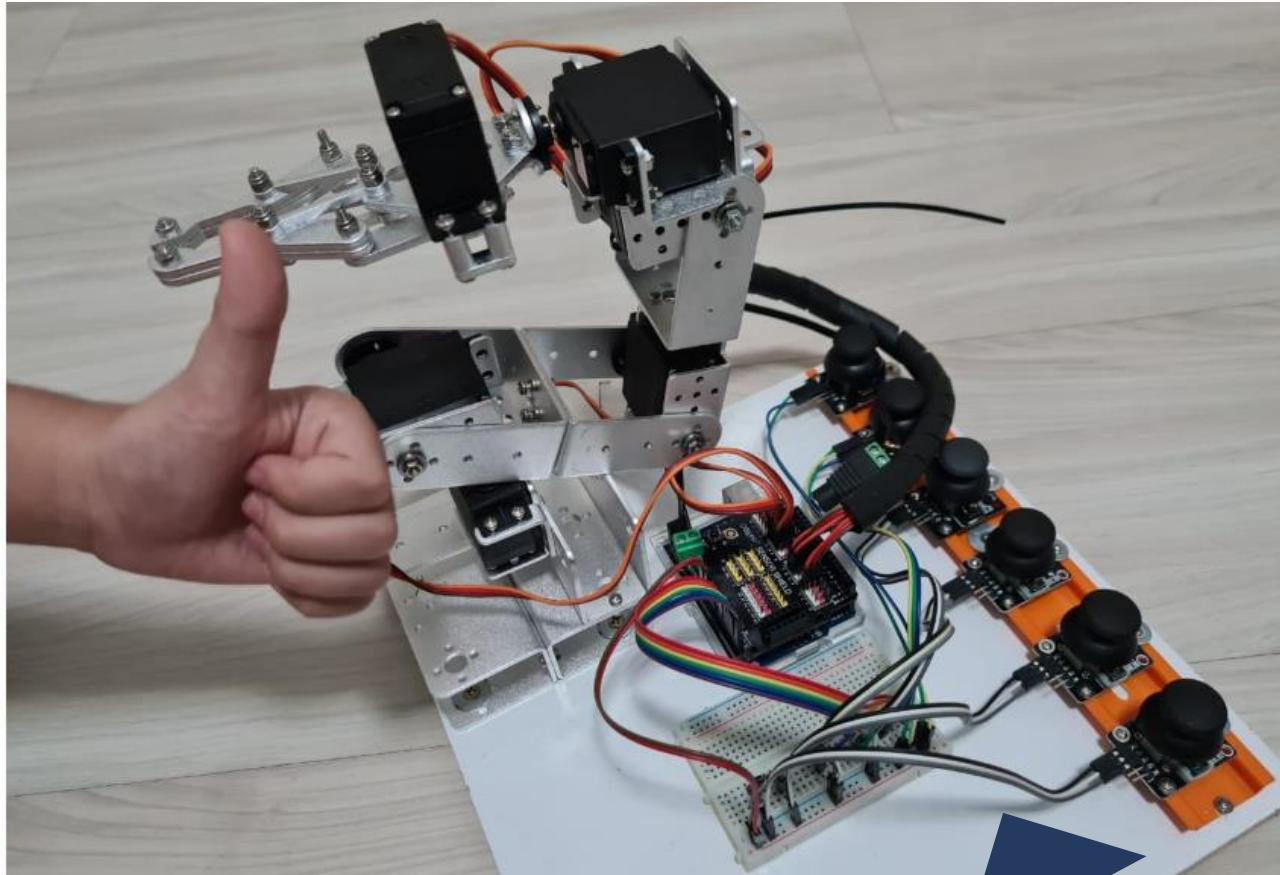
- Movendo os servos com um preset de posições

The screenshot shows the Arduino IDE interface with the sketch titled "RoboArmlD202105\_v2". The code implements a function to move servos based on a preset array. It iterates through the array, prints the servo ID and angle to the serial port, and then moves the servo to the specified angle. The IDE also displays the compilation results, which show the use of the Servo library version 1.1.7 and the memory usage of the sketch.

```
RoboArmlD202105_v2 | Arduino 1.8.13
Arquivo Editar Sketch Ferramentas Ajuda
RoboArmlD202105_v2 §
118 */
119 case ARM_PLAY_PRESET:
120     for(int i=0; i < totPreSet; i++) {
121
122         // Running the pre-sets of movements
123         presetServo = posPreSet[i][0];
124         presetAngle = posPreSet[i][1];
125
126         // Go to move the servo
127         Serial.println("presetServo = " + String (presetServo));
128         Serial.println("presetAngle = " + String (presetAngle));
129
130         myServo[presetServo].write(presetAngle);
131         delay(500);
132     }
Compilação terminada.
Usando a biblioteca Servo na versão 1.1.7 na pasta: C:\Users\wcamb\OneDrive - Microsoft
"C:\Program Files (x86)\Arduino\hardware\tools\avr/bin/avr-size" -A "C:\Users\wcamb\OneDrive - Microsoft\wcamb\Documentos\Arduino\RoboArmlD202105_v2.ino"
O sketch usa 6134 bytes (19%) de espaço de armazenamento para programas. O máximo são 32768 bytes.
Variáveis globais usam 638 bytes (31%) de memória dinâmica, deixando 1410 bytes para variáveis locais.
120
Arduino Uno em COM13
```

# Passo 2

- Conectar o Sonoff Wifi Módulo Relé Dc 5v Função Pulso E Travado com um protótipo de braço robótico de 6 servos MG996-R controlados por Arduino UNO R3, com sensor shield OSEPP



eWeLink - Smart Home

CoolKit Technology Estilo de vida

E Todos

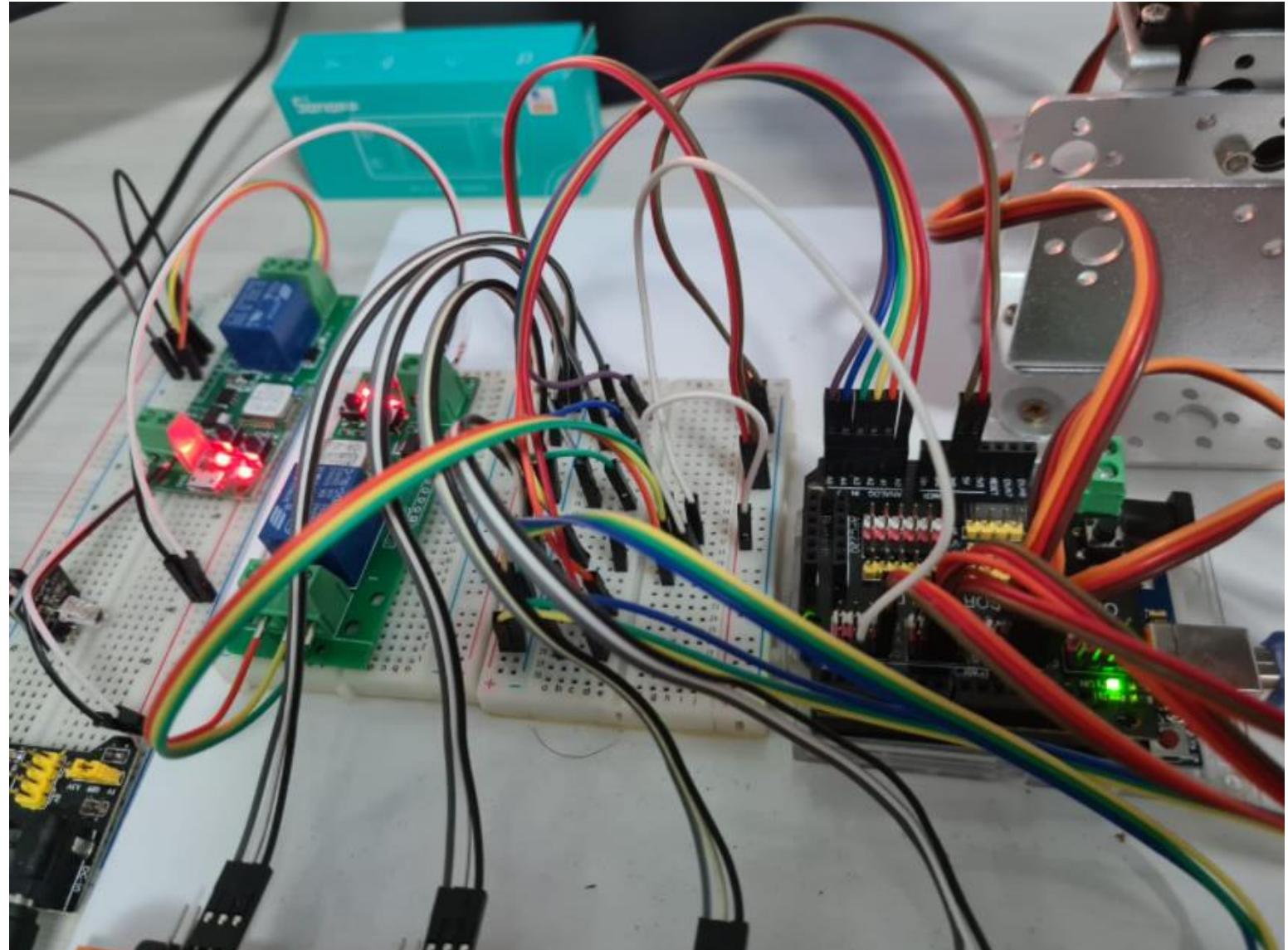
⚠ Você não tem dispositivos

+ Adicionar à lista de desejos



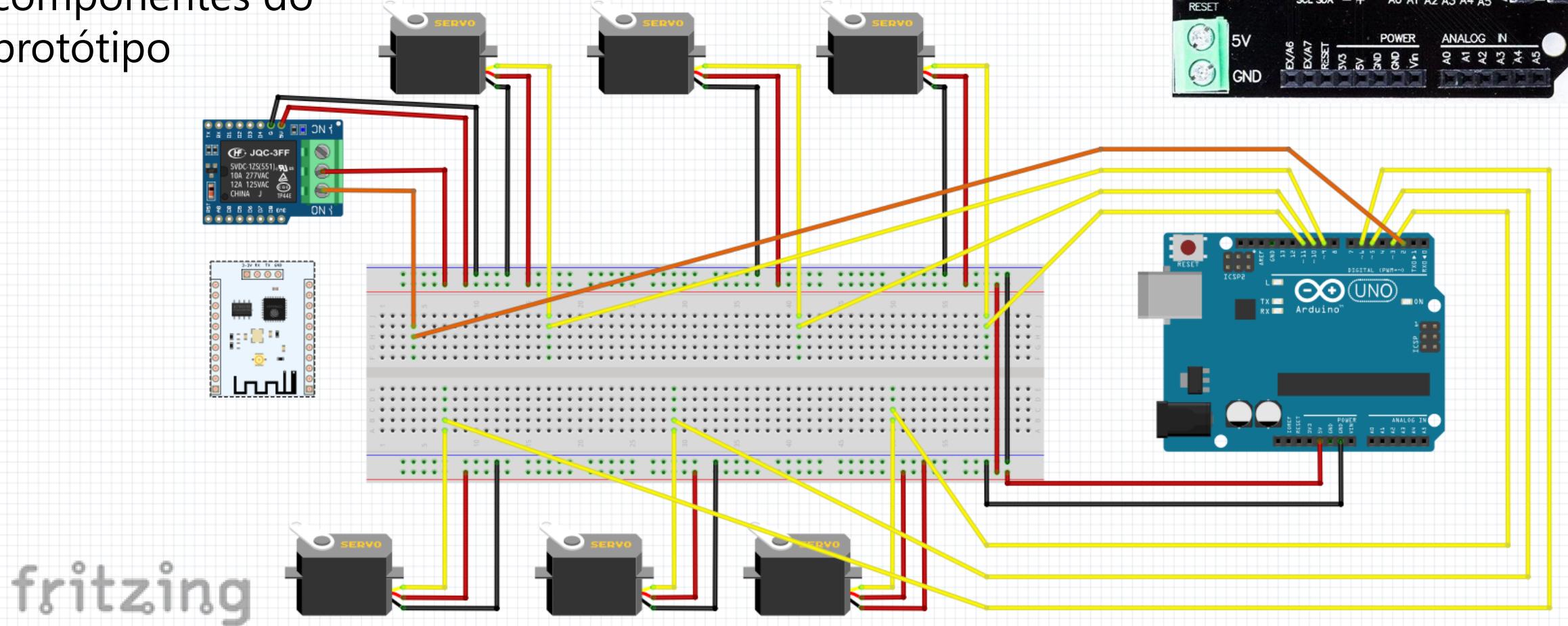
## Passo 2

- Conectar o Sonoff Wifi Módulo Relé Dc 5v Função Pulso E Travado com um protótipo de braço robótico de 6 servos MG996-R controlados por Arduino UNO R3, com sensor shield OSEPP



# Passo 2

- Desenho geral de componentes do protótipo



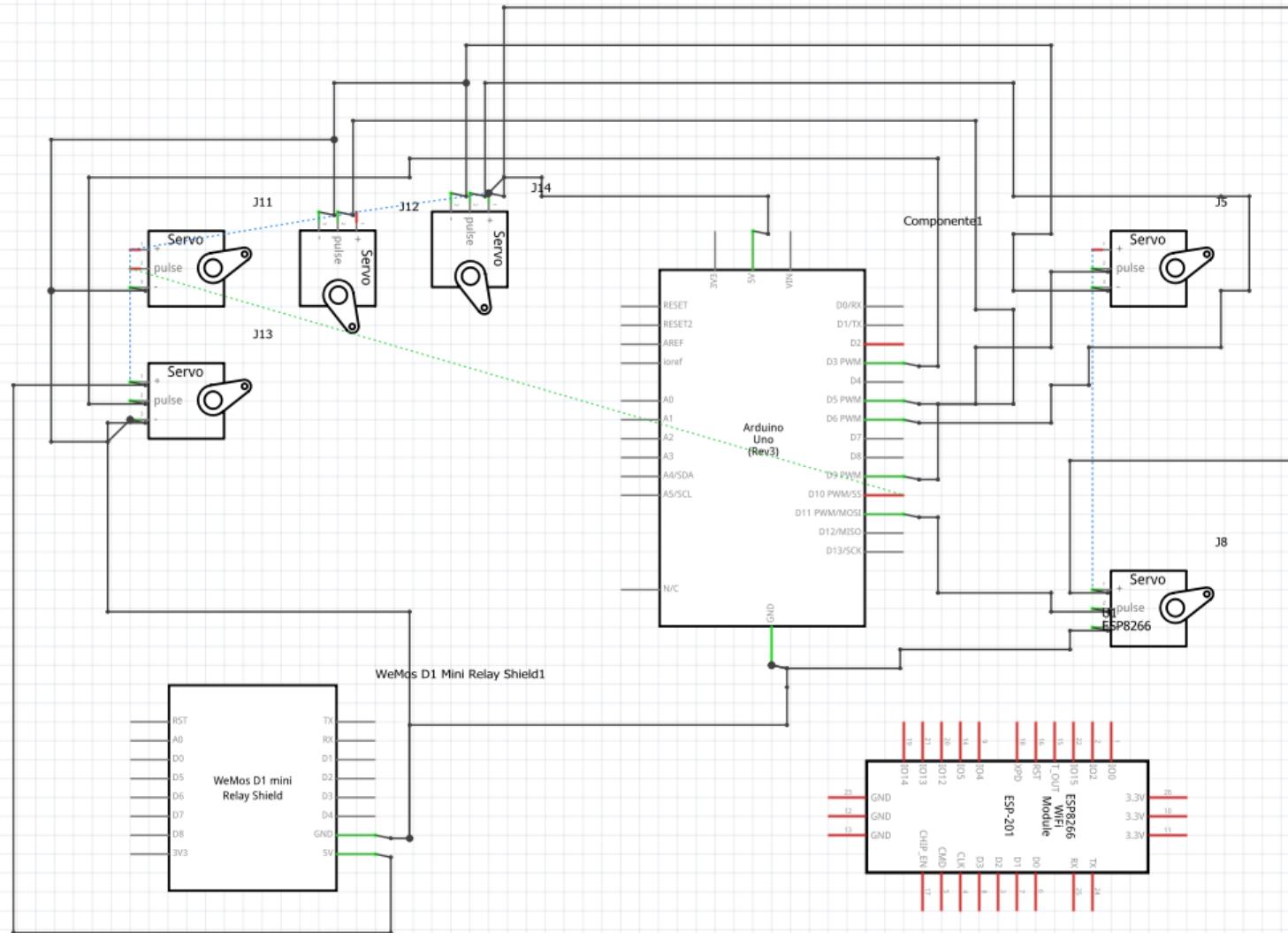
Welcome

Protoboard

Esquemático

PCB

Código



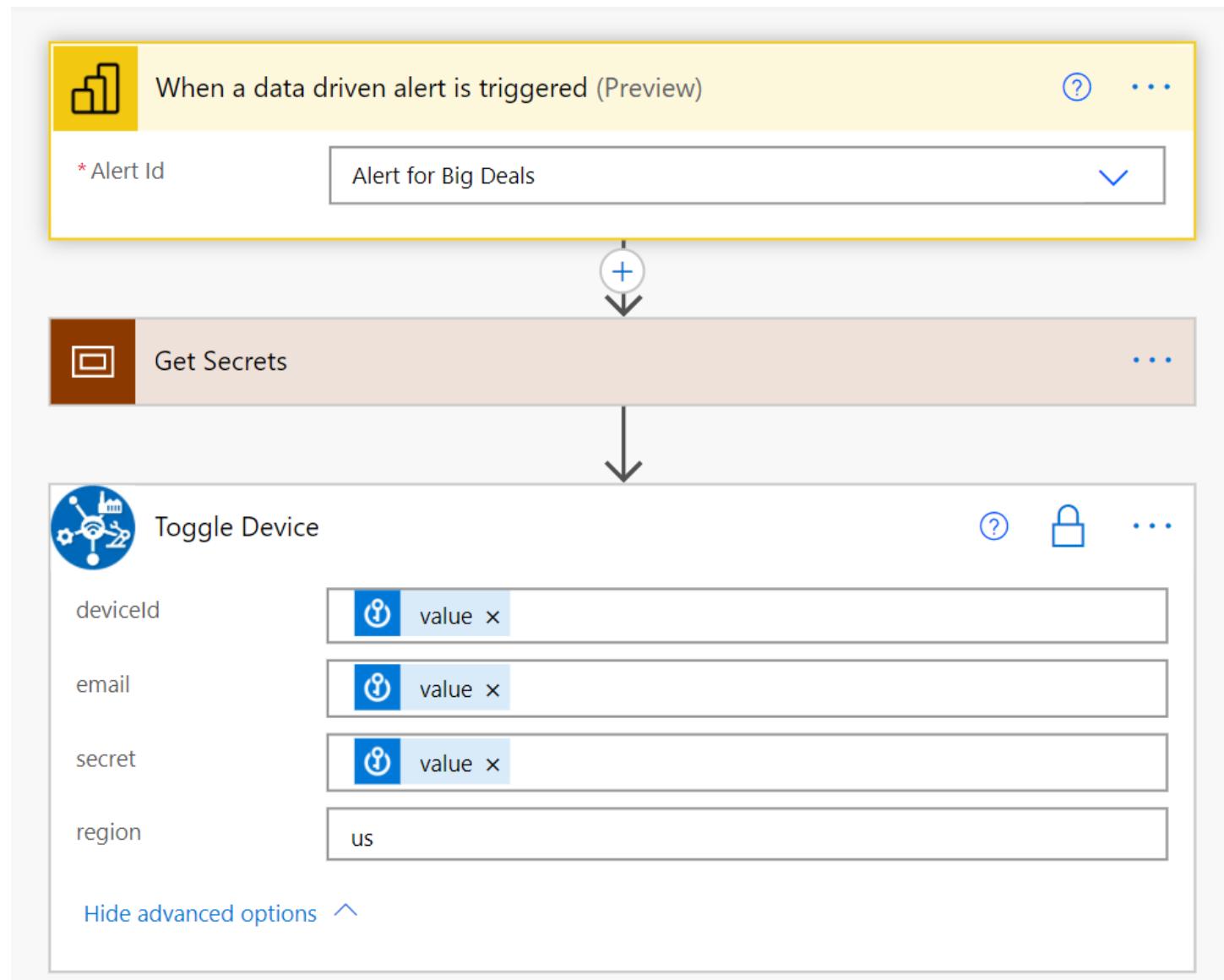
# Demo

Disparando o robô a partir do aplicativo eWelink

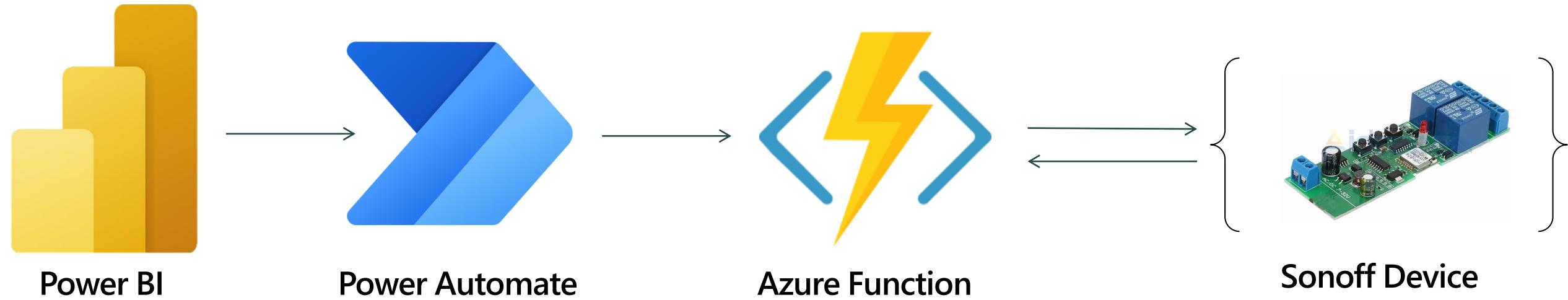


# Passo 3

- Publicando a API do Sonoff no POWER APPS



# Passo 3 - Arquitetura



# [skydiver/ewelink-api: eWeLink API for JavaScript \(github.com\)](https://github.com/skydiver/ewelink-api)

☰ README.md

## ewelink-api

eWeLink API for JavaScript

### Key features

- can run on browsers, node scripts or serverless environment
- set on/off devices
- get power consumption on devices like Sonoff POW
- listen for devices events
- using zeroconf (LAN mode), no internet connection required

### Installation

```
npm install ewelink-api
```

### Usage

Check library documentation and examples at <https://github.com/skydiver/ewelink-api/tree/master/docs>

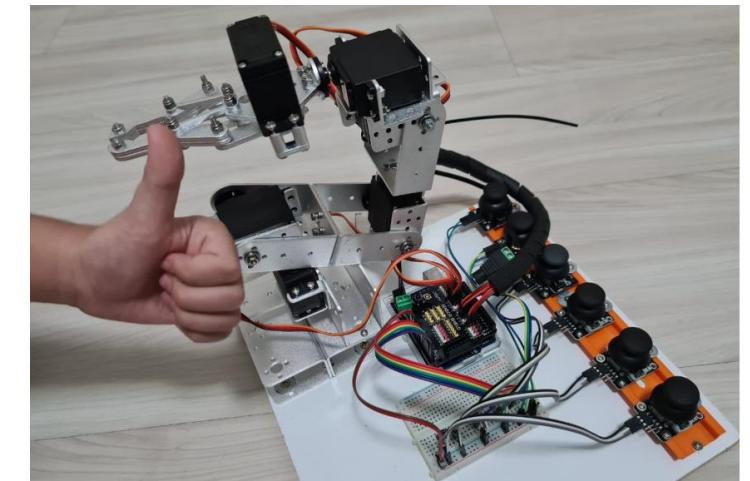
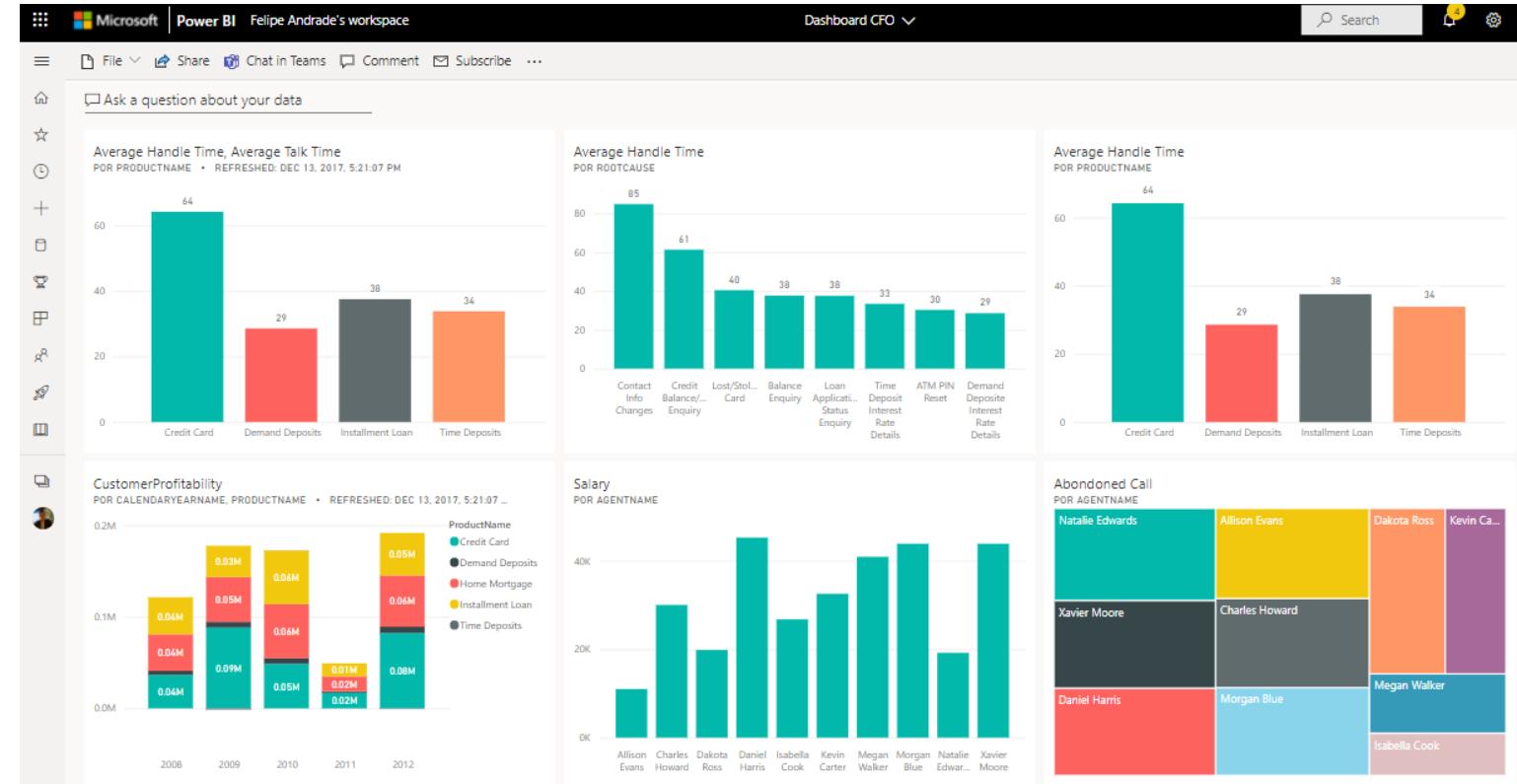
# Demo

Construindo um conector para  
SONOFF



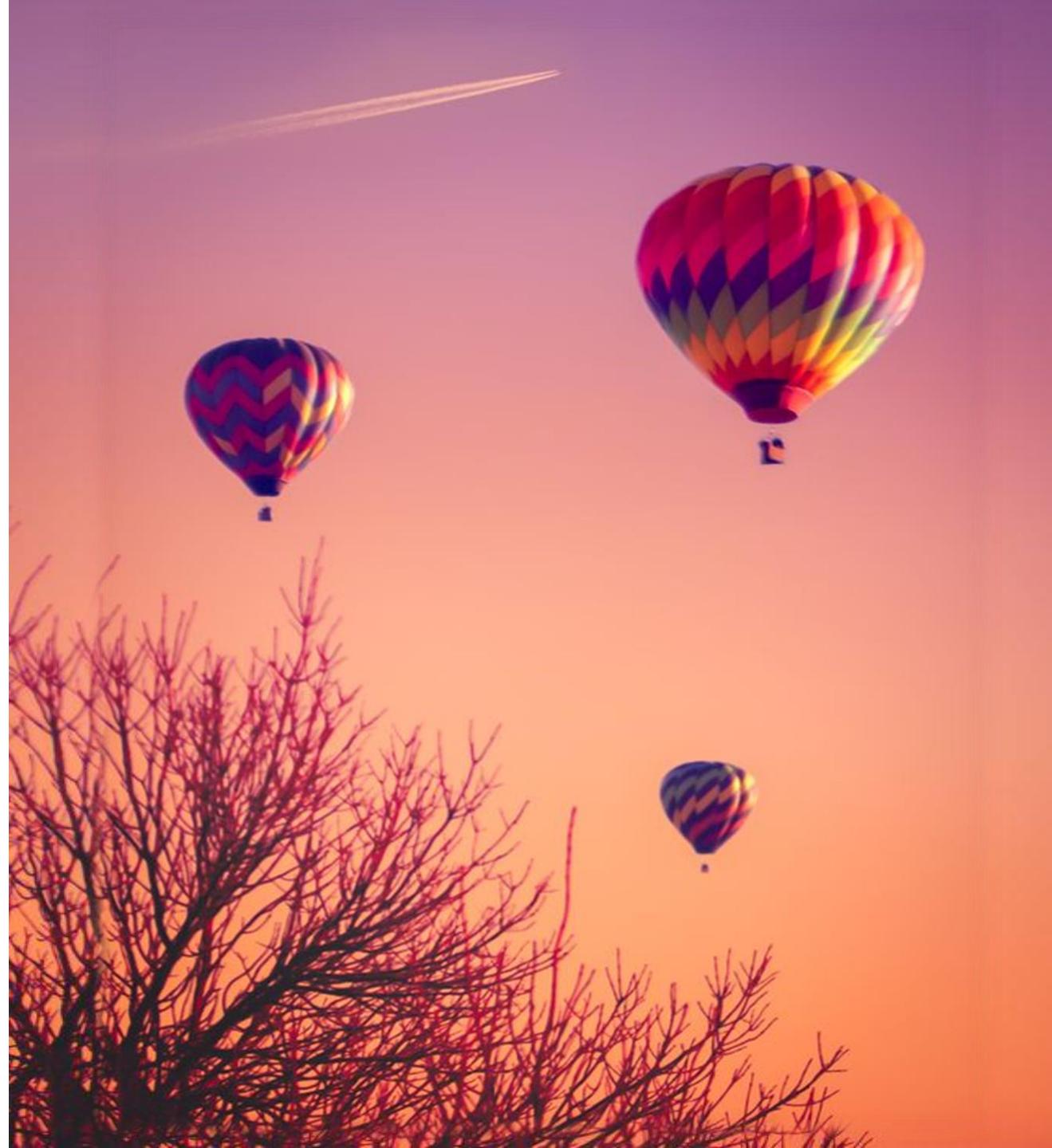
# Passo 4

- Acionando o trigger e disparando uma mensagem para o device via Power Automate



# Demo

Disparando o robô a partir do  
Power Platform



# Our Agenda

- Relembrando IOT
- Relembrando Power Platform
- Um cenário de comando CLOUD-TO-DEVICE
- **Considerações**
- Q&A



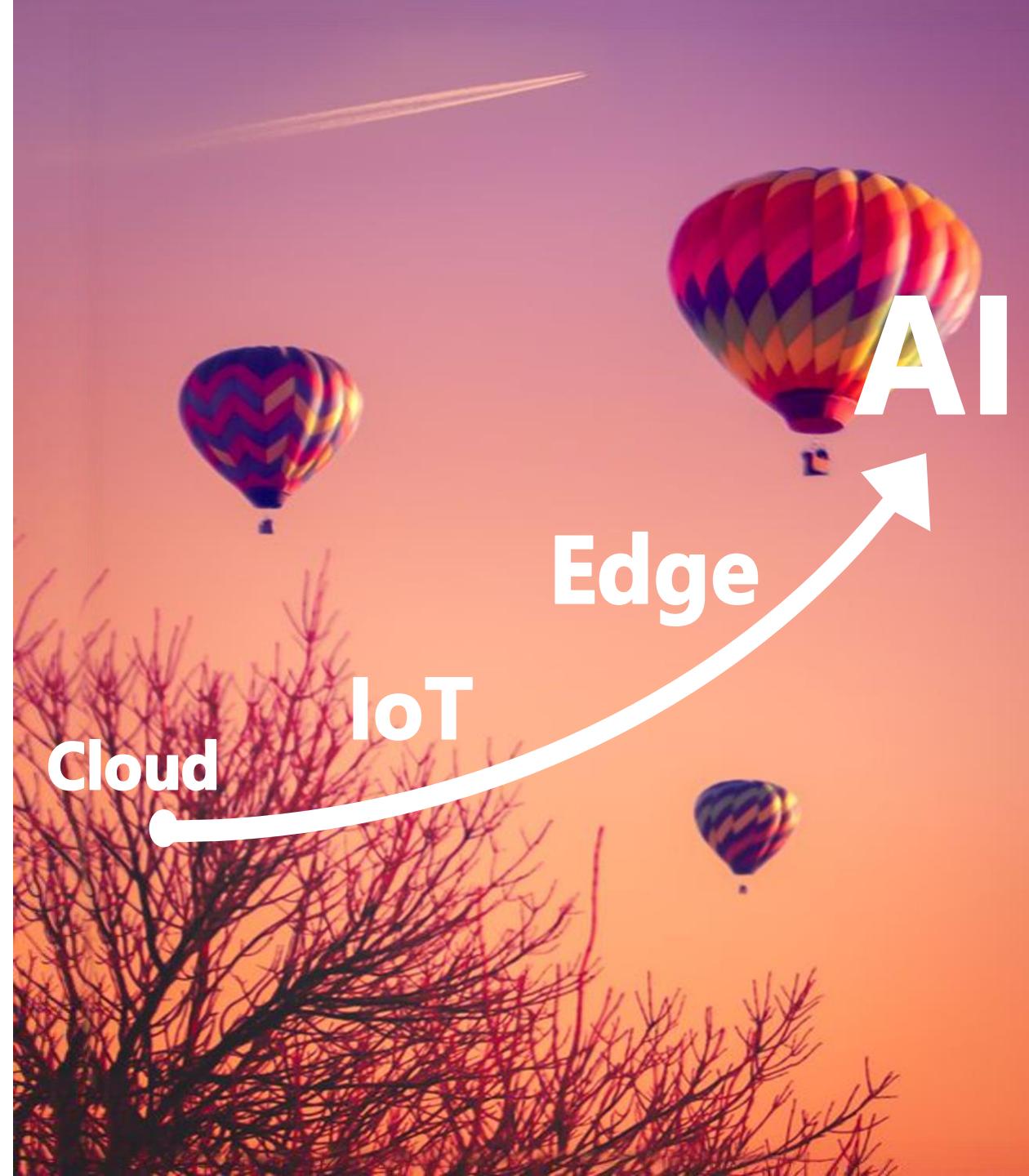
# Considerações sobre Power Platform e Azure Functions

1. A extensibilidade da Power Platform é incrível: oferece a possibilidade da criação dos seus próprios conectores. Podendo inclusive acelerar a conexão com devices de IOT, agilizando automação, monitoração remota, atuação, etc.
2. [Submeta seu conector para certificação Microsoft](#)
3. Azure Function é uma excelente opção Serverless para extensibilidade pro-dev da plataforma.

# Considerações sobre Power Platform + IOT

1. Um cenário de IOT pode ter diferentes tipos de mensageria, como TELEMETRIA, CONSULTA, COMANDO e NOTIFICAÇÃO
2. Diferentes cenários de conectividade podem ser usados entre os dispositivos de IOT e a nuvem, como WIFI, ZIGBEE, 4G, LORA, etc.
3. Não reinvente a roda! Aproveite os aceleradores de plataforma para seus cenários de IOT, como telemetria, notificação, comando, etc.
4. Prototipação é um passo super especial para polir o cenário e resultados esperado. Dedique um bom tempo para testes sobre seu protótipo.

# Tendências de inovação

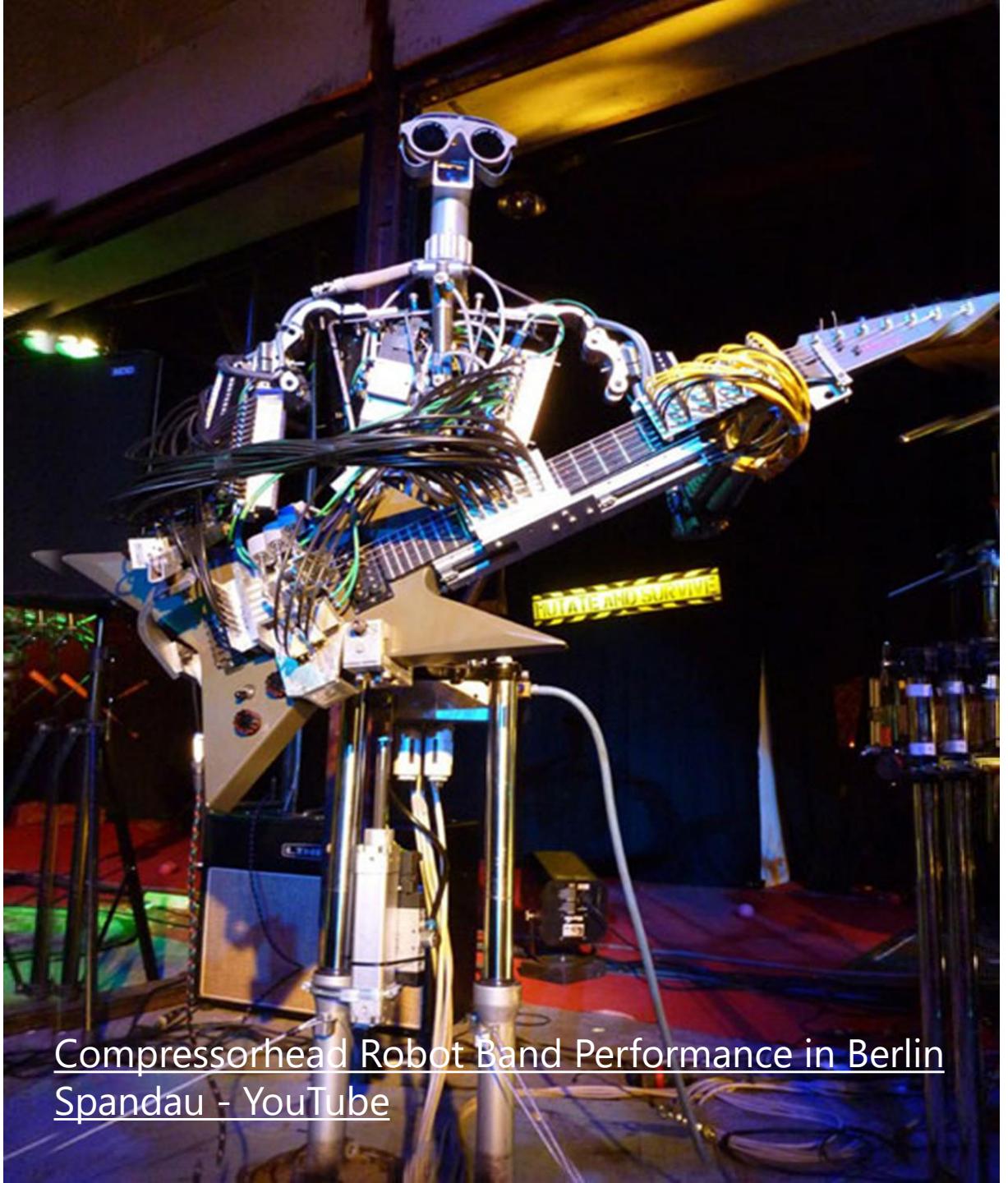


# Referências e links importantes

- Microsoft Azure IoT Reference Architecture
  - [https://download.microsoft.com/download/A/4/D/A4DAD253-BC21-41D3-B9D9-87D2AE6F0719/Microsoft Azure IoT Reference Architecture.pdf](https://download.microsoft.com/download/A/4/D/A4DAD253-BC21-41D3-B9D9-87D2AE6F0719/Microsoft%20Azure%20IoT%20Reference%20Architecture.pdf)
  - <https://docs.microsoft.com/en-us/azure/architecture/reference-architectures/iot>
- Sonoff Tech
  - [SONOFF Official Homepage | Smart Home automation SONOFF Official](#)
- Conectores customizados para a Power Platform  
[Links to content about custom connectors for canvas apps - Power Apps | Microsoft Docs](#)
- Sonoff Library  
[skydiver/ewelink-api: eWeLink API for JavaScript \(github.com\)](#)
- Primeiros passos com Azure Functions  
[Getting started with Azure Functions | Microsoft Docs](#)

# Our Agenda

- Relembrando IOT
- Relembrando Power Platform
- Um cenário de comando CLOUD-TO-DEVICE
- Considerações
- **Q&A**



[Compressorhead Robot Band Performance in Berlin Spandau - YouTube](#)

Obrigado!

