

IoT Foundations - Kickstart Your Journey with AWS

KLICKA.TECH





AGENDA

- Introduction;
- IoT - Big Picture;
- Examples of IoT Applications;
- Device and Cloud Communication;

Coffee Break

- AWS IoT Core DEMOs;
- AWS IoT Services Landscape and Future Plans;
- Q&A / Networking.

⚡ Mikhail Vataleu is



a Solution Architect in the Internet of Things (IoT) field with core expertise in Amazon Web Services (AWS). The Head of Solution Architecture Competency at Klika Tech, Inc.



AWS Certified Solutions Architect – Associate

Amazon Web Services
Training and...



AWS Certified Cloud Practitioner

Amazon Web Services
Training and...



AWS Certified Solutions Architect – Professional

Amazon Web Services
Training and...

EXPIRED

Klika Tech is

a global IoT, Cloud-native and Big Data product and solutions development company headquartered in the U.S., with offices in North America, Europe and Asia.

aws partner network

Advanced Consulting Partner

IoT Competency
Digital CX Services Competency
DevOps Competency

aws partner network

AWS IoT Core Service Delivery 

Amazon API Gateway Service Delivery 

AWS CloudFormation Service Delivery 

AWS IoT GreenGrass Service Delivery 

AWS Lambda Service Delivery 



KLika TECH Global Partnerships

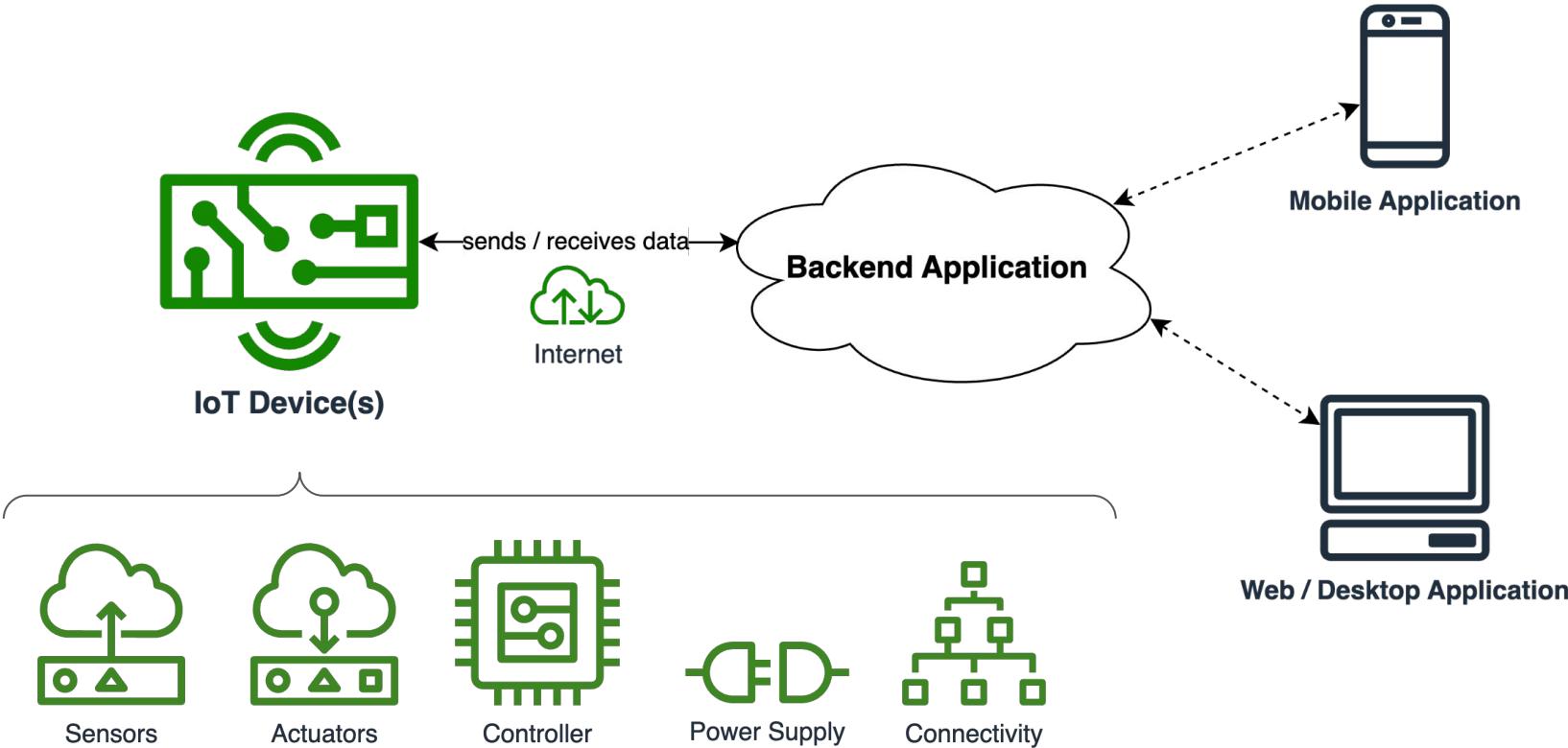


Big Picture of Internet of Things

SECTION #1



* Simple IoT Application

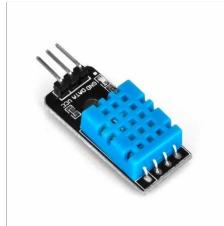


Sensor is

a device that detects
and measures physical
phenomena



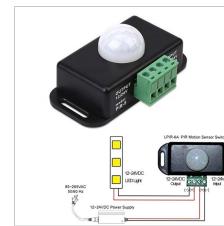
Sensors



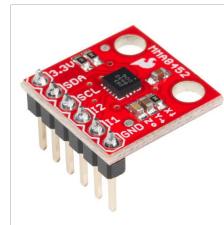
Temperature / Humidity Sensors



Light Sensors



Motion Sensors



Accelerometer / Gyroscope / Magnetometer



GPS Sensor



Cameras



Microphones



Buttons

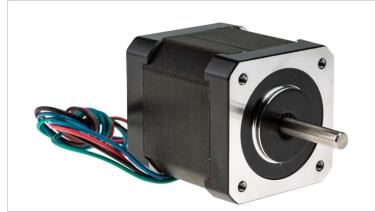
And Many Many
others...

Actuator is

a device that converts
digital signals into
physical actions



Actuators



Motors (Step and Servo)



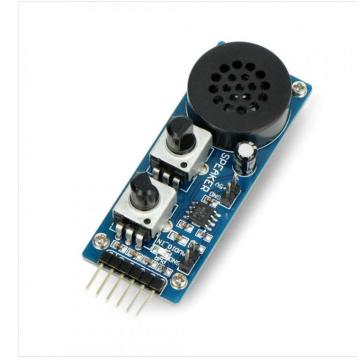
LEDs



Relays



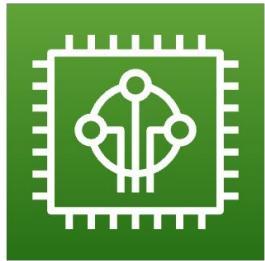
Displays



Speakers

And Many Many
others...

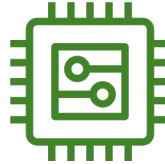
Controllers



FreeRTOS



Microcontroller (MPU)



Controller



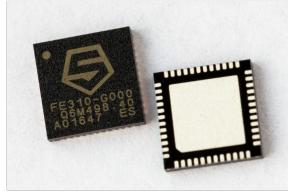
Microcomputer (SBC)



GreenGrass



STM Micro (STM32)



SiFive (FE310)



Espressif (ESP32)



Raspberry Pi Foundation (RPi4)



Lenovo (M90n-IoT)

KLIKA TECH GLOBAL IoT SOLUTIONS

Power Supply



Battery-powered IoT Devices

devices that rely on a battery (can be rechargeable) as their primary power source



Plugged-in IoT devices

devices that are connected directly to a power outlet for a continuous supply of power, without relying on batteries or other portable power sources

❖ Connectivity (Wired)

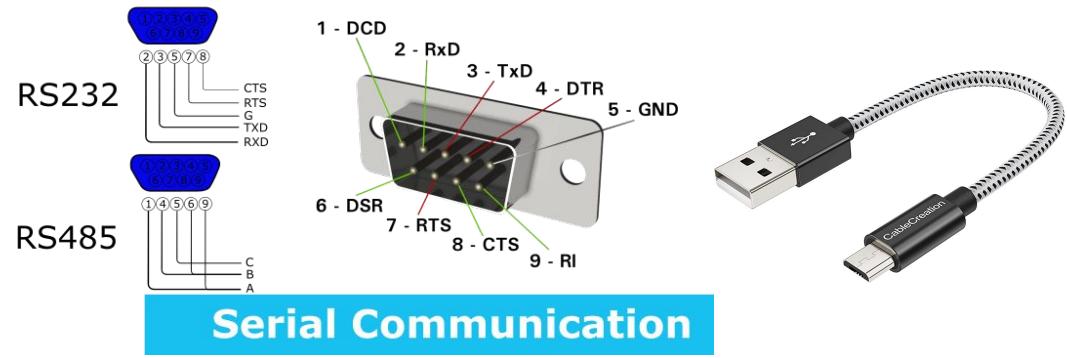
Peripherals Connectivity:

GPIO - General Purpose Input/Output

SPI - Serial Peripheral Interface

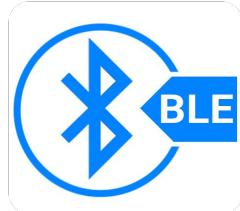
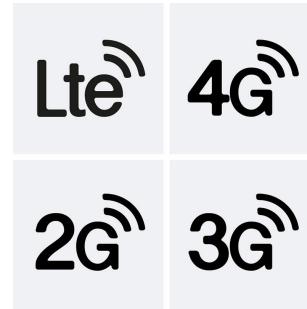
UART - Universal Asynchronous Receiver/Transmitter

I2C - Inter-Integrated Circuit



And Many Many others...

✳️ Connectivity (Wireless)



And Many Many
others...

Examples of IoT Applications

SECTION #2



Smart Watch

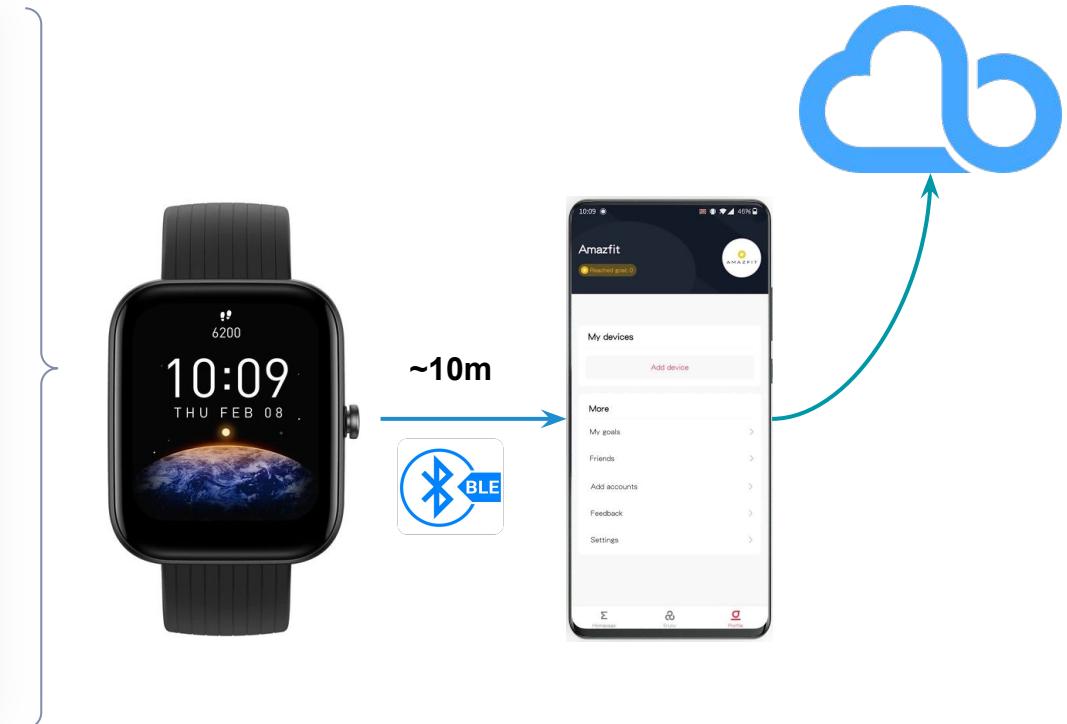
Sensors: Accelerometer, Gyroscope, SpO₂, GPS, Button, Touchscreen, etc.

Actuators: Touchscreen, Vibro

Controller: Microcontroller

Power Supply: Battery (up to 2w)

Connectivity: BLE



Robot Vacuum Cleaner

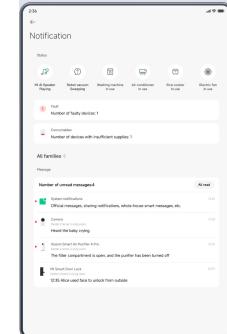
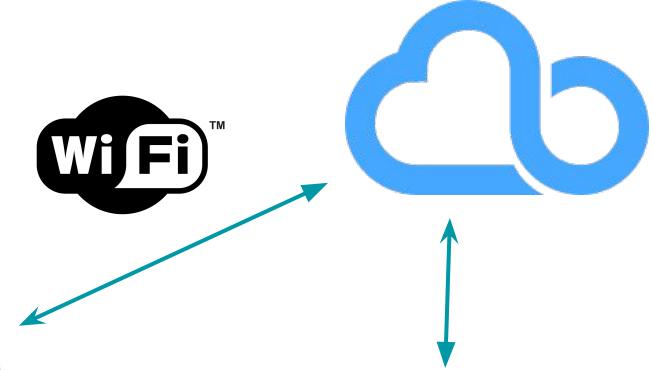
Sensors: Lidar, Infrared camera, Microphone, Gyroscope, Buttons, Bumper sensor, etc.

Actuators: Motors (wheels, brush, fan), Speaker, etc.

Controller: Microcomputer

Power Supply: Battery (up to 6h)

Connectivity: WiFi (primary), BLE (configuration)



Smart Home / Building

Sensors: Humidity

Actuators: Speaker

Controller: Microcontroller

Power Supply: Battery (up to 2y)

Connectivity: Zigbee

Sensors: Light

Actuators: LED

Controller: Microcontroller

Power Supply: Plugged-in

Connectivity: Zigbee

Sensors: -

Actuators: -

Controller: Microcomputer

Power Supply: Plugged-in

Connectivity: Zigbee, WiFi



Water leak sensor



zigbee



Smart Bulb

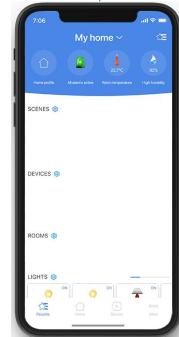
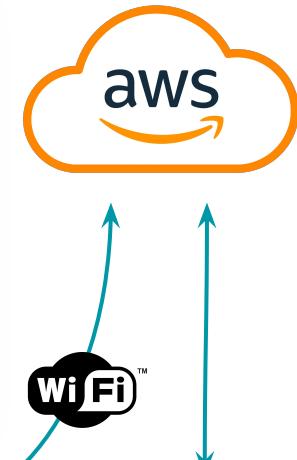


~15m



IoT Hub

~15m



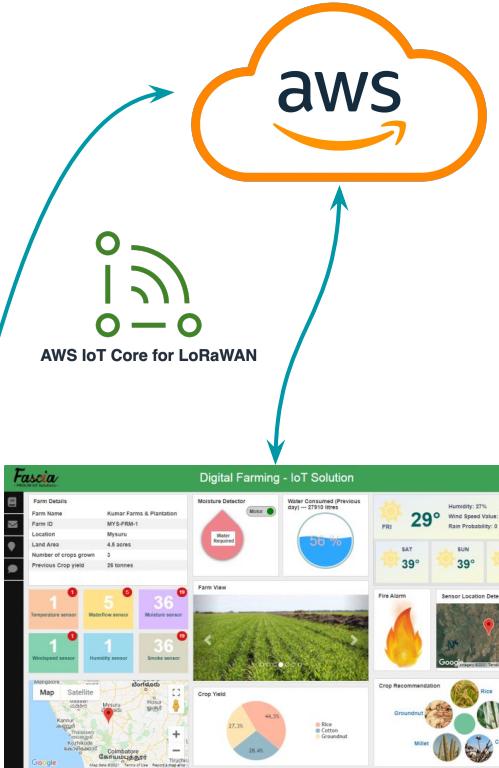
Smart Agriculture

Sensors: Soil Sensor, Temperature
Actuators: LED
Controller: Microcontroller
Power Supply: Battery (up to 10y)
Connectivity: LoRa

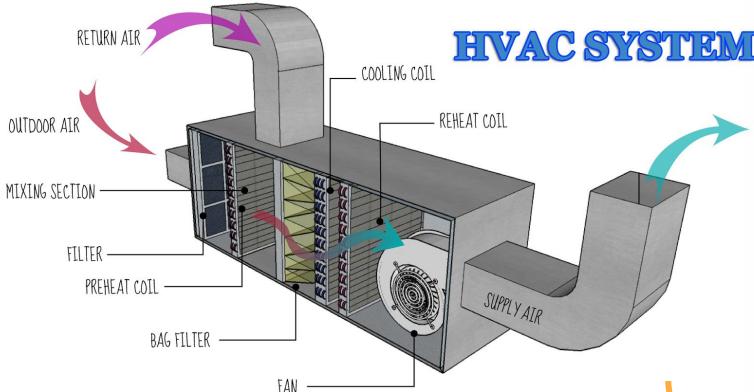


~50km
LoRaWAN™

Sensors: -
Actuators: -
Controller: Microcomputer
Power Supply: Plugged-in
Connectivity: LoRa, WiFi, Eth, LTE, etc



Industrial Asset Monitoring



HVAC SYSTEM

Sensors: Temperature, CO2, Airflow, Pressure, etc.

Actuators: Fan, motors, etc.

Controller: PLC

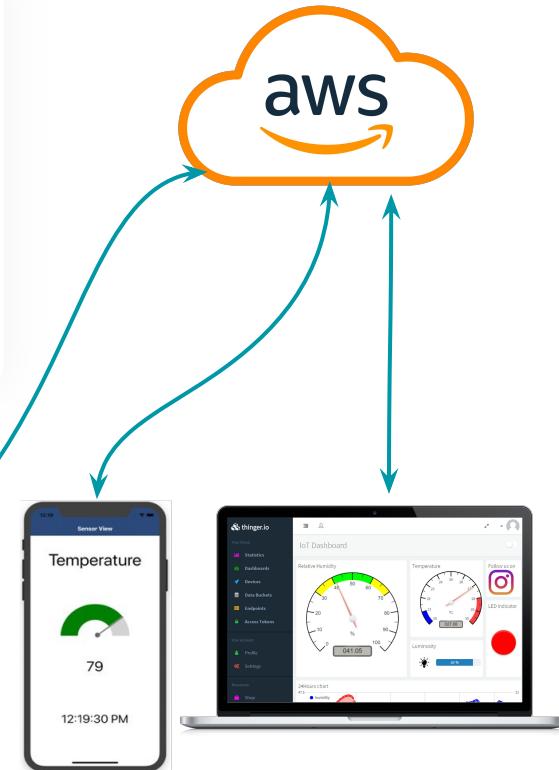
Power Supply: Plugged-in

Connectivity: Modbus over RS485

Sensors: -
Actuators: -
Controller: Microcomputer
Power Supply: Plugged-in
Connectivity: Modbus over RS485, LTE/4G, etc.



Industrial IoT Gateway



Device and Cloud Communication

SECTION #3



Application Protocols for IoT

	TCP	UDP	
HTTP	Secure	Unsecure	COAP
Socket	Connection-Oriented	Connectionless	LWM2M
AMQP	Slow	Fast	MQTT-SN
MQTT	Guaranteed Transmission	No Guarantee	
etc	Used by Critical Applications	Used by Real-Time Applications	etc
	Packet Reorder Mechanism	No Reorder Mechanism	
	Flow Control	No Flow Control	
	Advanced Error Checking	Basic Error Checking (Checksum)	
	20 Bytes Header	8 Bytes Header	
	Acknowledgement Mechanism	No Acknowledgement	
	Three-Way Handshake	No Handshake Mechanism	

MQTT 101

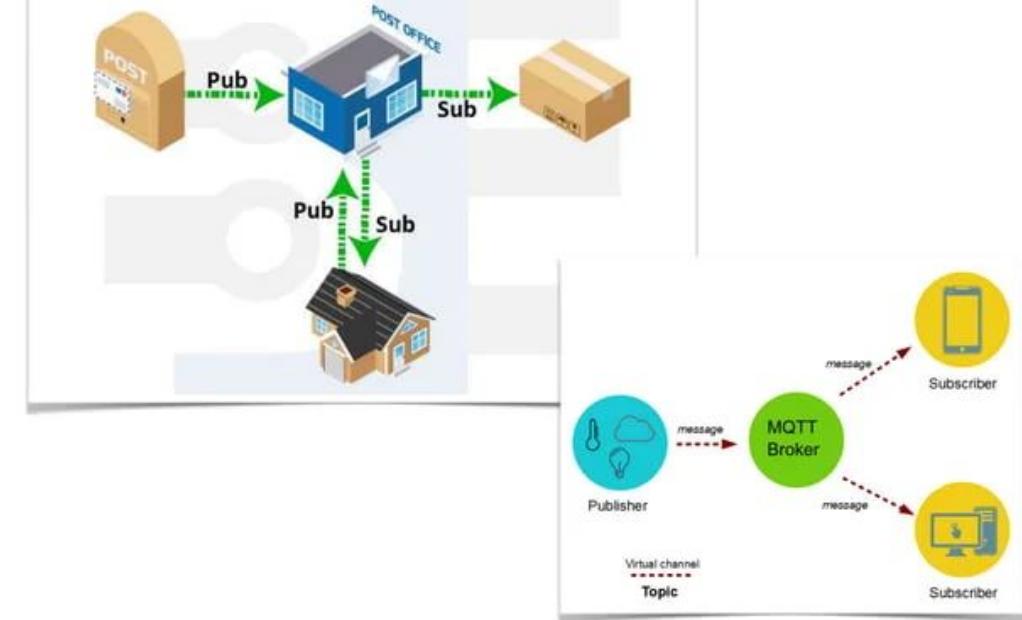
Serverless MQTT
Broker with extras



AWS IoT Core

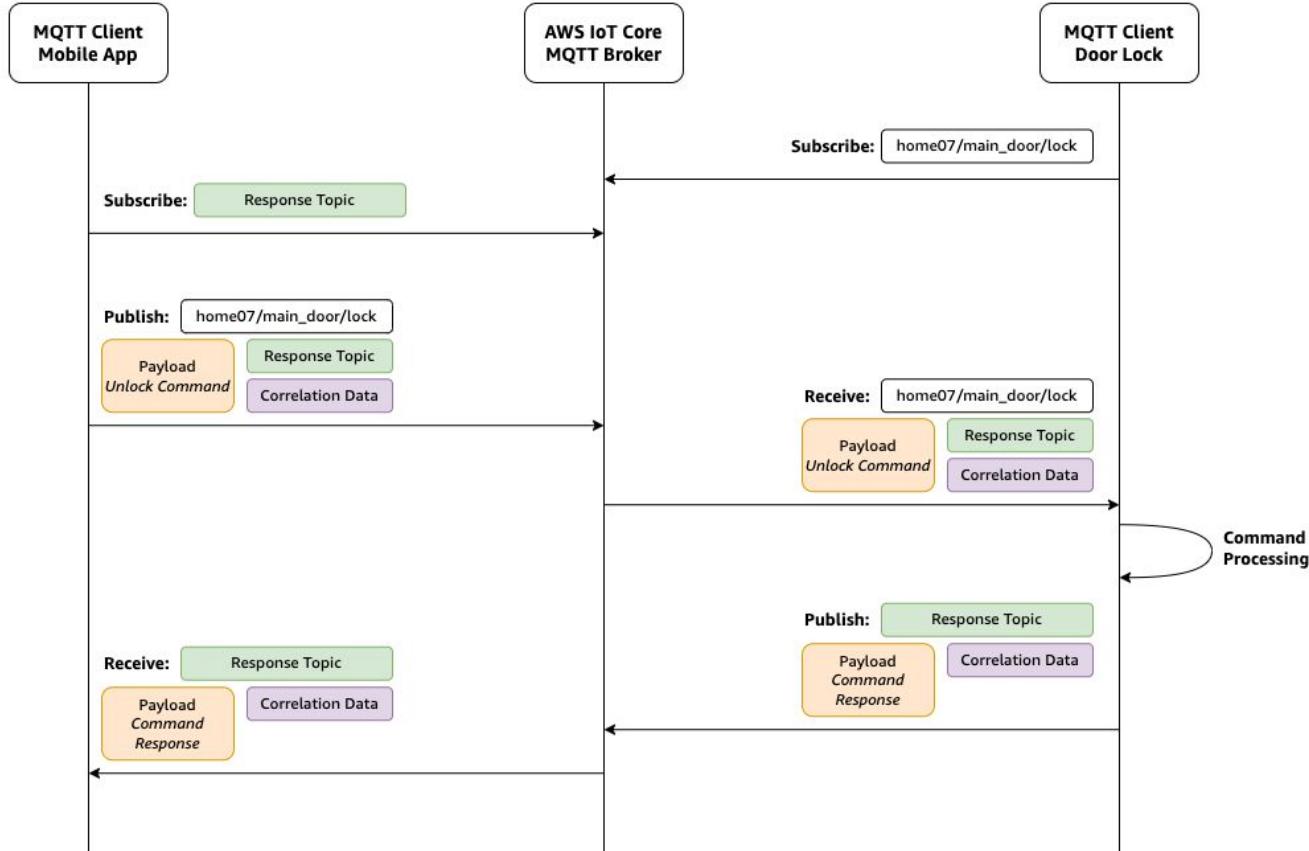
Analogy for MQTT

`mqtt://broker/topic/message`



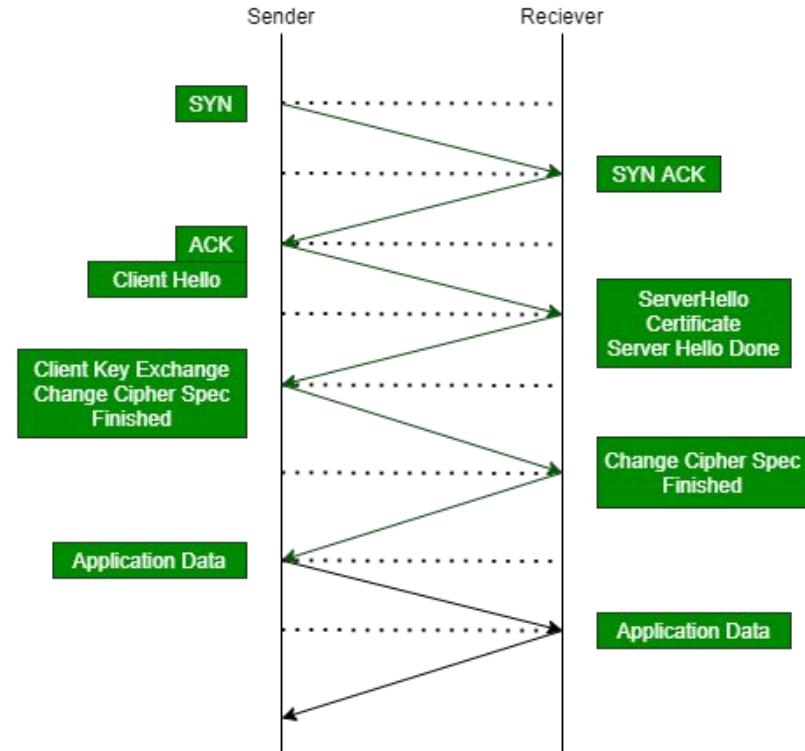
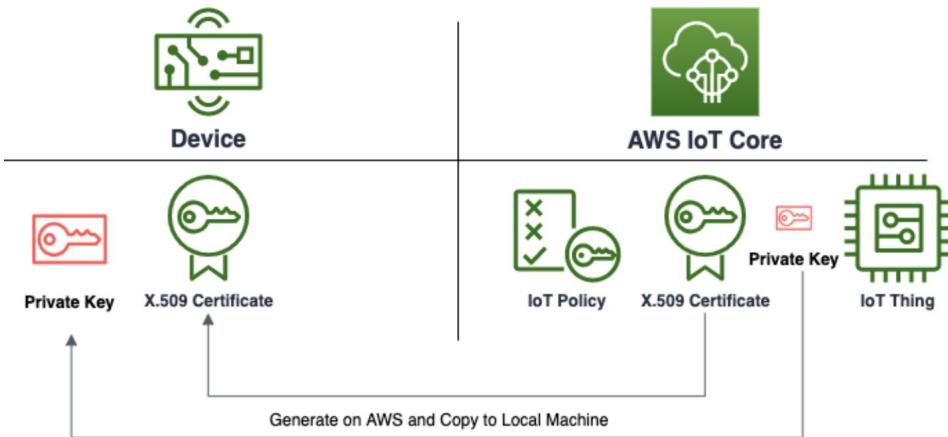
Request Response Pattern in MQTT

Typical use-case:
Execution of
Commands on the
Device from Cloud



★ Security in MQTT

MQTTs = MQTT + TLS



Coffee Break

15 minutes

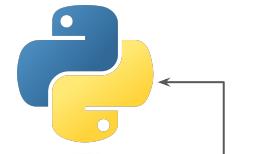
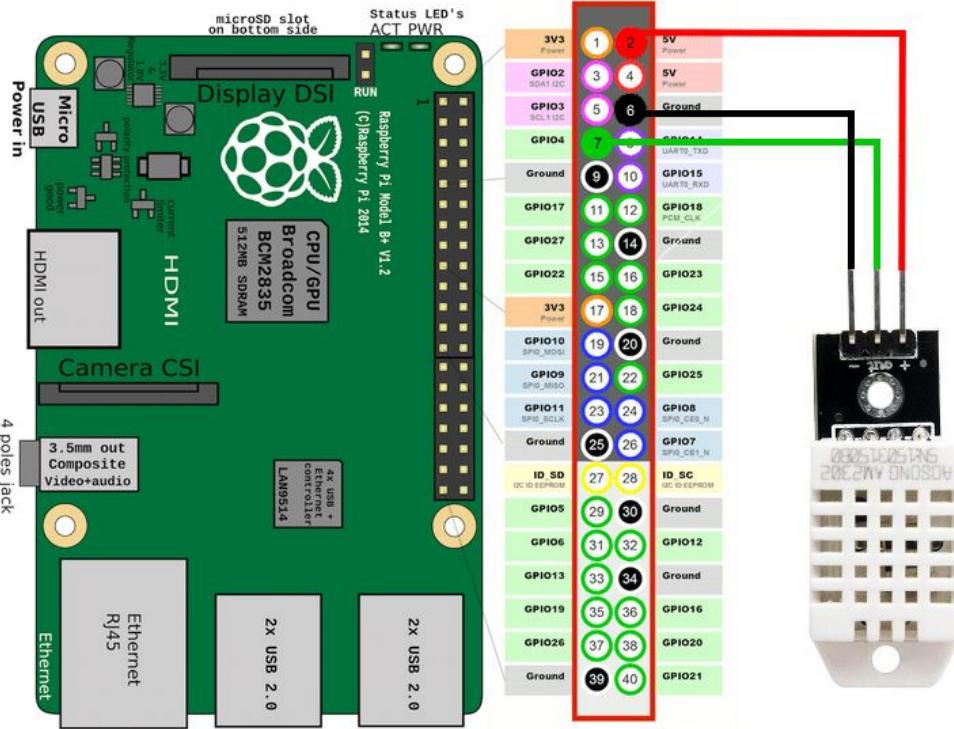
AWS IoT Core DEMOs



SECTION #4



Demo Setup

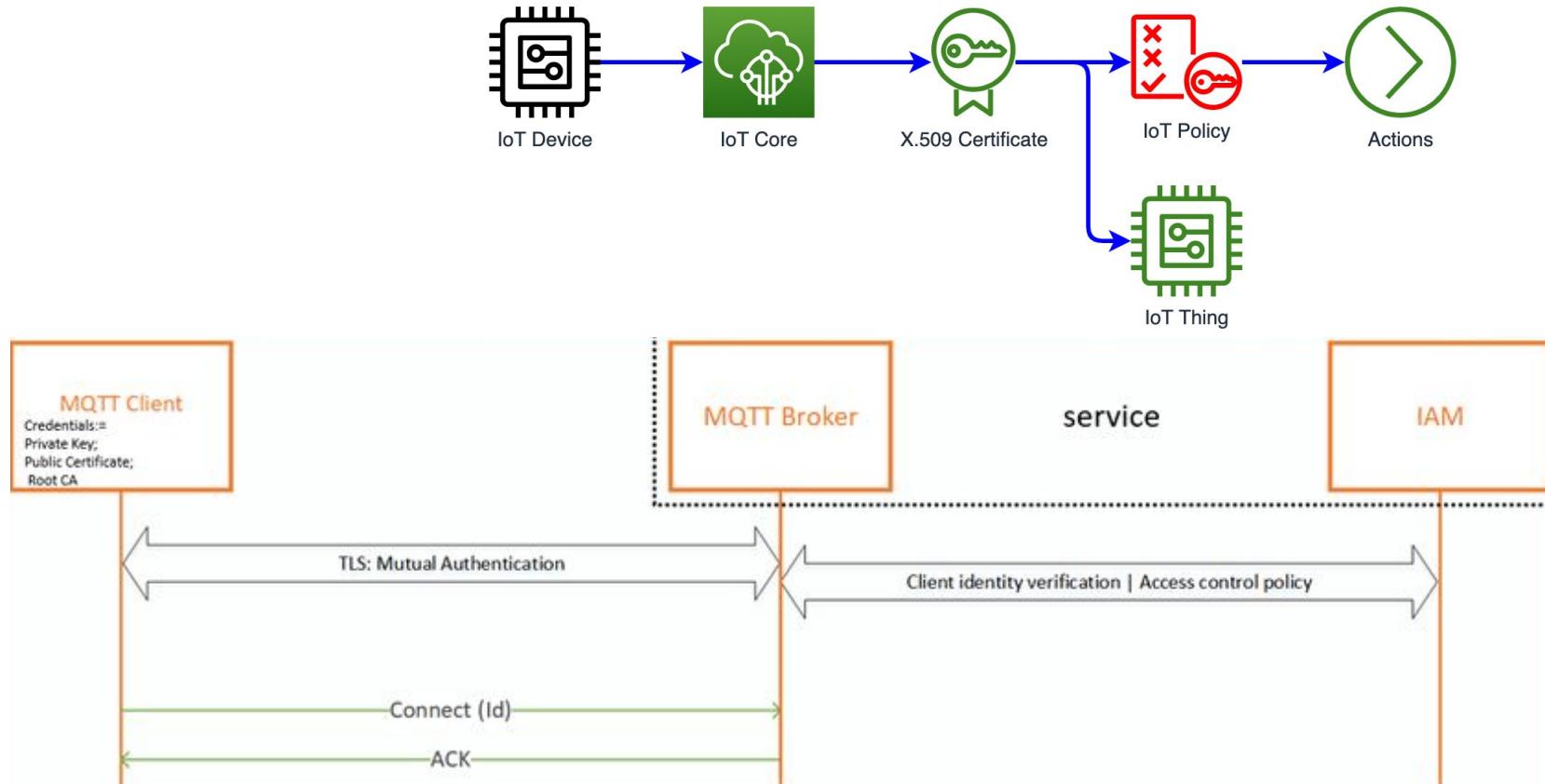


AWS IoT
Device SDK
v2 for Python

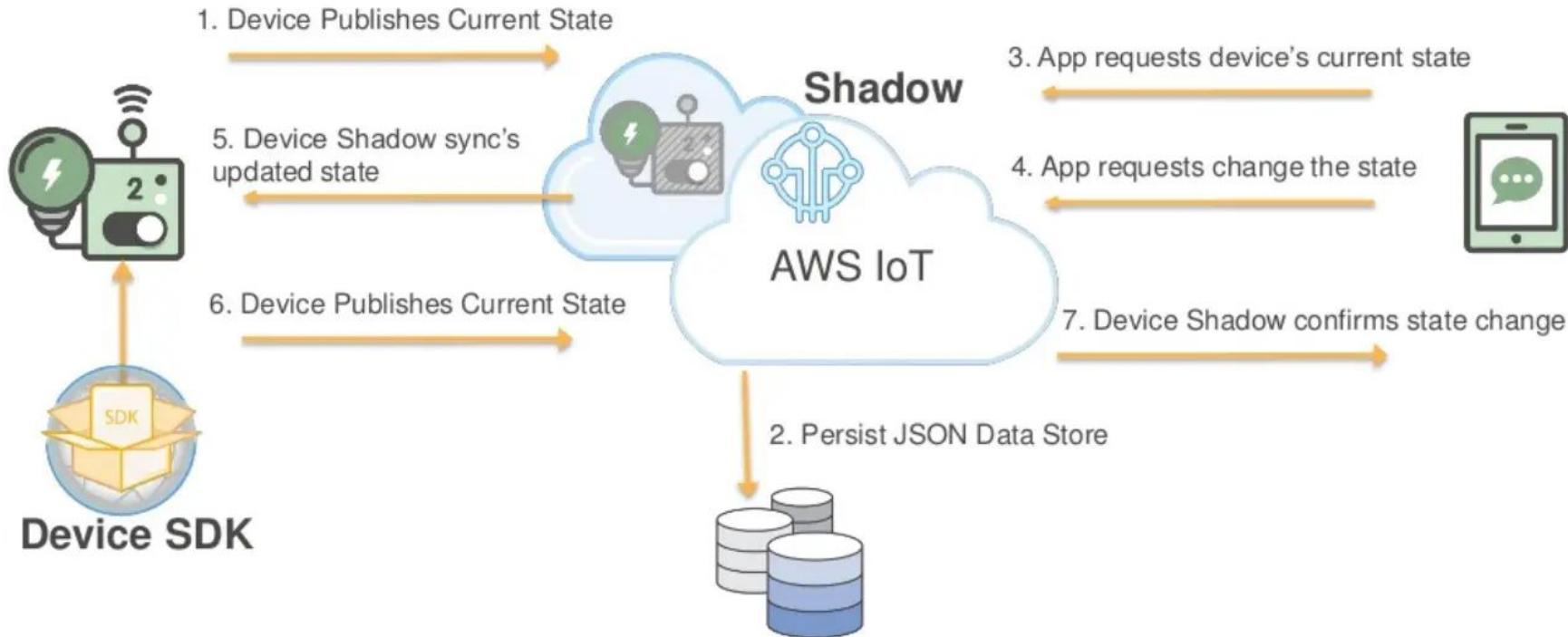


AWS IoT Core

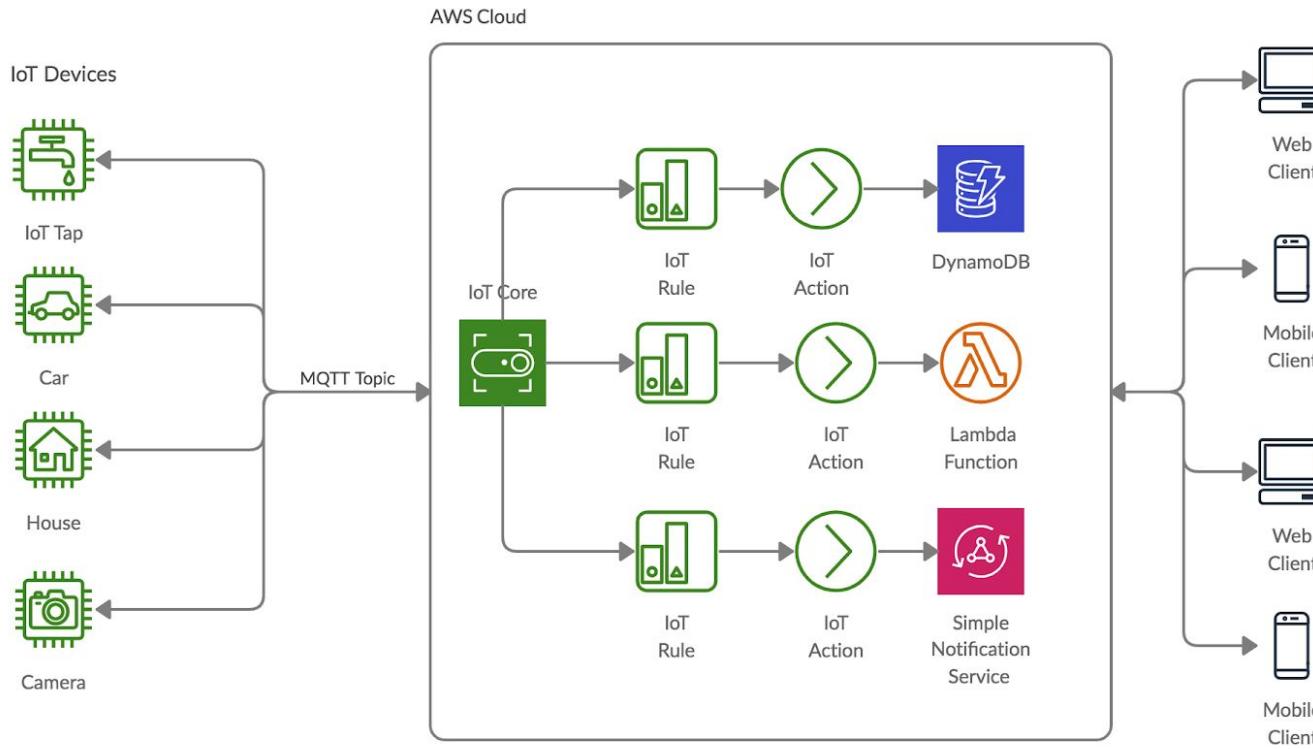
AWS IoT Core Security



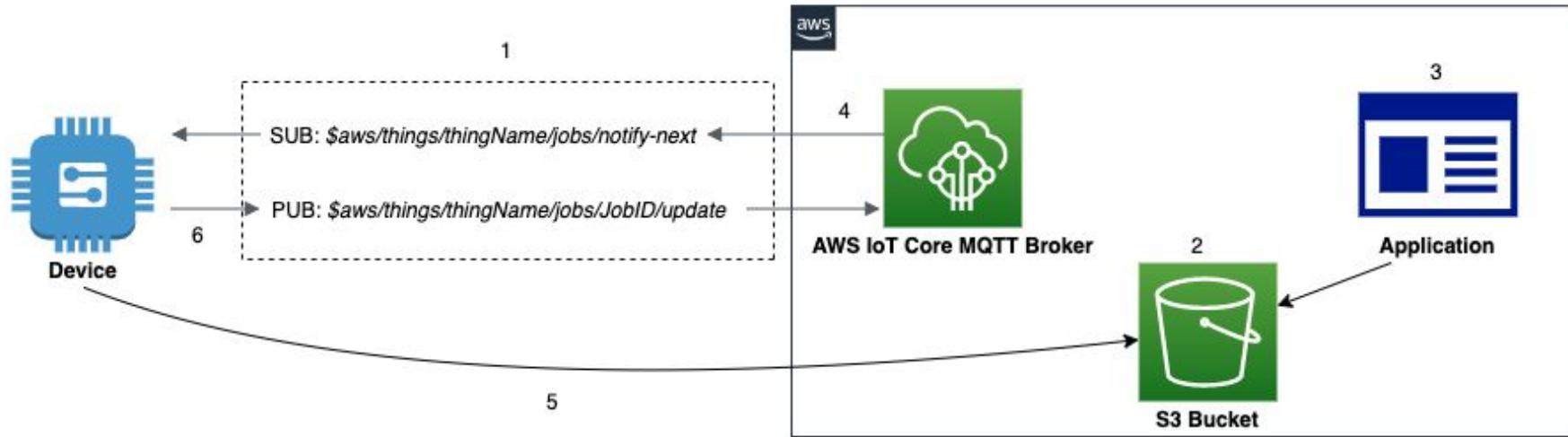
AWS IoT Device Shadow



AWS IoT Core Rules



AWS IoT Core Jobs



AWS IoT Services Landscape and Future Plans

SECTION #5

AWS IoT Services Landscape

Open Questions:

- How do x.509 certs appear on the device during manufacturing?
- How to rotate certificates on the device?
- How to perform firmware update on the device?
- How to manage a fleet of the devices in the Cloud?
- What I can do with device data in the Cloud?
- etc...

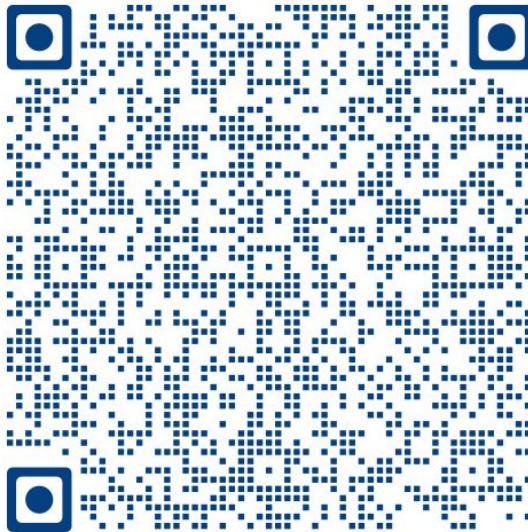
The screenshot shows the AWS IoT Core landing page. At the top, there's a navigation bar with links for Products, Solutions, Pricing, Documentation, Learn, and Partner Network. Below that, a secondary navigation bar has tabs for AWS IoT Core, Overview (which is underlined), IoT Services (with a dropdown arrow), and Features. A modal window is open over the page, displaying a list of IoT services under the heading "Device Software". The list includes FreeRTOS, AWS IoT ExpressLink, and AWS IoT Greengrass. Below this, another section lists "Control Services" like AWS IoT Core, AWS IoT Device Management, AWS IoT Device Defender, AWS IoT FleetWise, AWS IoT RoboRunner, AWS IoT 1-Click, and AWS Analytics Services. Further down are sections for AWS IoT Events, AWS IoT SiteWise, AWS IoT TwinMaker, Amazon Kinesis Video Streams, and other services.

- Device Software
 - FreeRTOS
 - AWS IoT ExpressLink
 - AWS IoT Greengrass
- Control Services
 - AWS IoT Core
 - AWS IoT Device Management
 - AWS IoT Device Defender
 - AWS IoT FleetWise
 - AWS IoT RoboRunner
 - AWS IoT 1-Click
 - Analytics Services
 - AWS IoT Analytics
 - AWS IoT Events
 - AWS IoT SiteWise
 - AWS IoT TwinMaker
 - Amazon Kinesis Video Streams

✳ Future Plans

We are thinking about running the following events:

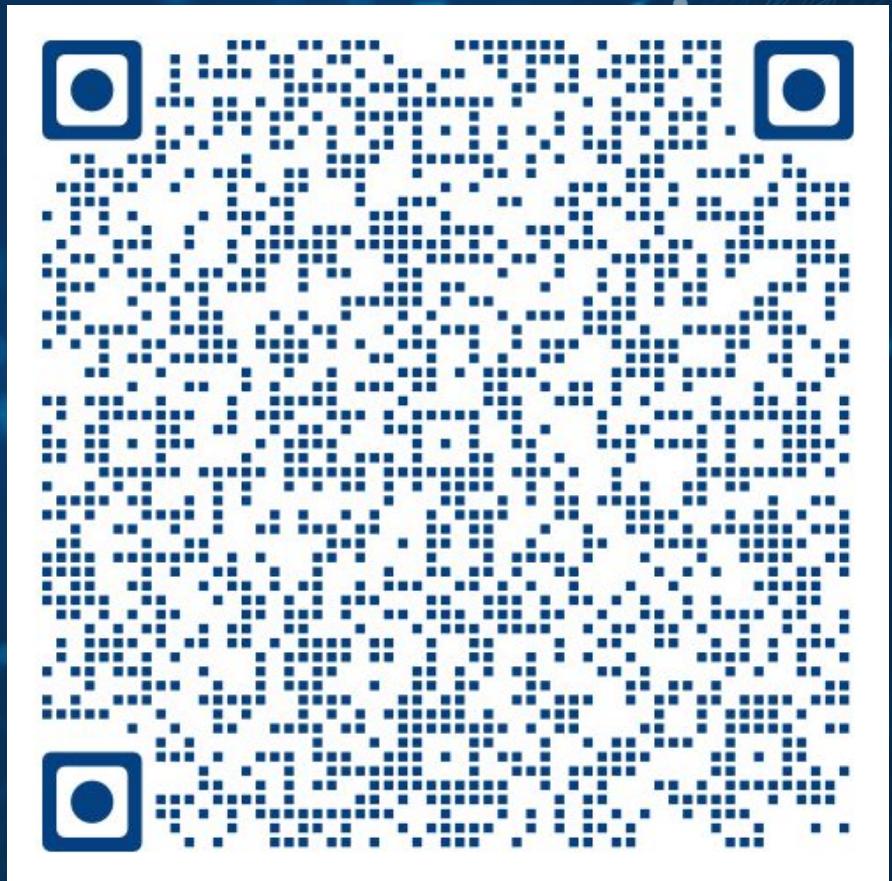
- A workshop on Amazon FreeRTOS
- A workshop on AWS Greengrass
- A lecture on handling IoT device data in the Cloud
- A workshop on Machine Learning with Greengrass



Please fill out a survey if you are interested in any of these IoT events

Thank You!

Q&A





USEFUL LINKS

- [Connect with me on LinkedIn](#)
- [Github Repo with Samples](#)
- [Meetup Feedback Form](#)
- [Careers at Klika Tech](#)