INTRODUCTION TO EMBEDDED SYSTEMS

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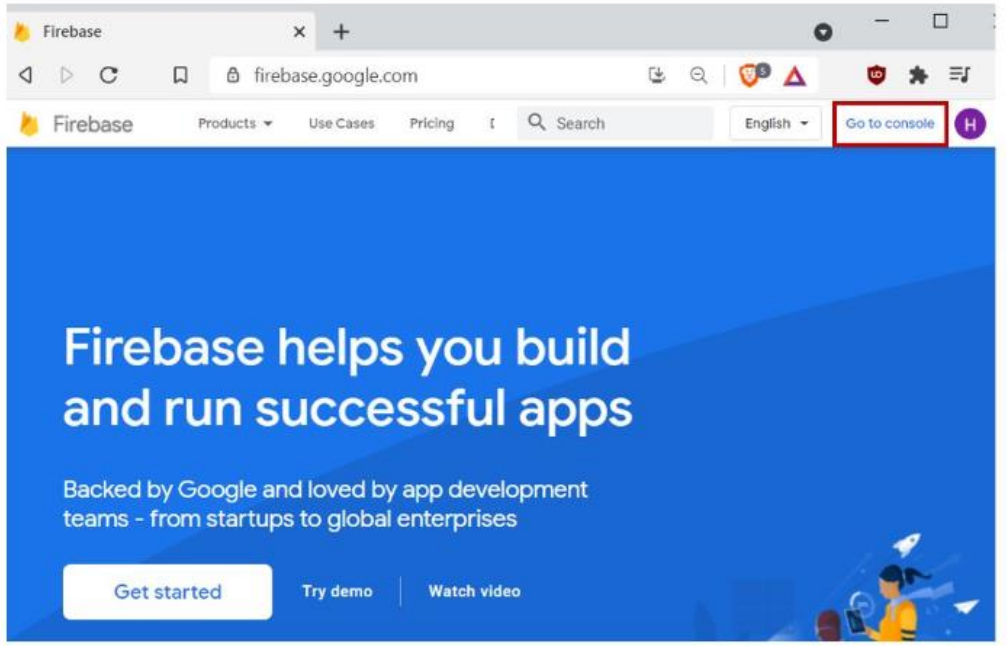
ESP32 Data Logging to Firebase Realtime Database

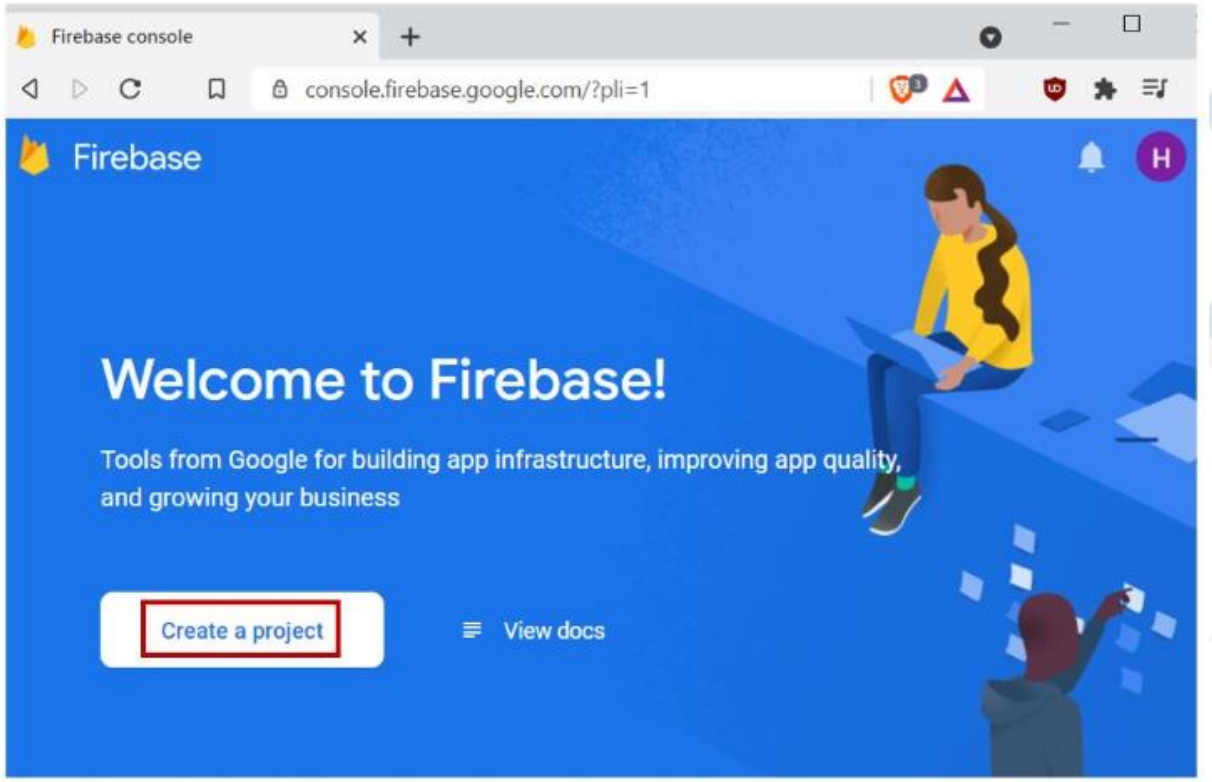
- Firebase is Google's mobile application development platform that helps you build, improve, and grow your app. It has many services used to manage data from any android, IOS, or web application like authentication, realtime database, hosting, etc.

Setting up Google Firebase Console

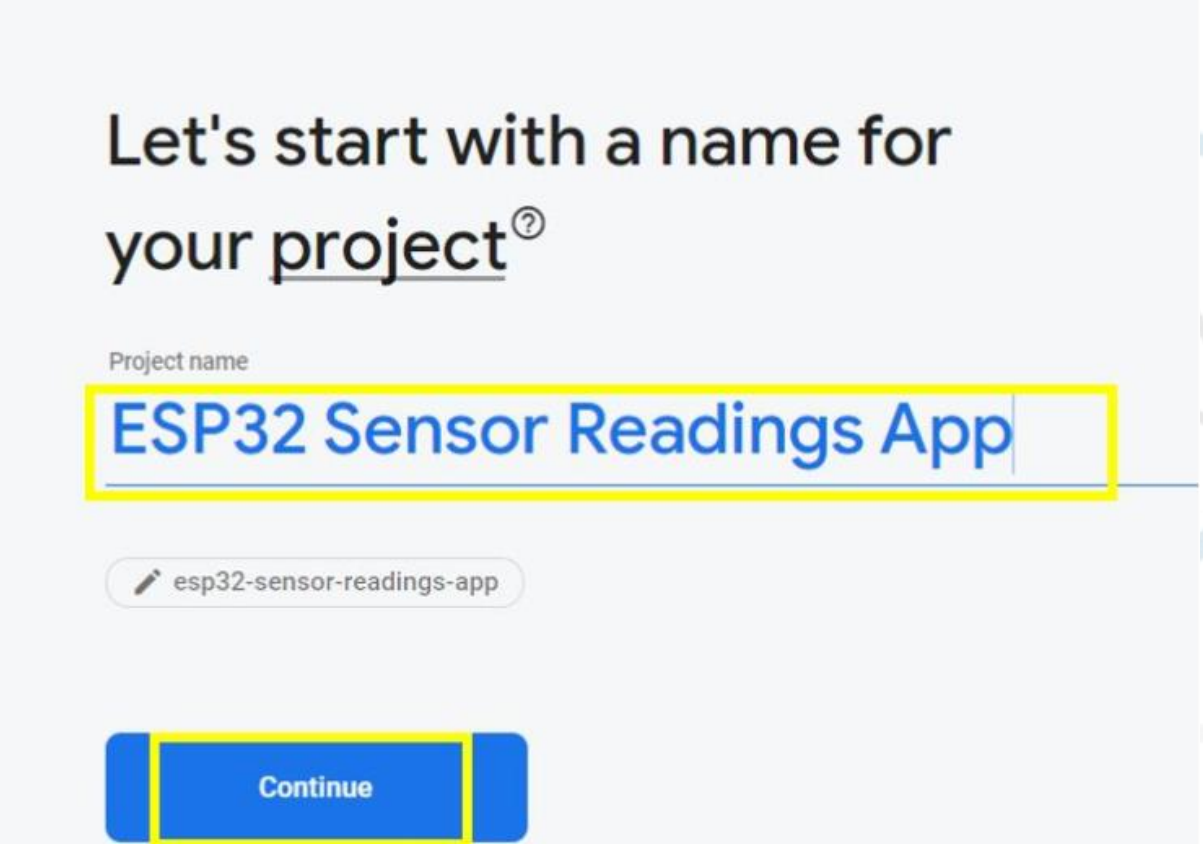
- Firstly, type https://firebase.google.com/ in your browser search tab and press enter.
- This will open the Firebase main page. Click ‘Go to Console’ as highlighted in the red rectangular box.



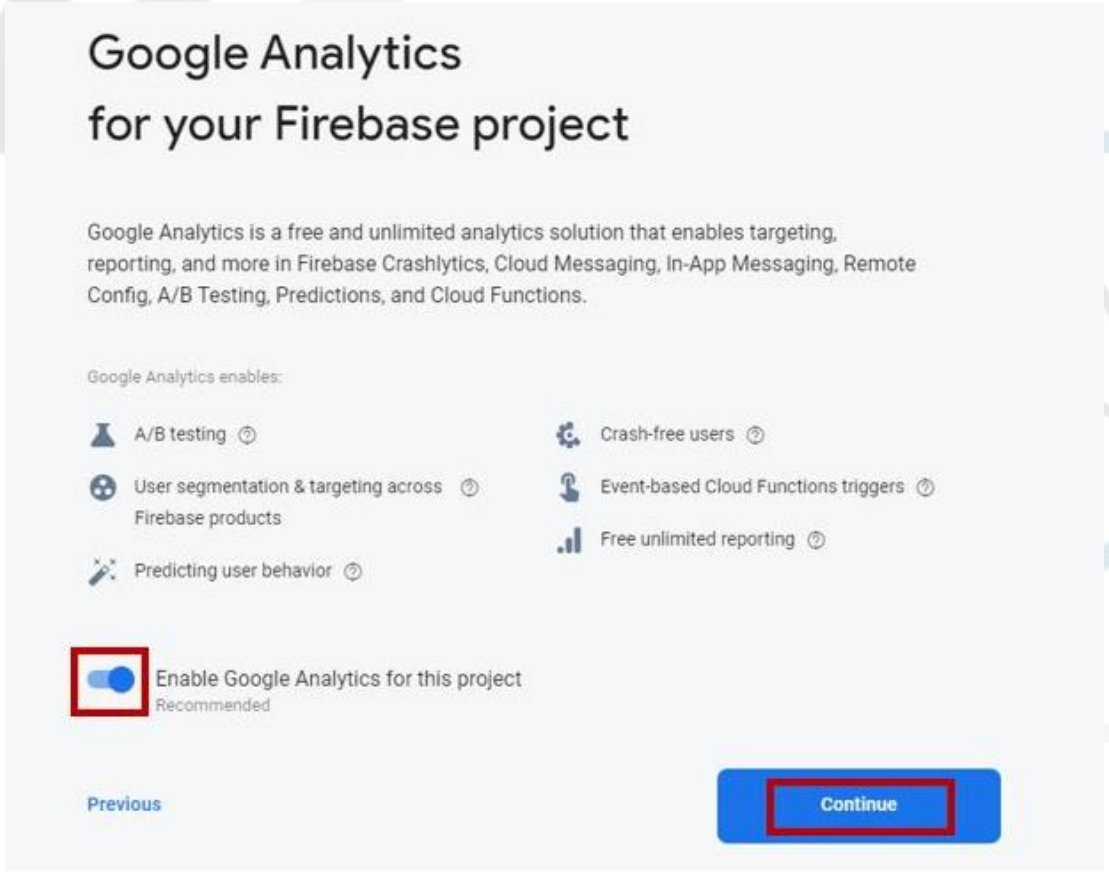
- You will be redirected to a new web page with the welcome message. Click the button ‘Create a Project’ as shown below.



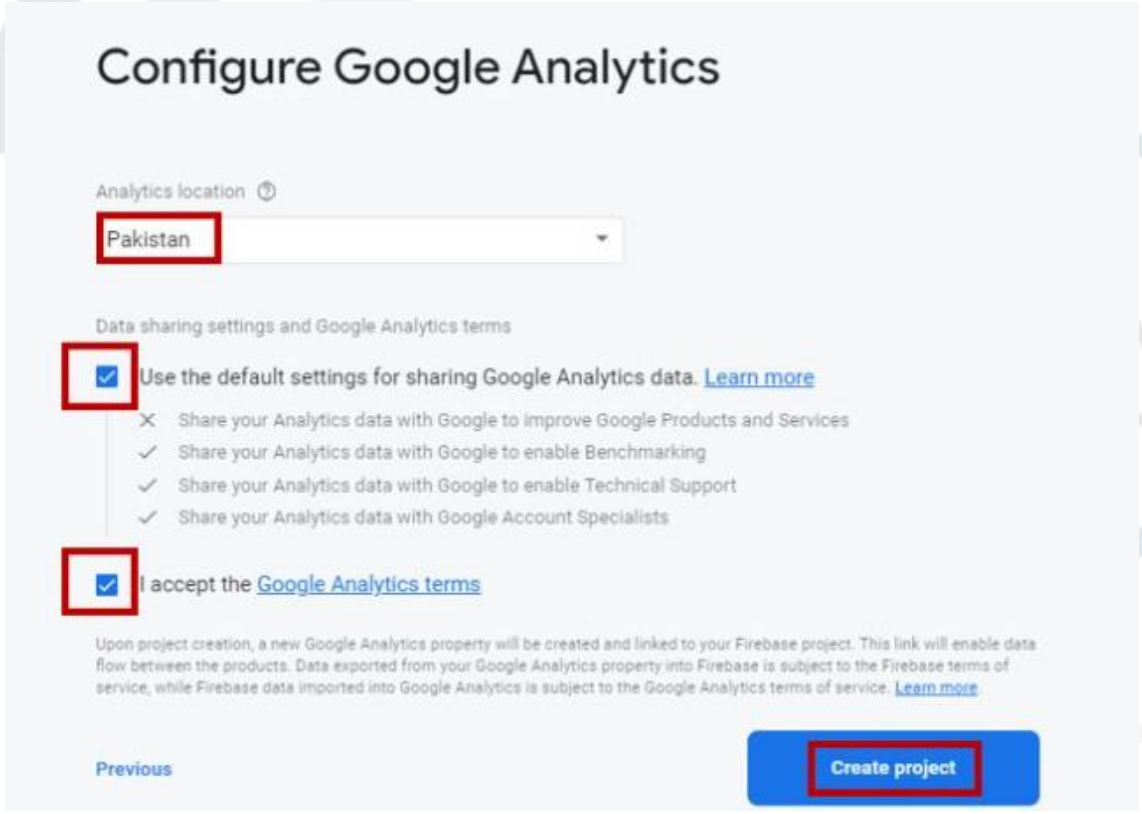
- Write the name of your project. Remember to tick the Firebase term agreement. Now click ‘Continue’.



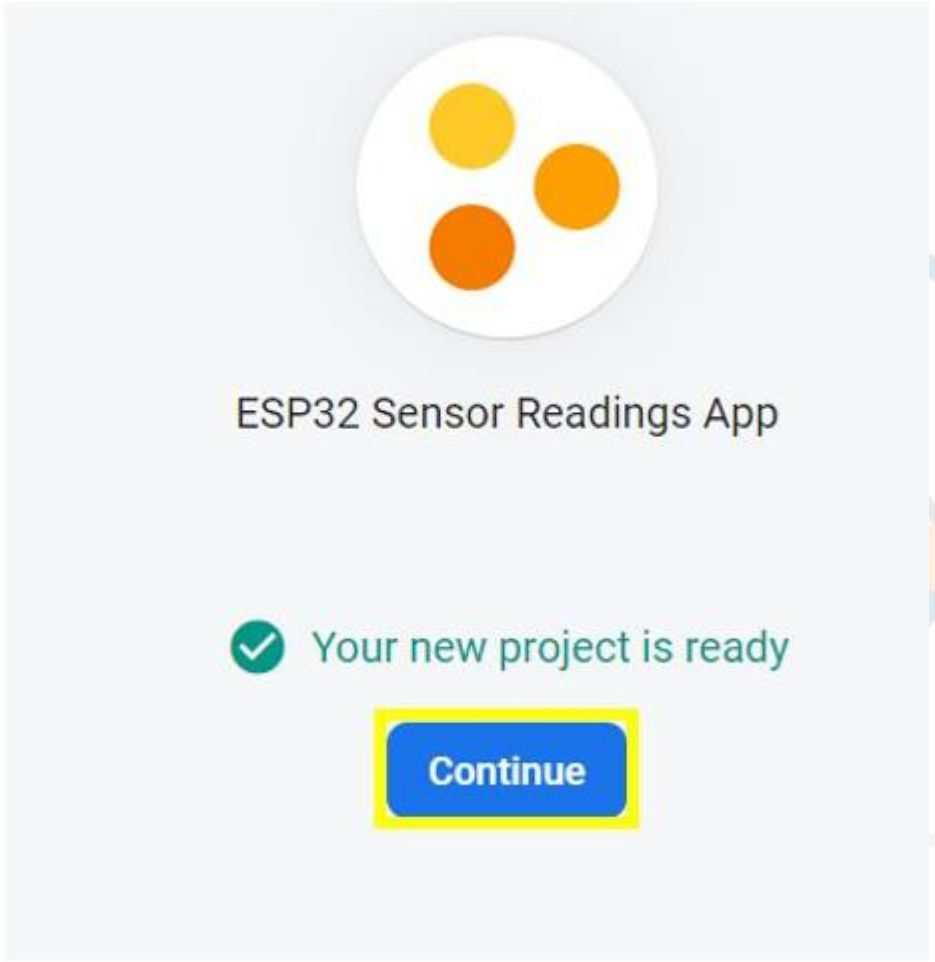
- Now enable ‘Google analytics for this project’ by swiping the sliding button. Click ‘Continue’ to proceed further.



- After choosing your location and ticking the required boxes click ‘Create Project’.

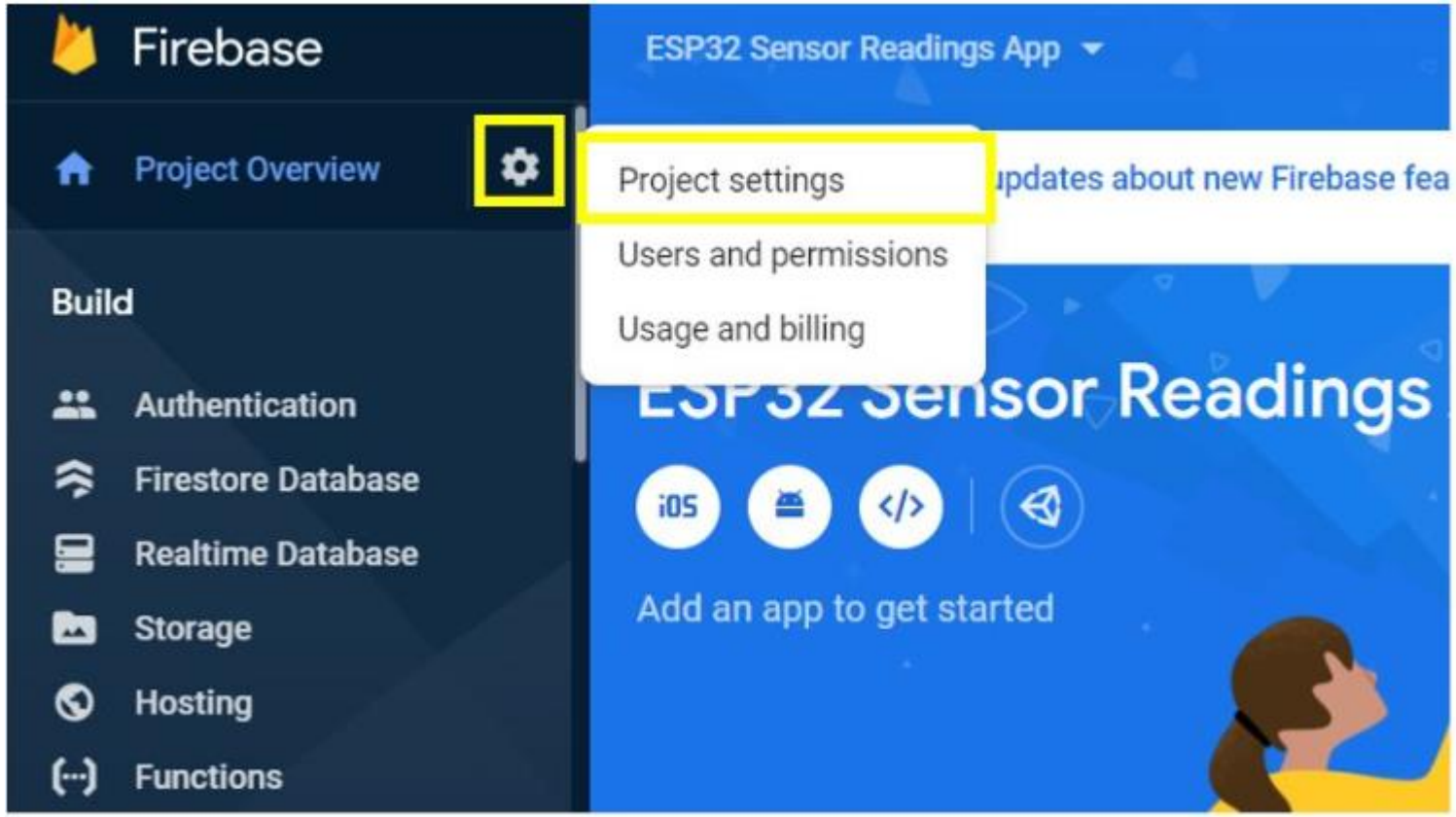


- After a few moments, your project will be created.
- Click ‘Continue.’

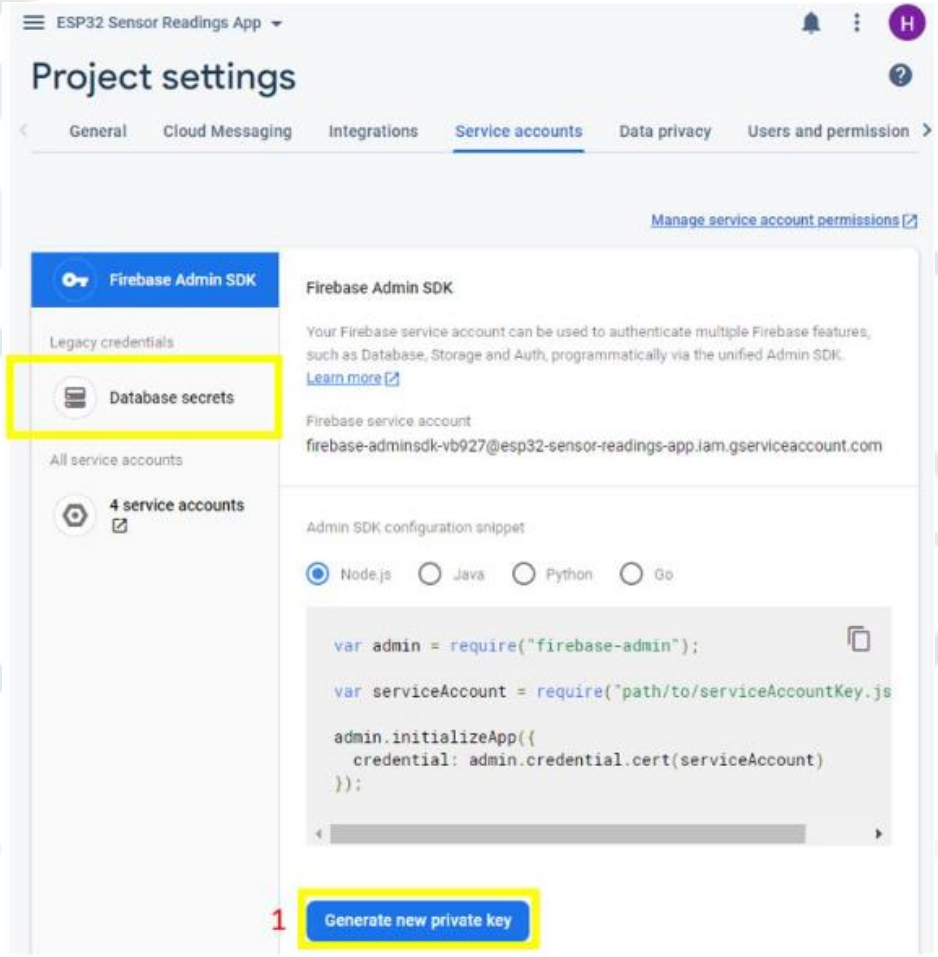


Obtaining Authorization key and Firebase host

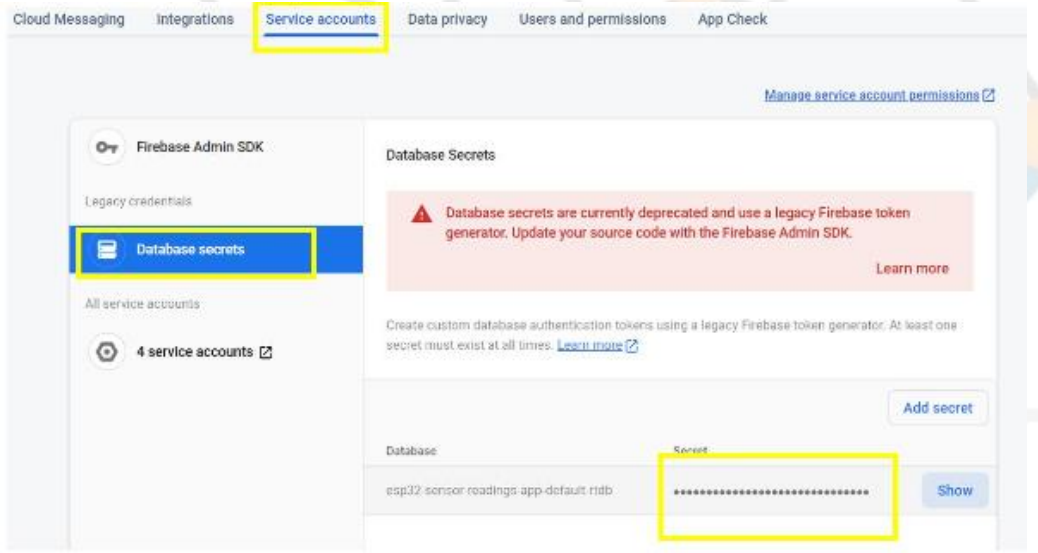
- Go to the settings icon and click ‘Project Settings’.



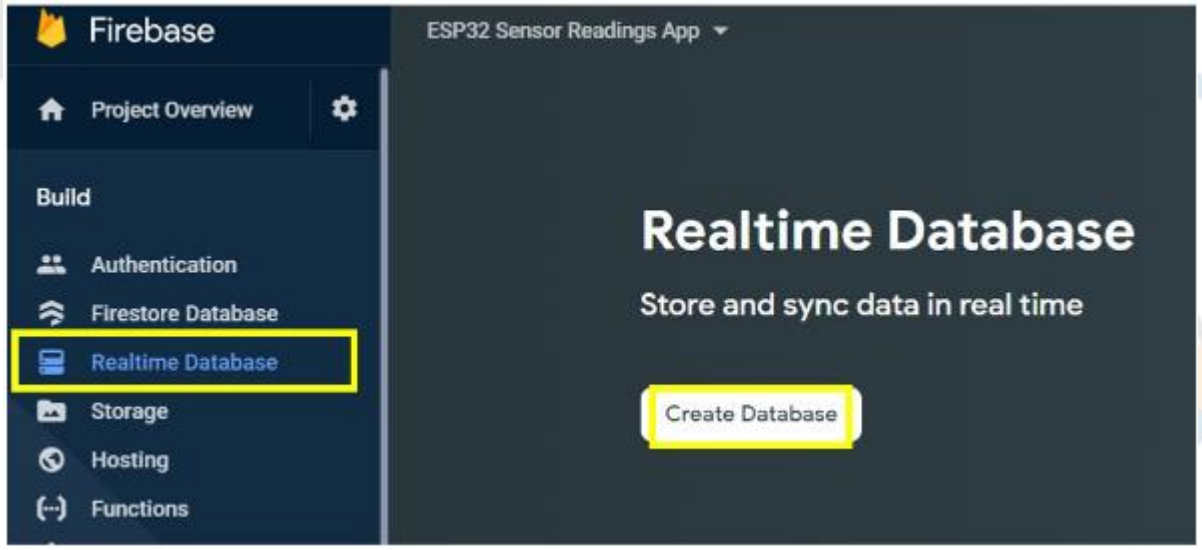
- Now, go to ‘Service Accounts’ and click ‘Generate new private key’.



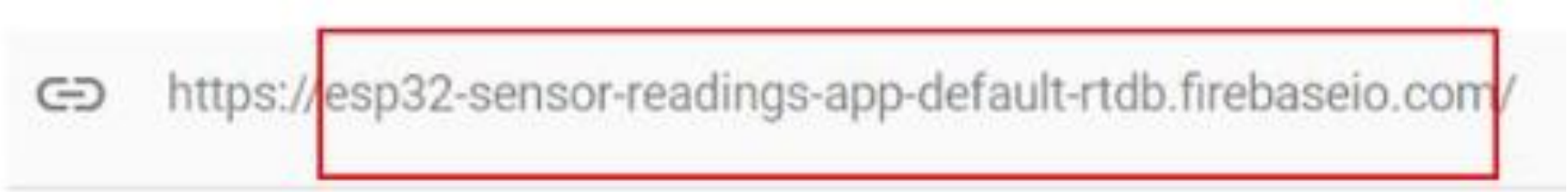
- Then go to ‘Database secrets.’ You will be able to view a secret key associated with your project. This is the unique authorization key that you will save and use later on in the program code. Keep it a secret and do not share it with anyone or your project security will be compromised.



- Next, Under the Build tab go to ‘Realtime Database.’ Then click ‘Create Database.’

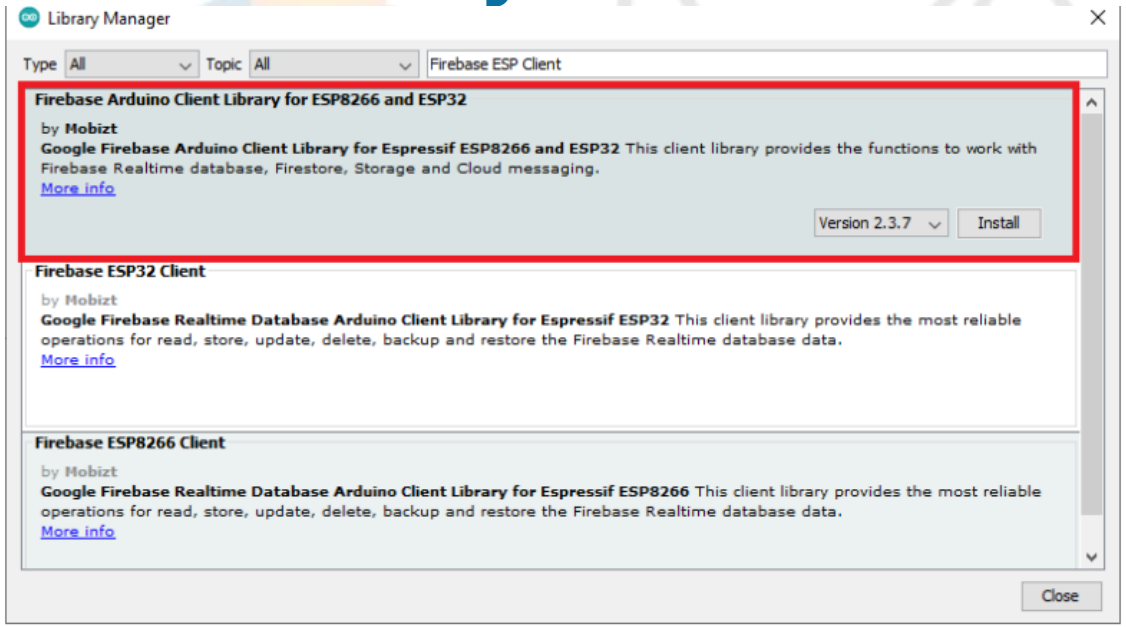


- After setting your location, check ‘Start in Lock mode’ and then click the Enable button. Your database settings are now completed. Copy the text shown in the highlighted box below. Save it as well. This will act as your Google Firebase host which we will incorporate in our program code.



Installing Google Firebase ESP32 Library

- Go to **Sketch** > **Include Library** > **Manage Libraries**, search for the libraries' names and install the libraries.
- For the Firebase Client library, select the **Firebase Arduino Client Library for ESP8266 and ESP32**.



Datalogging—Firebase Realtime Database

- #include <FirebaseESP32.h>
- #include <WiFi.h>
- #include "DHT.h"

- #define FIREBASE_HOST "esp32-sensor-readings-app-default-rtdb.firebaseio.com"
- #define WIFI_SSID "Your_SSID" // Change the name of your WIFI
- #define WIFI_PASSWORD "Your_Password" // Change the password of your WIFI
- #define FIREBASE_Authorization_key "Replace_with_your_secret_key"

- #define DHTPIN 2

- #define DHTTYPE DHT22
- DHT dht(DHTPIN, DHTTYPE);

- FirebaseData firebaseData;
- FirebaseJson json;

```
void setup() {

 Serial.begin(115200);
  dht.begin();
   WiFi.begin (WIFI_SSID, WIFI_PASSWORD);
   Serial.print("Connecting...");
  while (WiFi.status() != WL_CONNECTED)
  {
    Serial.print(".");
    delay(300);
  }
  Serial.println();
  Serial.print("IP Address: ");
  Serial.println(WiFi.localIP());
  Serial.println();
  Firebase.begin(FIREBASE_HOST,FIREBASE_Authorization_key);

}
```

```
void loop() {

  float hum = dht.readHumidity();
  float temp = dht.readTemperature();

   if (isnan(hum) || isnan(temp)  ){
    Serial.println(F("Failed to read from DHT sensor!"));
    return;
  }

  Serial.print("Temperature: ");
  Serial.print(temp);
  Serial.print("°C");
  Serial.print(" Humidity: ");
  Serial.print(hum);
  Serial.print("%");
  Serial.println();

  Firebase.setFloat(firebaseData, "/ESP32_APP/TEMPERATURE", temp);
  Firebase.setFloat(firebaseData, "/ESP32_APP/HUMIDITY", hum);
   delay(200);
}
```