

PRAGMATIC AWS IOT SCOPE OF WORK

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Internet-of-Things Introduction

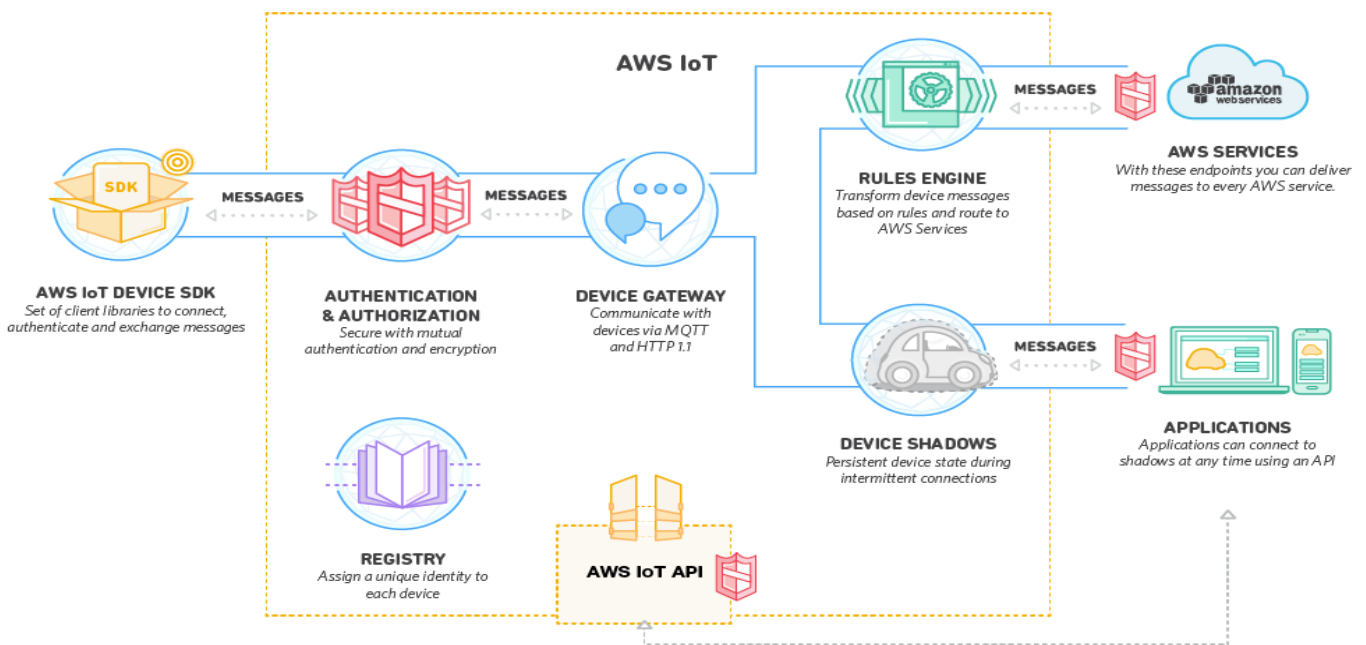


• The Internet of Things (IoT) is a network of physical objects embedded with sensors, software, and other technologies for connecting and exchanging data with other devices and systems over the internet. These objects range from simple household appliances like refrigerators and washing machines to complex industrial machinery and vehicles. The primary goal of IoT is to improve efficiency, reduce costs, and create new services and business models.

About Internet of Things?

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AWS IOT Architecture



AWS IOT Hardware Device Intel® Edison and Grove IoT Starter Kit Powered by AWS

The bundle includes the Grove IoT Environmental Kit* from Seeed Studios, a rapid-prototyping kit for designing indoor applications based on the Intel® Edison development board, and Amazon Web Services* (AWS), a suite of services that enables secure, bidirectional communications between the device and the cloud. AWS IoT* is a platform that allows devices — cars, turbines, sensor grids, light bulbs and more -- to connect to AWS services so companies can store, process, analyze, and act on the volumes of data generated by connected devices on a global scale. With a base shield that can connect up to 11 different sensors and actuators and access to AWS, you can easily create a new Internet of Things (IoT) device to explore and interact with your indoor environment. AWS services extends the functionality of the Grove Indoor Environmental Kit* for Intel Edison, adding the ability to transform, augment, or route messages to the AWS cloud with secure authentication from X.509 certificates installed on your device. You can also control how your IoT clients such as micro controllers, sensors, actuators, mobile devices, or applications connect to the AWS cloud with built-in services and SDKs to fine-tune communication, rules, and roles

Parts List:

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[Intel® Edison for Arduino](#)

[Base Shield](#)

[Grove - Temperature&Humidity Sensor \(High-Accuracy & Mini\)](#)

[Grove - Moisture Sensor](#)

[Grove - Light Sensor](#)

[Grove - UV Sensor](#)

[Grove - PIR Motion Sensor](#)

[Grove - Encoder](#)

[Grove - Button](#)

[Grove - LCD RGB Backlight](#)

[Grove - Relay](#)

[Grove - Servo](#)

[Grove - Buzzer](#)

USB Cable; 480mm-Black

USB Wall Power Supply

Elm 8 cW a YbUjcb

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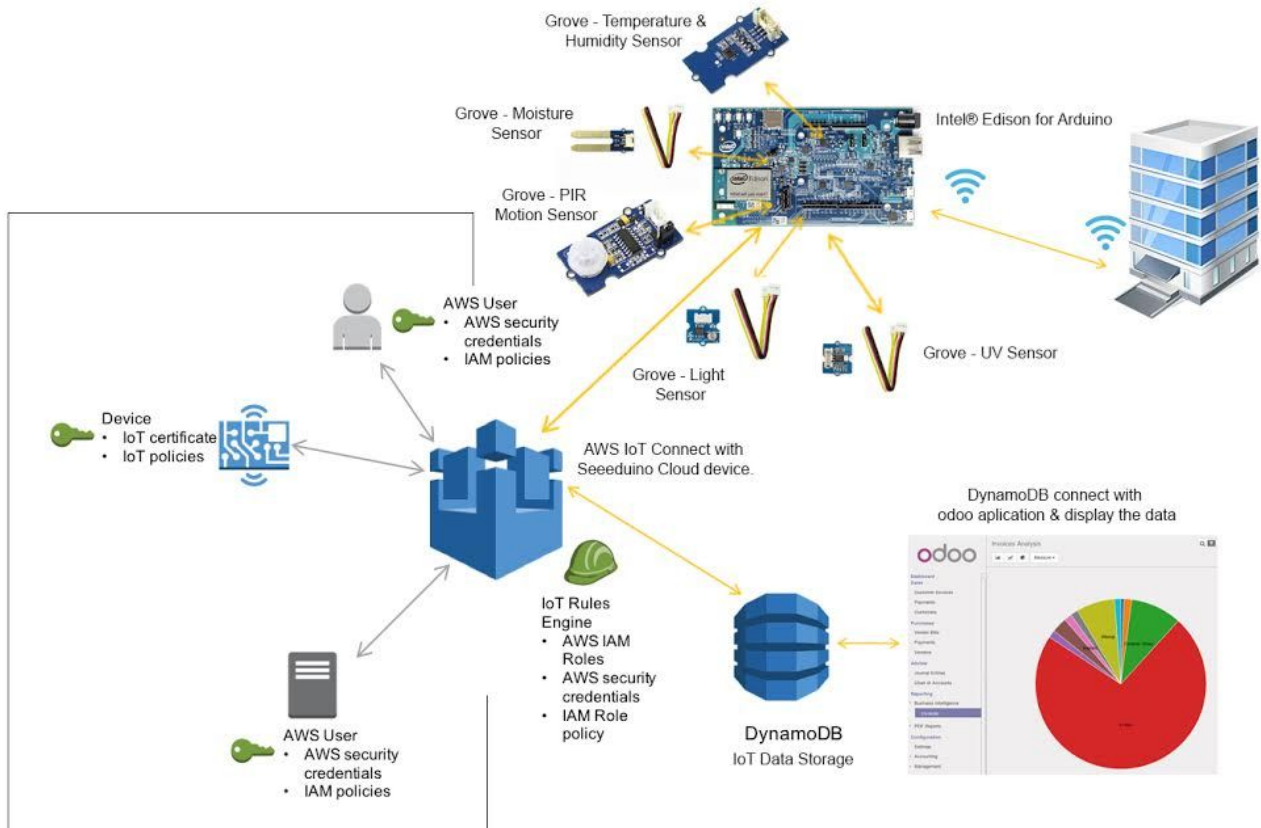
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Project Scope of Work

We expect that the team works on getting all 5 sensors listed below connect using the AWS IoT Architecture shown above. Once the device is connected to AWS we should be able to capture the data inside Dynamodb. The complete project should be able to use the Device Gateway, Device Shadow with TLS authentication and MQTT protocol.. The sensors to be used are defined below

Intel® device With AWS IoT Architecture



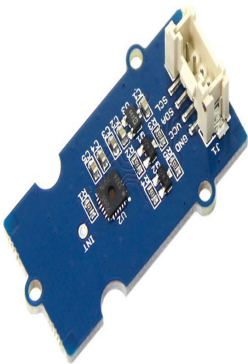
Intel® Edison for Arduino



FEATURES

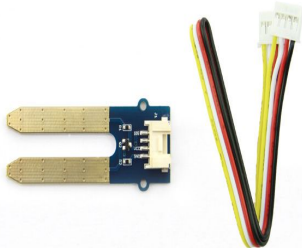
- Uses a 22nm Intel® SoC that includes a dual core, dual threaded Intel® Atom™ CPU at 500MHz and a 32-bit Intel® Quark™ microcontroller at 100 MHz. It supports 40 GPIOs and includes 1GB LPDDR3, 4 GB EMMC, and dual-band WiFi and BTLE on a module slightly larger than a postage stamp.
- The Intel Edison module will initially support development with Arduino* and C/C++, followed by Node.JS, Python, RTOS, and Visual Programming support in the near future.
- It includes a device-to-device and device-to-cloud connectivity framework to enable cross-device communication and a cloud-based, multi-tenant, time-series analytics service.
- Has an SD card connector, micro USB or standard sized USB host Type-A connector(via mechanical switch), Micro USB device, 6 analog inputs, and 20 digital input/output pins, 1x UART, 1x I2C, and 1x ICSP 6-pin header (SPI) Power jack with 7V-15V DC input.

Sensors



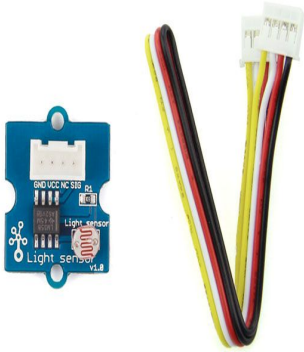
Grove - Temperature & Humidity Sensor (High-Accuracy & Mini)

This is a multifunctional sensor that gives you temperature and relative humidity information at the same time. It utilizes a TH02 sensor that can meet measurement needs of general purposes. It provides reliable readings when environment humidity condition in between 0-80% RH, and temperature condition in between 0-70°C, covering needs in most home and daily applications that don't contain extreme conditions.



Grove - Moisture Sensor

The [Grove - Moisture Sensor](#) can be used to detect the moisture of soil, to judge if there is dampness around the sensor. It can be used to decide if the plants in a garden needs watering. It can be used in gardens to automate watering plants. It can be used very easily by just inserting the sensor into the soil and reading the output using ADC.

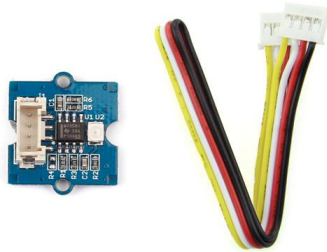


Grove - Light Sensor

The [Grove - Light sensor](#) module uses GL5528 photoresistor(light dependent resistor) to detect the intensity of light in the environment. The resistance of photoresistor decreases when the intensity of light increases. A dual OpAmp chip LM358 on board produces voltage corresponding to intensity of light(i.e based on resistance value). The output signal from this module will be HIGH in bright light and LOW in the dark.

This module can be used to build a light controlled switch i.e switch off lights during day time and switch on lights during night time.

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Grove - UV Sensor

The Grove – UV Sensor is used for detecting the intensity of incident ultraviolet(UV) radiation. This form of electromagnetic radiation has shorter wavelengths than visible radiation. It is based on the sensor GUVA-S12D.It has a wide spectral range of 200nm-400nm. The module will output electrical signal which is varied with the change of the UV intensity. UV sensors are used for determining exposure to

ultraviolet radiation in laboratory or environmental settings.

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Grove - PIR Motion Sensor

This is a simple to use PIR motion sensor with Grove compatible interface. Simply connect it to Stem shield and program it, when anyone moves in its detecting range, the sensor outputs HIGH on its SIG pin.

The detecting range and response speed can be adjusted by 2 potentiometers soldered on its circuit board, The response speed is from 0.3s - 25s, and max 6 meters of detecting range.

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AWS Device Shadow

A thing shadow (sometimes referred to as a device shadow) is a JSON document that is used to store and retrieve current state information for a thing (device, app, and so on). The Thing Shadows service maintains a thing shadow for each thing you connect to AWS IoT. You can use thing shadows to get and set the state of a thing over MQTT or HTTP, regardless of whether the thing is connected to the Internet

Device Shadows Data Flow

The Thing Shadows services acts as an intermediary, allowing devices and applications to retrieve and update thing shadows.

The Thing Shadows service uses a number of MQTT topics to facilitate communication between applications and devices. To see how this works, use the AWS IoT MQTT client to subscribe to the following MQTT topics with QoS 1:

`$aws/things/myLightBulb/shadow/update/accepted`

The Thing Shadows service sends messages to this topic when an update is successfully made to a thing shadow.

`$aws/things/myLightBulb/shadow/update/rejected`

The Thing Shadows service sends messages to this topic when an update to a thing shadow is rejected.

`$aws/things/myLightBulb/shadow/update/delta`

The Thing Shadows service sends messages to this topic when a difference is detected between the reported and desired sections of a thing shadow.

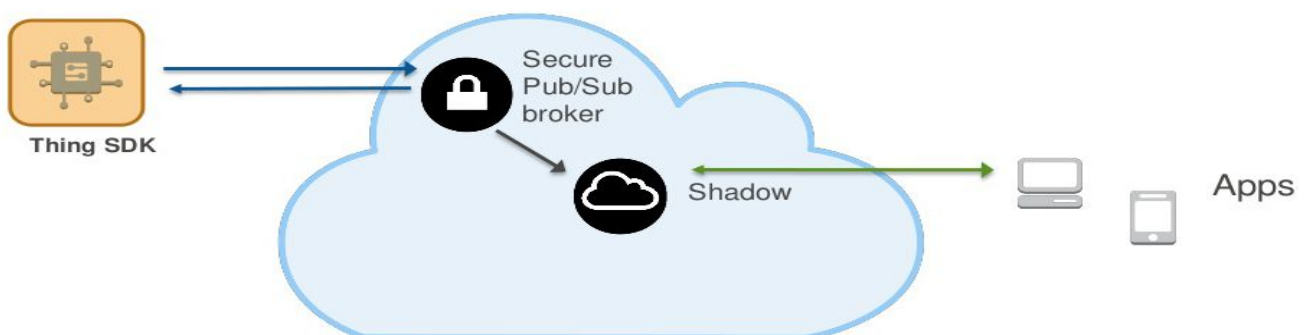
`$aws/things/myLightBulb/shadow/get/accepted`

The Thing Shadows service sends messages to this topic when a request for a thing shadow is made successfully.

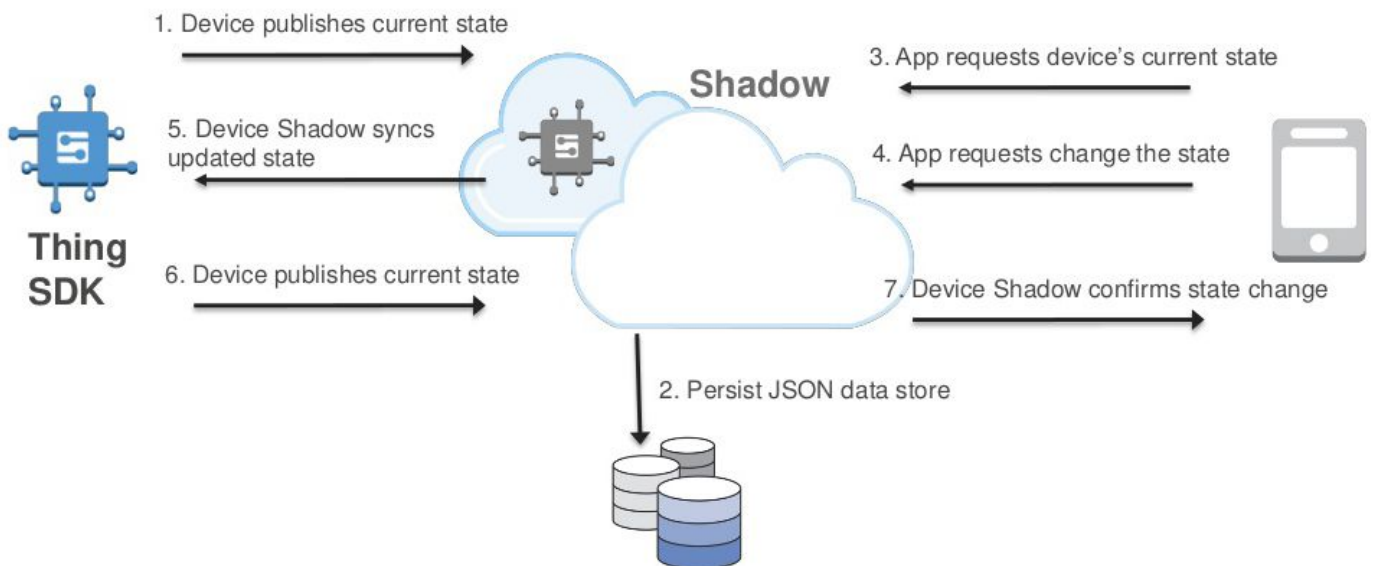
`$aws/things/myLightBulb/shadow/get/rejected`

The Thing Shadows service sends messages to this topic when a request for a thing shadow is rejected.

AWS IoT Device Shadows



AWS IoT Device Shadows flow



AWS IoT Device Gateway

The AWS IoT Device Gateway enables devices to securely and efficiently communicate with AWS IoT. The Device Gateway can exchange messages using a publication/subscription model, which enables one-to-one and one-to-many communications. With this one-to-many communication pattern AWS IoT makes it possible for a connected device to broadcast data to multiple subscribers for a given topic. The Device Gateway supports MQTT, WebSockets, and HTTP 1.1 protocols and you can easily implement support for proprietary or legacy protocols. The Device Gateway scales automatically to support over a billion devices without provisioning infrastructure.



Amazon DynamoDB

Amazon DynamoDB is a fast and flexible [NoSQL database](#) service for all applications that need consistent, single-digit millisecond latency at any scale. It is a fully managed cloud database and supports both document and key-value store models. Its flexible data model and reliable performance make it a great fit for mobile, web, gaming, ad tech, IoT, and many other applications. Start today by downloading the [local version of DynamoDB](#), then read our [Getting Started Guide](#).

Reference Material

Getting Started

AWS IoT is a managed cloud service that lets connected devices -- cars, light bulbs, sensor grids and more -- easily and securely interact with cloud applications and other devices.

This interactive tutorial will help you to get started quickly by demonstrating the following service features:

- Connect things to the Device Gateway
- Process and act on data with the Rules Engine
- Read and set device state with Device Shadows

Read and set device state with Shadows

AWS IoT includes Device Registry and Device Shadows, so you can register any thing you wish to represent in the cloud with a name, some attributes, and a persistent virtual 'shadow'.

The example at the left shows that a thing has been created to represent the physical light bulb, with a virtual counterpart in the cloud.

Try turning off the physical light bulb. You'll notice that the Device Shadow remembers the color of the physical light bulb.

Next, try sending new "R" "G" and "B" commands from the control unit, with the physical light bulb still turned off.

The shadow will persist the desired future state of the bulb. When you turn the physical bulb back on, AWS IoT will command the physical bulb to match

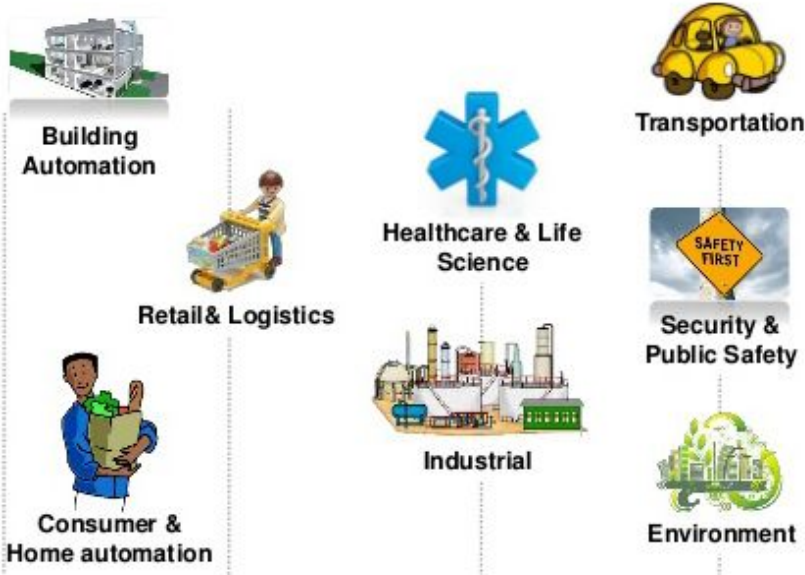
IoT news and features

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Application Scope?

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 *5A' MuijbmMl y' xMl' b' ' MZM Smart home \$ Smart City \$ Smart grids, Industrial Internet, and
 Connected Health (Digital health/Telehealth/Telemedicine)

Area Of Application



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