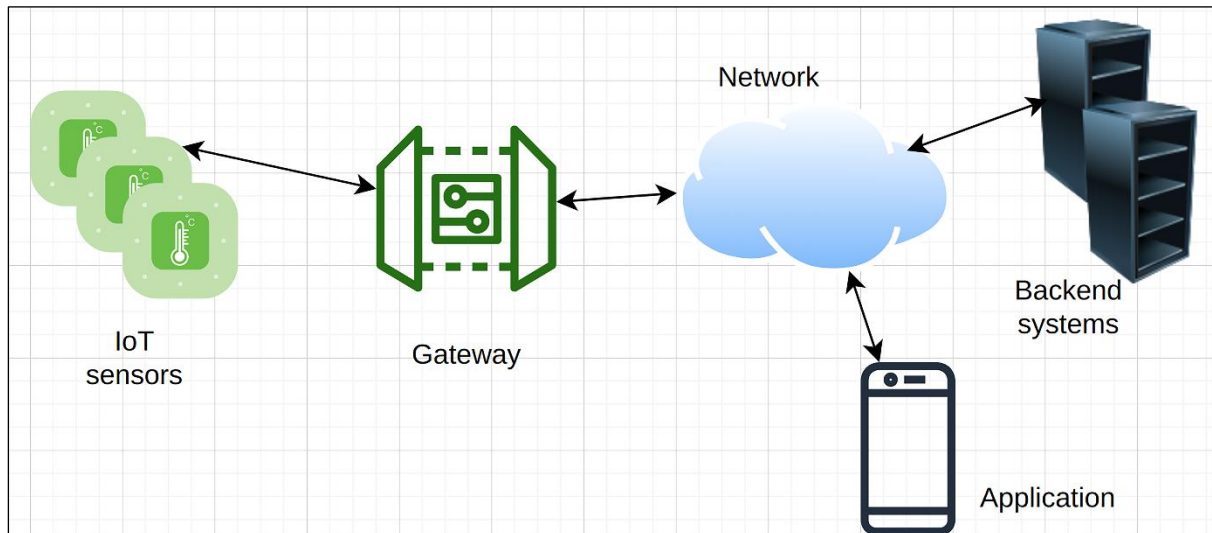
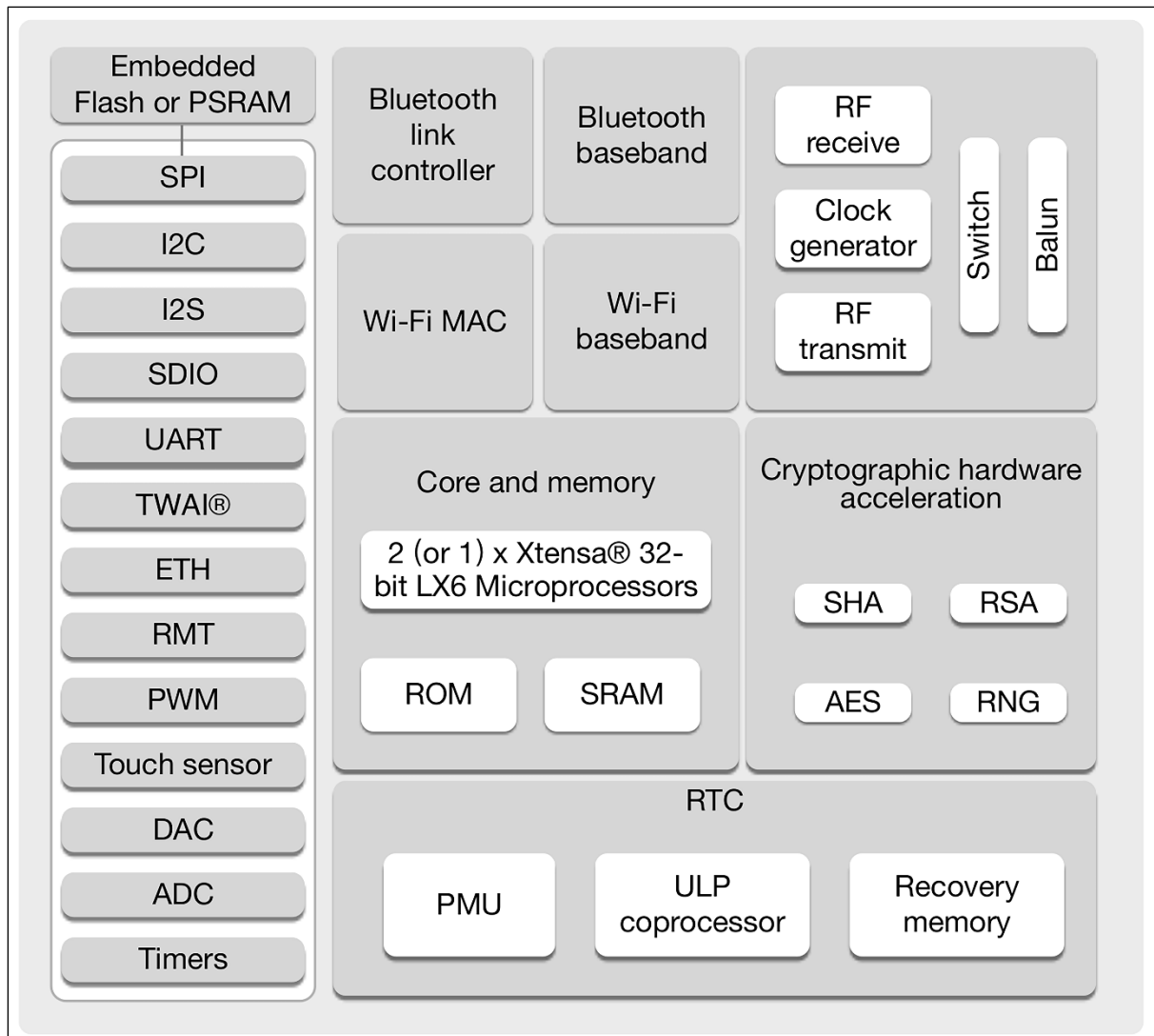
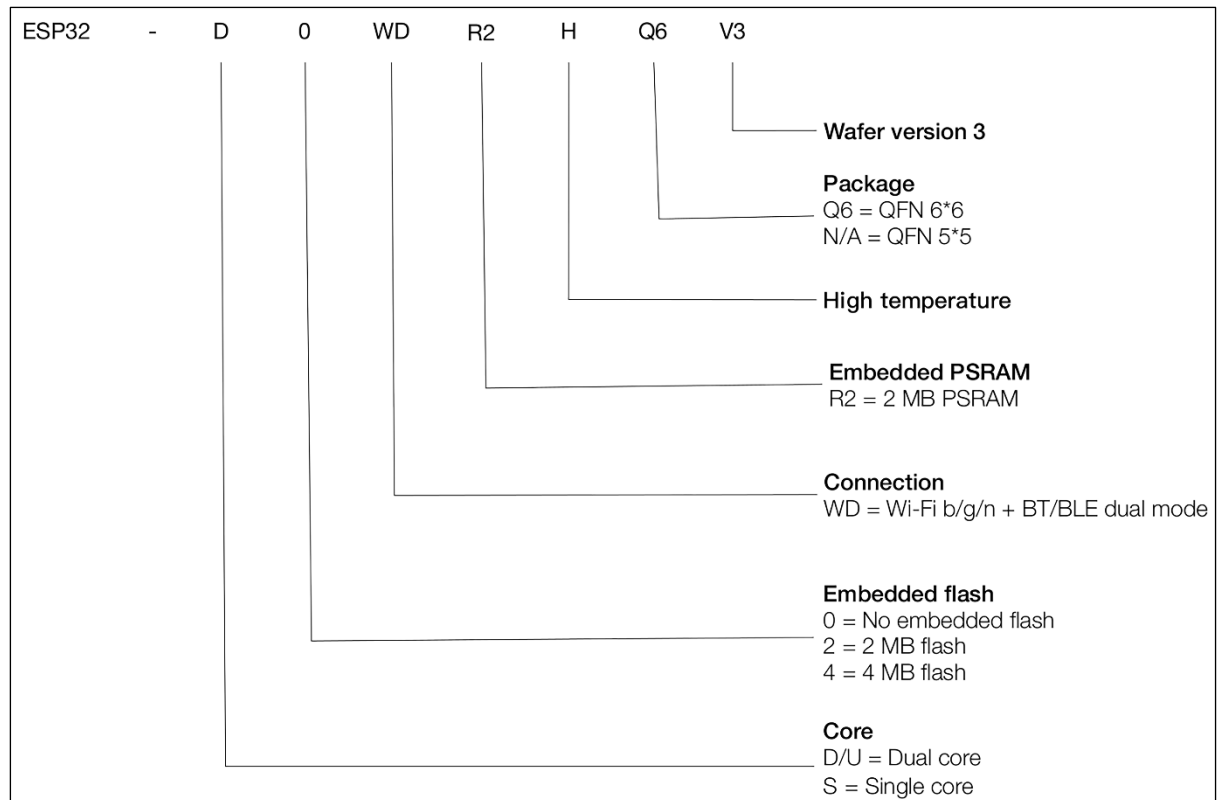


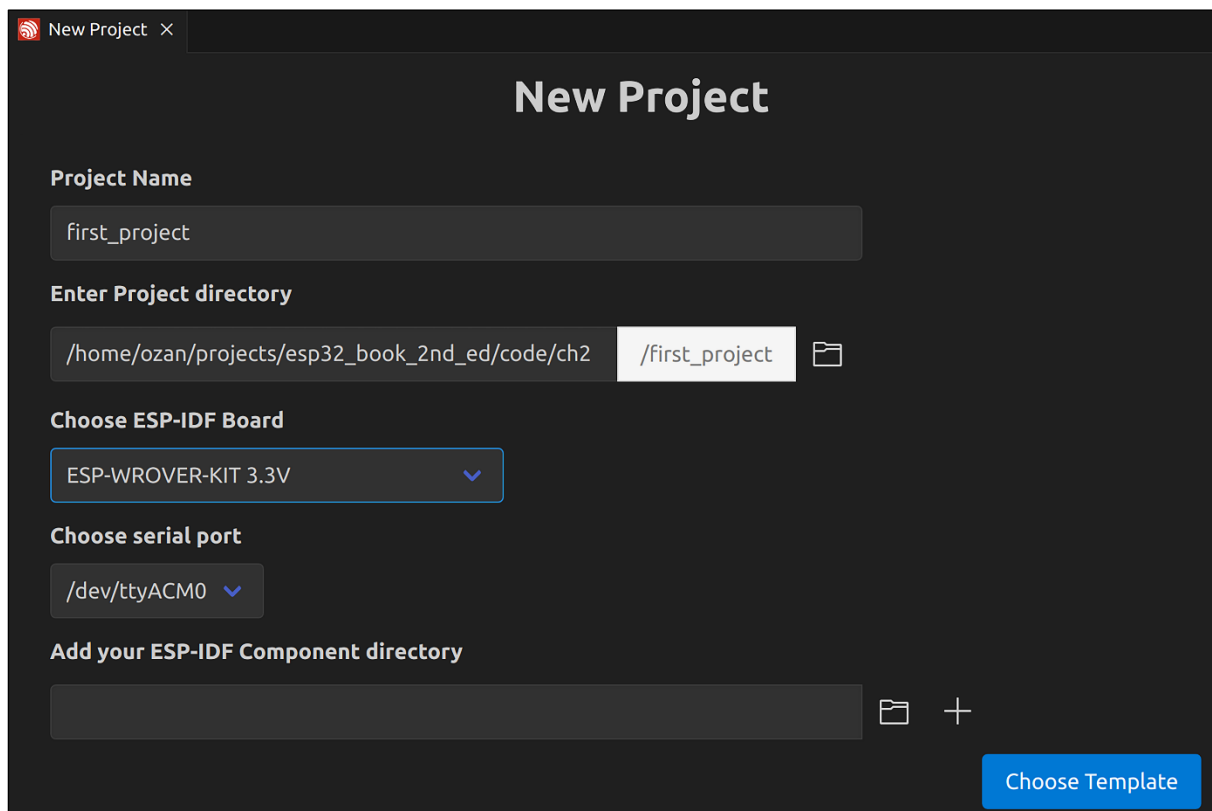
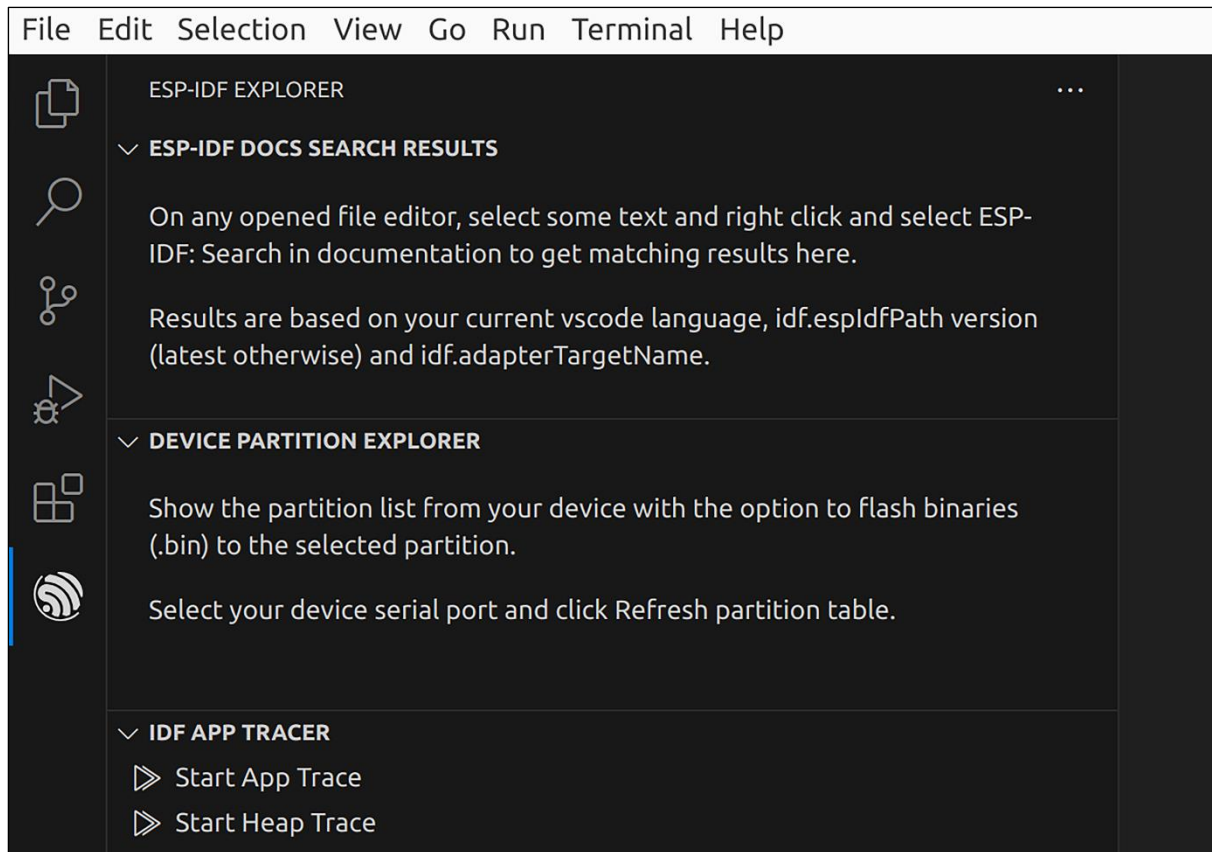
Chapter 1: Introduction to IoT development and the ESP32 platform

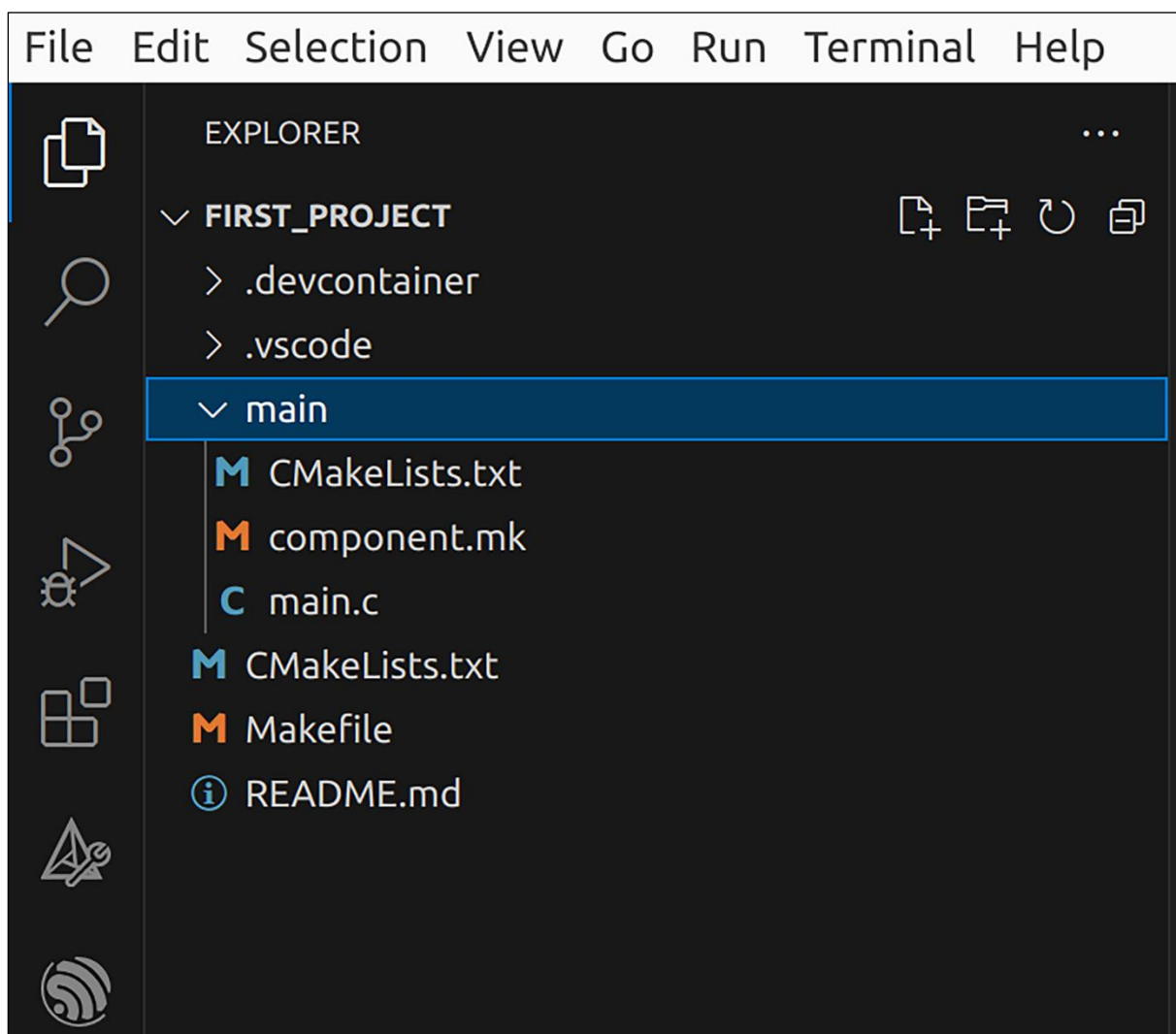
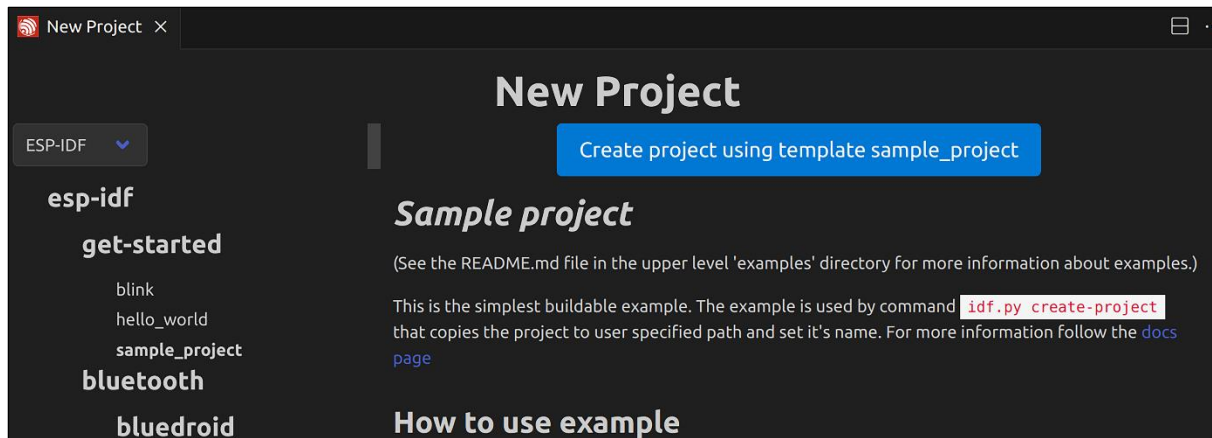






Chapter 2: Understanding the development tools








```
Select flash method, you can modify the choice later from settings 'idf.flashType'

JTAG
UART
DFU


4  {
5      std::cout << "Hello world!\n";
6  }
```


```
I (290) spi_flash: detected chip: gd
I (294) spi_flash: flash io: dio
W (298) spi_flash: Detected size(16384k) larger than the size in the bi
(2048k). Using the size in the binary image header.
I (313) sleep: Configure to isolate all GPIO pins in sleep state
I (318) sleep: Enable automatic switching of GPIO sleep configuration
I (325) cpu_start: Starting scheduler on PRO CPU.
I (0) cpu_start: Starting scheduler on APP CPU.
Hello world!
```





> build


> main

 CMakeLists.txt

 dependencies.lock

 Makefile

 README.md

 sdkconfig

PROBLEMS

OUTPUT

DEBUG CONSOLE

TERMINAL

```
● $ ls -1 build/*.json  
  build/compile_commands.json  
  build/flasher_args.json  
  build/project_description.json  
○ $
```

main.cpp

SDK Configuration editor

Search parameter

Save

Discard

Reset

SDK tool configuration

Build type

Application manager

Bootloader config

Security features

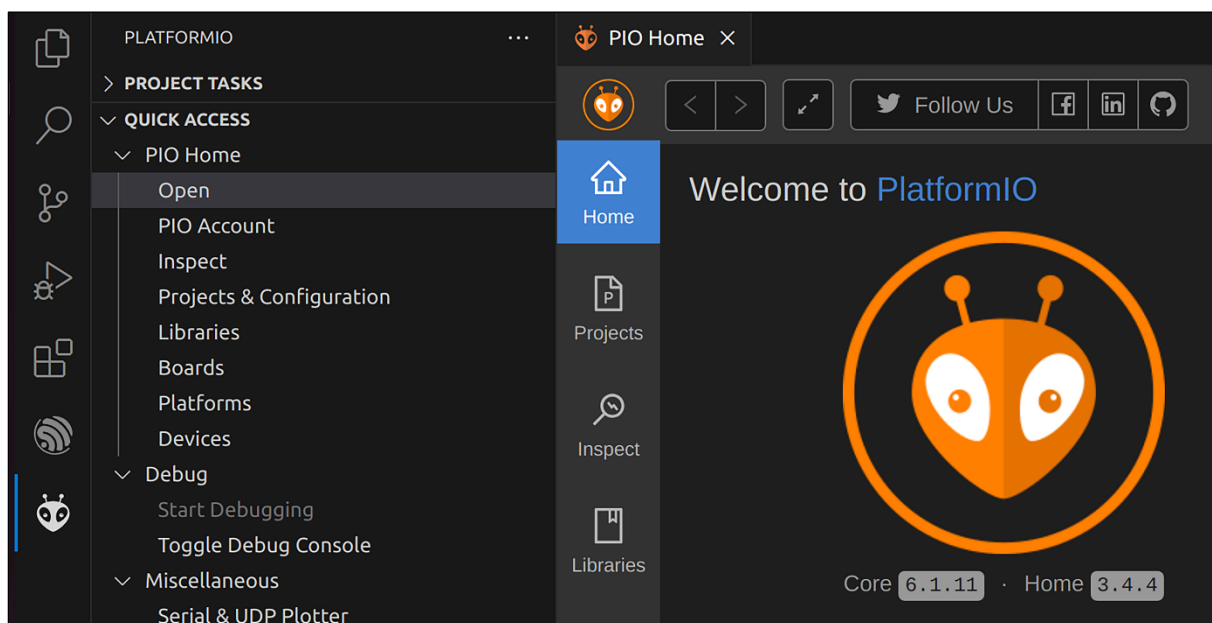
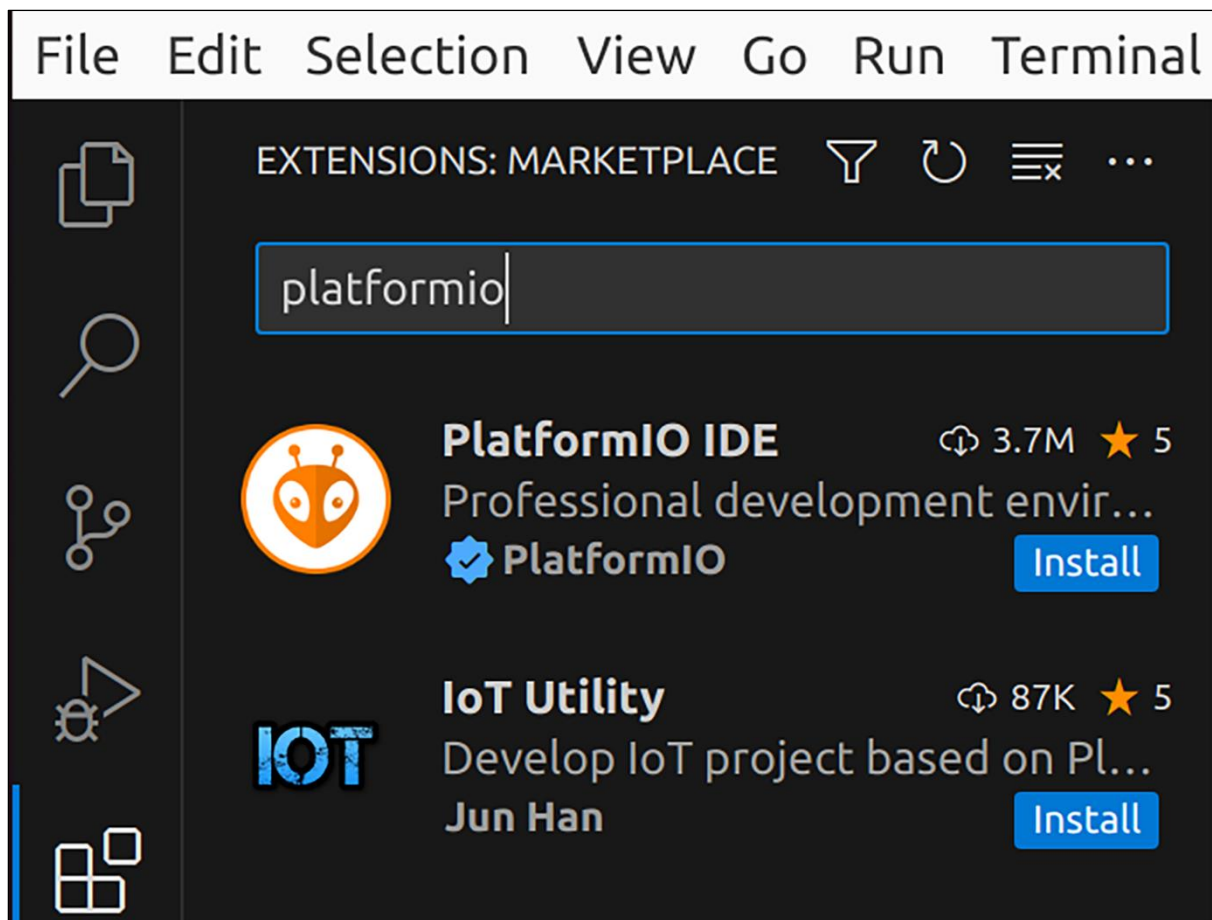
Boot ROM Behavior

SDK tool configuration

Compiler toolchain path/prefix ⓘ

xtensa-esp32s3-elf-

☐ Toolchain supports time_t wide 64-bits ⓘ





Show at startup

Quick Access

+ New Project

📁+ Import Arduino Project

📁 Open Project

📖 Project Examples

Project Wizard



This wizard allows you to **create new** PlatformIO project or **update existing**. In the last case, you need to uncheck "Use default location" and specify path to existing project.


Name:

Board:



Framework:



Location: ☒ Use default location 

Cancel

Finish

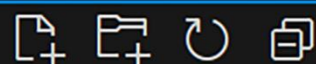
File Edit Selection View Go Run Terminal



EXPLORER

...

✓ PLATFORMIO_EX



✓ .pio/build

> esp32s3box



≡ project.checksum

> .vscode



✓ include

ⓘ README



✓ lib

ⓘ README



✓ src

M CMakeLists.txt

C main.c



✓ test

ⓘ README



.gitignore

M CMakeLists.txt



platformio.ini

≡ sdkconfig.esp32s3box

File Edit Selection View Go Run Terminal





PLATFORMIO




✓ **PROJECT TASKS**



>  Default

✓  esp32s3box



✓  General

○ Build

○ Upload

○ Monitor



○ Upload and Monitor




○ Clean

○ Full Clean



○ Devices

✓  Platform



○ Run Menuconfig

○ Build Filesystem Image



○ Program Size

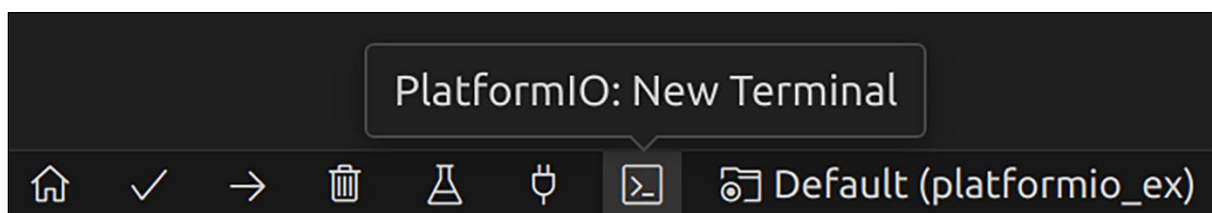
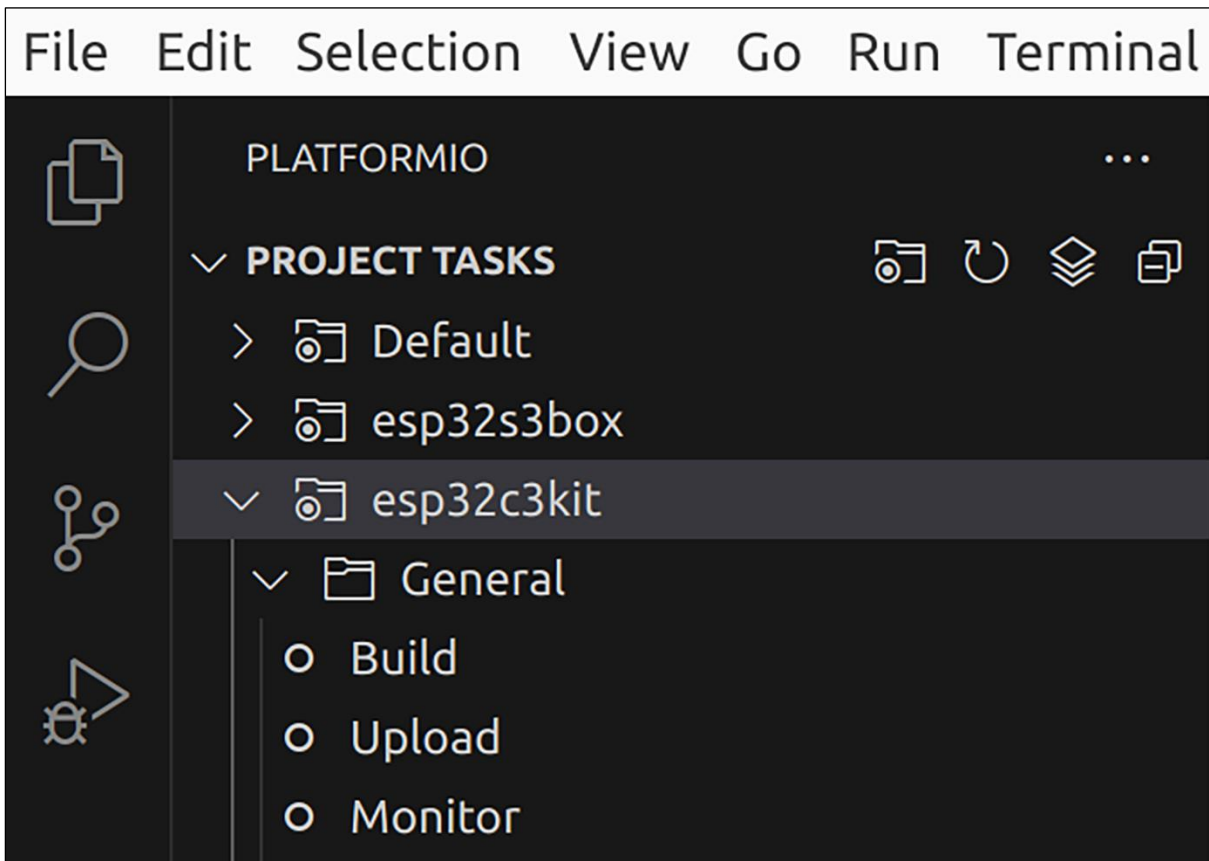
○ Upload Filesystem Image



○ Upload Filesystem Image OTA

○ Erase Flash


```
^[[0;32mI (334) app_start: Starting scheduler on CPU0^[[0m
^[[0;32mI (338) app_start: Starting scheduler on CPU1^[[0m
^[[0;32mI (338) main_task: Started on CPU0^[[0m
^[[0;32mI (348) main_task: Calling app_main()^[[0m
Hello World!
^[[0;32mI (348) main_task: Returned from app_main()^[[0m
```

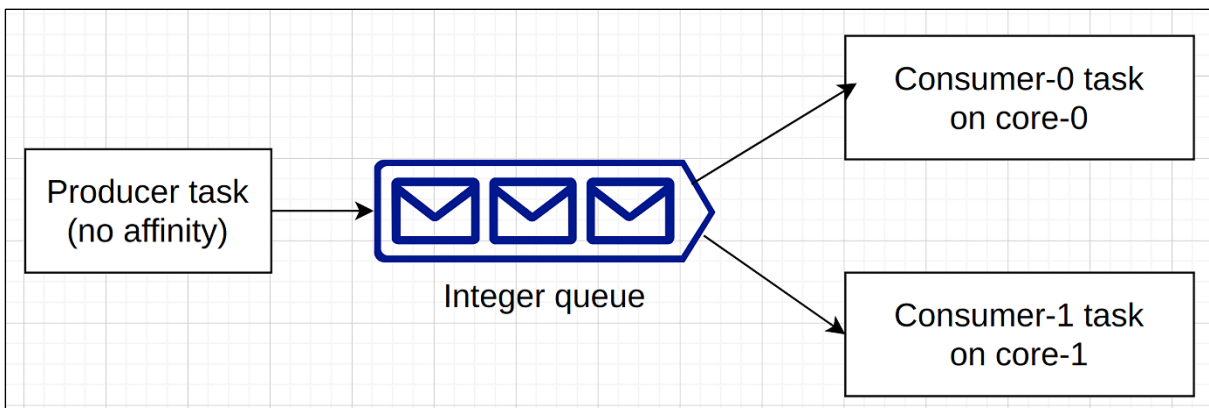











```
PROBLEMS    OUTPUT    DEBUG CONSOLE    TERMINAL    PORTS

● $ pio
Usage: pio [OPTIONS] COMMAND [ARGS]...

Options:
  --version            Show the version and exit.
  -c, --caller TEXT    Caller ID (service)
  --no-ansi            Do not print ANSI control characters
  -h, --help           Show this message and exit.


Commands:
  access      Manage resource access
  account     Manage PlatformIO account
  boards      Board Explorer
  check       Static Code Analysis
  ci          Continuous Integration
  debug       Unified Debugger
  device      Device manager & Serial/Socket monitor
  home        GUI to manage PlatformIO
  org         Manage organizations
  pkg         Unified Package Manager
  project     Project Manager
  remote      Remote Development
  run         Run project targets (build, upload, clean, etc.)
  settings    Manage system settings
  system      Miscellaneous system commands
  team        Manage organization teams
  test        Unit Testing
  upgrade     Upgrade PlatformIO Core to the latest version
○ $
```







PLATFORMIO

▼ PROJECT TASKS

>  Default

▼  esp32s3box

▼  General

○ Build

○ Upload


○ Monitor

○ Upload and Monitor

○ Clean

○ Full Clean

○ Devices

▼  Platform

○ Run Menuconfig





○ Build Filesystem Image

○ Program Size

○ Upload Filesystem Image

○ Upload Filesystem Image OTA

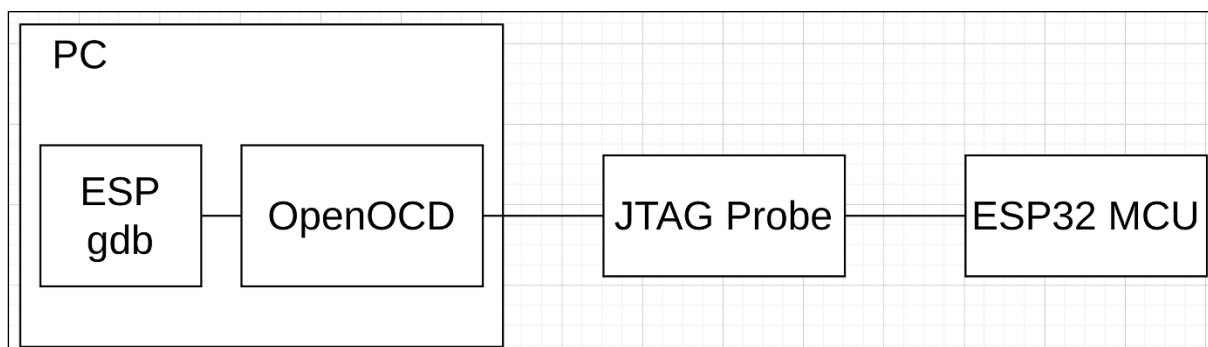
○ Erase Flash

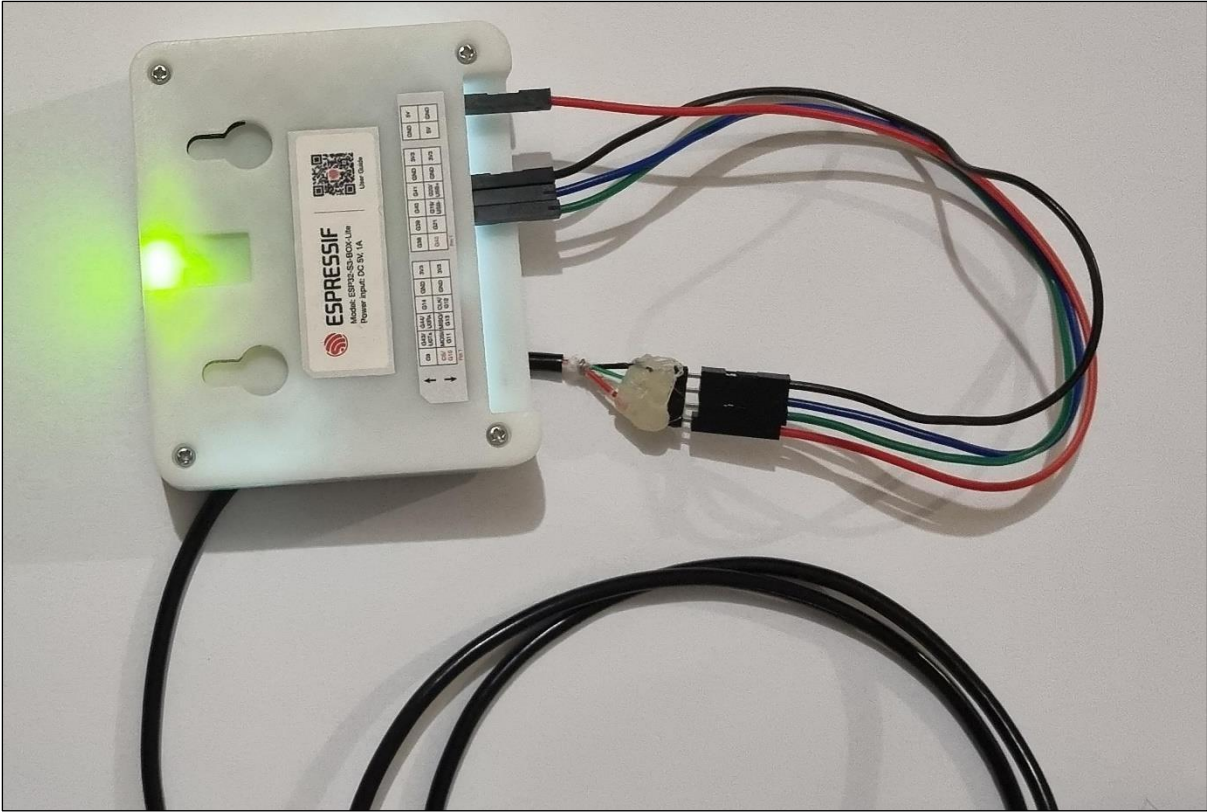


```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

(Top) → Component config → FreeRTOS → Kernel
Espressif IoT Development Framework Configuration
[ ] Run the Amazon SMP FreeRTOS kernel instead (FEATURE UNDER DEVELOPMENT)
[ ] Run FreeRTOS only on first core
(100) configTICK_RATE_HZ
      configCHECK_FOR_STACK_OVERFLOW (Check using canary bytes (Method 2)) --->
(1) configNUM_THREAD_LOCAL_STORAGE_POINTERS
(1536) configMINIMAL_STACK_SIZE (Idle task stack size)
[ ] configUSE_IDLE_HOOK
[ ] configUSE_TICK_HOOK
(16) configMAX_TASK_NAME_LEN
[ ] configENABLE_BACKWARD_COMPATIBILITY
(1) configTIMER_TASK_PRIORITY
(2048) configTIMER_TASK_STACK_DEPTH
(10) configTIMER_QUEUE_LENGTH
(0) configQUEUE_REGISTRY_SIZE
(1) configTASK_NOTIFICATION_ARRAY_ENTRIES
[*] configUSE_TRACE_FACILITY
[*] configUSE_STATS_FORMATTING_FUNCTIONS
[*] Enable display of xCoreID in vTaskList
[ ] configGENERATE_RUN_TIME_STATS
```

```
I (334) app_start: Starting scheduler on CPU0
I (339) app_start: Starting scheduler on CPU1
I (339) main_task: Started on CPU0
I (349) main_task: Calling app_main()
hi
I (349) main_task: Returned from app_main()
```





←

→

↻

127.0.0.1:5000

🔗

☆

⚙️

📺

⬛

⋮

Load Binary

/path/to/target/execut

↻

▶

⏸

⏪

⏩

⬇

⬆

NI

SI

⚙️

show filesystem

jump to line

/home/ozan/projects/Developing-IoT-Projects-with-ESP32

fetch disassembly

reload file

include "freertos/task.h"

4 void my_func(void)

5 {

6 int j = 0;

7 ++j;

8 }

9

10 extern "C" void app_main()

11 {

12 int i = 0;

13 while (1)

14 {

15 vTaskDelay(pdMS_TO_TICKS(1000));

16 ++i;

17 my_func();

18 }

19 }

(end of file)

local variables

i 1070549836 int

expressions

expression or variable

no expressions in this context

Tree

width (px) height (px)

memory

start address end address (

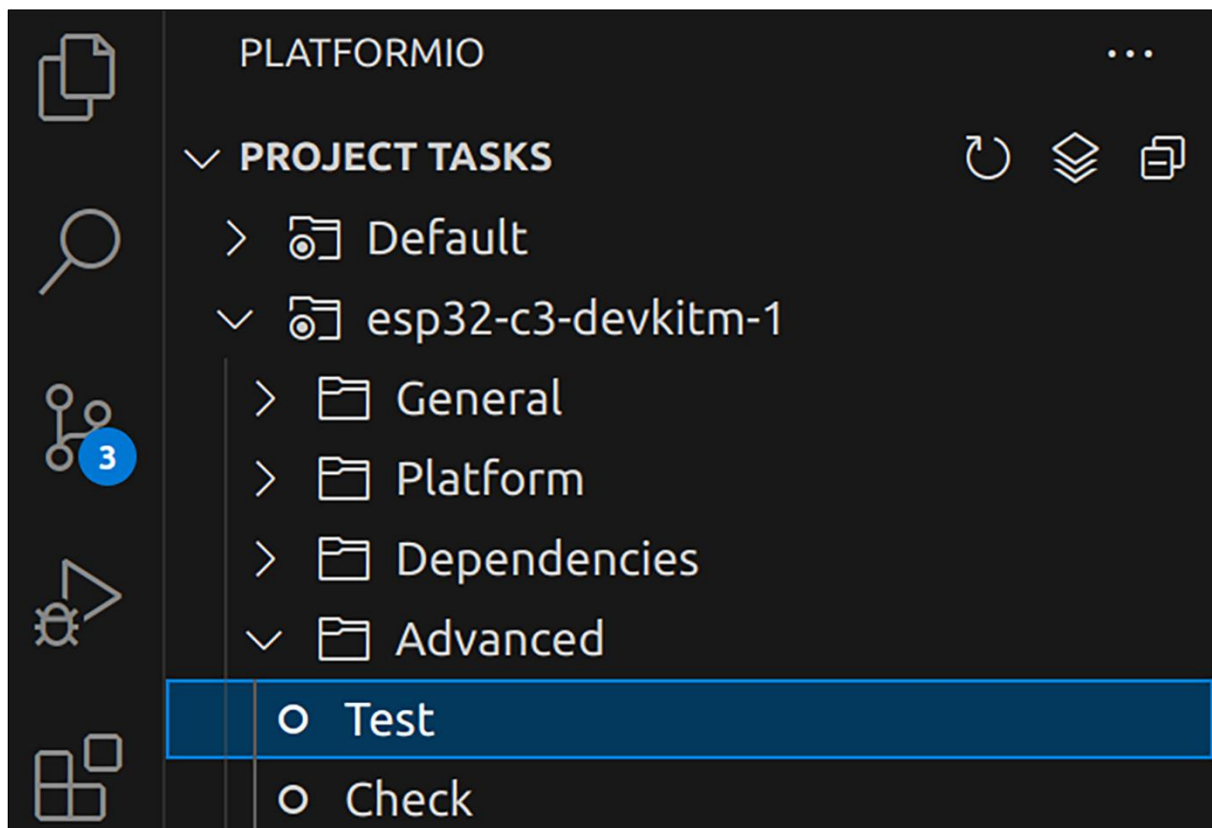
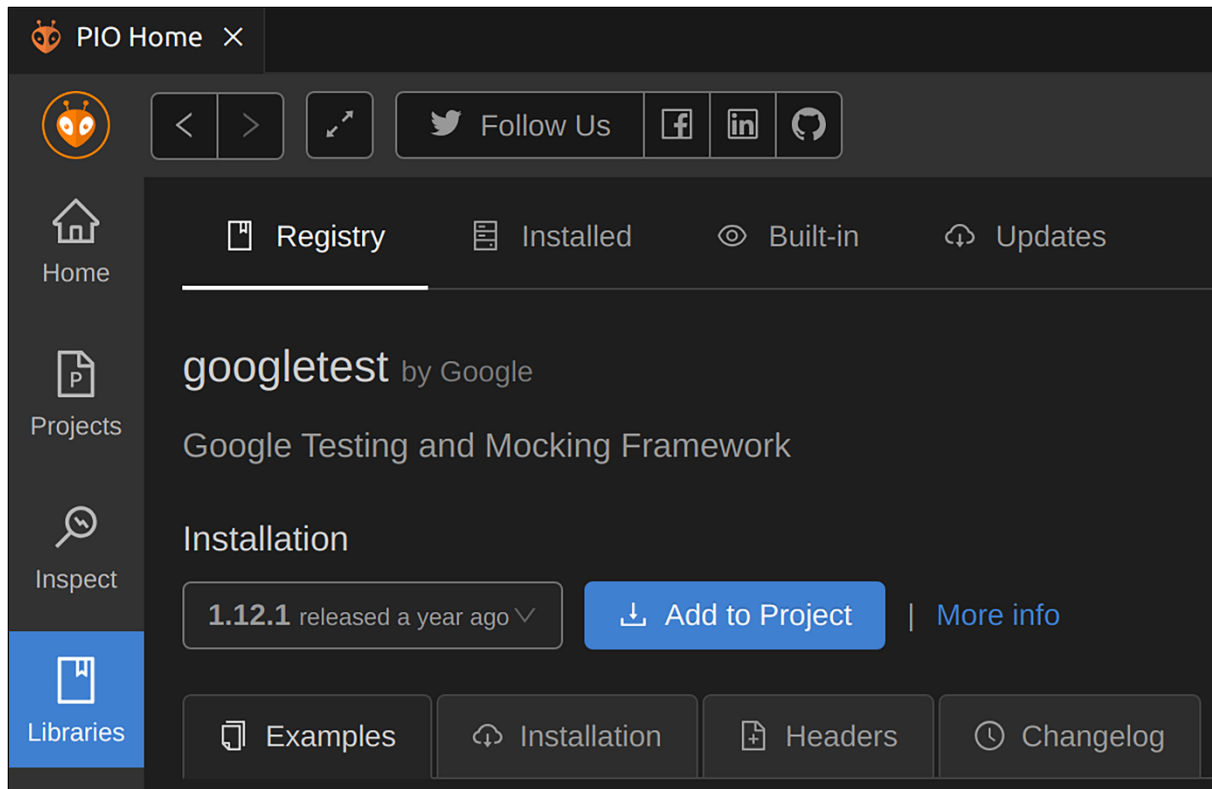
8 no memory to display

breakpoints

☒ app_main() thread groups: i1

/home/ozan/projects/Developing-IoT-Proje

my_func();



```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS

Processing * in esp32-c3-devkitm-1 environment
-----
Building & Uploading...
Library Manager: Installing google/googletest @ 1.12.1
Unpacking [#####] 100%
Library Manager: googletest@1.12.1 has been installed!

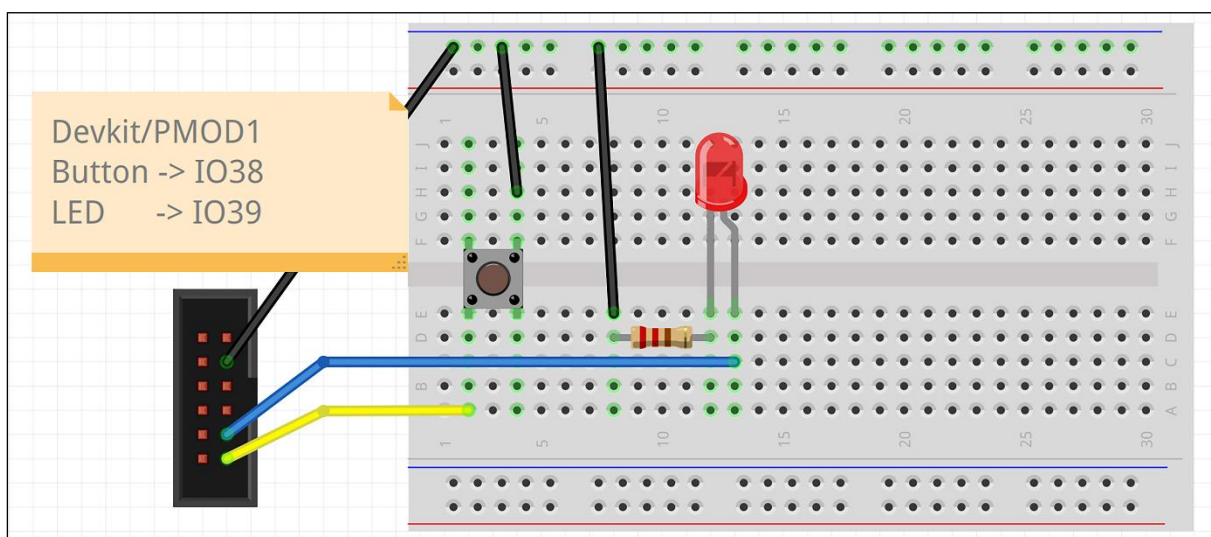
Warning! Please install `99-platformio-udev.rules`.
More details: https://docs.platformio.org/en/latest/core/installation/udev-r
ules.html

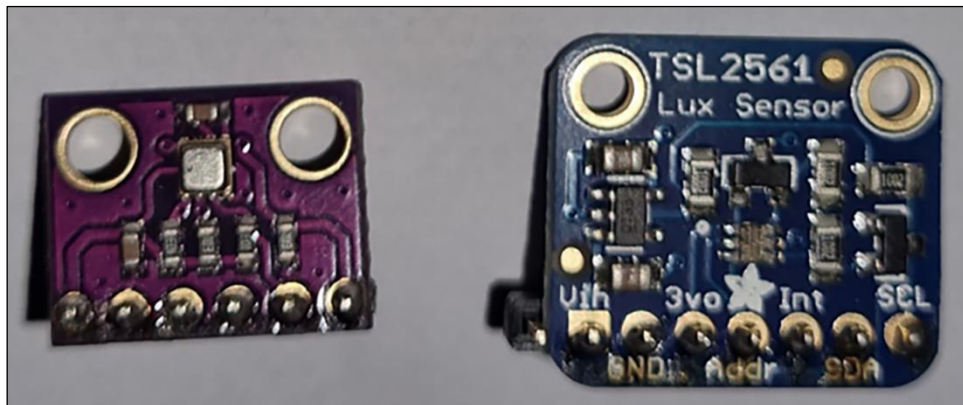
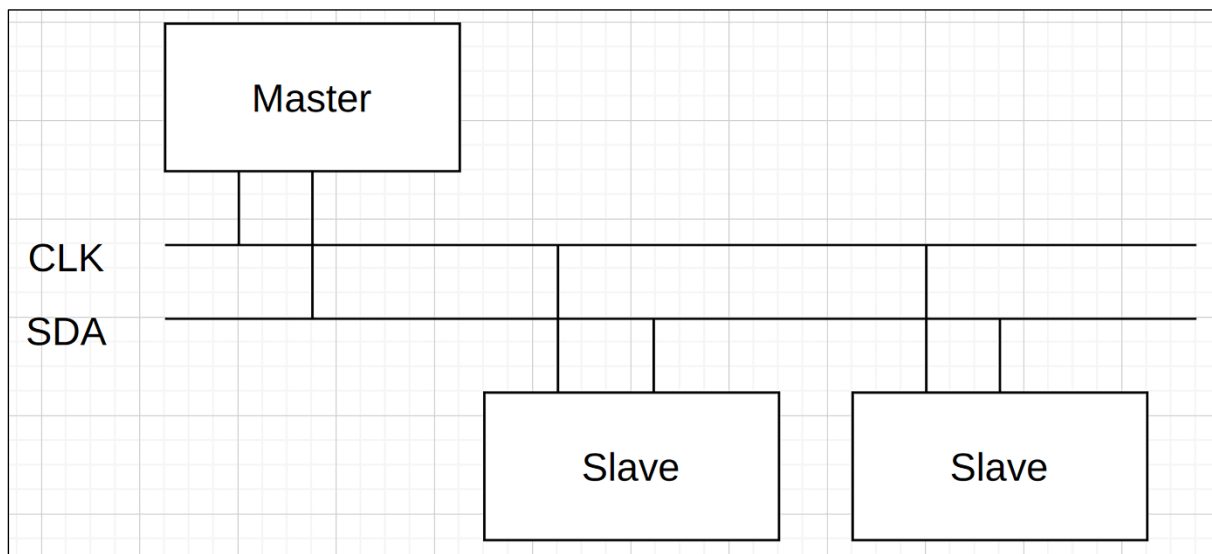
Testing...
If you don't see any output for the first 10 secs, please reset board (press
reset button)

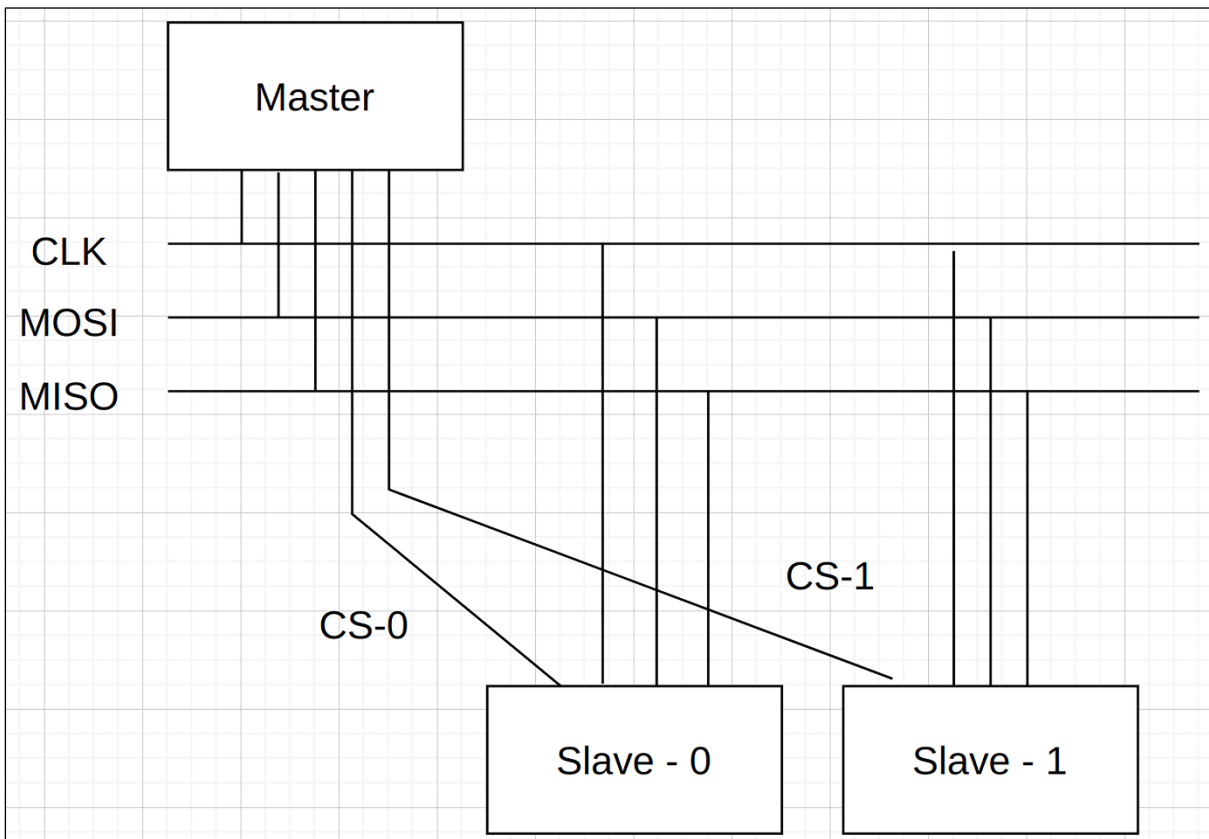
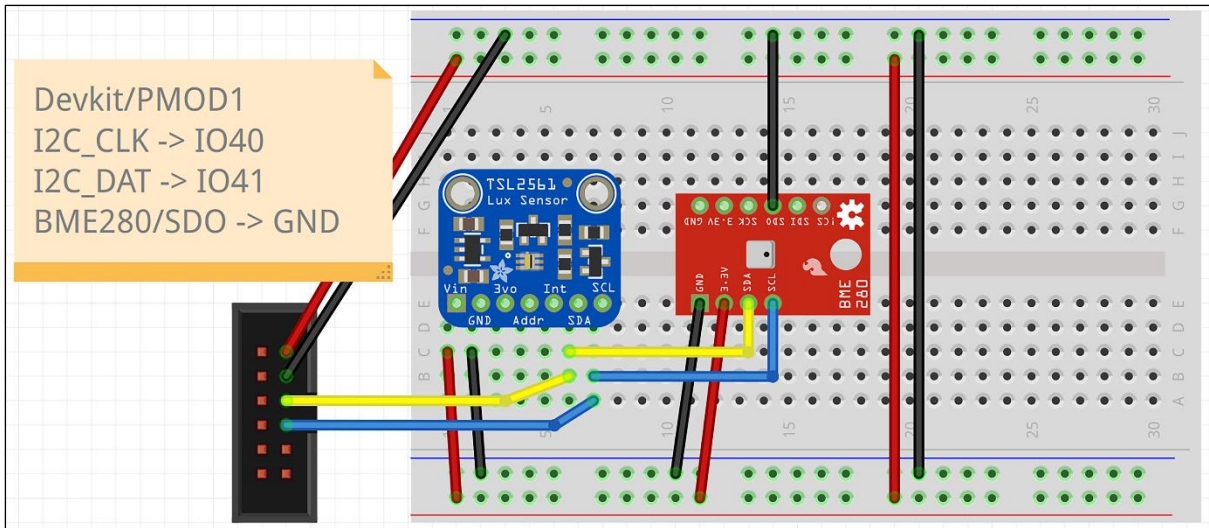
LightTest.turns_on_light          [PASSED]
LightTest.turns_off_light         [PASSED]
----- esp32-c3-devkitm-1:* [PASSED] Took 35.21 seconds -----

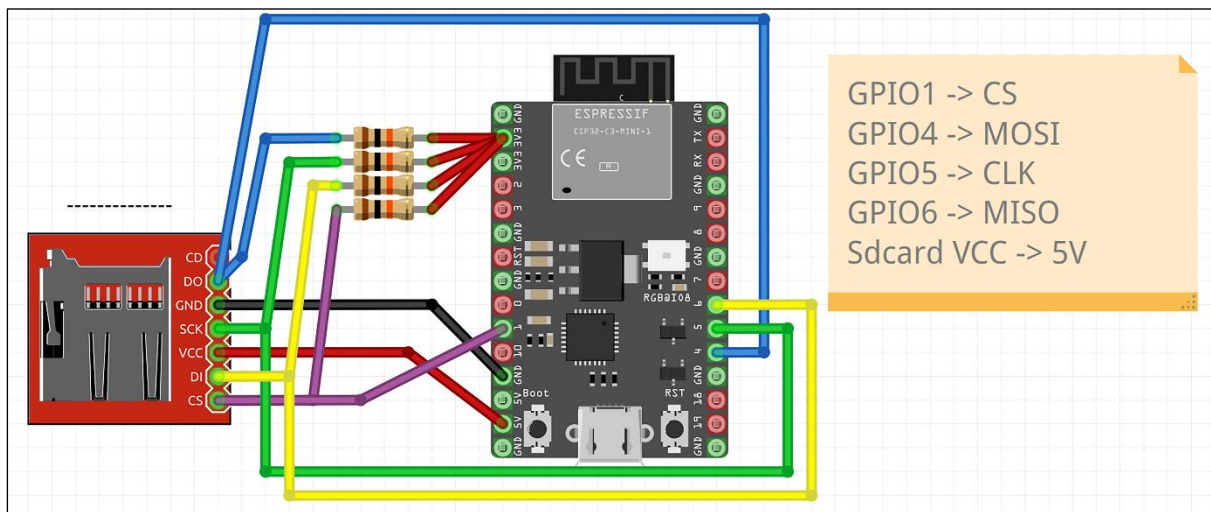
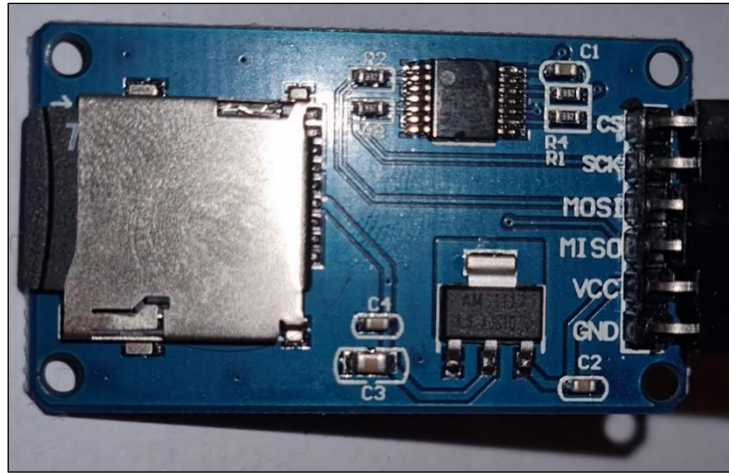
===== SUMMARY =====
Environment      Test      Status      Duration
-----
esp32-c3-devkitm-1 *      PASSED      00:00:35.205
===== 2 test cases: 2 succeeded in 00:00:35.205 =====
* Terminal will be reused by tasks, press any key to close it.
```

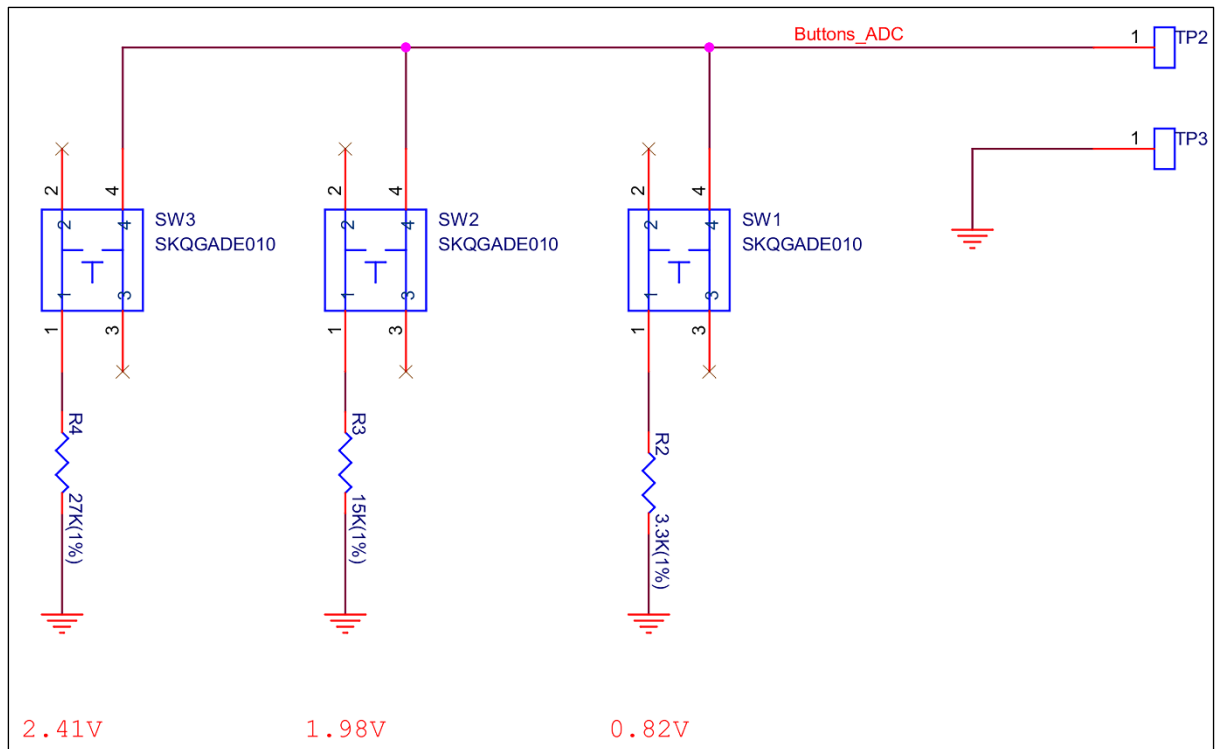
Chapter 3: Using ESP32 peripherals



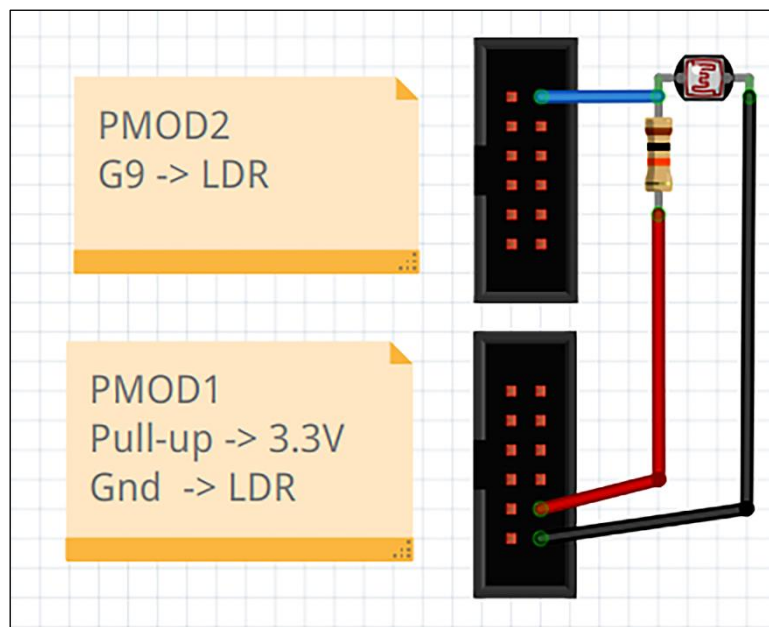


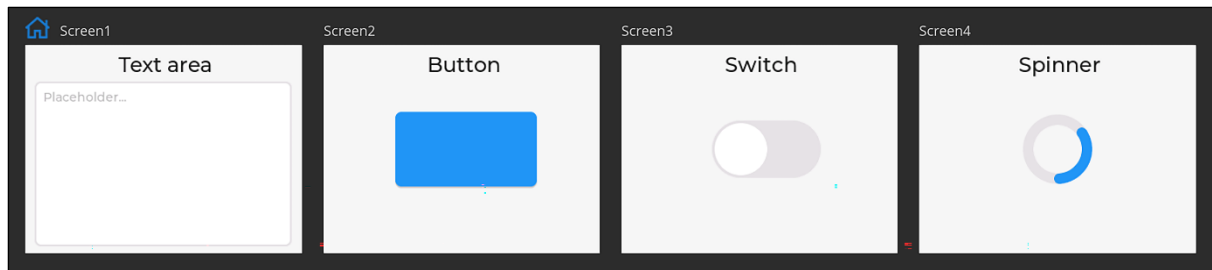




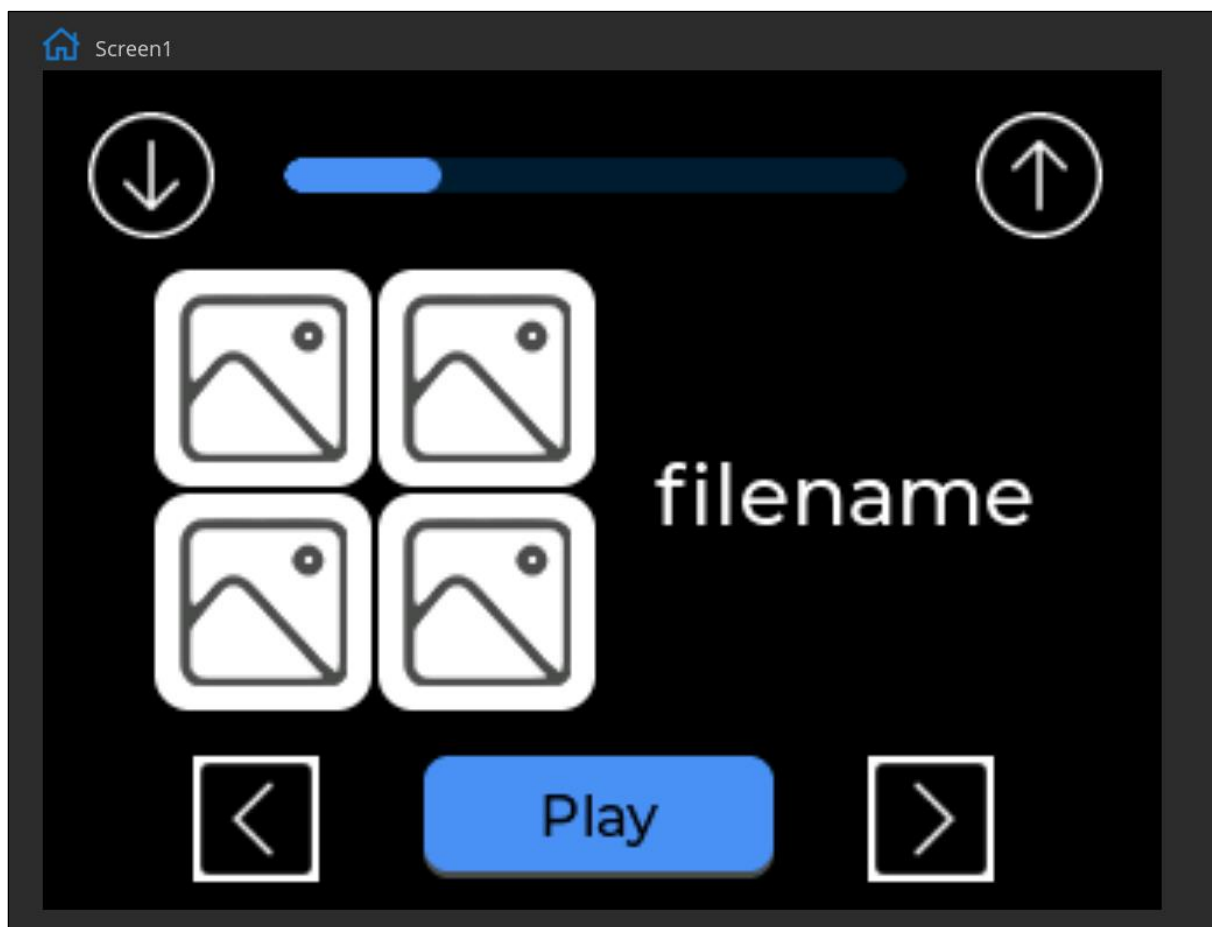


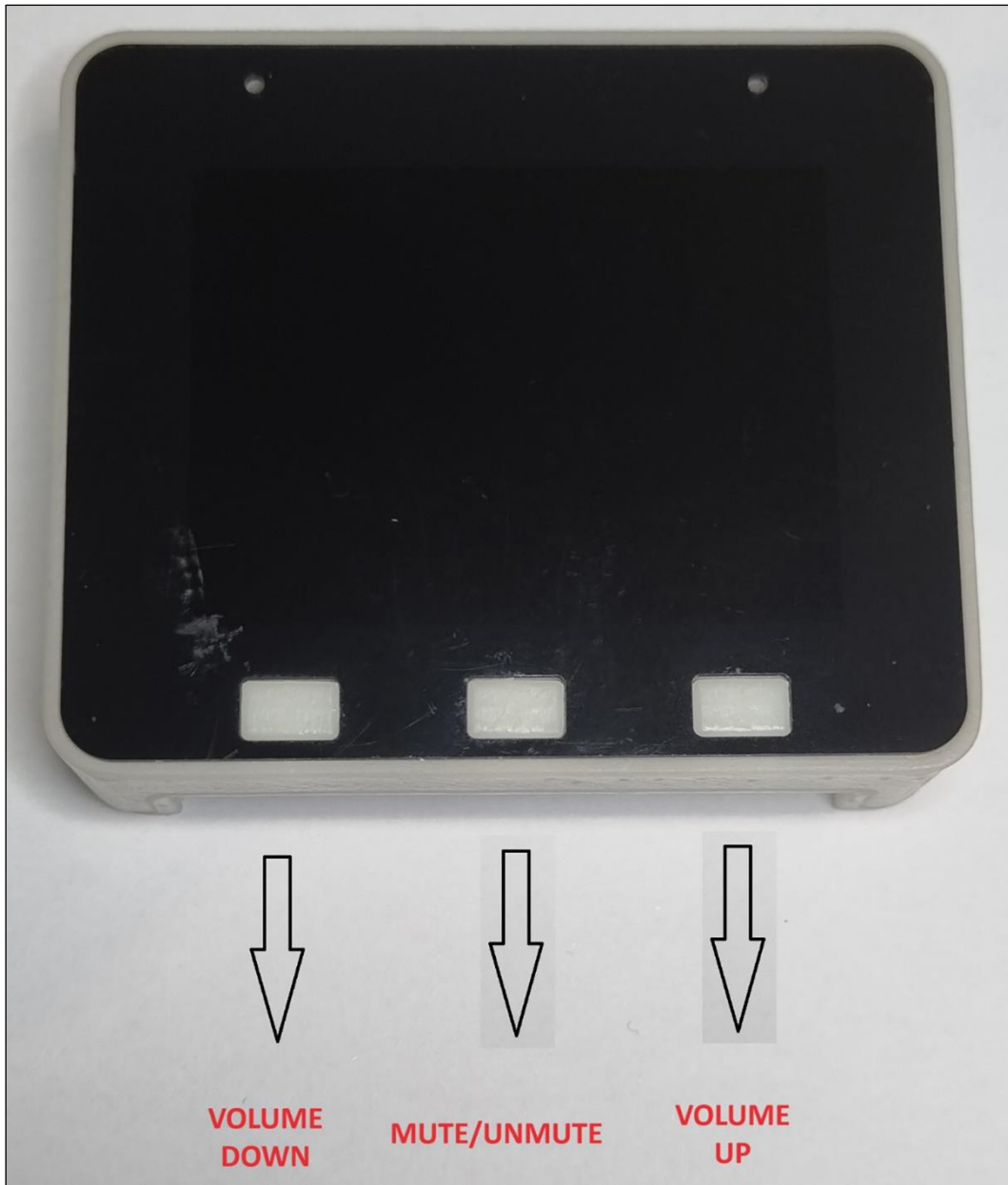
Chapter 4: Employing Third-party libraries in ESP32 projects

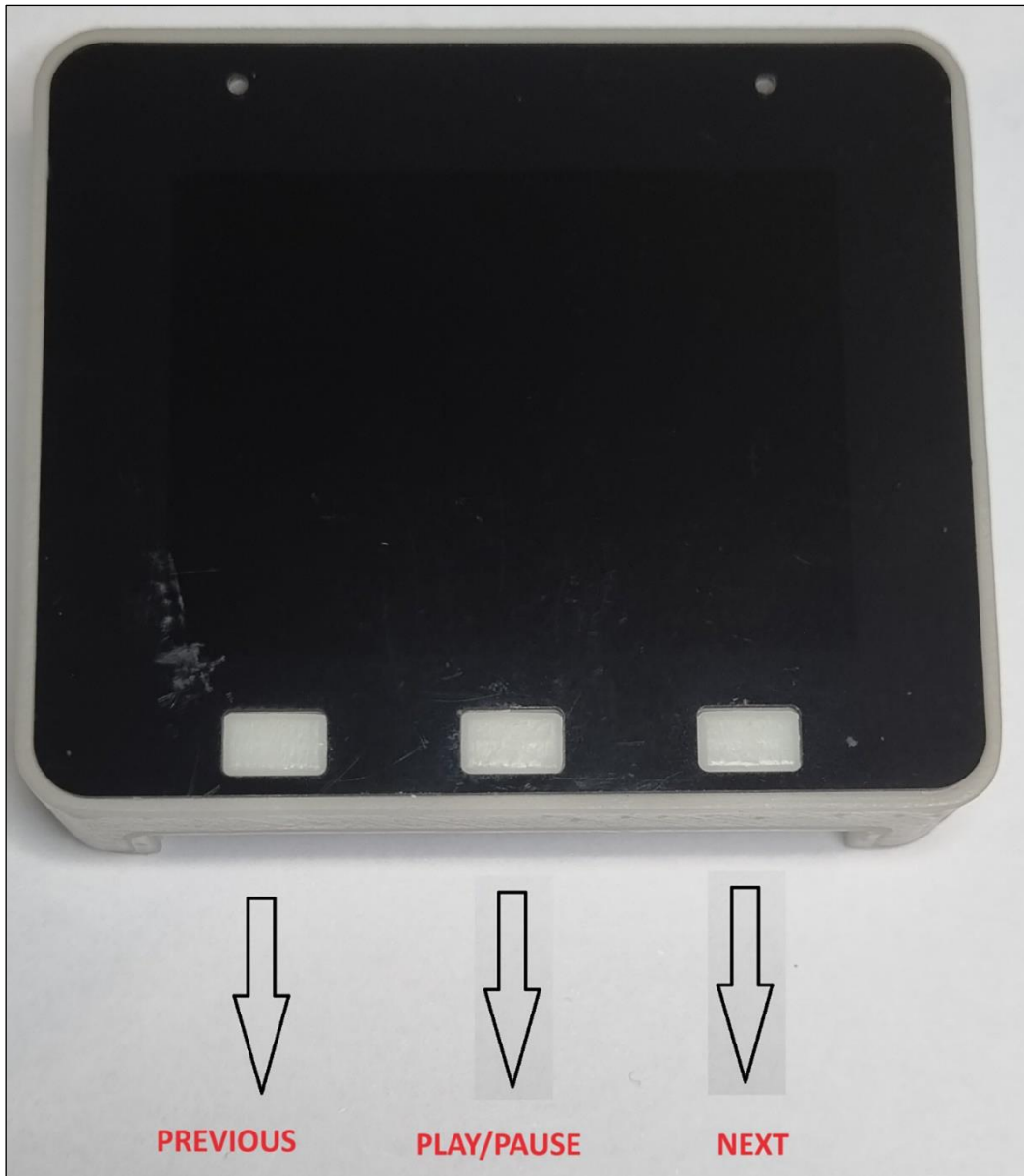


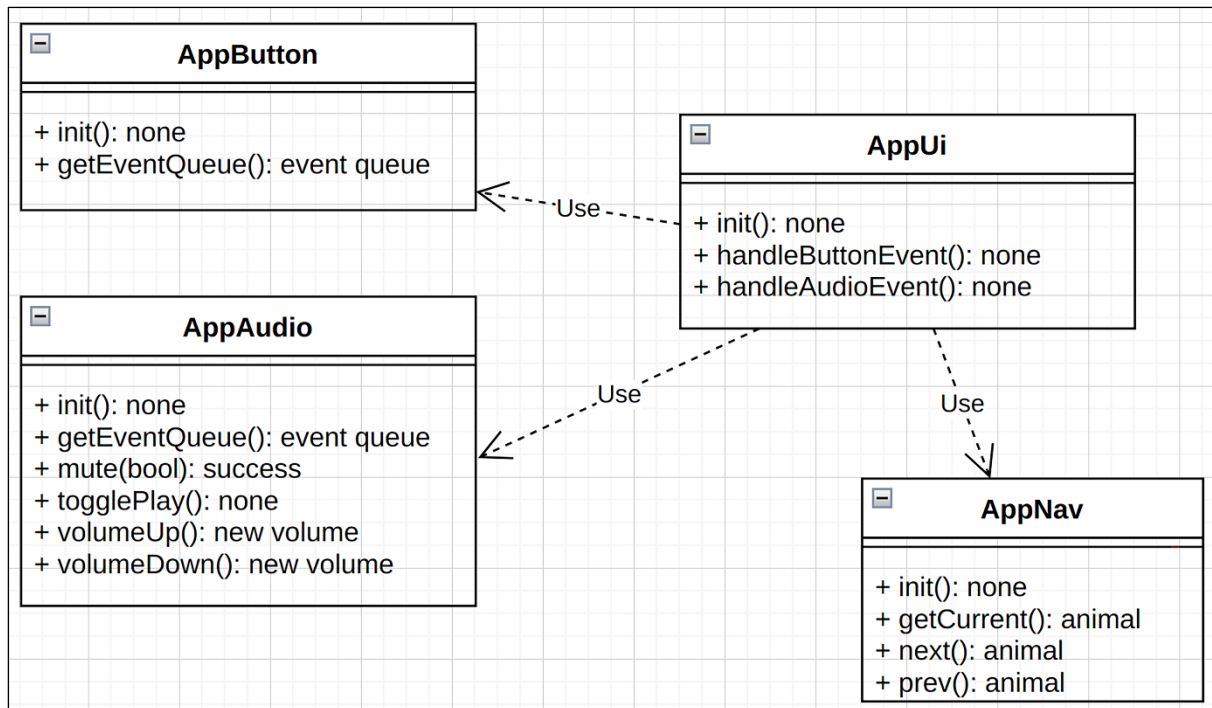


Chapter 5: Project - Audio Player









SquareLine Studio 1.3.3

Open
 Create
 Example

Welcome **TRIAL** [LOGOUT](#)

Arduino
Desktop
Espressif
NXP
Nuvoton
ST

ESP32-S3-LCD-EV-BOARD [INFO](#) [LICENSE](#)

ESP32-S3-LCD-EV-BOARD is a development board for evaluating and verifying ESP32-S3 screen interactive applications. It has the functions of touch screen interaction and voice interaction.

Language: **C** | Res.: **800 x 480** | Color: **16** | LVGL: **8.2.0, 8.3.*** 1.0.1 ▼

ESP32-S3-USB-OTG [INFO](#) [LICENSE](#)

ESP32-S3-USB-OTG is a development board produced by Espressif that focuses on USB-OTG function verification and application development.

Language: **C** | Res.: **240 x 240** | Color: **16 sw** | LVGL: **8.2.0, 8.3.*** 1.0.0 ▼

ESP-BOX [INFO](#) [LICENSE](#)

Espressif's ESP-BOX

Language: **C** | Res.: **320 x 240** | Color: **16 sw** | LVGL: **8.2.0, 8.3.*** 1.0.0 ▼

▼ CONTROLLER



Calendar



Checkbox



Colorwheel



Dropdown



Imgbutton



Keyboard



Roller



Slider



Spinbox



Switch

Assets

Console



down-f.png



down-w.png



next-f.png



next-w.png



prev-f.png



prev-w.png



up-f.png



up-w.png

Inspector

History

Font Manager

Animation

► **COMPONENT**

▼ **IMGBUTTON**

Name

ImgButton1

► **Layout**

► **Transform**

► **Flags**

► **States**

▼ **Images**

Button state

RELEASED

Image released

-



down-f.png

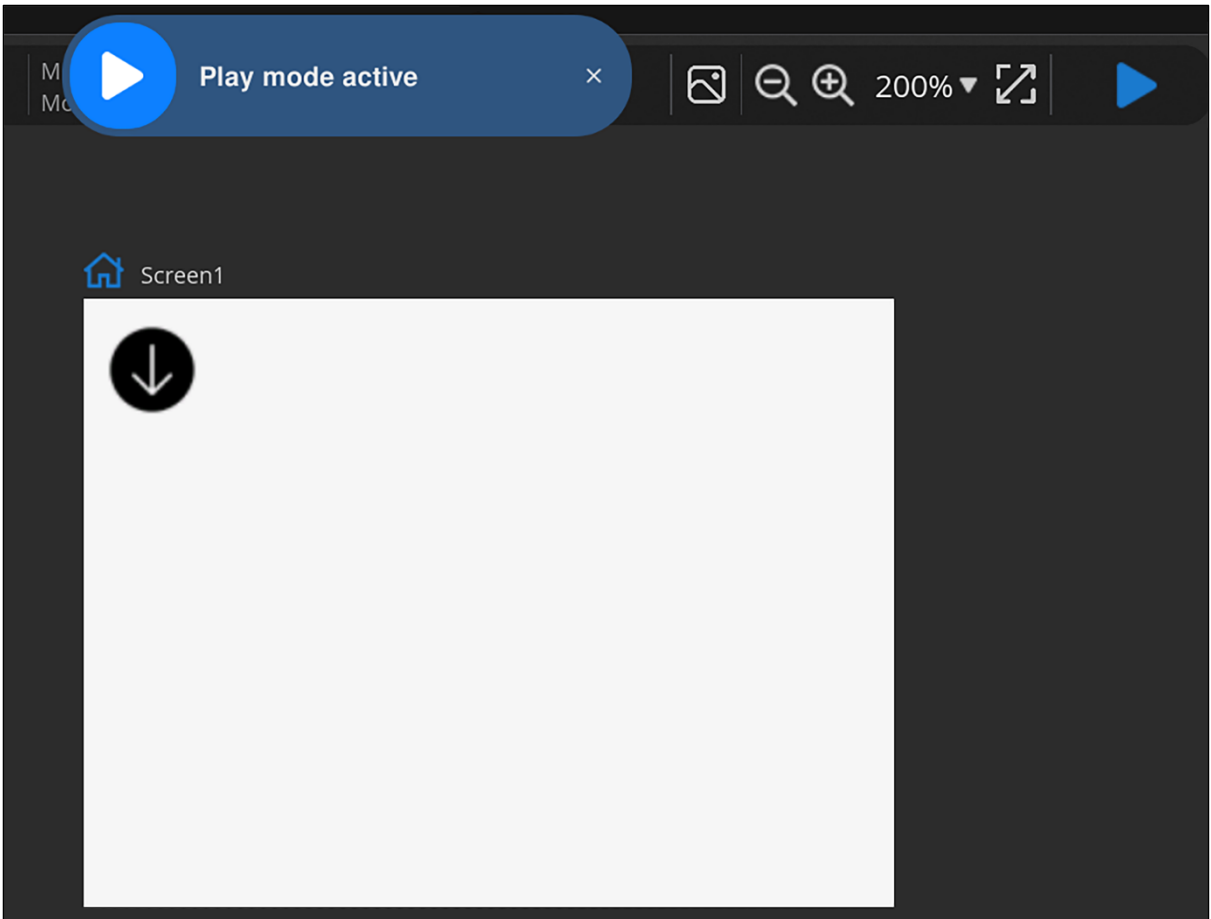
down-w.png

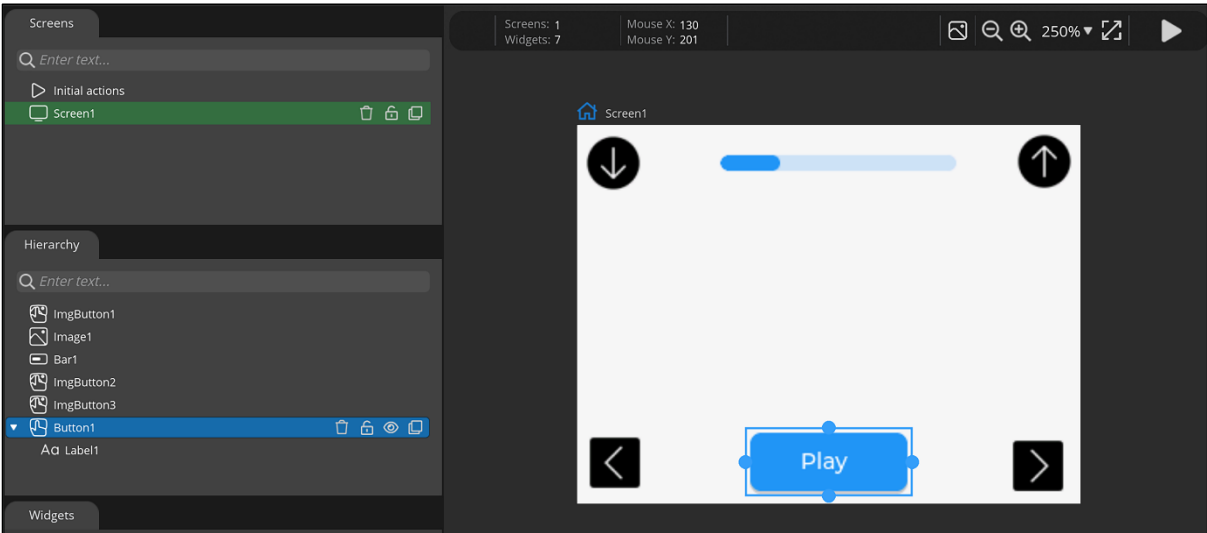
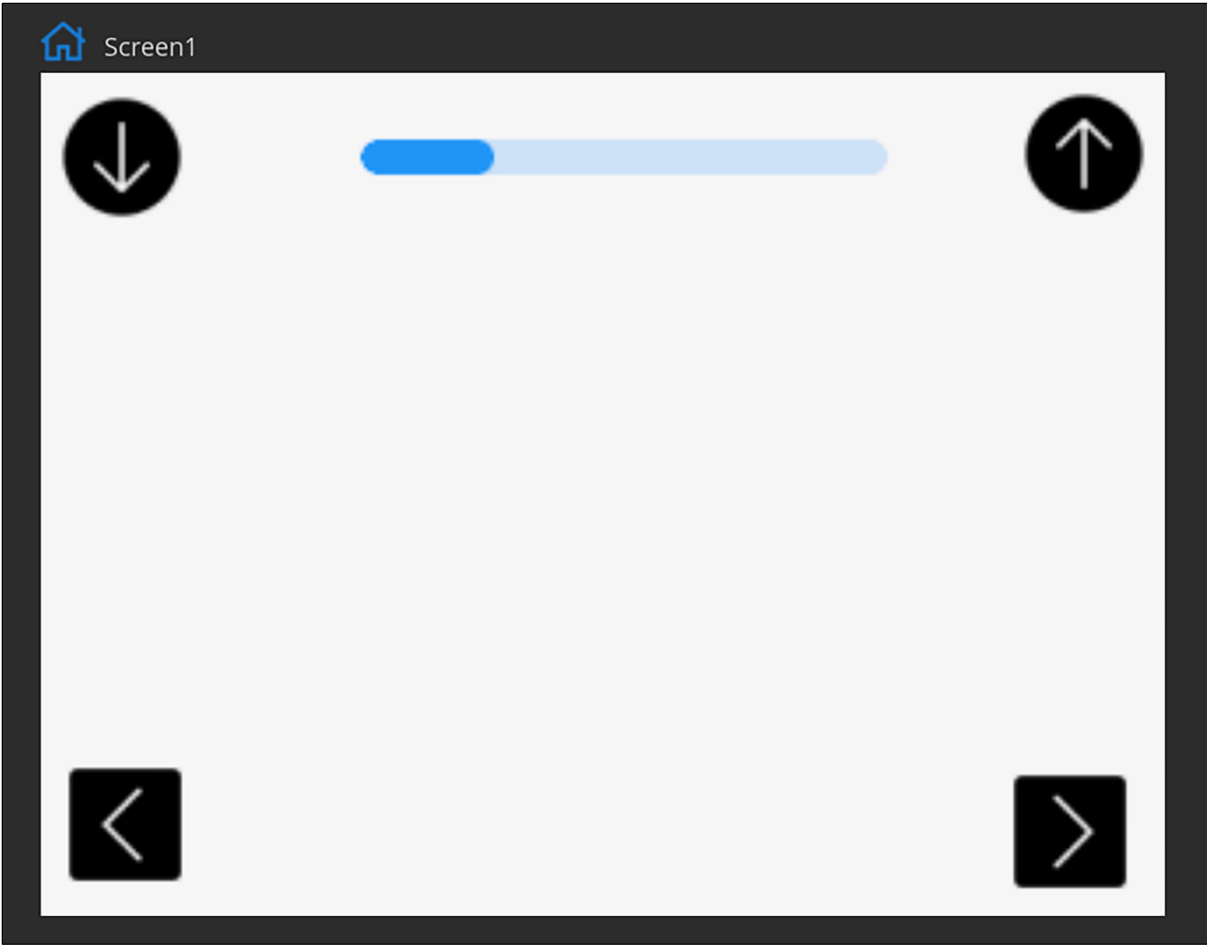
next-f.png

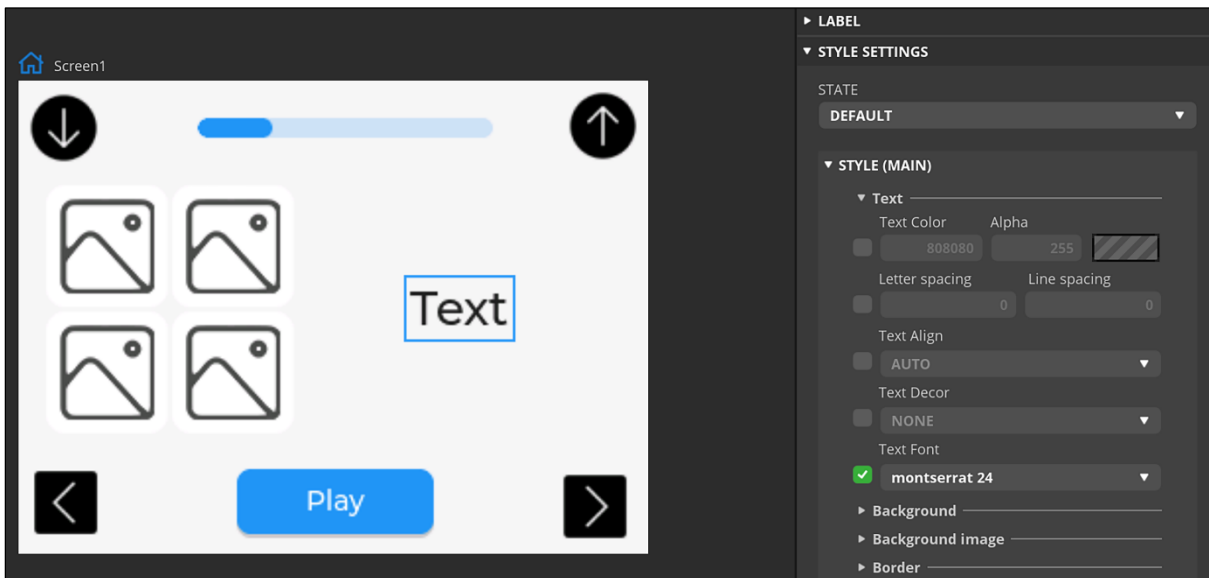
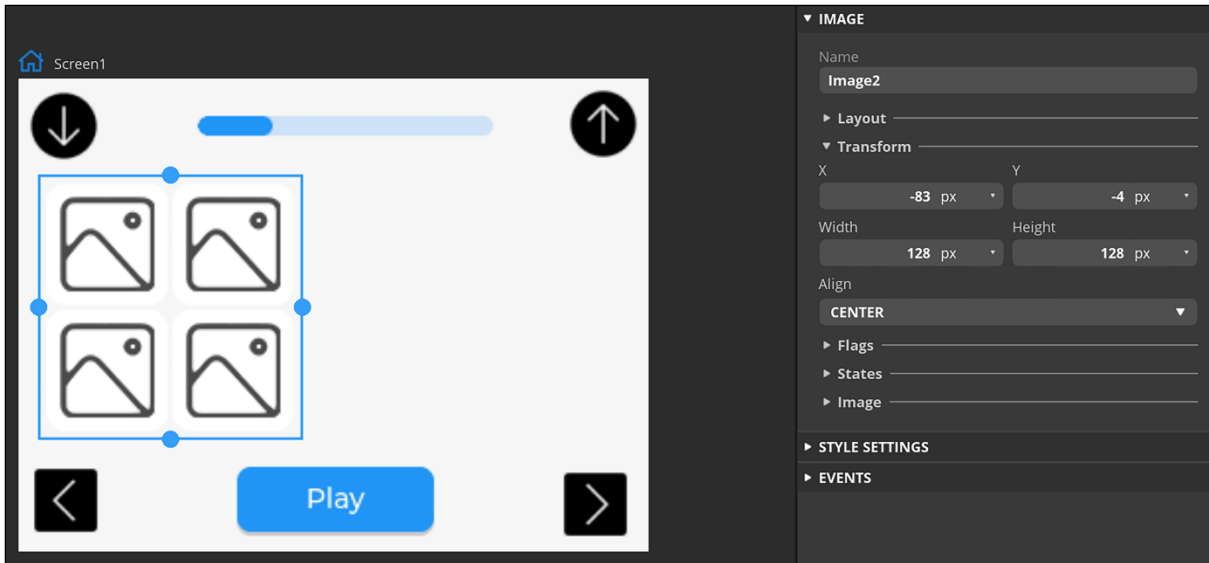
next-w.png

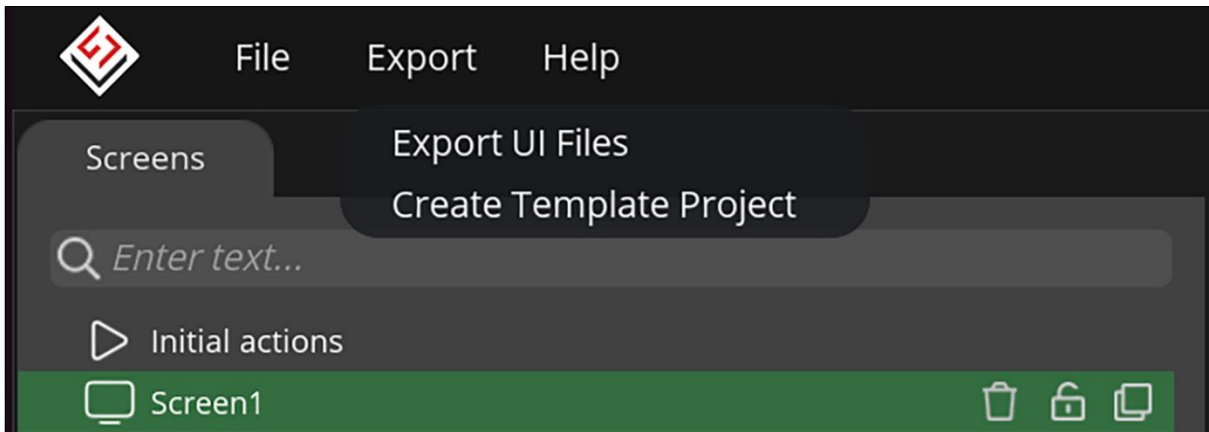
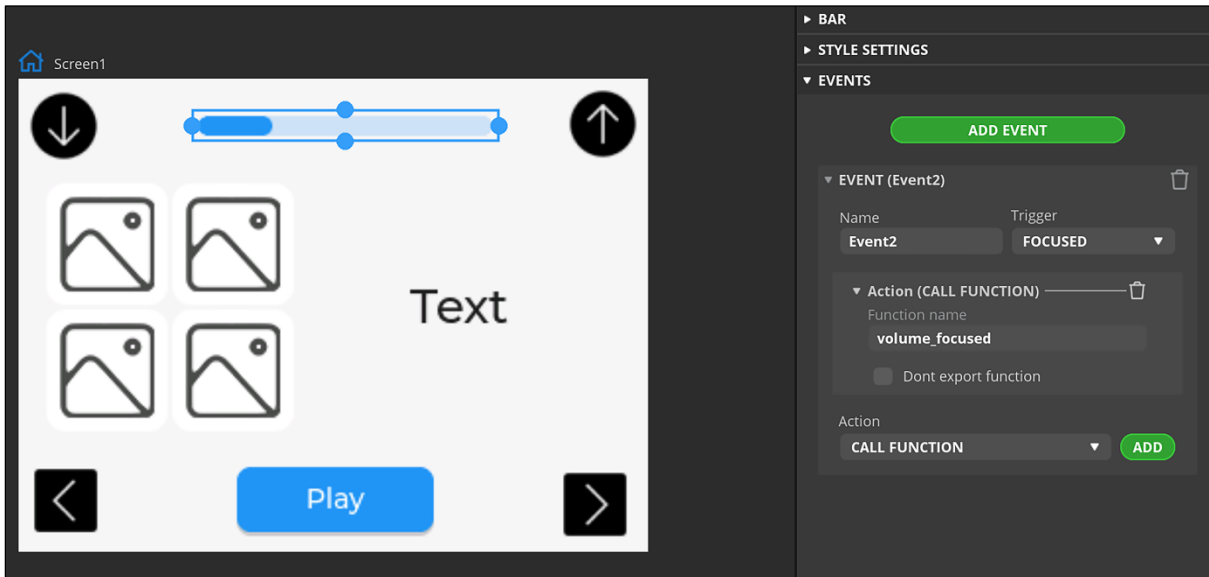
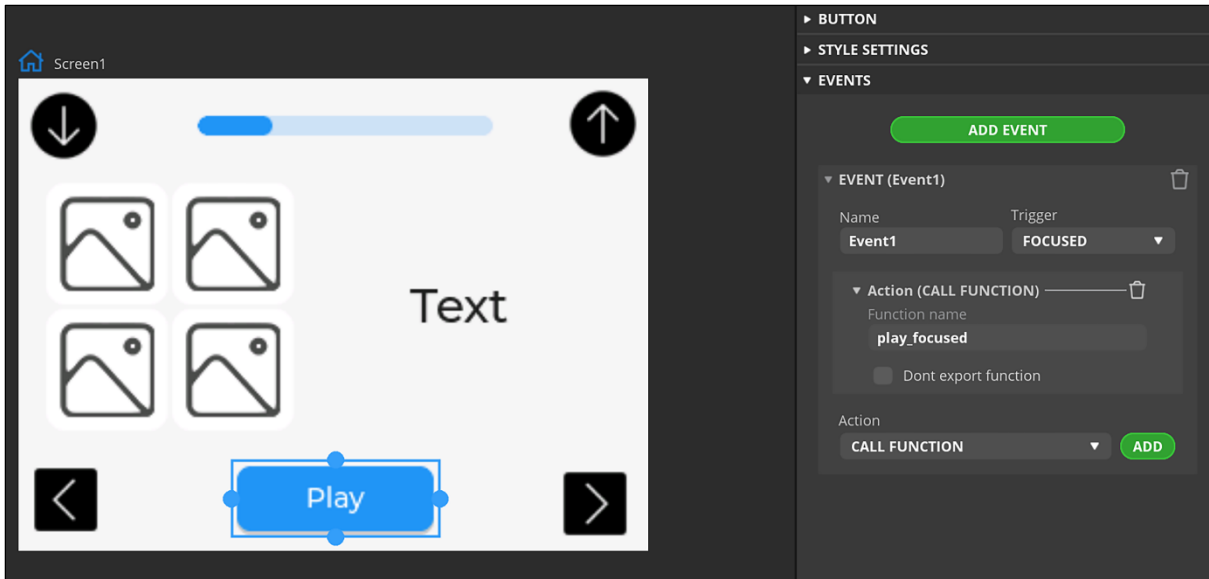
prev-f.png

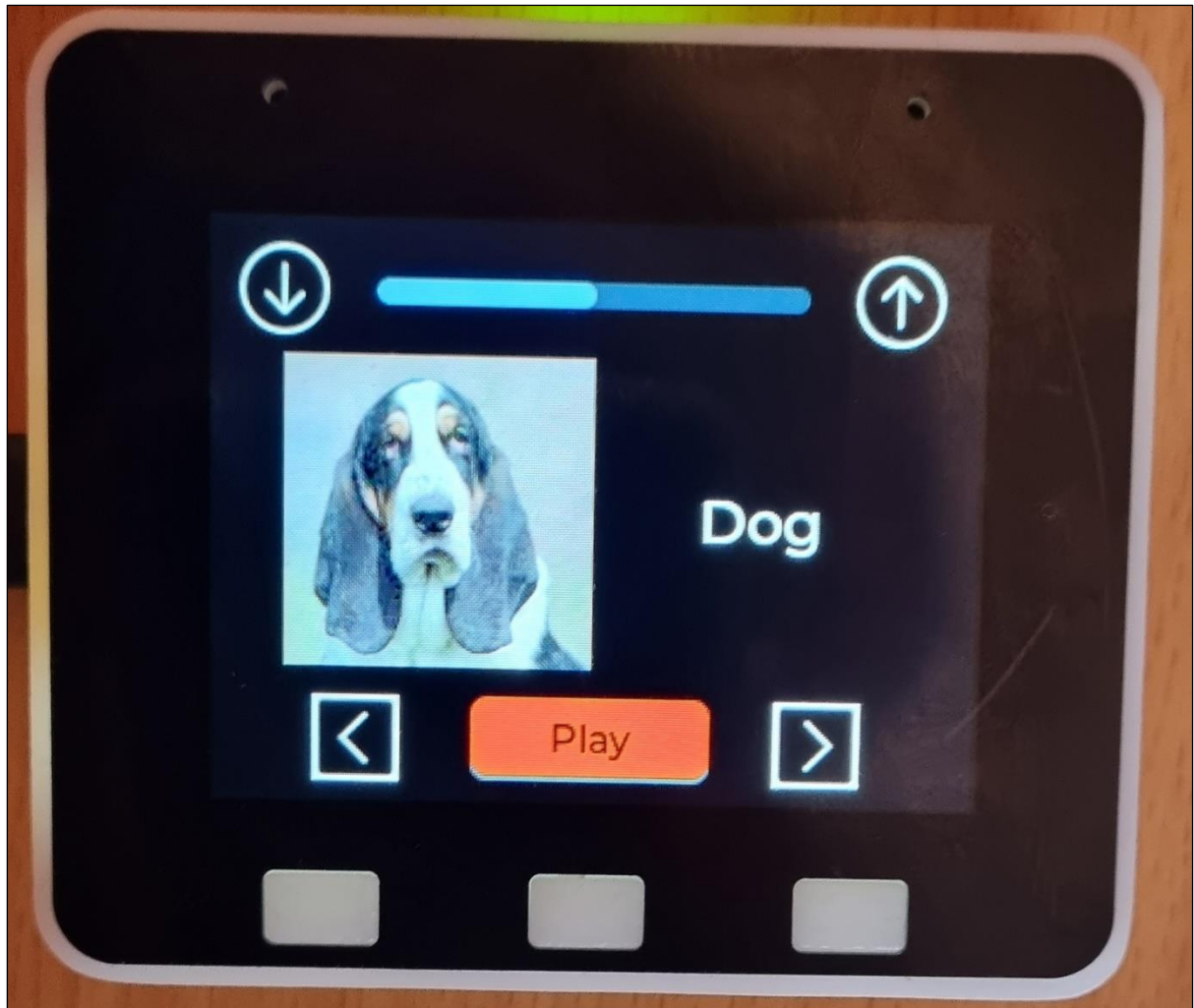
prev-w.png



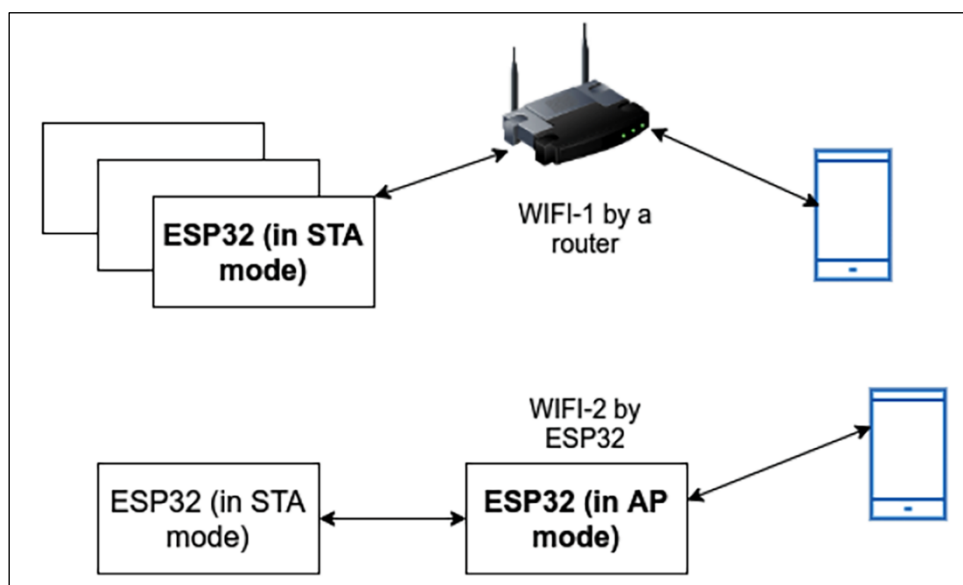








Chapter 6: Using Wi-Fi communication for connectivity



```
I (556) wifi_prov_mgr: Provisioning started with service name : PROV_ESP32  
I (566) QRCODE: Encoding below text with ECC LVL 0 & QR Code Version 10  
I (566) QRCODE: {"name":"PROV_ESP32","pop":"abcd1234","transport":"softap","ver":"v1"}
```



Connect to device?

ESP SoftAP Prov will use a temporary Wi-Fi network to connect to the device.

PROV_ESP32

Cancel

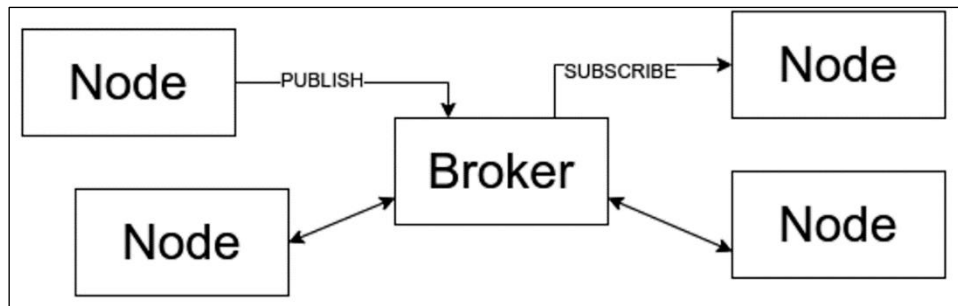
Connect



- ✓ Sending Wi-Fi credentials
- ✓ Applying Wi-Fi connection
- ✓ Checking provisioning status

OK

```
(Top) → Application settings → Provisioning method  
Espressif IoT Development Framework Configuration  
( ) softap  
(X) ble
```



Chapter 7: ESP32 Security Features for Production-Grade devices

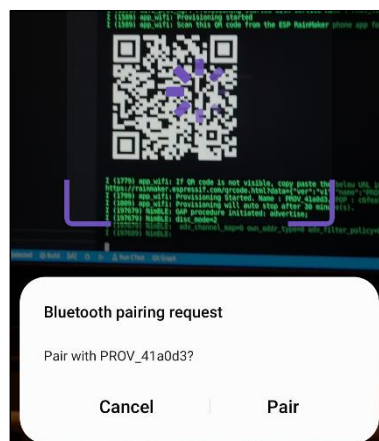
```

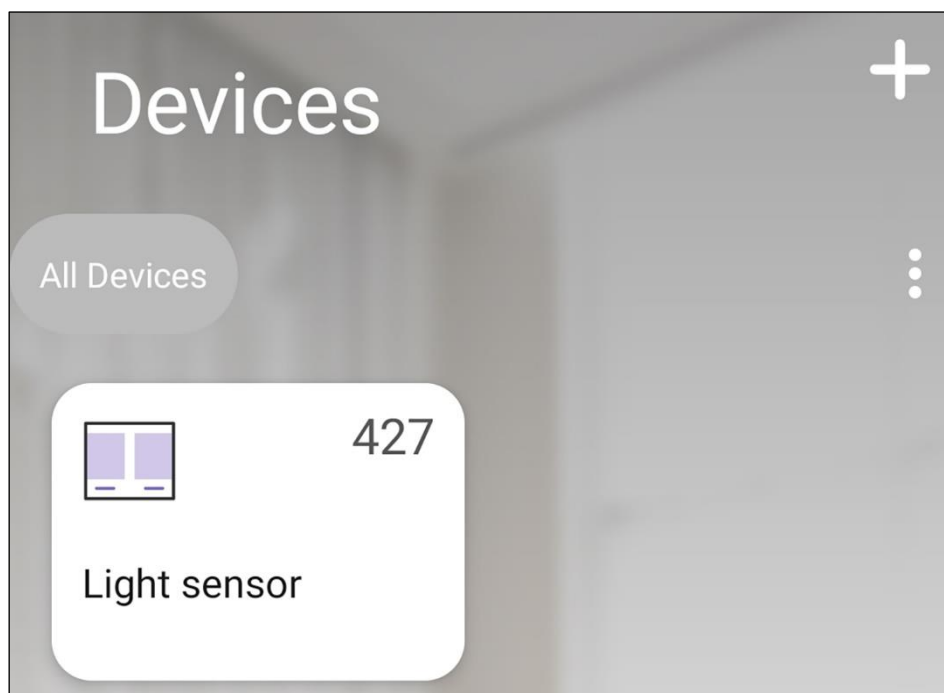
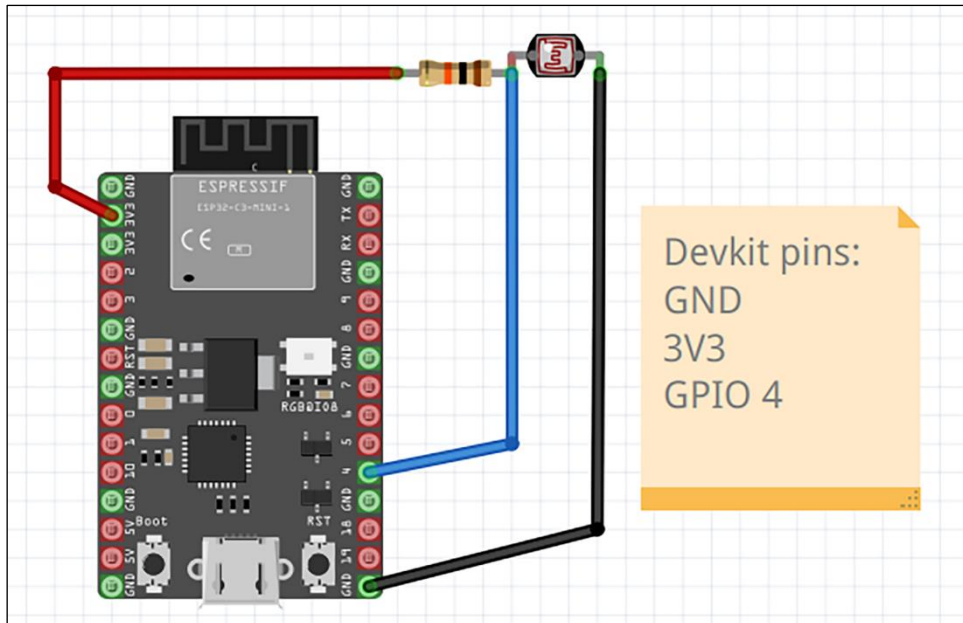
I (1579) wifi_prov_mgr: Provisioning started with service name : PROV_41a0d3
I (1589) app_wifi: Provisioning started
I (1589) app_wifi: Scan this QR code from the ESP RainMaker phone app for Provisioning.



I (1779) app_wifi: If QR code is not visible, copy paste the below URL in a browser.
https://rainmaker.espressif.com/qrcode.html?data={"ver":"v1","name":"PROV_41a0d3","pop":"c6feaf83","transport":"ble"}
I (1799) app_wifi: Provisioning Started, Name : PROV_41a0d3, POP : c6feaf83
I (1809) app_wifi: Provisioning will auto stop after 30 minute(s).

```





<

Light sensor

i


Name

Light sensor

Edit

LightParam

426



ESPRAINMAKER

Nodes

Node Groups

Firmware Images

OTA Jobs

Insights

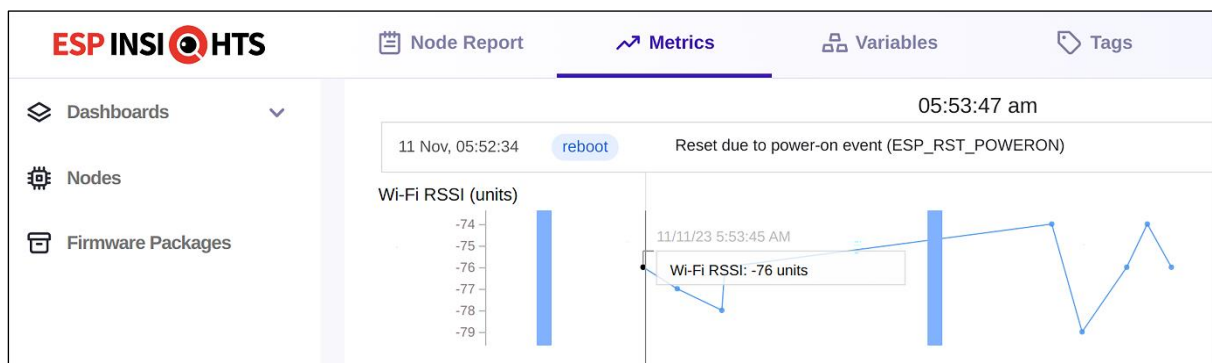
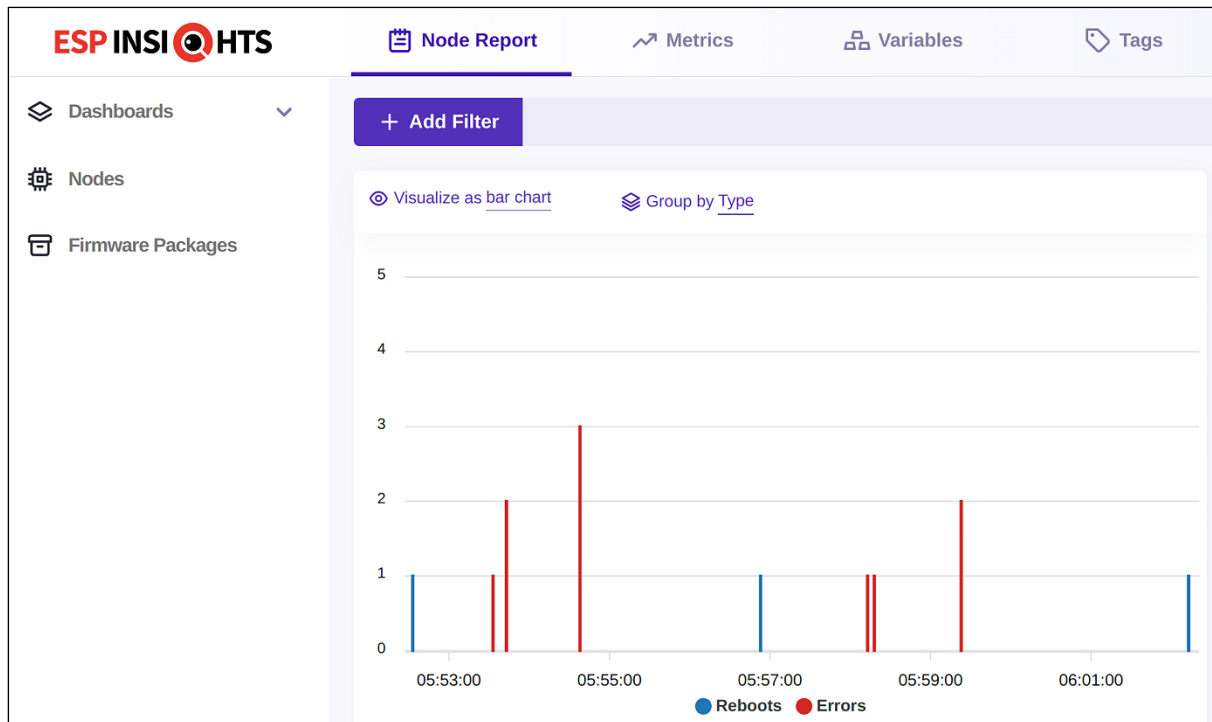
Overview

Nodes

The node details will get populated when the nodes connect to the ESP RainMaker cloud and send their configuration

Select the node to add them in the Node Group.

<input type="checkbox"/>	Node Id	Name
<input type="checkbox"/>	5numpAUEd7HKnB3SudhxyX	ESP RainMaker Device
<input type="checkbox"/>	A0764E76F90C	A light-sensor node
<input type="checkbox"/>	FdzVD5JsBhJZMTncG4cGkx	ESP RainMaker Device



Chapter 8: Connecting to cloud platforms and using services

Thing properties

☒ Create a new thing

☐ Choose an existing thing

Thing name

my_light_sensor1

Enter a unique name containing only: letters, numbers, hyphens, colons, or underscores. A thing name can't contain any spaces.

[AWS IoT](#) > [Security](#) > [Policies](#) > my_light_sensor1-Policy

my_light_sensor1-Policy [Info](#)

Edit active version

Delete

Policy version status

Active policy

☒ Set the edited version as the active version for this policy

You can change this setting later in the policy's detail page.

Cancel

Save as new version

Versions	Targets	Noncompliance	Tags
Active version: 2 Info		Builder	JSON
Policy effect	Policy action	Policy resource	
Allow	iot:Publish	arn:aws:iot:*:*:*	
Allow	iot:Receive	arn:aws:iot:*:*:*	
Allow	iot:Subscribe	arn:aws:iot:*:*:*	
Allow	iot:Connect	arn:aws:iot:*:*:*	

AWS IoT

×

Monitor

Connect

Connect one device

▶ Connect many devices

Test

▶ Device Advisor

MQTT test client

Device Location [New](#)

Manage

▼ All devices

Things

Thing groups

[AWS IoT](#) > MQTT test client

MQTT test client [Info](#)

You can use the MQTT test client to monitor the MQTT messages being passed in your AWS account. Devices publish MQTT messages that are identified by topics to communicate their state to AWS IoT. AWS IoT also publishes MQTT messages to inform devices and apps of changes and events. You can subscribe to MQTT message topics and publish MQTT messages to topics by using the MQTT test client.

▶ Connection details

✔ Connected

You can update the connection details by choosing Disconnect and making updates on the Establish connection to continue page.

Subscribe to a topic

Topic filter [Info](#)

The topic filter describes the topic(s) to which you want to subscribe. The topic filter can include MQTT wildcard characters.

Enter the topic filter

▶ Additional configuration

Subscribe

Publish to a topic

▼ my_light_sensor1/reading

November 11, 2023, 06:38:18 (UTCZ)

```
{
  "light_level": 448
}
```

► Properties

Database

Amazon Timestream

Fast, scalable, serverless and managed service for time-series data

Get started with Amazon Timestream

To start using Amazon Timestream, create your first database. A database is a top-level container for tables. Databases are a fundamental management concept in Amazon Timestream.

Create database

[Timestream](#) > [Databases](#) > Create database

Create database [Info](#)

Database configuration

Create and configure a database or create a database with sample data to explore Timestream right away.

Choose a configuration

☒ **Standard database**
Create a new database with custom configuration.

☐ **Sample database**
Create a database and populate it with sample data to get started in a single click.

Name

Specify a name that is unique for all Timestream databases in your AWS account in the current Region. You can not change this name once you create it.

ch8_db1

Must be between 3 and 256 characters long. Must contain letters, digits, dashes, periods or underscores.

Monitoring

Tables

Tags

Tables (0) [Info](#)

Create backup

Create scheduled query

Edit

Delete

Create table

Filter

< 1 >

Create table [Info](#)

Table details

Database name

Choose the database where this table will be created.

ch8_db1

Table name

Specify a table name that is unique within this database. You can not change this name once you create it.

light_data

Must be between 3 and 256 characters long. Must contain letters, digits, dashes, periods or underscores.

[AWS IoT](#) > [Message routing](#) > Rules

Rules (2) [Info](#)

Activate

Deactivate

Edit

Delete

Create rule

Rules allow your things to interact with other services. Rules are analyzed and perform specific actions based on messages published by your devices.

Find rules

< 1 >

[AWS IoT](#) > [Message routing](#) > [Rules](#) > Create rule

Step 1

Specify rule properties

Step 2

Configure SQL statement

Step 3

Attach rule actions

Step 4

Specify rule properties [Info](#)

A rule resource contains a list of actions based on the MQTT topic stream.

Rule properties

Rule name

light_rule1

Enter an alphanumeric string that can also contain underscore () characters, but no spaces.

[AWS IoT](#) > [Message routing](#) > [Rules](#) > Create rule

Step 1

[Specify rule properties](#)

Step 2

Configure SQL statement

Step 3

Attach rule actions

Step 4

Review and create

Configure SQL statement [Info](#)

Add a simplified SQL syntax to filter messages received on an MQTT topic and push the data elsewhere.

SQL statement

SQL version

The version of the SQL rules engine to use when evaluating the rule.

2016-03-23

SQL statement

Enter a SQL statement using the following: SELECT <Attribute> FROM <Topic Filter> WHERE <Condition>. For example: SELECT temperature FROM 'iot/topic' WHERE temperature > 50. To learn more, see [AWS IoT SQL Reference](#).

1 SELECT * FROM 'my_light_sensor/reading'

Rule actions

Select one or more actions to happen when the above rule is matched by an inbound message. Actions define additional activities that occur when messages arrive, like storing them in a database, invoking cloud functions, or sending notifications. You can add up to 10 actions.

Action 1

Timestream table

Write a message into a Timestream table

Remove

Database name [Info](#)

ch8_db

View

Create Timestream database

Table name

light_data

View

Create Timestream table

Dimensions

Each record contains an array of dimensions (minimum 1). Dimensions represent the metadata attributes of a time series data point.

Dimensions name

sensor_id

Dimension value

my_sensor

Remove

Add new dimension

Timestamp value - optional

Enter substitutional template

Timestamp unit

MILLISECONDS

IAM role

Choose a role to grant AWS IoT access to your endpoint.

ilght_data_rule

View

Create new role

[Timestream](#) > Query editor

Query editor

[Info](#)

EditorRecentSaved queriesSample queries

Database

Choose a database to query.

ch8_db

Query 1

1

```
select * from ch8_db."light_data"
```

Table detailsQuery resultsOutput

Rows returned (16)

Filter

<12>

sensor_id	measure_name	time	measure_value::bigint
my_sensor	light_level	2023-11-11 07:18:23.420000000	455
my_sensor	light_level	2023-11-11 07:18:28.423000000	443

[Amazon Grafana](#) > [Workspaces](#) > Create new workspace

Step 1Specify workspace details

Step 2Configure settings

Step 3Service managed permission settings

Step 4Review and create

Specify workspace details

A workspace is a logically isolated Grafana server. Once you have created a workspace, you can integrate it with data sources, then query and visualize metrics from those data sources. As part of creating a workspace, you will enable AWS IAM Identity Center (successor to AWS SSO) if you haven't done so already.

Workspace details

Workspace name

Give a unique name to your workspace.

ch8_ex1

Valid special characters include "-", ".", "_", "~". Cannot contain non-ASCII characters or spaces. Max length of 255 characters.

[Amazon Grafana](#) > [Workspaces](#) > Create new workspace

Step 1

[Specify workspace details](#)

Step 2

Configure settings

Step 3

Service managed permission settings

Step 4

Review and create

Configure settings [Info](#)

Authentication access [Info](#)

Choose at least one authentication method.

☒ **AWS IAM Identity Center (successor to AWS SSO)** ✔ Enabled


You can enable IAM Identity Center by creating a user. This new user does not automatically have access to the Grafana console. You will still need to assign this user later, once this workspace is created.

☐ **Security Assertion Markup Language (SAML)**

You will need to complete additional steps to finish SAML configuration once this workspace is created.

Data sources

Selecting an AWS data source below creates an IAM role that enables Amazon Grafana access to those resources in your current account. It does not set up the selected service as a data source. Note that some resources must be tagged GrafanaDataSource to be accessible.

	Data source name
<input type="checkbox"/>	AWS IoT SiteWise
<input type="checkbox"/>	AWS X-Ray
<input type="checkbox"/>	Amazon CloudWatch
<input type="checkbox"/>	Amazon OpenSearch Service
<input type="checkbox"/>	Amazon Managed Service for Prometheus
<input checked="" type="checkbox"/>	Amazon TimeStream
<input type="checkbox"/>	Amazon Redshift
<input type="checkbox"/>	Amazon Athena


AWS IAM Identity Center (successor to AWS SSO)

 Pending user input


You can enable AWS IAM Identity Center by creating a user or connect IAM Identity Center to an external identity provider (IdP) to enable users to log in to the workspace with their existing credentials. Note that when you enable IAM Identity Center by creating a new user, you will need to assign this user access to the workspace before they can log in to the workspace.


Assign new user or group

 Assign new users to the Grafana workspace so users can access the workspace URL.


 [IAM Identity Center](#) > Users

Users (1)


 [Delete users](#) [Add user](#)

Users listed here can sign in to the AWS access portal to access AWS accounts and assigned cloud applications. [Learn more](#) 

Username ▼

 Find users

< 1 >




[Amazon Grafana](#) > [Workspaces](#) > [ch8_ex](#) > AWS IAM Identity Center (successor to AWS SSO)

AWS IAM Identity Center (successor to AWS SSO)










[Assigned users](#) | Assigned user groups

Users (1) [Info](#)

The following users have already been assigned access to Grafana.

 Find users

<input type="checkbox"/>	Full name	User type
<input type="checkbox"/>	ozan oner	Admin



General / Home

Welcome to Amazon Managed Grafana

Basic


The steps below will guide you to quickly finish setting up your Grafana installation.

TUTORIAL

DATA SOURCE AND DASHBOARDS


Grafana fundamentals

Set up and understand Grafana if you have no prior experience. This tutorial guides you through the entire process and covers the "Data source" and "Dashboards" steps to the right.



COMPLETE


Add your first data source



Learn how in the docs [↗](#)

COMPLETE

Create your first dashboard



Learn how in the docs [↗](#)



Add data source

Choose a data source type

time



Amazon Timestream

Managed timeseries database from amazon

Signed

Connection Details

Authentication Provider	Workspace IAM Role
Assume Role ARN	arn:aws:iam:*
External ID	External ID
Endpoint	https://query-{cell}.timestream.{region}.amazonaws.com
Default Region	eu-west-1

Timestream Details

Default values to be used as macros

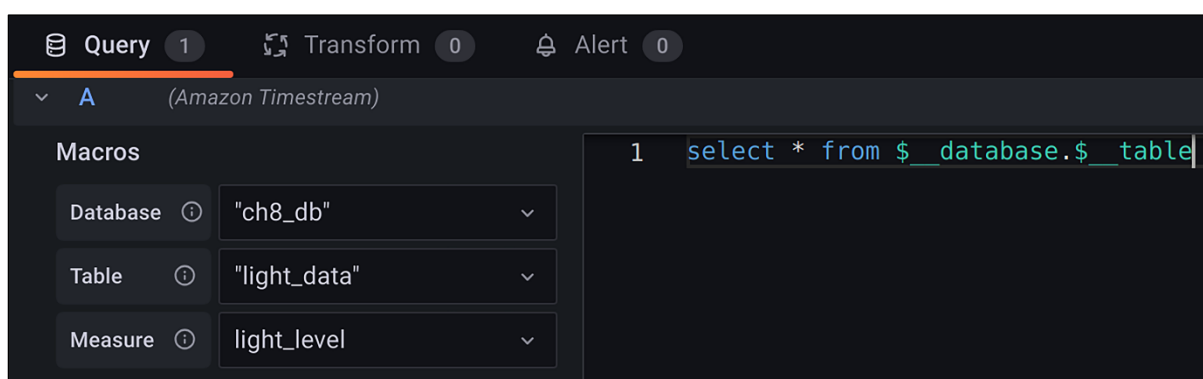
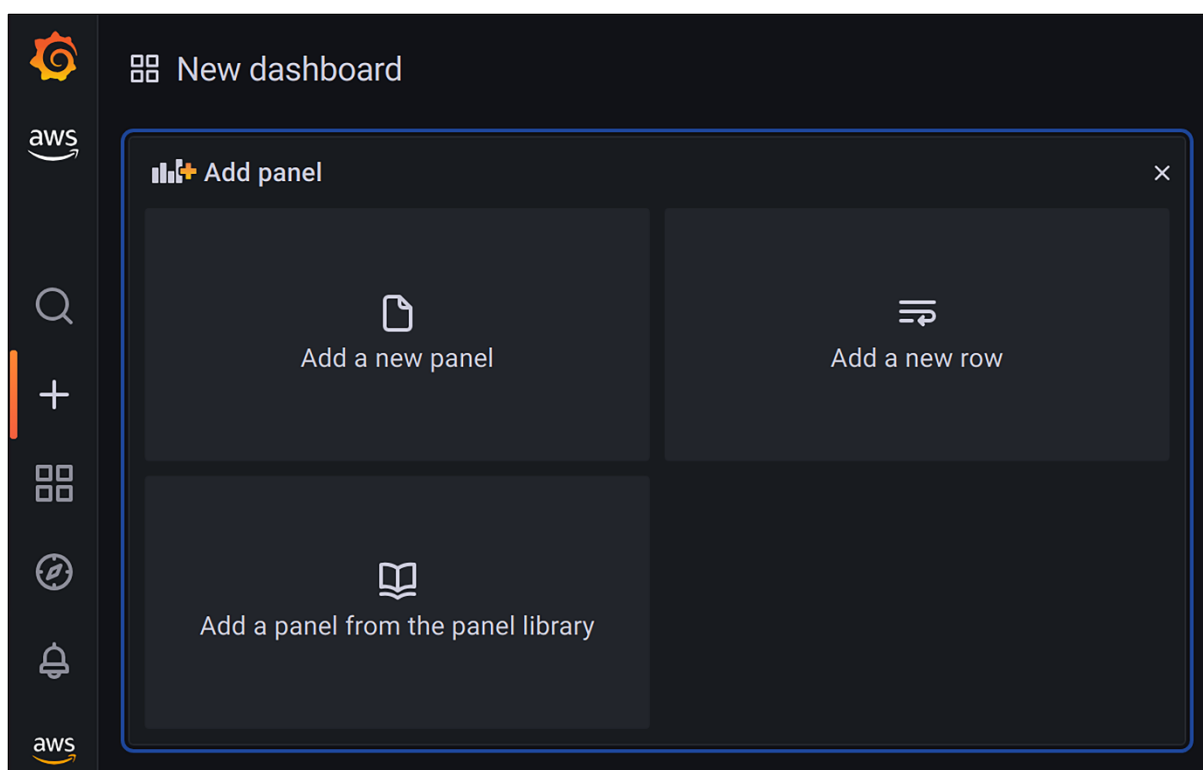
Database	"ch8_db"
Table	"light_data"
Measure	light_level

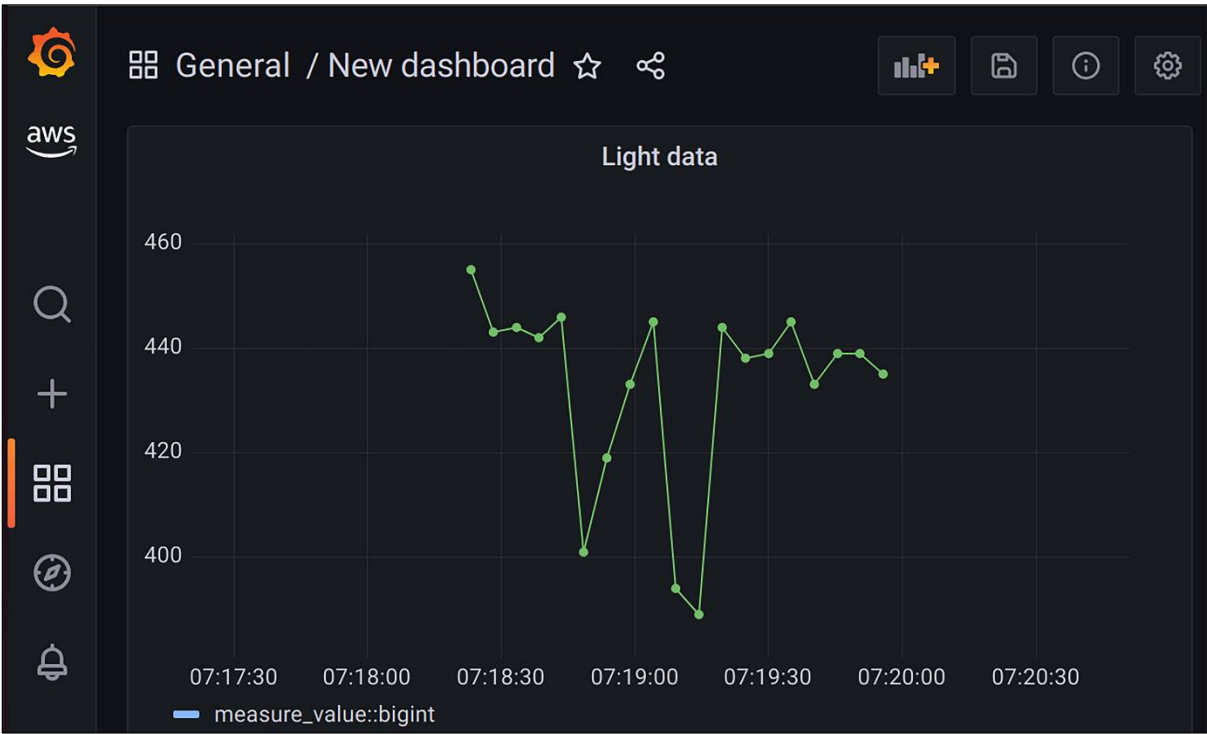
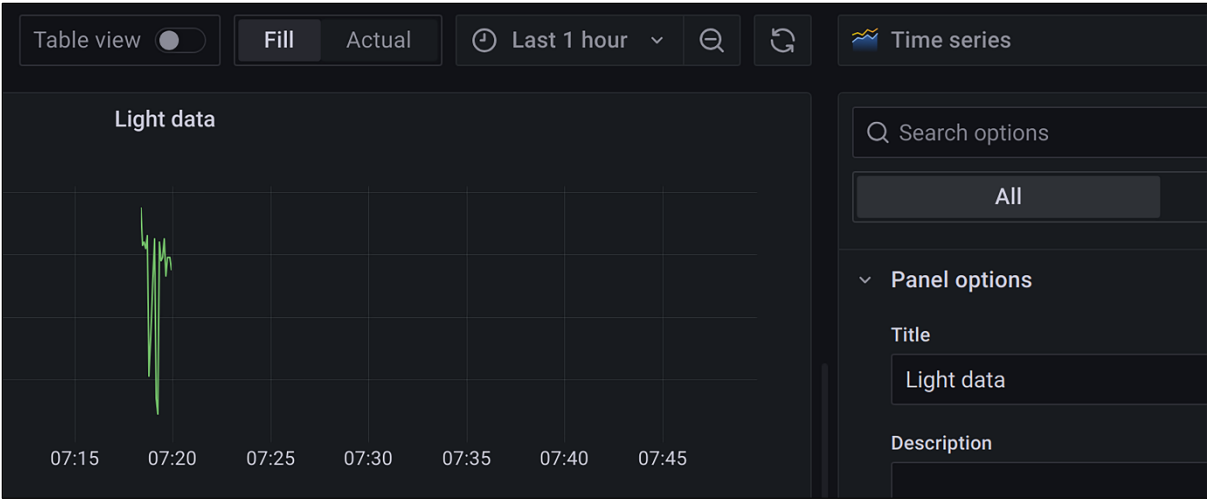
Back

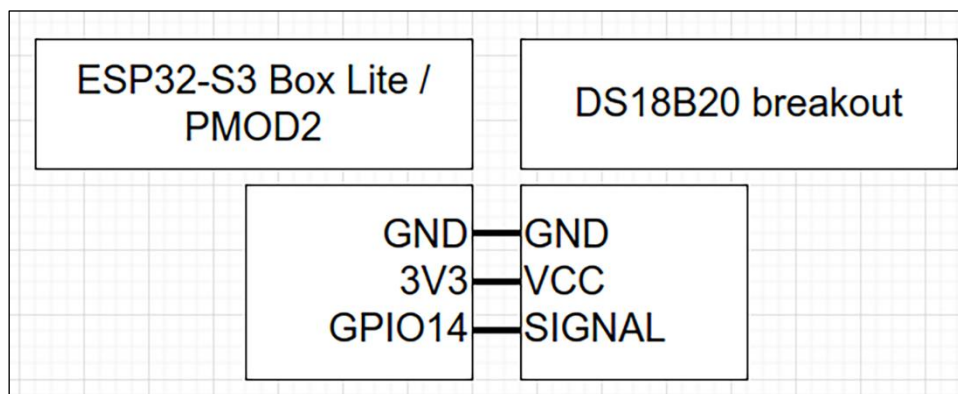
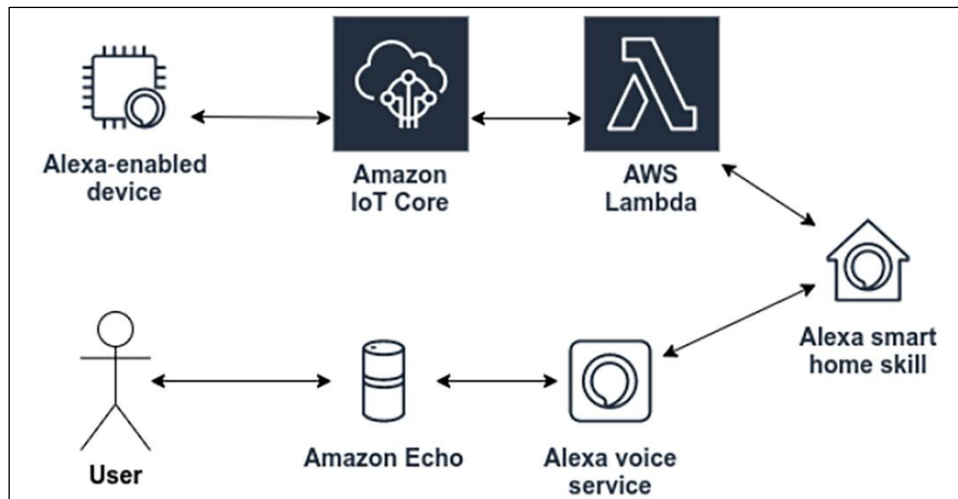
Explore

Delete

Save & test







Manage

▼ All devices

Things

Thing groups
Thing types
Fleet metrics

▶ Greengrass devices
▶ LPWAN devices

Software packages
New

▶ Remote actions
▶ Message routing
Retained messages

Device Shadow document
MQTT topics

Device Shadow document
Info

The Device Shadow document contains the reported, desired, and delta values of the device's state. You can edit the state values here or programmatically. Your device can sync its state while it's connected to AWS IoT.

Device Shadow state

```

{
  "state": {
    "reported": {
      "temperature": 22.6875
    }
  }
}

```

[Lambda](#) > [Functions](#) > Create function

Create function

Info

AWS Serverless Application Repository applications have moved to [Create application](#).

☒ Author from scratch

Start with a simple Hello World example.

☐ Use a blueprint

Build a Lambda application from sample code and configuration presets for common use cases.

☐ Container image

Select a container image to deploy for your function.

Basic information

Function name

Enter a name that describes the purpose of your function.

alex_aemp_sensor1

Use only letters, numbers, hyphens, or underscores with no spaces.

Runtime

Info

Choose the language to use to write your function. Note that the console code editor supports only Node.js, Python, and Ruby.

Python 3.9

Code

Test

Monitor

Configuration

Aliases

Versions

General configuration

Triggers

Permissions

Destinations

Execution role

Role name

alex_aemp_sensor-role-l9ilgqtp

Resource summary

Permissions

Trust relationships

Tags

Access Advisor

Revoke sessions

Permissions policies (2)

Info

You can attach up to 10 managed policies.

Search

Filter by Type

All types

Simulate

Remove

Add permissions

Attach policies

Create inline policy

PermissionsTrust relationshipsTagsAccess AdvisorRevoke sessions

Permissions policies (2) Info

↺

Simulate ↗

Remove

Add permissions ▼

You can attach up to 10 managed policies.

Filter by Type

Search

All types ▼

< 1 > ⚙

<input type="checkbox"/>	Policy name ↗	Type	Attached entities
<input type="checkbox"/>	<div><div>+</div>AWSLambdaBasicExecuti...</div>	Customer managed	1
<input type="checkbox"/>	<div><div>+</div>temp_shadow_access</div>	Customer inline	0

CodeTestMonitorConfigurationAliasesVersions

Code source Info

FileEditFindViewGoToolsWindow

Test ▼Deploy

Go to Anything (Ctrl-P)

Environment

alex_a-temp_sensor ⚙

lambda_function.py

lambda_function ×

Environment Vari × +

1

2import logging

3import time

4import json

5import uuid

6import boto3

7

CodeTestMonitorConfigurationAliasesVersions

Code source Info

FileEditFindViewGoToolsWindow

Test ▼Deploy

Go to Anything (Ctrl-P)

lambda_function ×

Configure test event

Ctrl-Shift-C

Code sourceInfo

Upload from

FileEditFindViewGoToolsWindowTestDeploy

Go to Anything (Ctrl-P)

Environment

Execution results

Test Event Name

test-avs-discovery

Response

```
{
  "event": {
    "header": {
      "namespace": "Alexa.Discovery",
      "name": "Discover.Response",
      "payloadVersion": "3",
      "messageId": "1d5259e2-9eaa-4215-98eb-efad7389626c"
    },
    "payload": {
      "endpoints": [
        {
          "endpointId": "home_temp_sensor",
          "manufacturerName": "lot-with-esp32",
          "description": "Smart temperature sensor",
          "friendlyName": "Temperature sensor",
          "displayCategories": [
            "TEMPERATURE_SENSOR"
          ],

```

Status: SucceededMax memory used: 66 MBTime: 2.83 ms

< Your Skills

home_temp_sensor_skill

BuildCodeTest

English (US)

SMART HOME

MODELS

ACCOUNT LINKING

PERMISSIONS

Smart Home

1. Payload version*?

[Lambda](#) > [Functions](#) > alexa_temp_sensor1

alexa_temp_sensor1

▼ Function overview [Info](#)



alexa_temp_sensor1



Layers

(0)

+ Add trigger

[Lambda](#) > Add trigger

Add trigger

Trigger configuration [Info](#)



Alexa
alexa iot voice

Choose an Alexa product

☐ Alexa Skills Kit

☒ Alexa Smart Home

Skill ID

Lambda will add the necessary permissions for Amazon Alexa to invoke your Lambda function from this trigger. [Learn more](#) [about the Lambda permissions model.](#)

Cancel

Add

3. Account Linking



You will need to configure the account linking skill capability in order for the Smart Home Voice Model to be functional

[Setup Account Linking](#)

Security Profile Name *

myhome_sec_profile

Security Profile Description *

myhome_sec_profile

Consent Privacy Notice URL *

https://mevoo.co.uk

Consent Logo Image

UPLOAD
IMAGE

Save

Cancel

Login with Amazon Configurations

Security Profile Name

OAuth2 Credentials

myhome_sec_profile

Client ID:

[REDACTED]

Client Secret:

[REDACTED]

Security Profile Management



myhome_sec_profile - Security Profile

General

Web Settings

Android/Kindle Settings

iOS Settings

TVs and Other Devices Settings

To use Login with Amazon with a website, you must specify either an allowed JavaScript origin (for the Implicit grant) or an allowed return URL (for the Authorization Code grant). [Learn More](#)

Client ID



Client Secret

Show Secret

Allowed Origins ?

Allowed Return URLs ?

https://layla.am
https://alexa.am
https://pitangui.a



English (US)



SMART HOME

MODELS

ACCOUNT LINKING

PERMISSIONS



Success! Your changes have been saved.

Account Linking

Do you allow users to create an account or link to an existing account with you?

[Learn more](#)



DISCOVER ALEXA



Skills & Games

Things to Try

Your Skills

Dev



home_temp_sensor_skill

Account linking required



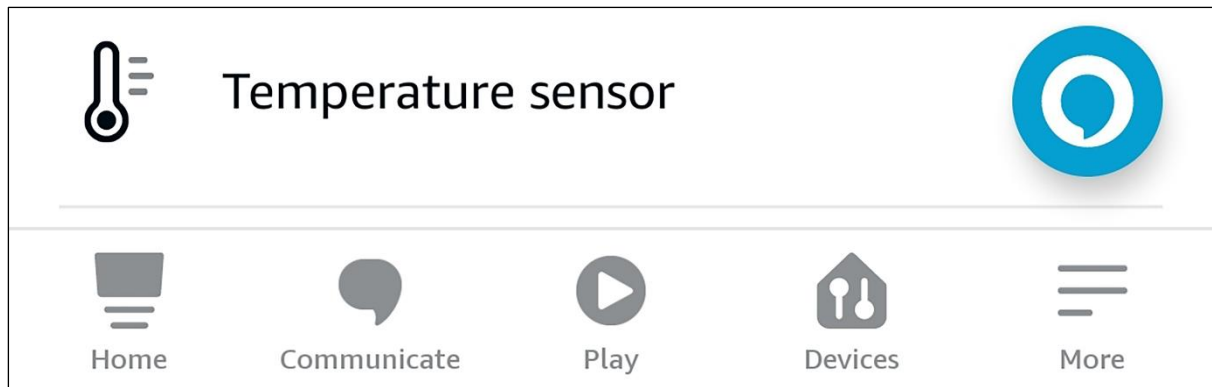
**Your
home_temp_sensor_skill1
account has been
successfully linked.**

Next, continue to discover your device

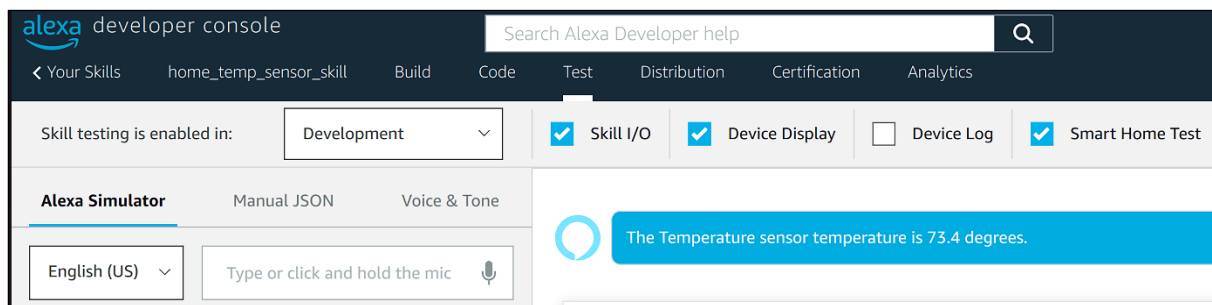


**1 iot-with-esp32
temperature sensor found
and connected**

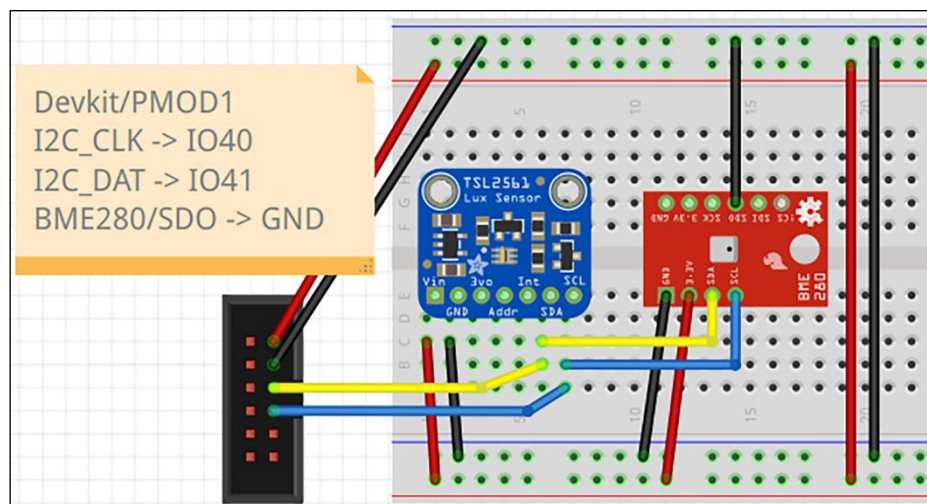
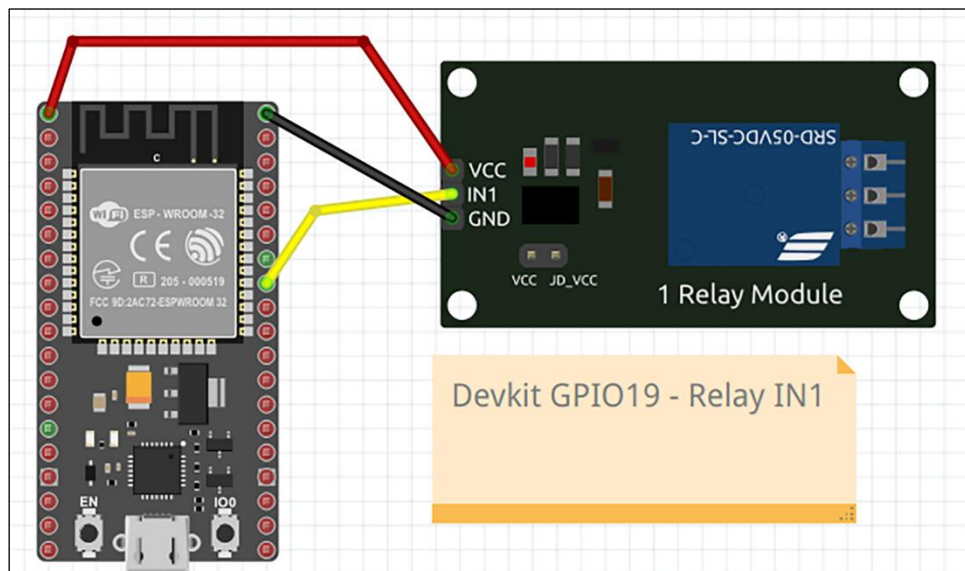
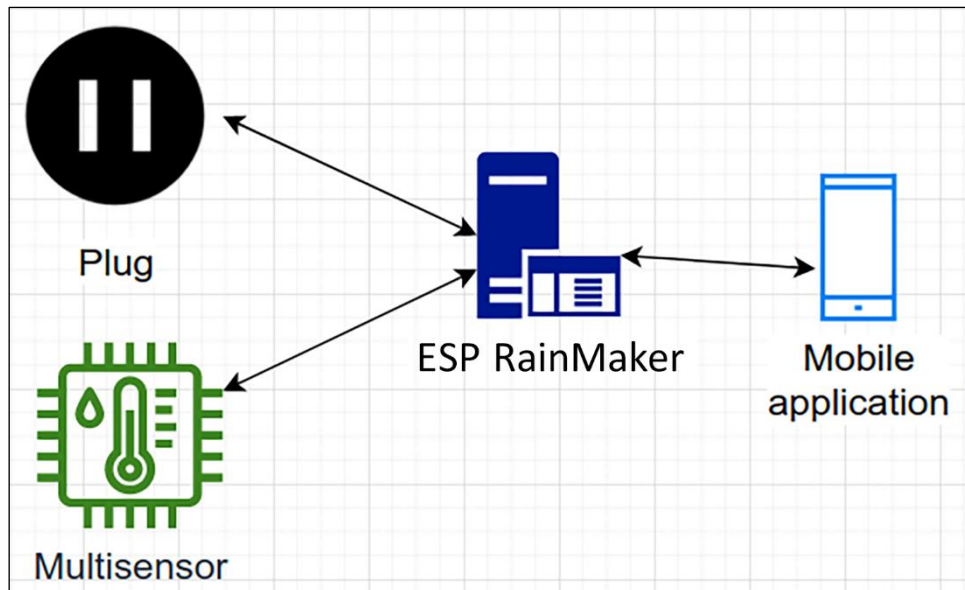
Your temperature sensor has been added to your Alexa account. Next, we'll help you finish setting up your device.

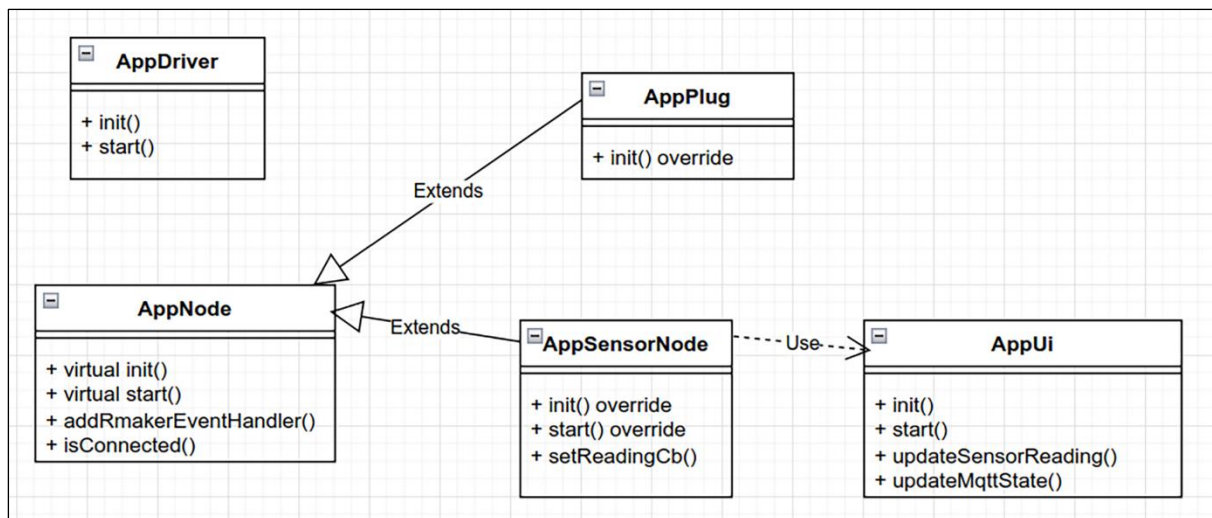


16.6
Current temperature



Chapter 9: Project - Smart home





```
$ tree ch9_common/
ch9_common/
├── CMakeLists.txt
├── include
│   ├── AppDriver.hpp
│   └── AppNode.hpp
1 directory, 3 files
```



Screen1

<date/time>

Text

Text

Text

Text



Disconnected

- ✓ Sending Wi-Fi credentials
- ✓ Confirming Wi-Fi connection
- ✓ Configuring Node association
- ✓ Confirming Node association
- ✓ Setting up the Node

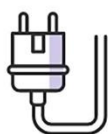
Device Added Successfully!!

Done

Devices



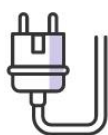
All Devices



Plug

 Reachable on WLAN

All Devices



Plug

 Reachable on WLAN

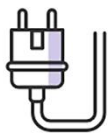
Devices



All Devices



All Devices



Plug

 Reachable on WLAN


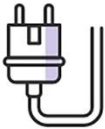


5


Sensor


 Reachable on WLAN

All Devices




Plug

 Reachable on WLAN




38


Sensor

 Reachable on WLAN


Add Schedule




Devices




Schedules



Scenes



Automations



Settings

<

Actions

Done

☐

Sensor

>

☒

Plug

>

☒

power
ON

Schedules

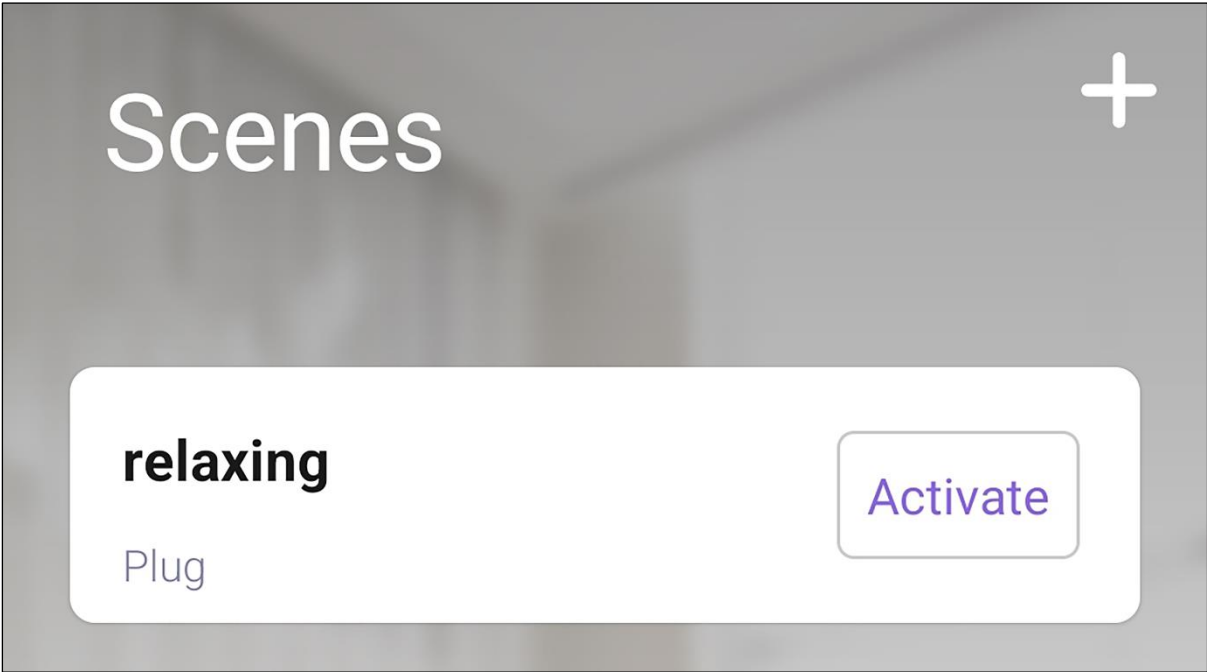
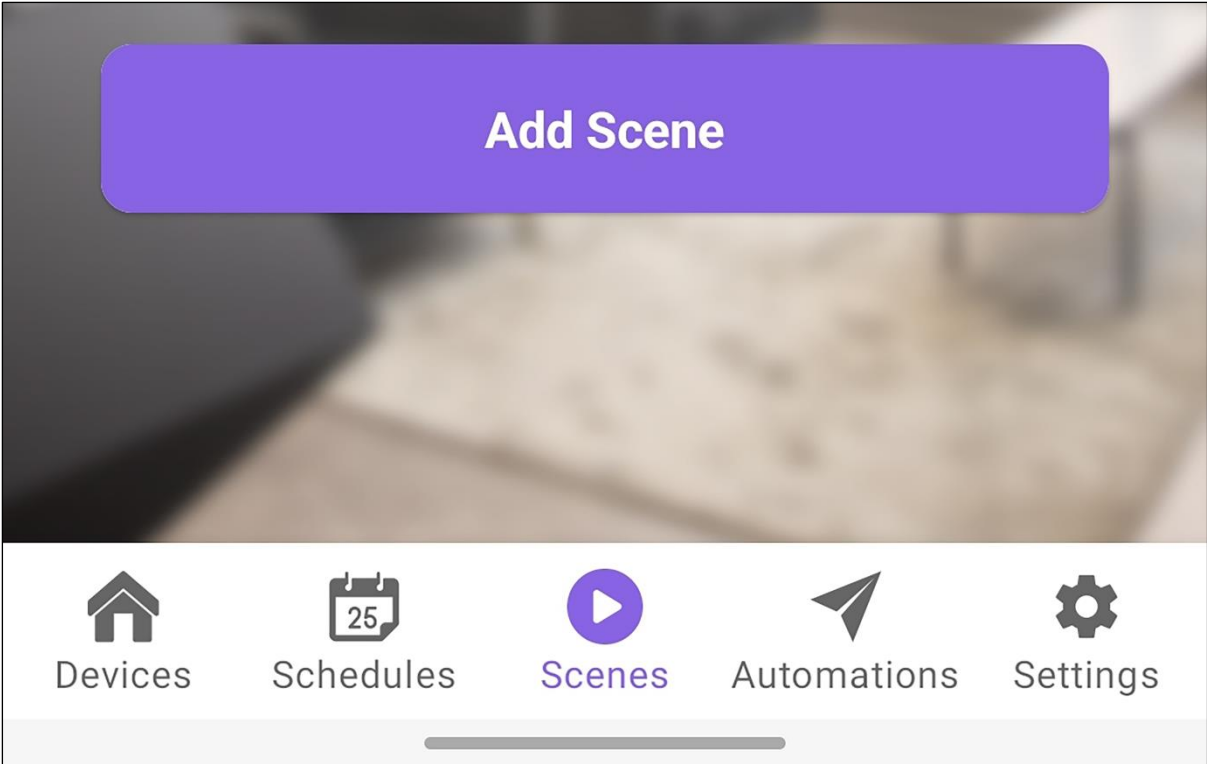
+

08:03 PM

Once

night time

Plug



Add Automation



Devices



Schedules



Scenes



Automations



Settings



Select Event



Plug



Sensor



Actions

Save

Event: Sensor: light-intensity>30



Sensor



Plug



power
OFF



Automations



sunrise



If: Sensor: light-intensity>30

Set: Plug: power:false

Account

Notifications

Voice Services

About

Logout



Devices



Schedules



Scenes



Automations



Settings



Voice Services

Supported Services



Amazon Alexa



Google Assistant



ALL DEVICES



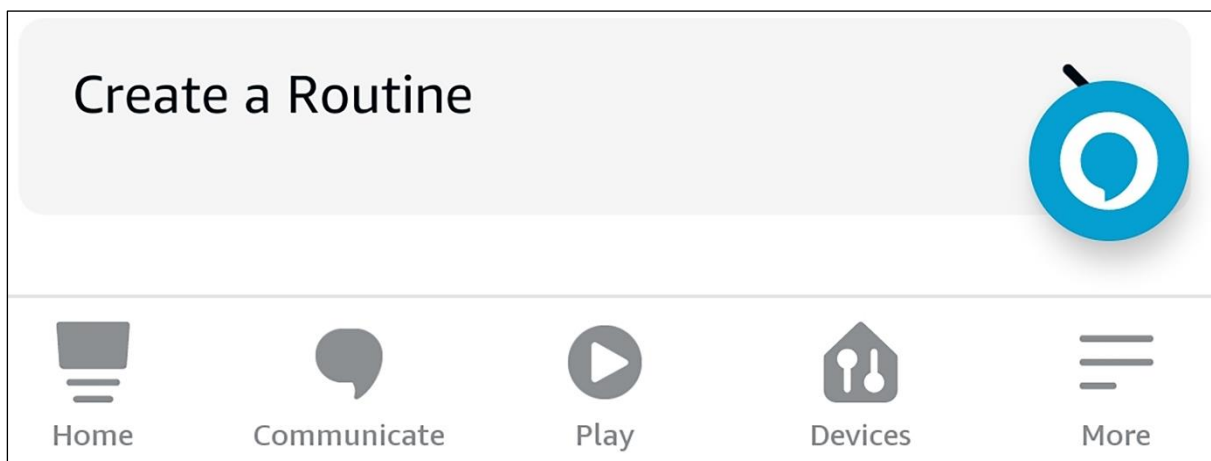
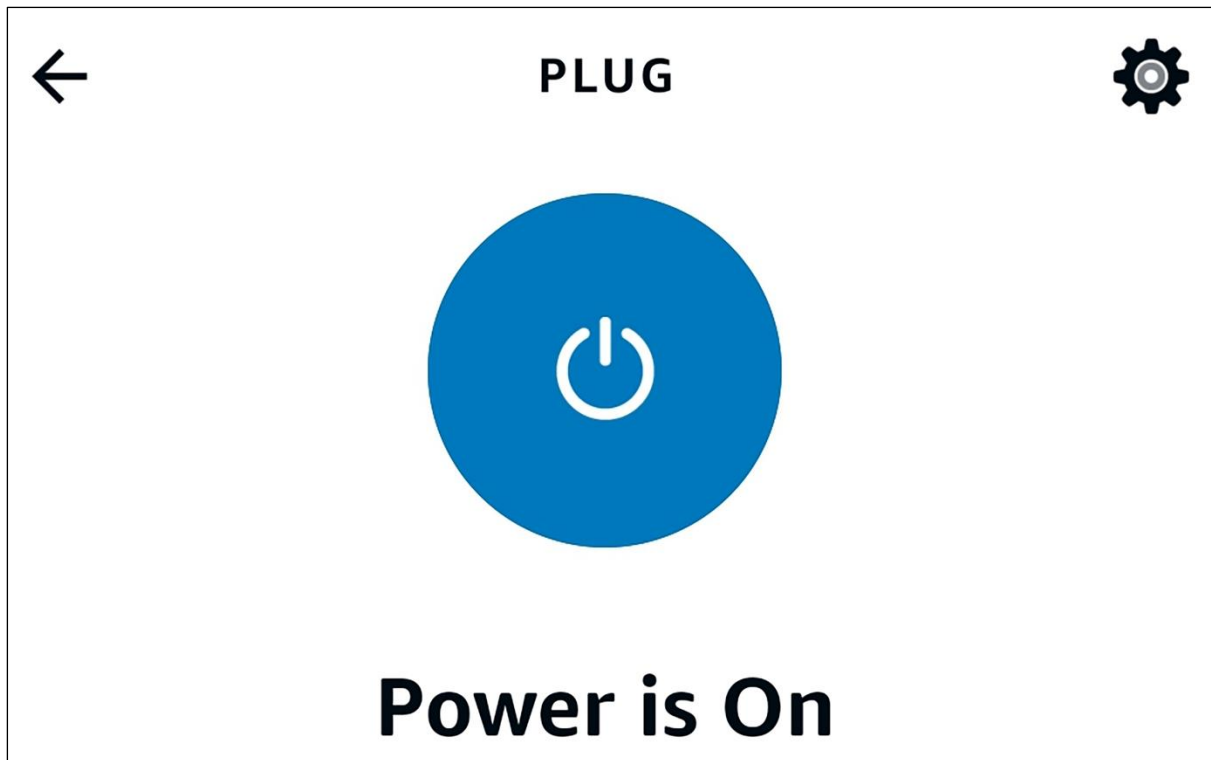
Plug

• New Device

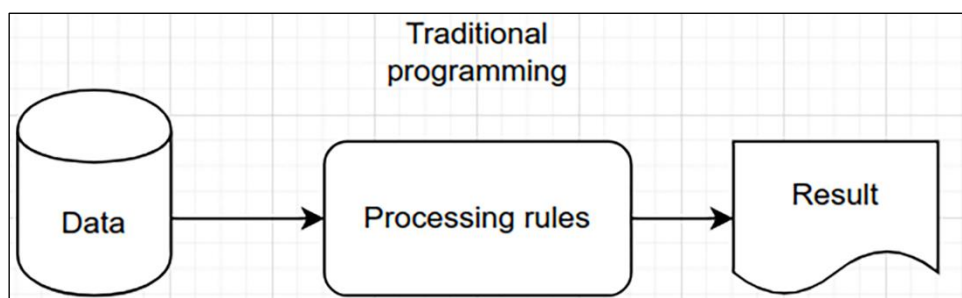


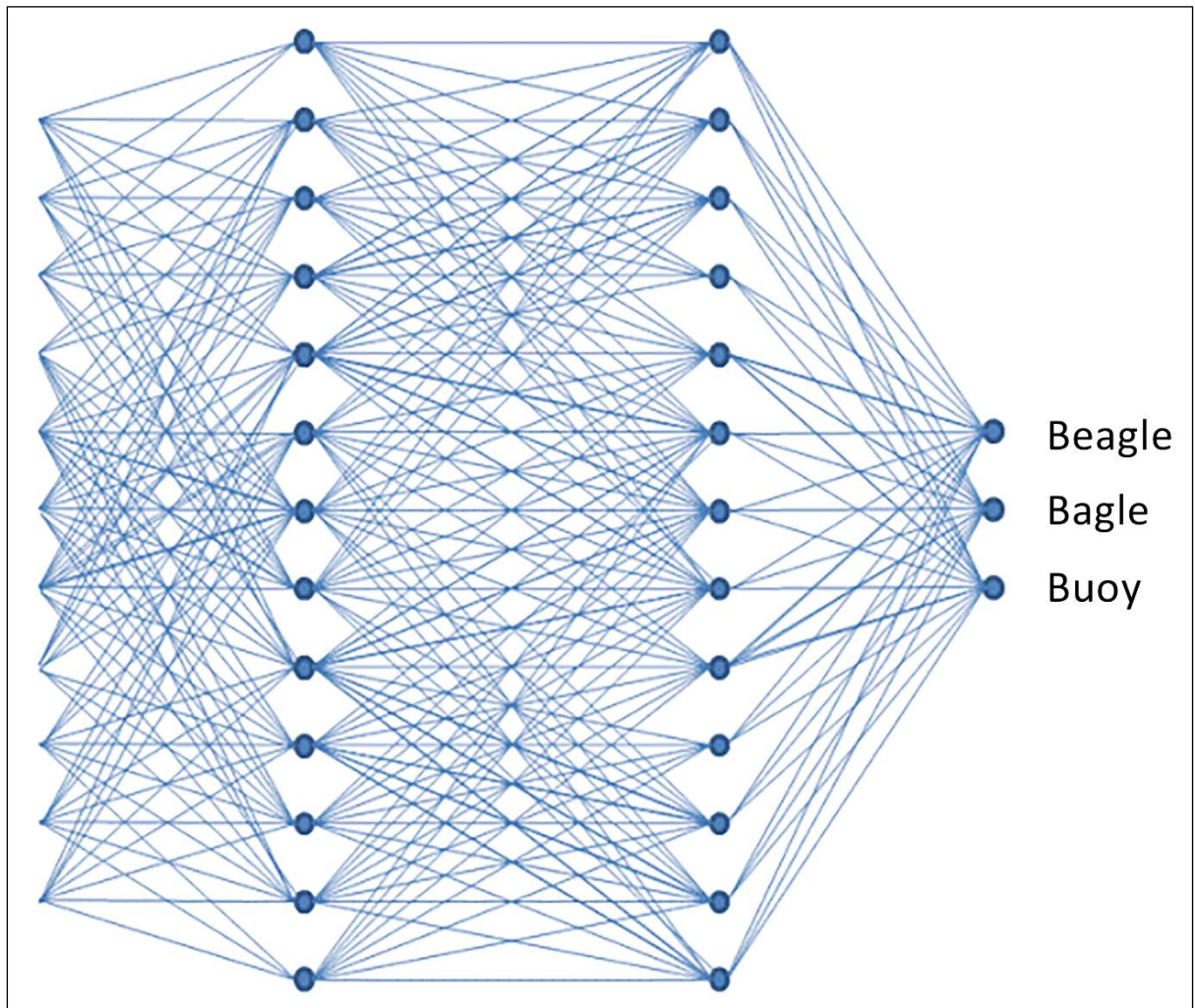
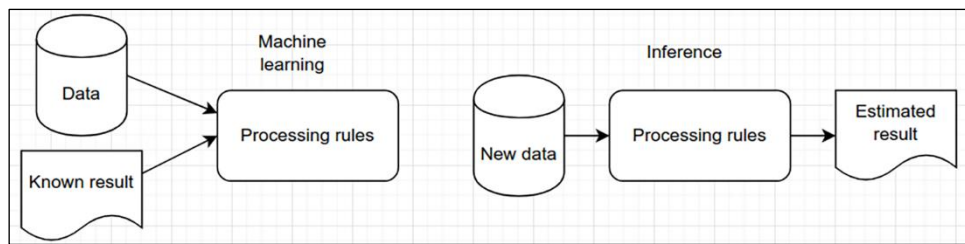
Sensor

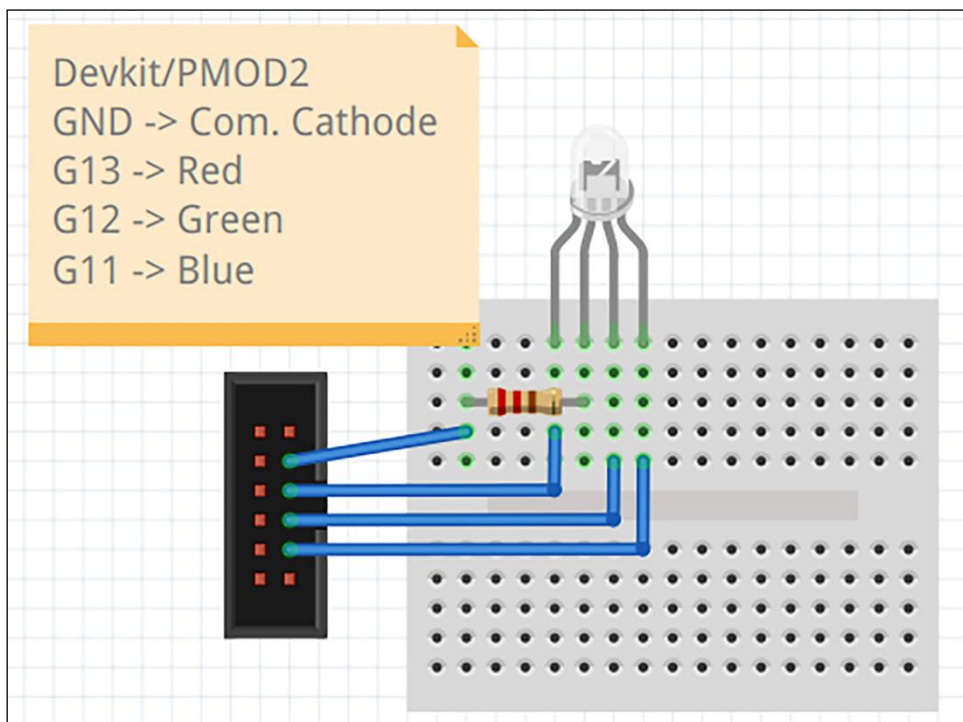
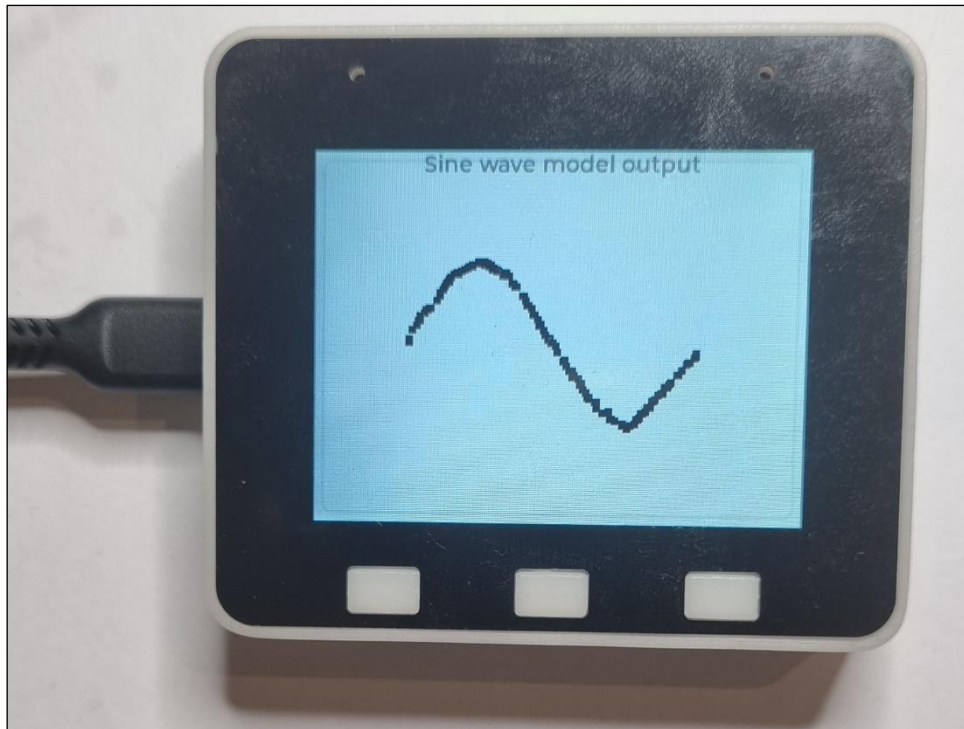
• New Device



Chapter 10: Machine Learning with ESP32







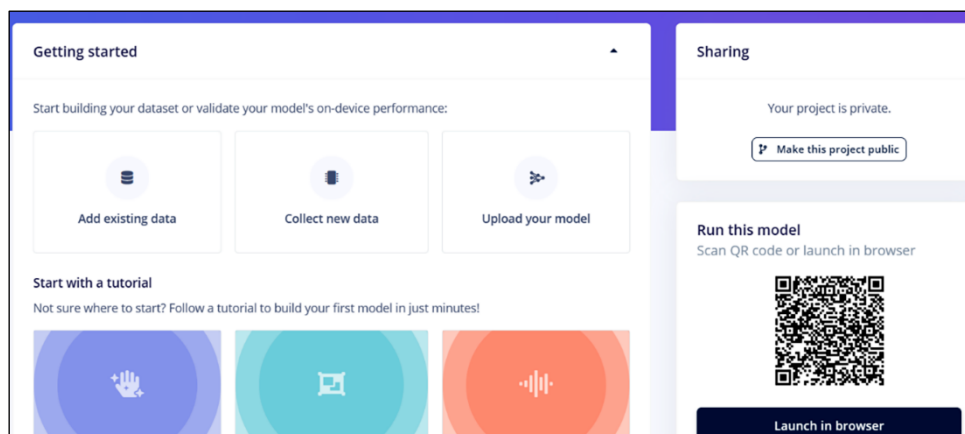
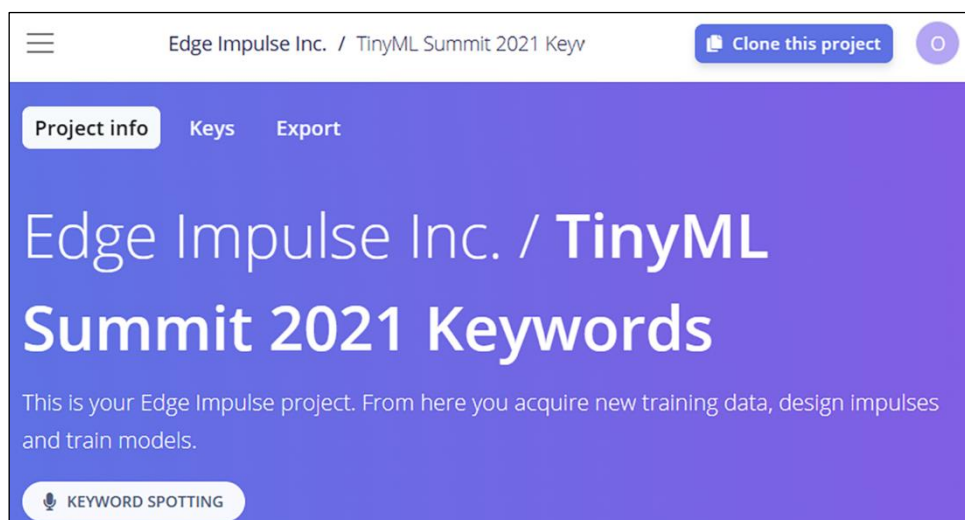
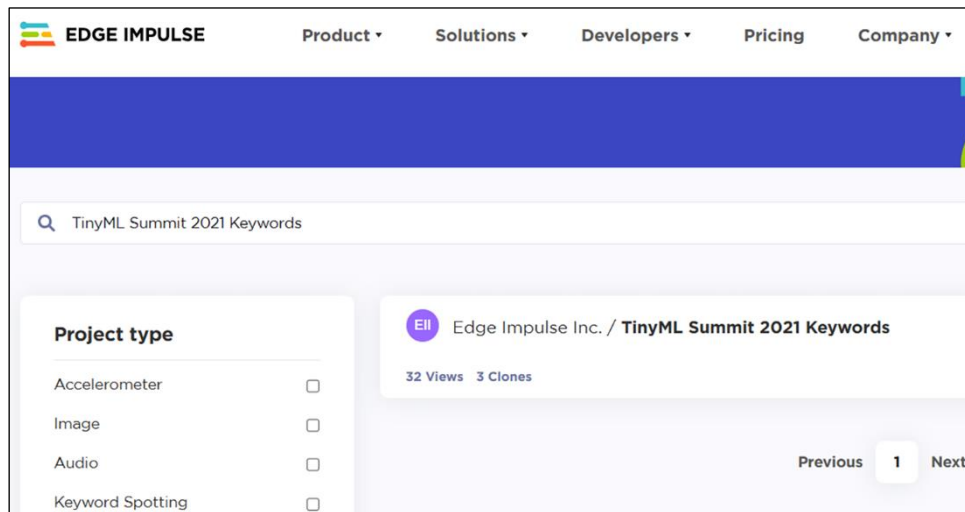


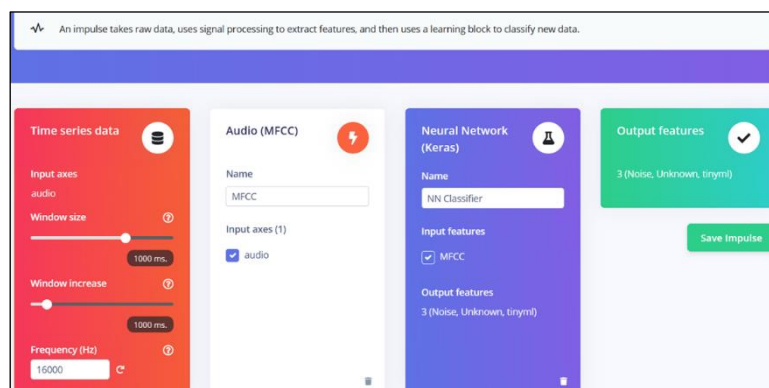
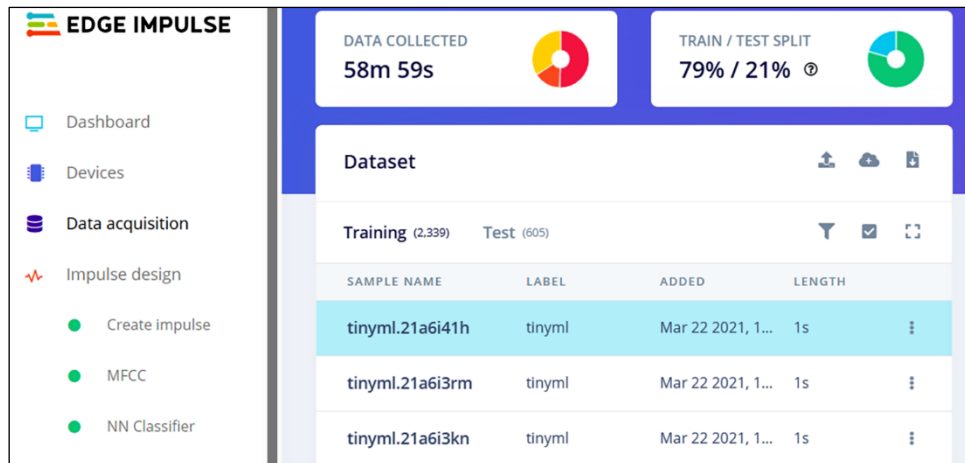
```
(Top) → ESP Speech Recognition
Espressif IoT Development Framework Configuration
model data path (spiffs partition) --->
[*] use afe
    Afe interface (afe interface(version: v1)) --->
[*] use wakenet
    Select wake words (Hi,ESP (wn9_hiesp)) ---->
[*] use multinet
    Chinese Speech Commands Model (None) --->
    English Speech Commands Model (english recognition (mn5q8_en)) --->
    Add English speech commands ---->
```

```
(Top) → ESP Speech Recognition → Add English speech commands
Espressif IoT Development Framework Configuration
(Ptk nN) ID0
(Ptk eF) ID1
(SfT KcLk RfD) ID2
(SfT KcLk GRmN) ID3
(SfT KcLk BLo) ID4
(hicST VnLYoM) ID5
(LbcST VnLYoM) ID6
(gNKRM S jc VnLYoM) ID7
(DgKRM S jc VnLYoM) ID8
```

```
(Top) → Audio Media HAL → Audio hardware board
Espressif
( ) ESP32-S3-Box
(X) ESP32-S3-Box-Lite
( ) ESP32-S3-Korvo-1
( ) ESP32-S3-Korvo-2
( ) ESP32-S3-EYE
```

Chapter 11: Developing on Edge Impulse





Model testing results



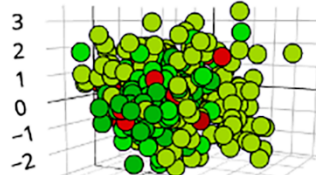
ACCURACY
93.88%

	NOISE	UNKNOWN	TINYML	UNCERTAIN
NOISE	96%	0.8%	0%	3.2%
UNKNOWN	3.3%	91.7%	2.1%	2.9%
TINYML	0%	4.4%	93.9%	1.8%
F1 SCORE	0.96	0.94	0.95	

Feature explorer

- Noise - correct
- Unknown - correct
- tinyml - correct
- Noise - incorrect
- Unknown - incorrect
- tinyml - incorrect

Visualization



C++ library

A portable C++ library with no external dependencies, which can be compiled with any modern C++ compiler.

MODEL OPTIMIZATIONS

Model optimizations can increase on-device performance but may reduce accuracy.

☒ **Enable EON™ Compiler**
Same accuracy, up to 50% less memory. [Learn more](#)

Quantized
(int8)

Selected ✓

	MFCC	NN CLASSIFIER	TOTAL
LATENCY	365 ms.	6 ms.	371 ms.
RAM	16.8K	5.3K	16.8K
FLASH	-	36.0K	-
ACCURACY			93.72%

Unoptimized
(float32)

Select

	MFCC	NN CLASSIFIER	TOTAL
LATENCY	365 ms.	17 ms.	382 ms.
RAM	16.8K	8.8K	16.8K
FLASH	-	38.9K	-
ACCURACY			93.88%

Estimate for Espressif ESP-EYE (ESP32 240MHz) - [Change target](#)

Build

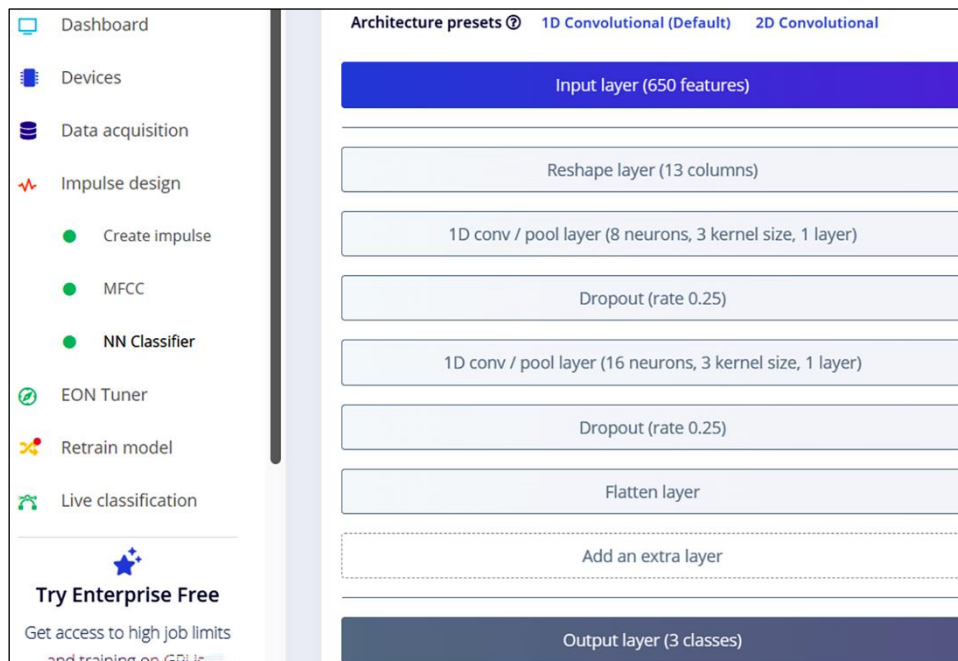
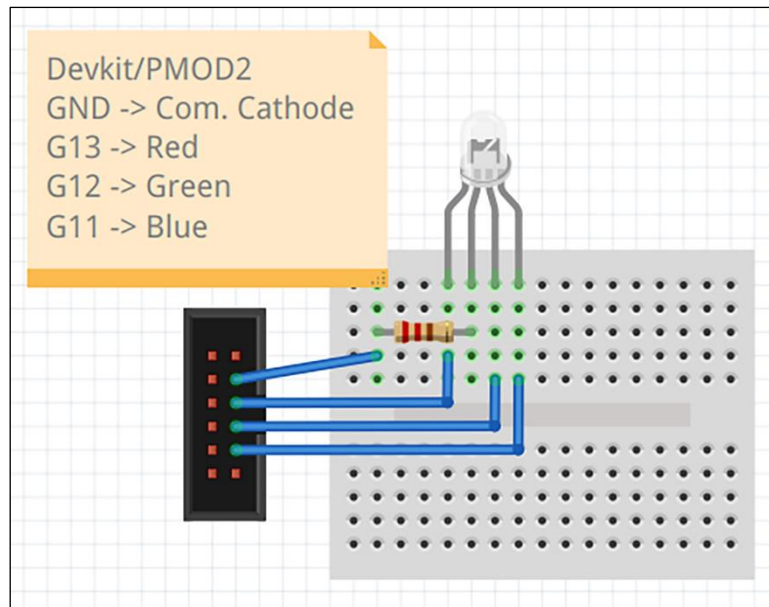
Scheduling job in cluster...
Job started
Compiling EON model...
Compiling EON model OK

Removing clutter...
Removing clutter OK

Copying output...
Copying output OK

Scheduling job in cluster...
Container image pulled!
Job started
Creating archive...
Creating archive OK
Copying output OK

Job completed





File

Open...

Ctrl+O

Export as PNG

Ctrl+Shift+E

Export as SVG

Ctrl+Alt+E

Edit

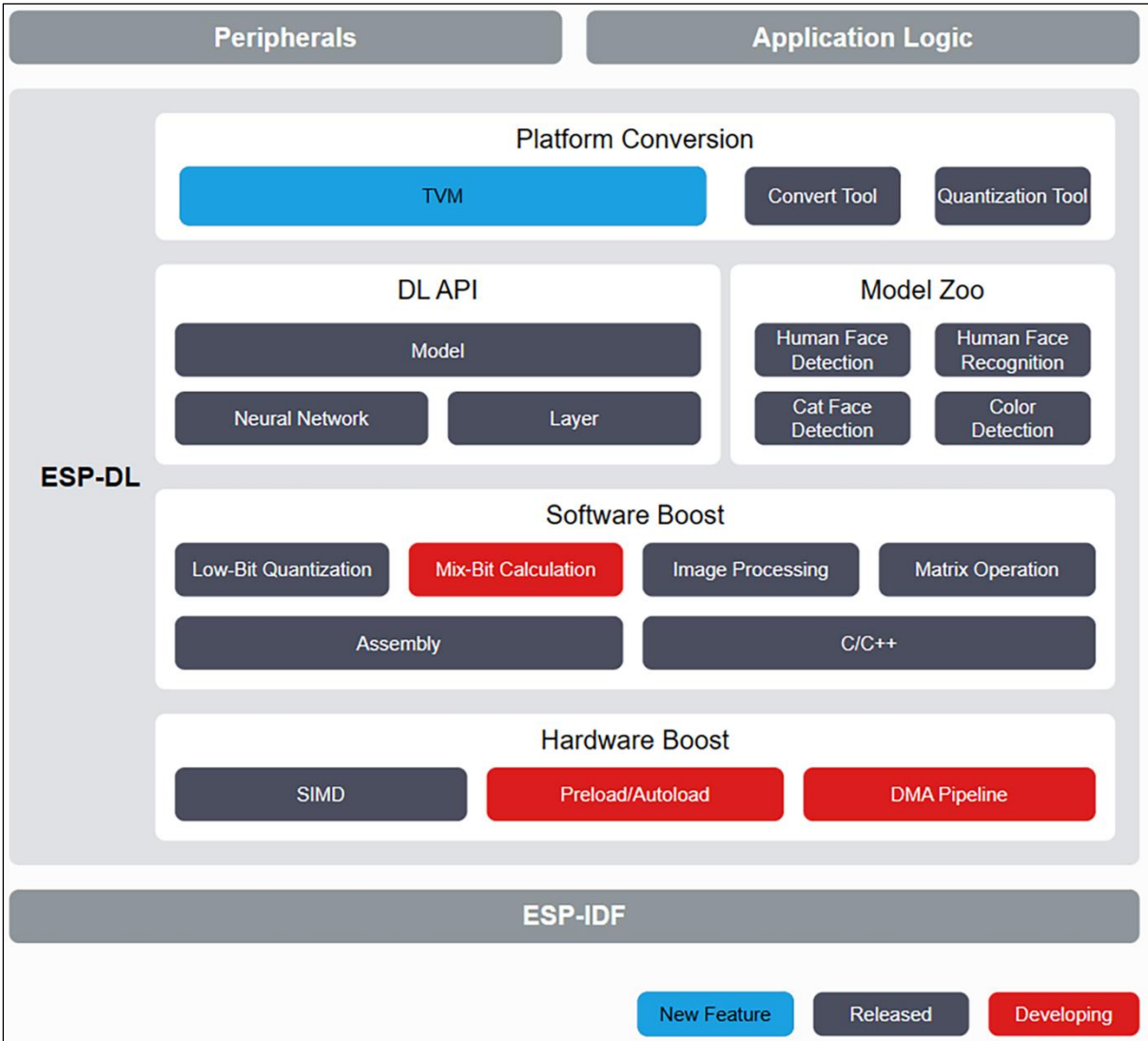
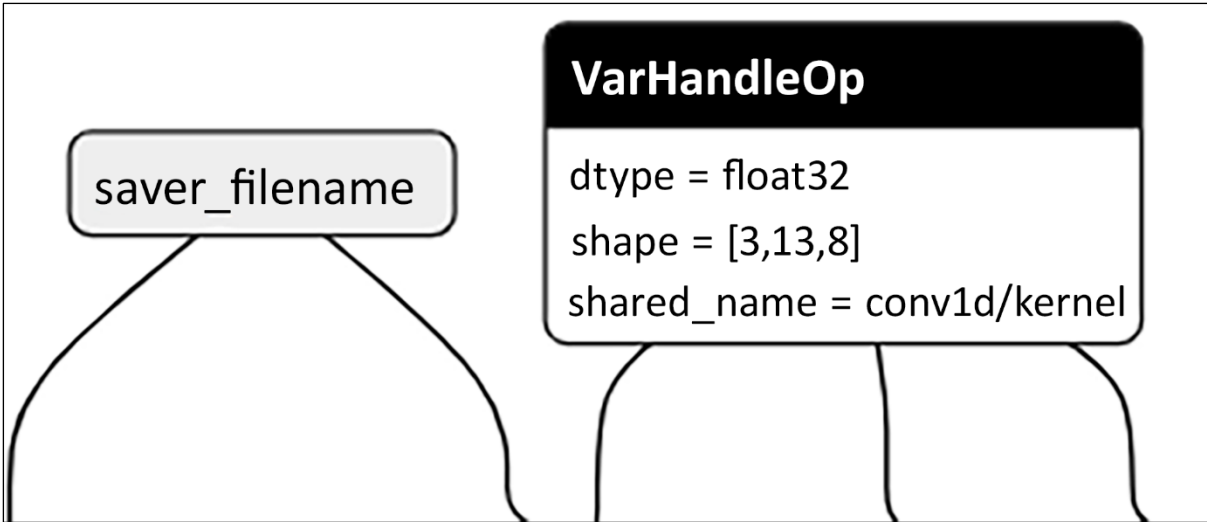
Find...

Ctrl+F

View

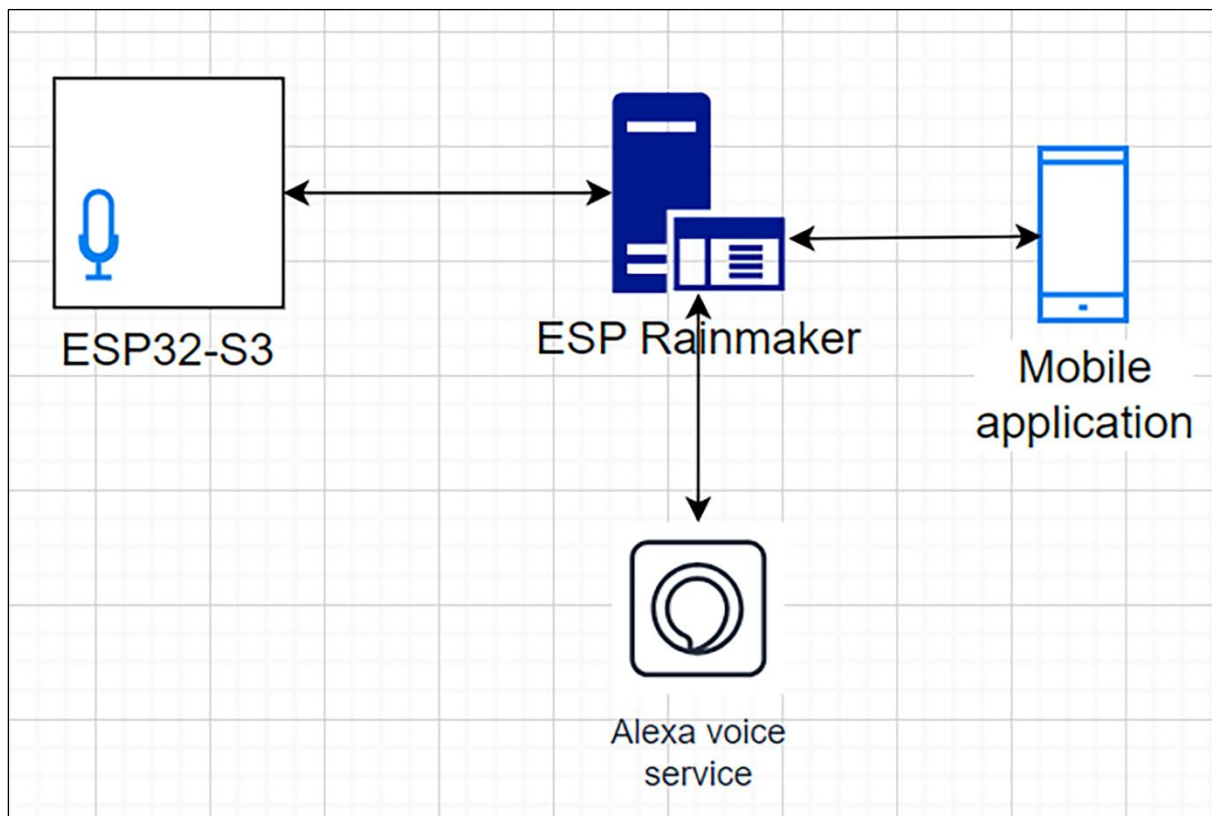
Show Attributes

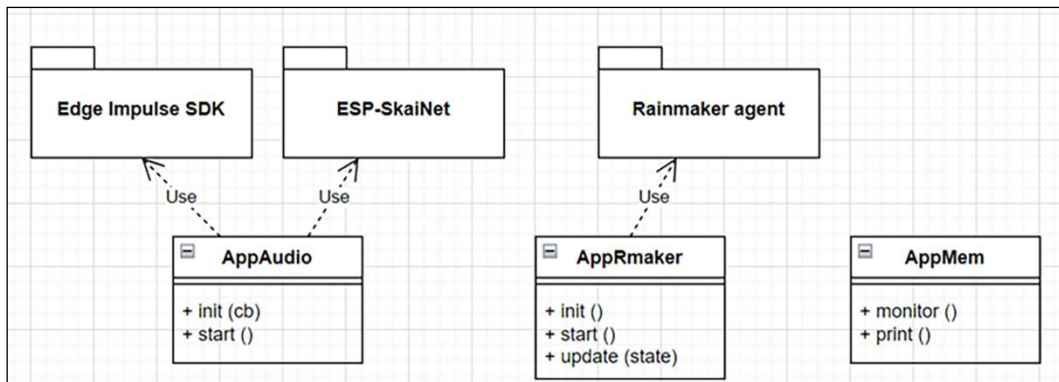
Ctrl+D




Time series data Input axes (3) accX, accY, accZ Window size <input type="range" value="2000"/> 2000 ms. Window increase <input type="range" value="220"/> 220 ms. Frequency (Hz) <input type="text" value="100"/> Zero-pad data <input checked="" type="checkbox"/>	Spectral Analysis Name <input type="text" value="Spectral features"/> Input axes (3) <input checked="" type="checkbox"/> accX <input checked="" type="checkbox"/> accY <input checked="" type="checkbox"/> accZ	Classification (Keras) Name <input type="text" value="NN Classifier"/> Input features <input checked="" type="checkbox"/> Spectral features Output features 2 (nominal, off)	Output features 3 (nominal, off, Anomaly score)
Anomaly Detection (K-means) Name <input type="text" value="Anomaly detection"/> Input features <input checked="" type="checkbox"/> Spectral features Output features 1 (Anomaly score)			


Chapter 12: Project - Baby Monitor






 mandymadongyi / **Baby-cry-detector** Mandy Madongyi

1644 Views 7 Clones

 mandymadongyi / Baby-cry-detector Mandy Madongyi PUBLIC [Clone this project](#)

Project info Keys Export

 Clone this project ×

Enter a name for the cloned project:

Choose your project type:

☒ **Developer**
20 min job limit, 4GB or 4 hours of data, limited collaboration.

☐ **Enterprise**
No job or data size limits, higher performance, custom blocks. [Learn more](#)

[Clone project](#)

Project info

Project ID 279239

Labeling method One label per data item ▾

Target device Espressif ESP-EYE (ESP32) ▾

Configure your deployment

You can deploy your impulse to any device. This makes the model run without an internet connection, minimizes latency, and runs with minimal power consumption. [Read more.](#)



C++ library ×



SELECTED DEPLOYMENT

C++ library

A portable C++ library with no external dependencies, which can be compiled with any modern C++ compiler.

MODEL OPTIMIZATIONS

Model optimizations can increase on-device performance but may reduce accuracy.



Enable EON™ Compiler Same accuracy, up to 50% less memory. [Learn more](#)

Quantized (int8)

Selected ✓

	SPECTROGRAM	NN CLASSIFIER	TOTAL
LATENCY	208 ms.	71 ms.	279 ms.
RAM	27.8K	30.7K	30.7K
FLASH	-	62.2K	-
ACCURACY			-

Estimate for Espressif ESP-EYE (ESP32 240MHz) - [Change target](#)

Build

Build output

Creating job... OK (ID: 12484356)

Scheduling job in cluster...

Still waiting for job to be scheduled...

Scheduling job in cluster...

...lled!

l...

l OK

.

K

cluster...

job to be scheduled...



Built C++ library

 [Learn how to integrate this library](#)






Latest build



v5 (C++ library)

Today, 22:24:06

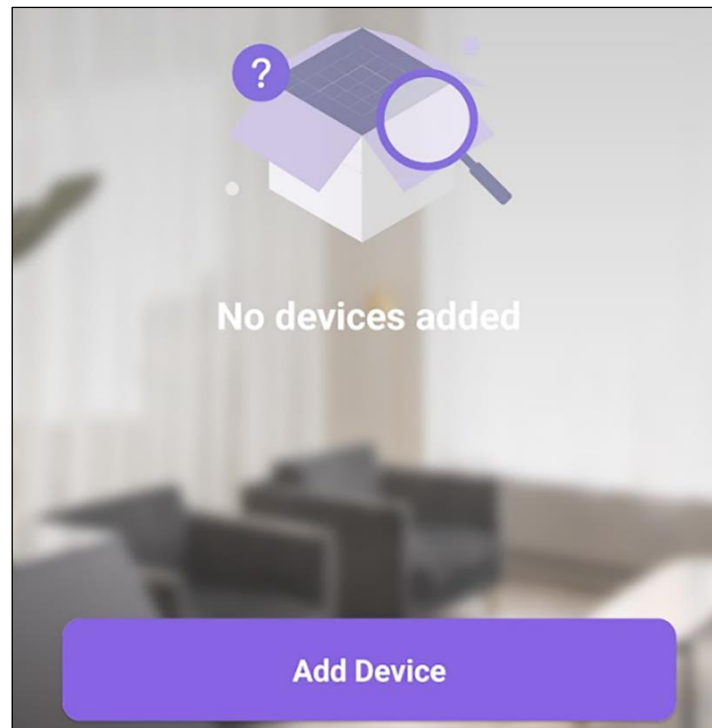
 [View docs](#)

 edge-impulse-sdk	File folder
 model-parameters	File folder
 tflite-model	File folder
 CMakeLists.txt	Text Document
 README.txt	Text Document

```
(Top) → Component config → ESP32S3-Specific → Support for external, SPI-connected RAM → SPI RAM config
Espressif IoT Development Framework Configuration
Mode (QUAD/OCT) of SPI RAM chip in use (Octal Mode PSRAM) --->
Type of SPIRAM chip in use (Auto-detect) --->
[ ] Cache fetch instructions from SPI RAM
[ ] Cache load read only data from SPI RAM
[*] Allow external memory as an argument to xTaskCreateStatic
Set RAM clock speed (80MHz clock speed) --->
[*] Initialize SPI RAM during startup
```

```
ig → ESP32S3-Specific → Support for external, SPI-connected RAM → SPI RAM config → SPI RAM access method
Espressif IoT Development Framework Configuration
( ) Integrate RAM into memory map
( ) Make RAM allocatable using heap_caps_malloc(..., MALLOC_CAP_SPIRAM)
(X) Make RAM allocatable using malloc() as well
```

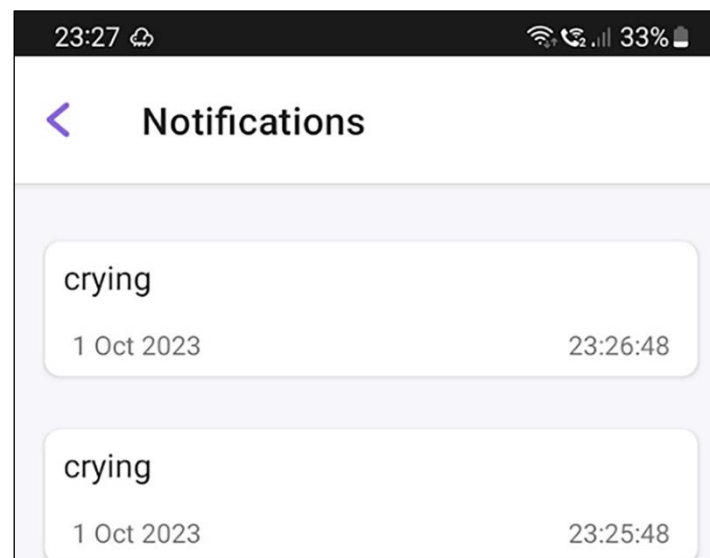
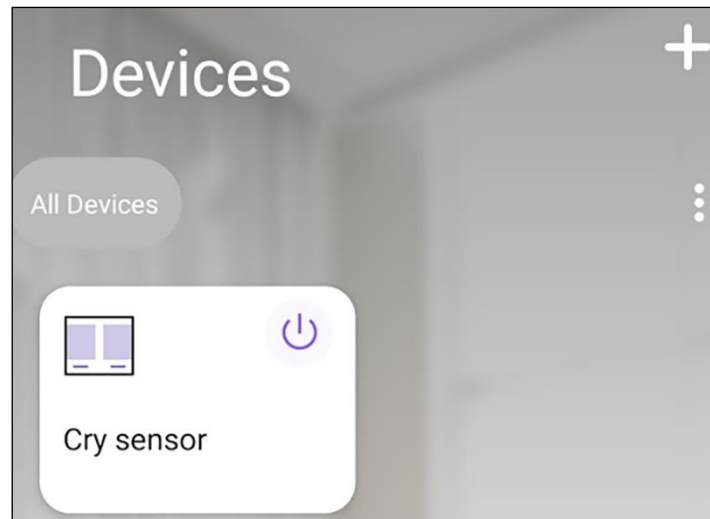
```
(Top) → Component config → ESP32S3-Specific → Support for external, SPI-connected RAM → SPI RAM config
Espressif IoT Development Framework Configuration
Mode (QUAD/OCT) of SPI RAM chip in use (Octal Mode PSRAM) --->
Type of SPIRAM chip in use (Auto-detect) --->
[ ] Cache fetch instructions from SPI RAM
[ ] Cache load read only data from SPI RAM
[*] Allow external memory as an argument to xTaskCreateStatic
Set RAM clock speed (80MHz clock speed) --->
[*] Initialize SPI RAM during startup
[ ] Ignore PSRAM when not found
SPI RAM access method (Make RAM allocatable using malloc() as well) --->
[*] Run memory test on SPI RAM initialization
(1024) Maximum malloc() size, in bytes, to always put in internal memory
[*] Try to allocate memories of WiFi and LWIP in SPIRAM firstly. If failed, allocate internal memory
(16384) Reserve this amount of bytes for data that specifically needs to be in DMA or internal memory
```



I (7815) app_wifi: Scan this QR code from the ESP RainMaker phone app for Provisioning.



I (7995) app_wifi: If QR code is not visible, copy paste the below URL in a browser.
[https://rainmaker.espressif.com/qrcode.html?data={"ver":"v1","name":"PROV_be0541","pop"](https://rainmaker.espressif.com/qrcode.html?data={)
I (8015) app_wifi: Provisioning Started. Name : PROV_be0541, POP : 5b2771bb
I (8025) app_wifi: Provisioning will auto stop after 30 minute(s).



```
I (625425) esp_rmaker_param: Reporting params: {"Cry sensor":{"Baby crying":true}}
I (625435) esp_rmaker_param: Reporting alert: {"esp.alert.str":"crying"}
I (626705) esp_rmaker_param: Reporting params: {"Cry sensor":{"Baby crying":false}}
```

```
I (644395) app-mem: ----- mem stats -----
I (644395) app-mem: internal      :    158307 (free) /    306147 (total)
I (644395) app-mem: spiram       :   8062555 (free) /   8388607 (total)
```