



**Firestore Real time  
monitoring using  
ESP32 and DHT11**

# What You'll Learn

- **Firebase Project:**

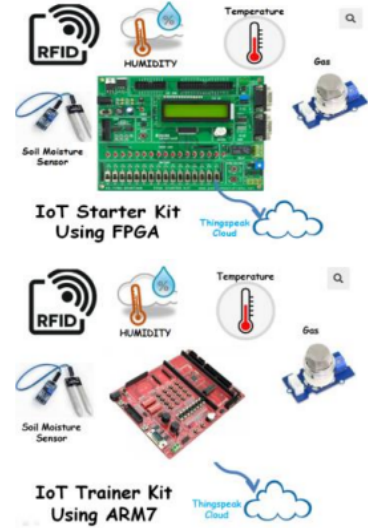
- Create a Firebase project;
- Add authentication to your Firebase project (email and password);
- Add a Realtime Database (RTDB) to your project to save data in JSON format;
- Organize your RTDB;
- Protect the RTDB using database rules;
- Add a web app to your Firebase project to control and monitor your ESP32 and ESP8266 boards;
- Host your web app in Firebase servers;
- Add a custom domain to your web app— this requires that you buy a domain name (this step is optional).

- **ESP32/ESP8266:**

- Authenticate the ESP32 or ESP8266 board as an authorized user with email and password;
- Write data to the Realtime Database;

# About Pantech Prolabs India Pvt Ltd

- ✓ Started in the Year 2004
- ✓ Lab equipments and Sensor Interface
- ✓ Manufacturer of Brainsense EEG Headset
- ✓ Reconfigurable Algorithms on AI
- ✓ Manufacture of AI development Boards
- ✓ Power electronics, Fuel cell and Renewable Energy trainers



## Vision

To help 10 Million students around the globe to learn technology in a easy way

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# About me



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Technology Beyond The Dreams  
helping 10 million people to learn and source technology in a easy way  
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**Jeeva Rajan M K**  
Founder and Director, Pantech Prolabs  
Chennai, Tamil Nadu, India · 500+ connections

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College of Engineering, Guindy  
Company Website

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## Education



College of Engineering, Guindy  
Masters of Engineering, Applied Electronics  
2002 – 2004



Govt College of Engg, Bargur  
Bachelor of Engineering (B.E.), Electrical, Electronics and Communications Engineering, A  
1998 – 2002

## My Primary Expertise

Microcontroller Architecture: 8051, PIC, AVR, ARM, MSP430, PSOC3

DSP Architecture: Blackfin, C2000, C6000, 21065L Sharc

FPGA: Spartan, Virtex, Cyclone

Image Processing Algorithms: Image/Scene Recognition, Machine Learning, Computer Vision, Deep Learning, Pattern Recognition, Object Classification, Image Retrieval, Image enhancement and denoising.

Neural Networks : SVM, RBF, BPN

Cryptography : RSA, DES, 3DES, Elliptic curve, Blowfish, Diffie Hellman

Compilers: Keil, Visual DSP++, CCS, Xilinx Platform studio, ISE, Matlab, Open CV

<https://www.linkedin.com/in/jeevarajan/>

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# Announcement

- Attendance Link at 7 pm
- Minimum attendance required for an E-Certificate is 5 Days. Attendance link will be valid for 2 hrs. after the event.
- Recorded Video Streaming for LAB classes to improve Learning Experience

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- 8051 Architecture (5 Days)
- PIC Architecture(5 Days)
- ARM7-LPC2148(5 Days)
- LPC4088 CortexM4(5 Days)
- NodeMCU(5 Days)

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You Can Access All The 30 Day's Of Recorded Videos For 180 Days(6 Months).
- ✓ **Download Source code**  
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- ✓ **Learn & Practice 10+ Projects**  
You Can Learn And Practice The 10+ Projects.
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- ✗ **No Material Downloads**
- ✗ **No Support**

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# What is Firebase



Firebase is Google's mobile application development platform that includes many services to manage data from iOS, Android, or web applications. You'll create a Firebase project with a realtime database (RTDB), and you'll learn how to store and read values from the database with your ESP32.

# What is Firebase



Firebase

## Develop

### Backend Services

- Realtime Database
- Authentication
- Hosting
- Storage
- Cloud Messaging
- Remote Config

### App Quality Services

- Test Lab for Android
- Crash Reporting

## Grow

### Acquisition

- Dynamic Links
- Invites
- AdWords

### Re-Engagement

- Notifications
- App Indexing

## Earn

### In-app Ads

AdMob



# Why Firebase

- Forget about infrastructure



- Make smart, data-driven decisions



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# DEVELOP

- **Realtime Database**  
Store and sync app data in realtime
- **Authentication**  
Reduce friction with robust authentication
- **Cloud Messaging**  
Deliver and receive messages across platforms reliably
- **Storage**  
Store files with ease



# DEVELOP

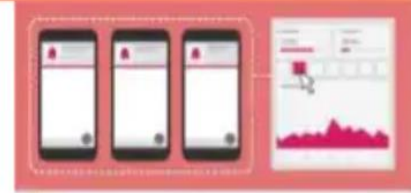
- **Hosting**  
Deliver web content faster
- **Test Lab**  
Test in the lab, not on your users
- **Crash Reporting**  
Keep your app stable



# GROW

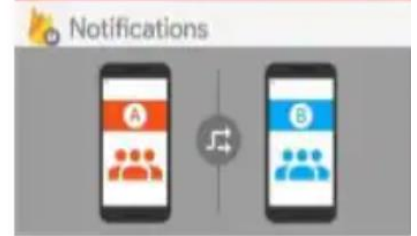
- Notifications

Engage with users at the right moment



- Remote Config

Customize your app on the fly



- App Indexing

Drive organic search traffic to your app



# GROW

- **Dynamic Links**

Send users to the right place inside your app



Dynamic Links

- **Invites**

Empower your users to share your app



Invites

- **AdWords**

Acquire users with the reach of Google

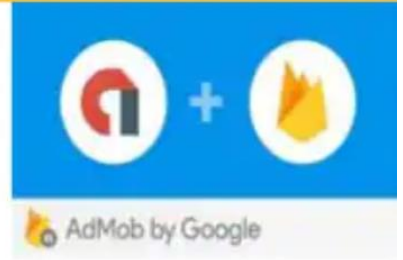


Google AdWords

# EARN

- AdMob

Monetize through engaging ads







# Authentication

- Authentication & account management
- Supports:
  - Email & password
  - Social providers
  - Existing auth systems
- **[New!]** Out-of-the box UI





# Realtime Database

- Cloud-hosted NoSQL database
- Synchronization & conflict resolution
- Access directly from your app



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# Hosting

- Serve static assets (images too)
- SSL by default
- **New:** free custom domains





# Storage

- Easy file storage
- Handles poor connectivity
- Backed by & accessible from Google Cloud Storage



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# Crash Reporting

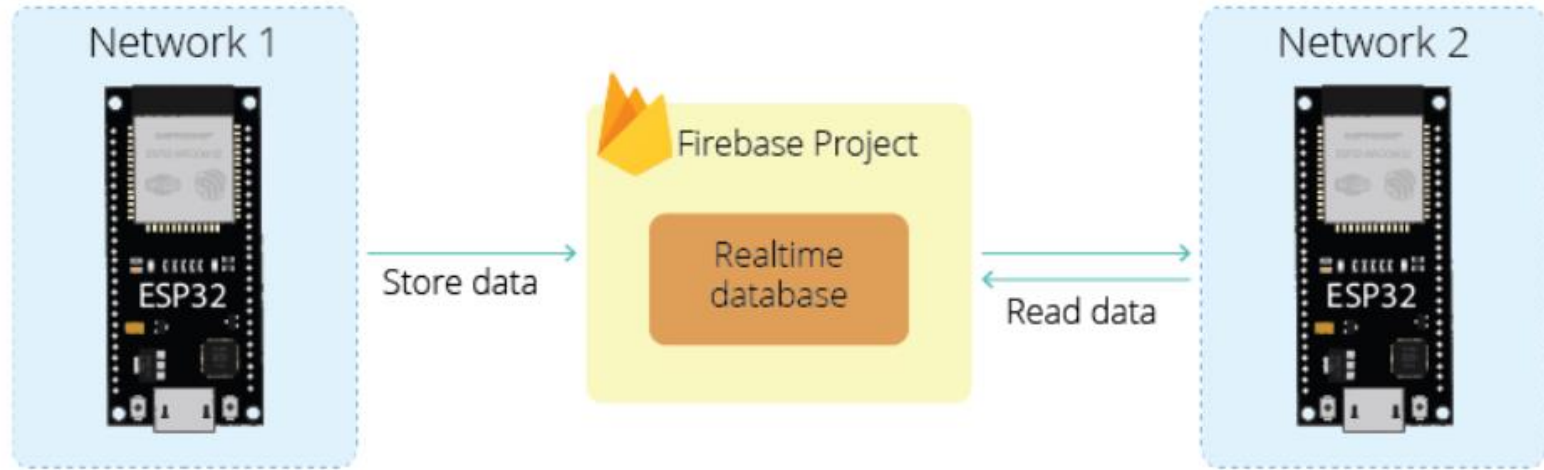
- See crashes & impact
- Version & OS drill-down
- Integrated with Analytics



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# What you can do with Firebase



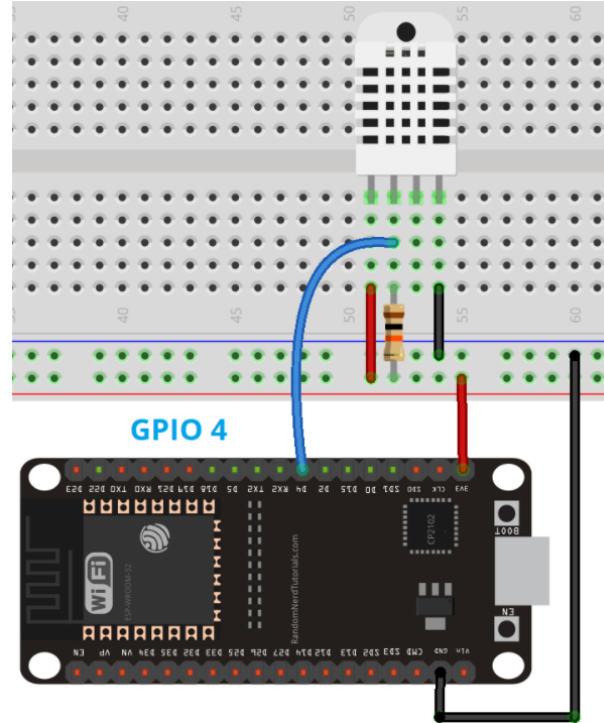
# Parts Required

- ✓ ESP32
- ✓ DHT11



The following table shows the DHT22/DHT11 pinout. When the sensor is facing you, pin numbering starts at 1 from left to right

DHT pin	Connect to
1	3.3V
2	Any digital GPIO; also connect a 10k Ohm pull-up resistor
3	Don't connect
4	GND



# Project Overview

In this tutorial, you'll learn how to create a Firebase project with a realtime database and store and read data from the database using the ESP32.

To follow this project, first, you need to set up a Firebase project and create a realtime database for that project. Then, you'll program the ESP32 to store and read data from the database. This tutorial is divided into two sections.

1. [Create a Firebase Project](#)
2. [ESP32: Store data to the Firebase Realtime Database](#)



# 1. Create a New Project

Follow the next instructions to create a new project on Firebase.

1. Go to **Firebase** and sign in using a Google Account.
2. Click *Get Started*, and then *Add project* to create a new project.
3. Give a name to your project, for example: *ESP32 Firebase Demo*.



<https://firebase.google.com/>

4. Disable the option *Enable Google Analytics* for this project as it is not needed and click *Create project*.

× Create a project (Step 2 of 2)

## Google Analytics for your Firebase project

Google Analytics is a free and unlimited analytics solution that enables targeting, reporting, and more in Firebase Crashlytics, Cloud Messaging, In-App Messaging, Remote Config, A/B Testing, Predictions, and Cloud Functions.

Google Analytics enables:

× A/B-testing ⓘ

× Crash-free-users ⓘ

× User-segmentation & targeting across  
Firebase-products ⓘ

× Event-based-Cloud-Functions-triggers ⓘ

× Predicting-user-behavior ⓘ

× Free-unlimited-reporting ⓘ

**Enable Google Analytics for this project**  
Recommended

5. It will take a few seconds setting up your project. Then, click *Continue* when it's ready.

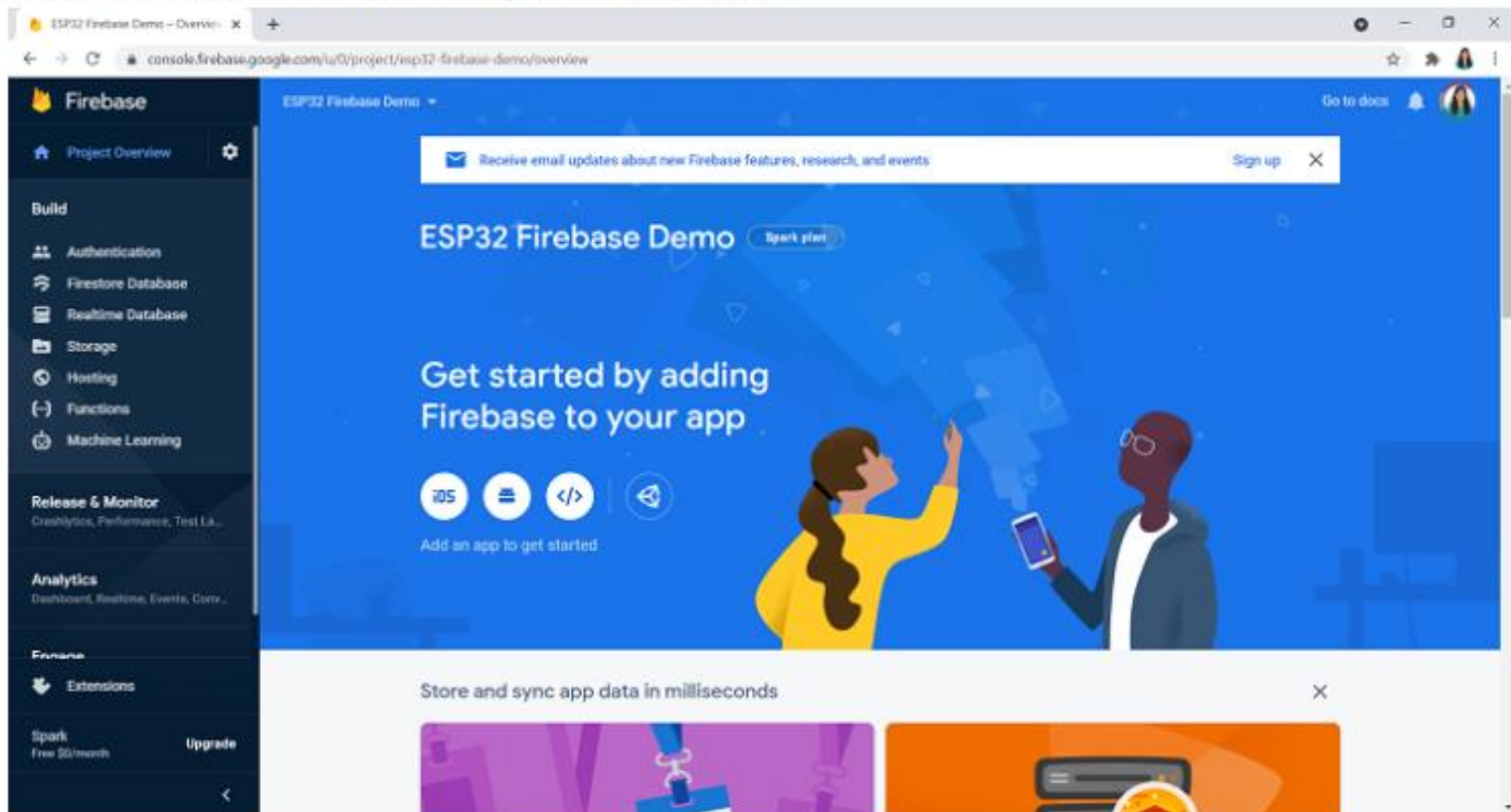


ESP32 Firebase Demo

✓ Your new project is ready

Continue

6. You'll be redirected to your Project console page.

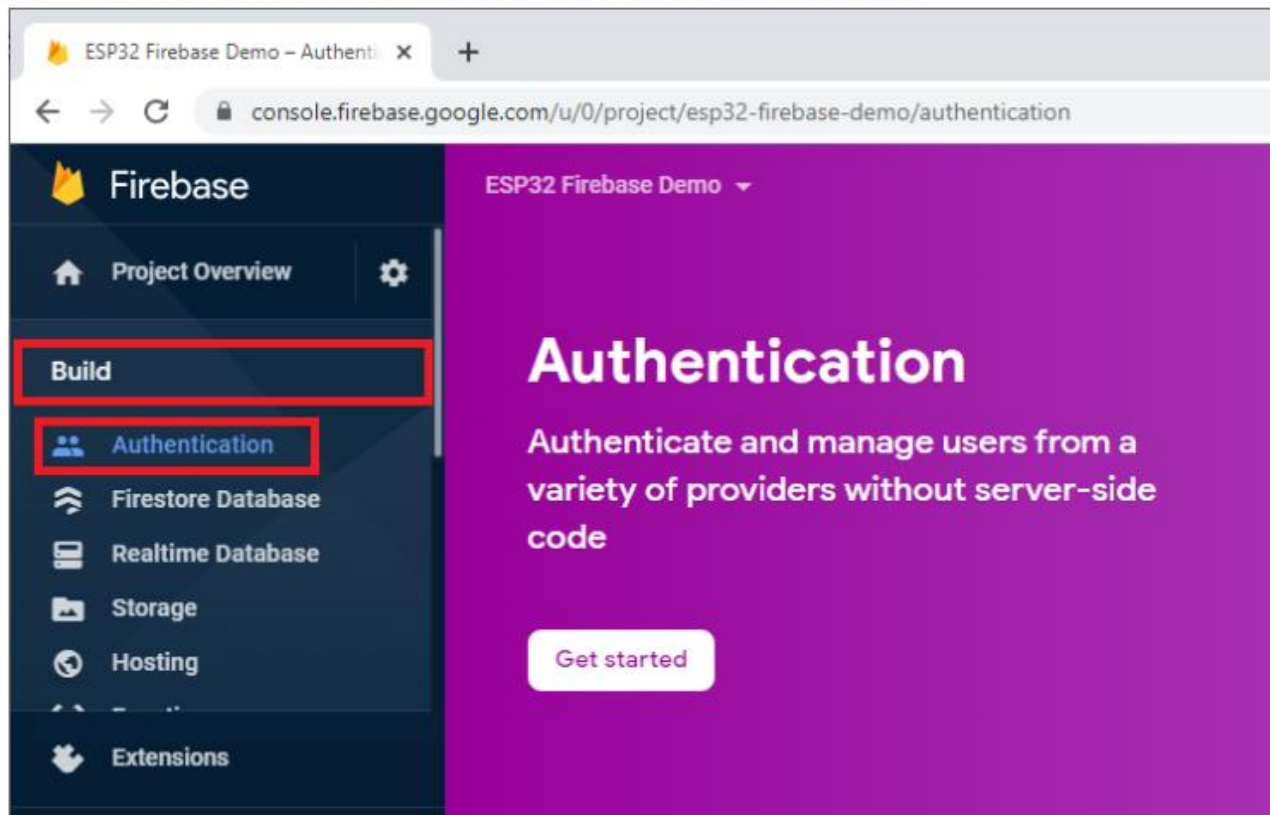


## 2. Set Authentication Methods

You need to set authentication methods for your app.











“Most apps need to know the identity of a user. In other words, it takes care of logging in and identify the users (in this case, the ESP32). Knowing a user's identity allows an app to securely save user data in the cloud and provide the same personalized experience across all of the user's devices.” To learn more about the authentication methods, you can [read the documentation](#).

1. On the left sidebar, click on *Authentication* and then on *Get started*.



2. There are several authentication methods like email and password, Google Account, Facebook account, and others.

**Sign-in providers**

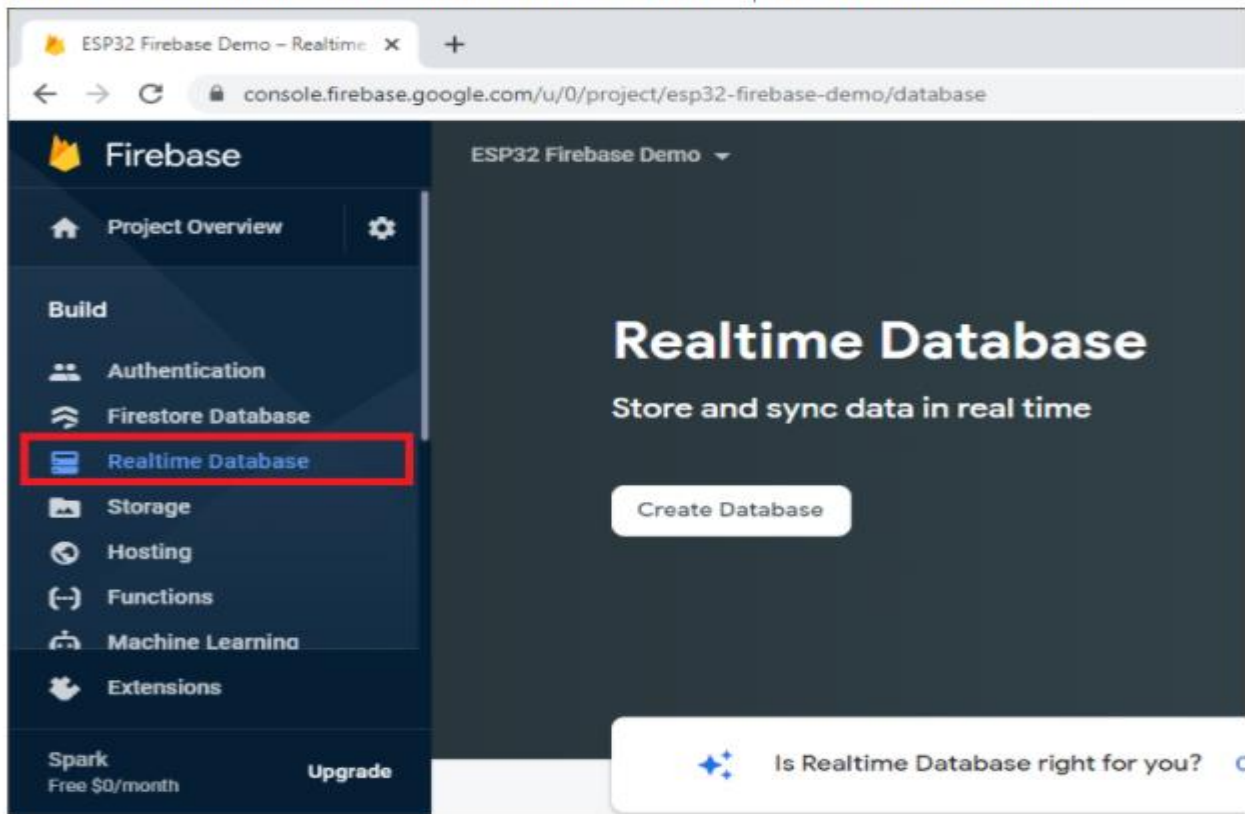
Provider	Status
 Email/Password	Disabled 
 Phone	Disabled
 Google	Disabled
 Play Games	Disabled
 Game Center	Disabled
 Facebook	Disabled
 Twitter	Disabled
 GitHub	Disabled
 Yahoo	Disabled

### **3. Creating a Realtime Database**

The next step is creating a Realtime Database for your project. Follow the next steps to create the database.



1. On the left sidebar click on *Realtime Database* and then, click on *Create Database*.



2. Select your database location. It should be the closest to your location.

### Set up database ✕

1 Database options 2 Security rules

Your location setting is where your Realtime Database data will be stored.

Realtime Database location

Belgium (europe-west1) ▼

Cancel **Next**

3. Set up security rules for your database. For testing purposes, select *Start in test mode*. In later tutorials you'll learn how to secure your database using database rules.

## Set up database



- 1 Database options ——— 2 **Security rules**

Once you have defined your data structure you will have to write rules to secure your data.

[Learn more](#)

**Start in locked mode**

Your data is private by default. Client read/write access will only be granted as specified by your security rules.

**Start in test mode**

Your data is open by default to enable quick setup. However, you must update your security rules within 30 days to enable long-term client read/write access.

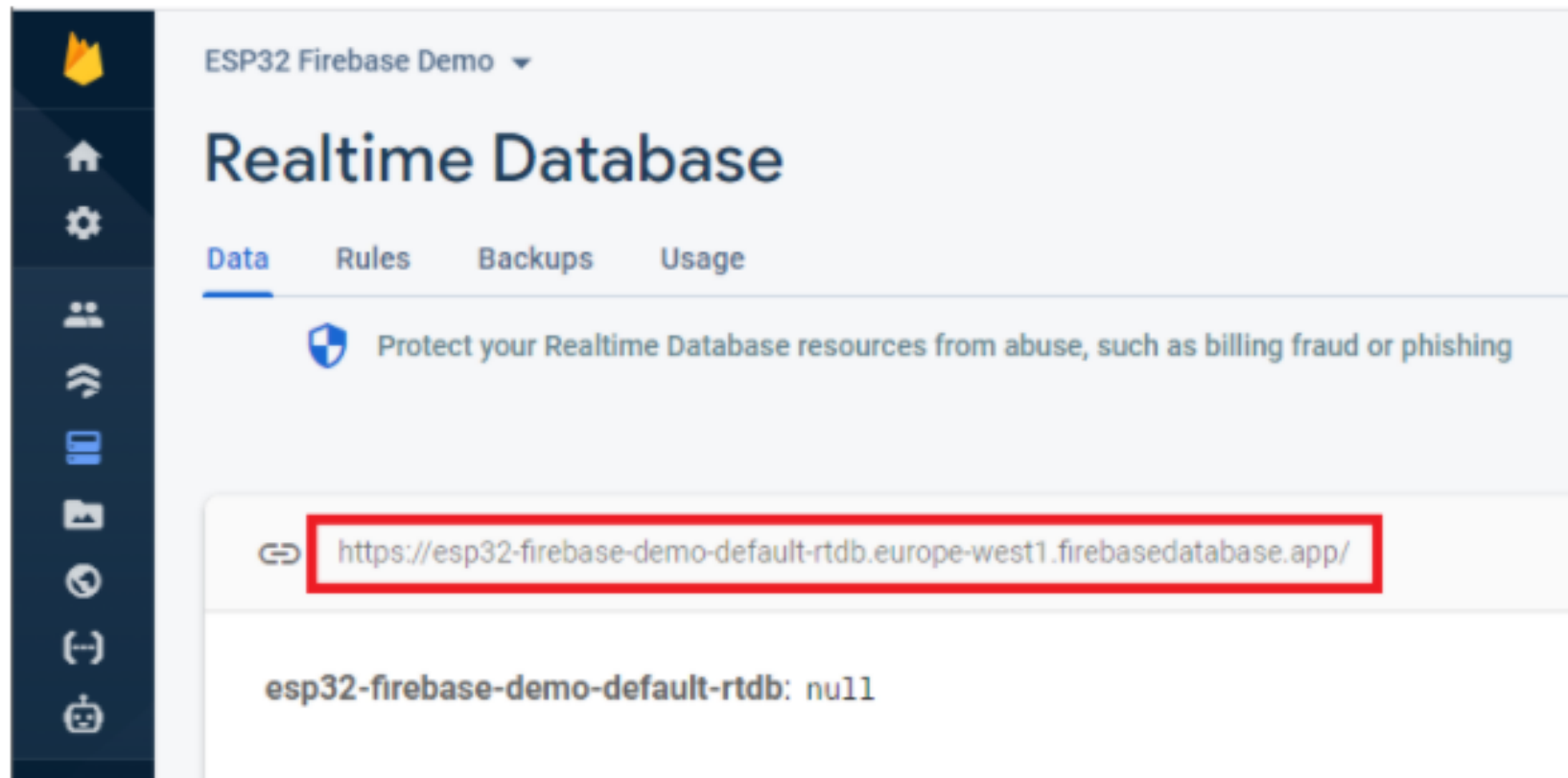
```
{
  "rules": {
    ".read": "now < 1630537200000", // 2021-9-2
    ".write": "now < 1630537200000", // 2021-9-2
  }
}
```

**!** The default security rules for test mode allow anyone with your database reference to view, edit and delete all data in your database for the next 30 days

Cancel

Enable

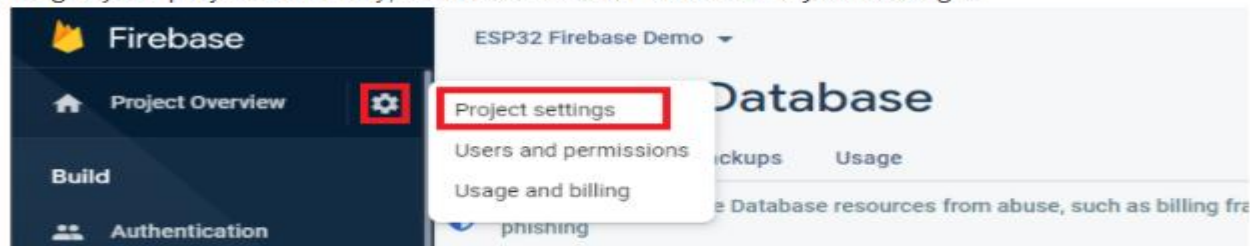
4. Your database is now created. You need to copy and save the database URL—highlighted in the following image—because you'll need it later in your ESP32 code.



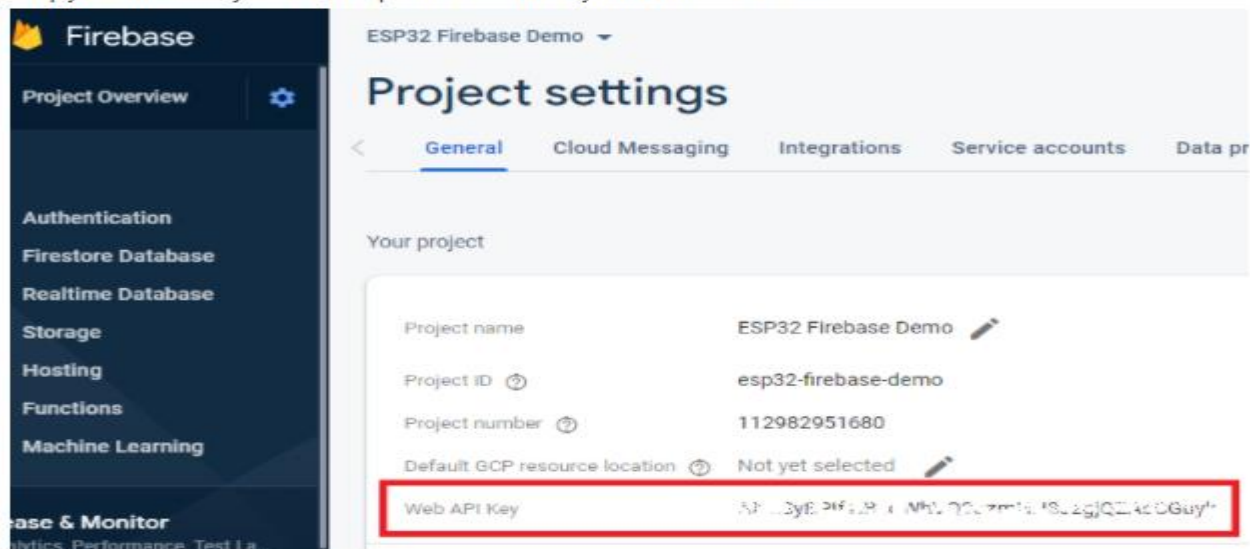
The screenshot shows the Firebase Realtime Database console for a project named "ESP32 Firebase Demo". The main heading is "Realtime Database". Below the heading are tabs for "Data", "Rules", "Backups", and "Usage". A security warning is visible: "Protect your Realtime Database resources from abuse, such as billing fraud or phishing". The database URL is displayed as `https://esp32-firebase-demo-default-rtdb.europe-west1.firebaseio.com/` and is highlighted with a red rectangular box. Below the URL, the database name is shown as `esp32-firebase-demo-default-rtdb: null`.

## 4. Get Project API Key

1. To get your project's API key, on the left sidebar click on *Project Settings*.

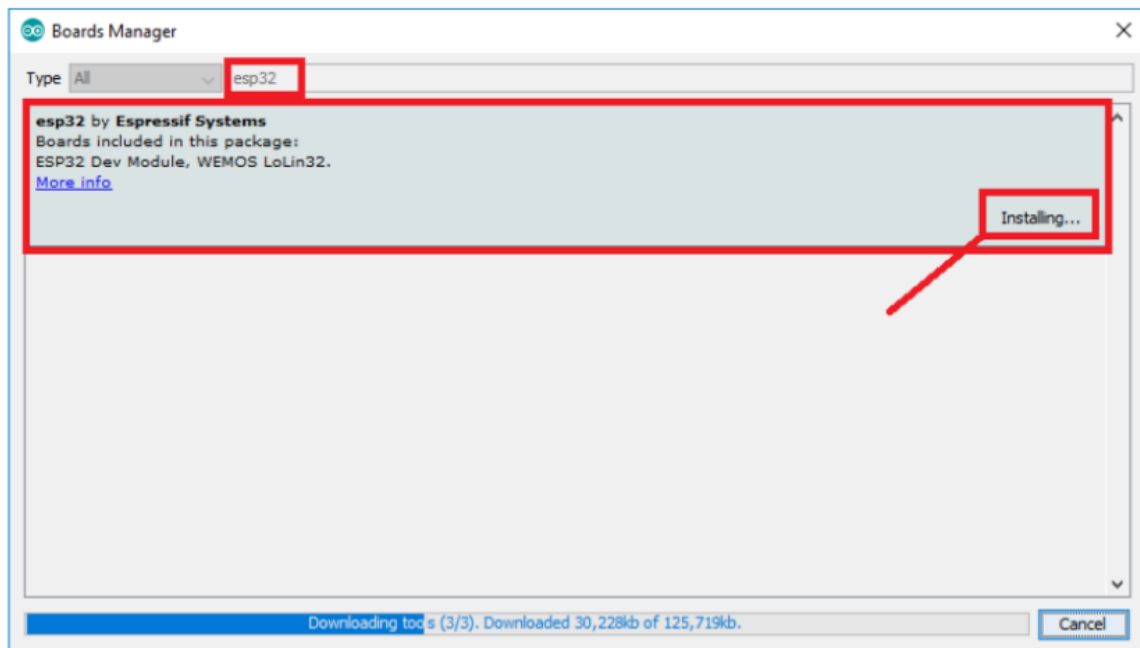


2. Copy the API Key to a safe place because you'll need it later.



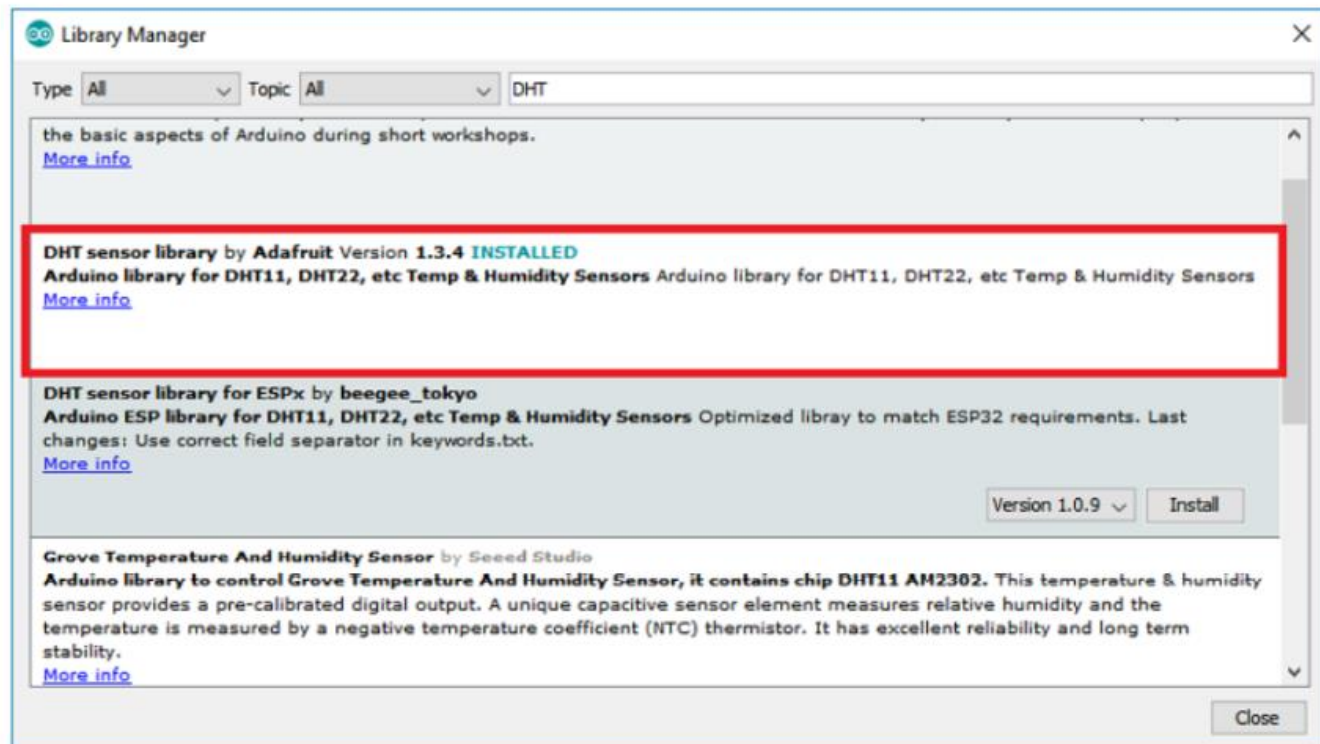
# Install ESP32 in Board Manager

4. Search for **ESP32** and press install button for the "**ESP32 by Espressif Systems**":



# Library required

Search for "DHT" on the Search box and install the DHT library from Adafruit.



The screenshot shows the 'Library Manager' window in the Arduino IDE. At the top, there are dropdown menus for 'Type' (set to 'All'), 'Topic' (set to 'All'), and a search box containing 'DHT'. Below the search bar, a list of libraries is displayed. The second library, 'DHT sensor library by Adafruit', is highlighted with a red rectangular border. This library is marked as 'Version 1.3.4 INSTALLED' and includes a 'More info' link. Below it, the 'DHT sensor library for ESPx by beegee\_tokyo' is listed with a 'Version 1.0.9' dropdown and an 'Install' button. At the bottom of the window, there is a 'Close' button.

Library Manager

Type All Topic All DHT

the basic aspects of Arduino during short workshops.  
[More info](#)

**DHT sensor library by Adafruit** Version 1.3.4 **INSTALLED**  
**Arduino library for DHT11, DHT22, etc Temp & Humidity Sensors** Arduino library for DHT11, DHT22, etc Temp & Humidity Sensors  
[More info](#)

**DHT sensor library for ESPx by beegee\_tokyo**  
**Arduino ESP library for DHT11, DHT22, etc Temp & Humidity Sensors** Optimized library to match ESP32 requirements. Last changes: Use correct field separator in keywords.txt.  
[More info](#)

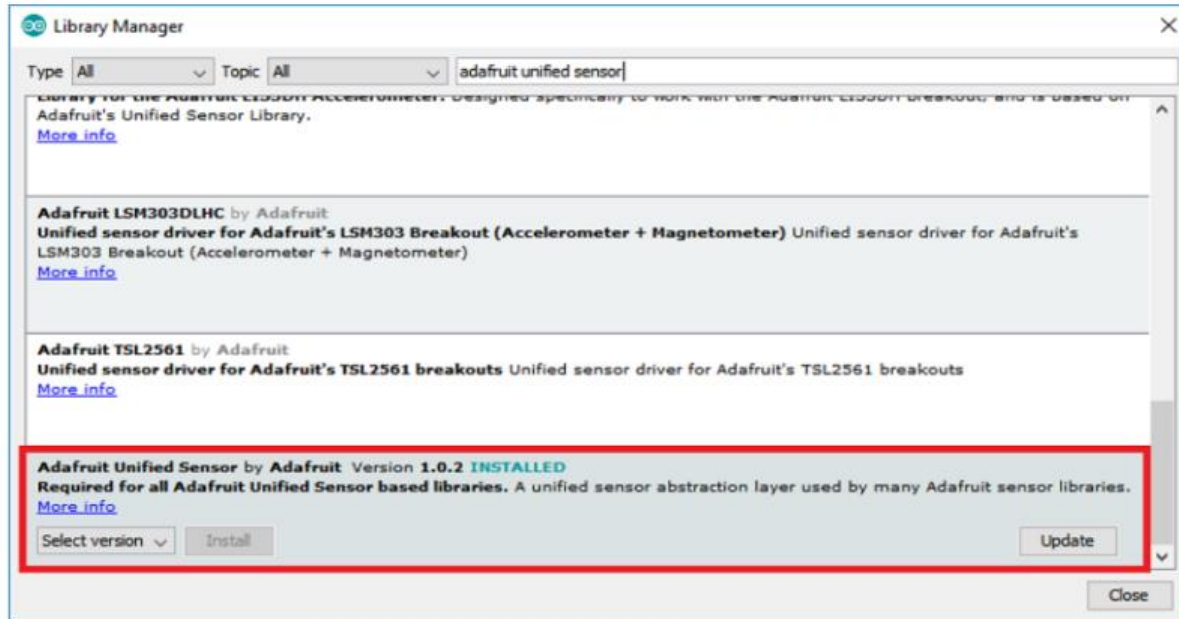
Version 1.0.9 Install

**Grove Temperature And Humidity Sensor** by Seeed Studio  
**Arduino library to control Grove Temperature And Humidity Sensor, it contains chip DHT11 AM2302.** This temperature & humidity sensor provides a pre-calibrated digital output. A unique capacitive sensor element measures relative humidity and the temperature is measured by a negative temperature coefficient (NTC) thermistor. It has excellent reliability and long term stability.  
[More info](#)

Close

# Library required

After installing the DHT library from Adafruit, type “**Adafruit Unified Sensor**” in the search box. Scroll all the way down to find the library and install it.



- After installing the libraries, restart your Arduino IDE.

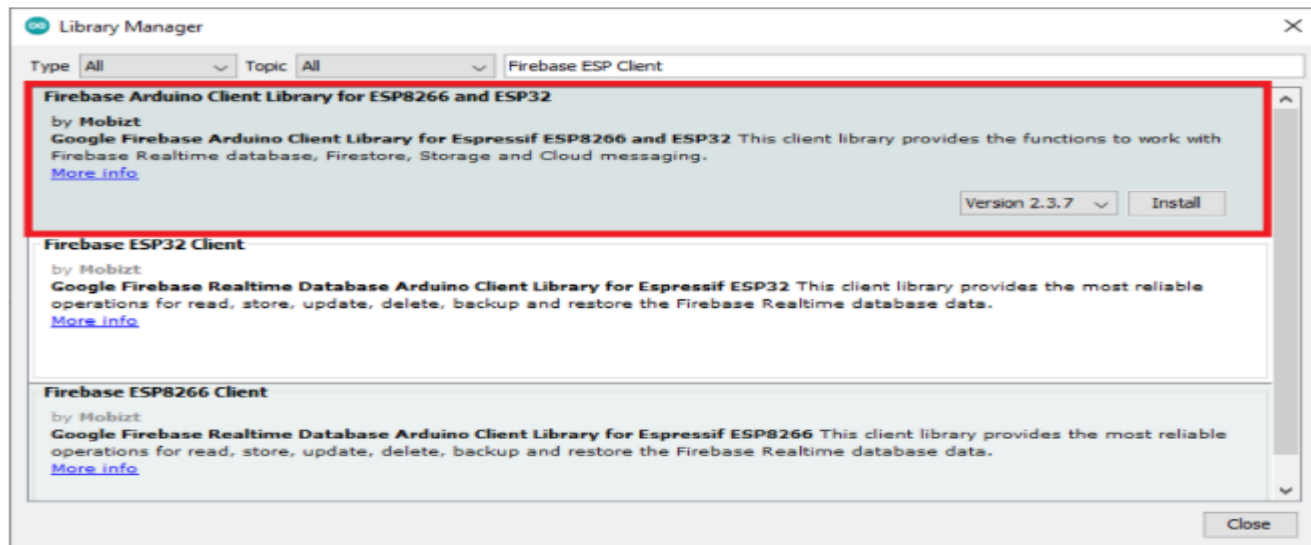


## Installation – Arduino IDE

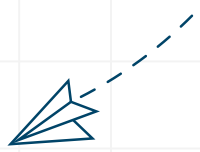
If you're using Arduino IDE, follow the next steps to install the library.

1. Go to **Sketch > Include Library > Manage Libraries**
2. Search for *Firebase ESP Client* and install the *Firebase Arduino Client Library for ESP8266 and ESP32* by Mobitz.

**Note:** We are using version 2.3.7. If you have issues compiling your code with more recent versions of the library, downgrade to version 2.3.7.



**DEMO**



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- ARM7-LPC2148(5 Days)
- LPC4088 CortexM4(5 Days)
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