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Sensor Data Recording and Alerts Notification using IFTTT with ESP32

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ABSTRACT

IoT's main value is data. Real-time data from different sources, stored and processed into actionable insights to transform and optimise processes is invaluable. This is why the device cloud is an important (and sometimes expensive) part of the architecture of any IoT solution since the data must be easily accessed for analysis. For individuals looking to deploy pilots and prototypes of scalable work on a budget, coughing up huge sums for data storage on platforms like Azure can be a burden. While there are tonnes of free IoT platforms, they sometimes have restrictions that make them unsuitable in certain situations. This work will cover a cheap/free cloud storage alternative. How to connect IoT devices to Google Sheets to log data. Google Sheets is used to creating spreadsheets instead of Microsoft Excel. It can be integrated with dozens of Google services, like Maps, to create innovative solutions. Google made it easy for developers to programmatically fill in data into a Google sheet using APIs and Gscript, which we have used for this work. To demonstrate Google Sheets as a device cloud, we have built a simple IoT temperature and humidity monitor. Using DHT11, the device will measure temperature and humidity and upload the data to a Google Sheet.

Keywords*: ESP32, IFTTT, DHT11, Sensor,*

I. INTRODUCTION

This microcontroller depends on the ATmega328P. There are 20 pins (0-19), 6 of which are simple data sources, 14 are automated input yield pins (6 pins provide PWM voltage), a 16 MHz ceramic resonator, a USB connection, a force jack, and a reset button. It's 5V. It's everything a microcontroller needs. Designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices. Arduino's hardware is licenced under a CC BY-SA licence, while its software is licenced under the GNU LGPL or GPL, allowing anyone to manufacture and distribute Arduino boards and software. Arduino boards are available online or from authorised distributors. Arduino boards use microprocessors and controllers. The boards have digital and analogue I/O pins that can be connected to shields, breadboards, and other circuits. Some boards have USB serial interfaces for loading programmes. Microcontrollers can be programmed in C and C++ using a standard API inspired by Processing and used with a modified version of the Processing IDE.

IFTTT is a free web service and mobile app that helps users automate web-based tasks and boost productivity. IFTTT stands for "If This Then That" Using "recipes," users can automate tasks so that one app triggers another. If you share a photo on Facebook, it can automatically be posted to Twitter, Instagram, Flickr, and other services. IFTTT is easy. To use automation, create an IFTTT account and connect your devices. We'll create an IFTTT applet to integrate Webhooks and

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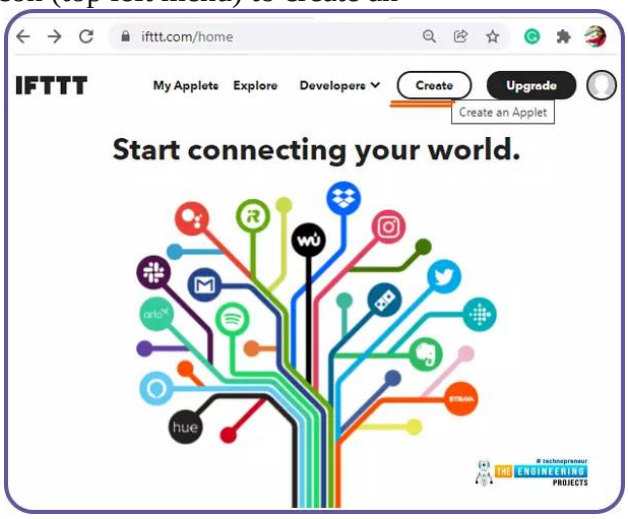
Google Sheets. We'll use Applets and Webhooks with the IFTTT server. Before we begin, let's define these terms: Applets are small programmes with one or a few simple functions. Connects devices or apps. Applets integrate two devices or services to enable functionality they can't do alone. Applets have triggers and actions. User-defined Webhooks are HTTP callbacks. Data and executable commands are sent over HTTP instead of the command line. It lets apps send automated messages to other apps. "Trigger" app serialises data and sends it to "action" app's webhook URL when an event occurs (the app that processes the data from the "trigger" application). The active app can then send a callback.

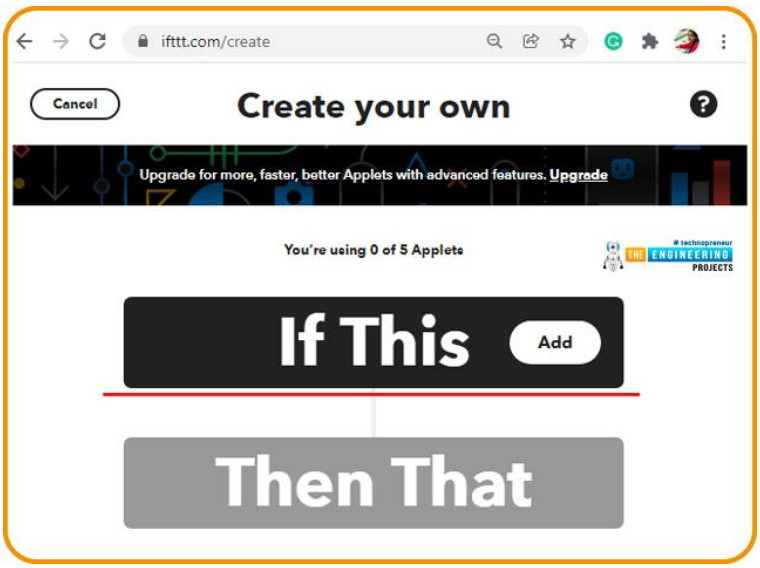
1. Click on the **"if This"** icon.

Getting Started with IFTTT:

1. Enter the following link in the web browser: https://ifttt.com
2. Login with your Gmail or Facebook accounts for free.
3. Click on **Create** icon (top left menu) to create an



4. Select a service. Search for the **Webhooks** service and select the respective icon.
5. Click on the **Receive a web request** option to select a trigger option. The trigger will fire every



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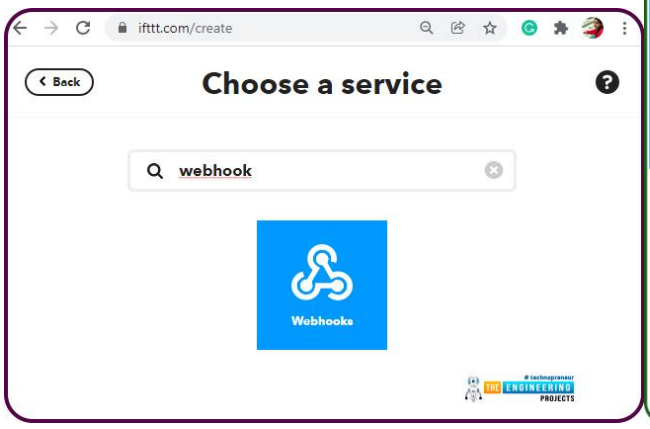
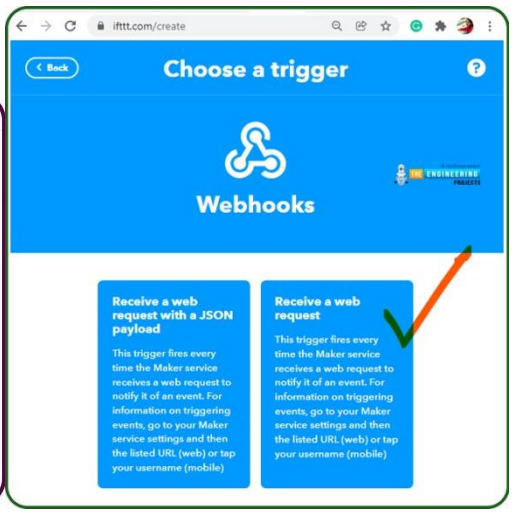
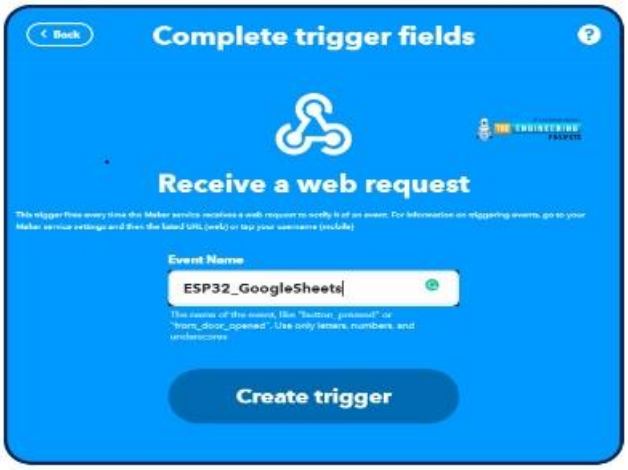
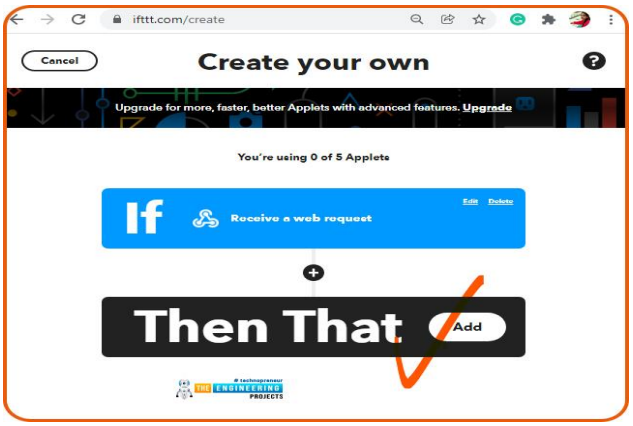


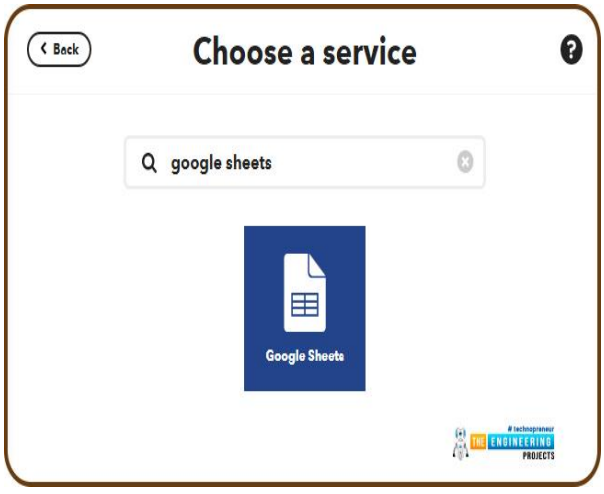


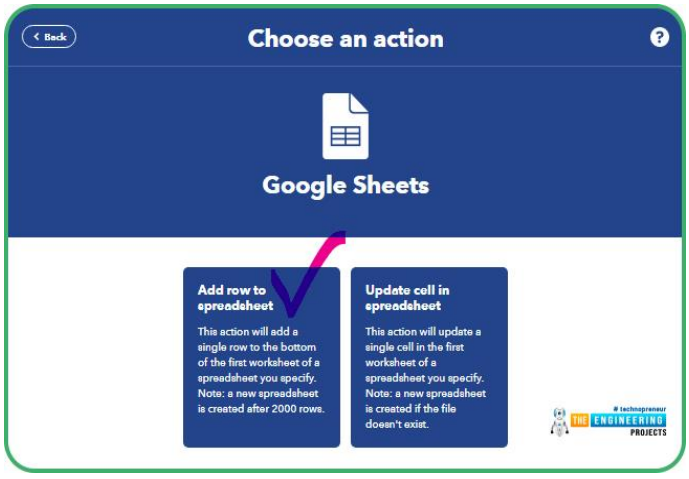
6. time the maker service receives a web request to notify it of an event.
7. Assign a name to the trigger **event** and click on **Create trigger** We have assigned **ESP32_GoogleSheets.**
8. Next, click on the "**Then That"**





9. To select the service, search for the Google Sheets service and click on the respective icon.
10. The next step is selecting an action, click on **Add row to the spreadsheet**





11. Click on the **connect** button to connect with the Google Sheet service, if you haven't connected to yet it

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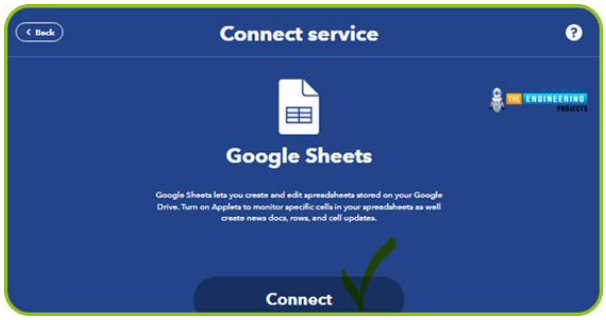
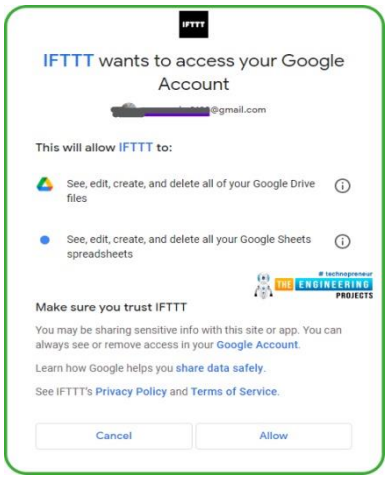
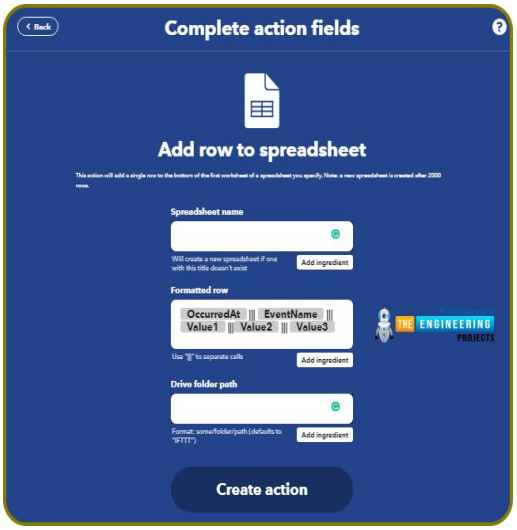


12. A new window will pop up, where you need to log in with your Gmail account.
13. Enter your Gmail account address and password.
14. Click on **Allow** icon, (as shown below) to allow the IFTTT web service to access files from your Google drive. S o that IFTTT can create new folders or update details in the existing Google drive folders with new sensor readings.



15. Finally, complete the action field by assigning the **name** to the **spreadsheet** and **path** the folder in Google drive. Leave the **Formatted row** as it is (default).A folder named IFTTT will be created by default if you leave the above fields empty.



16. Click on the **finish**

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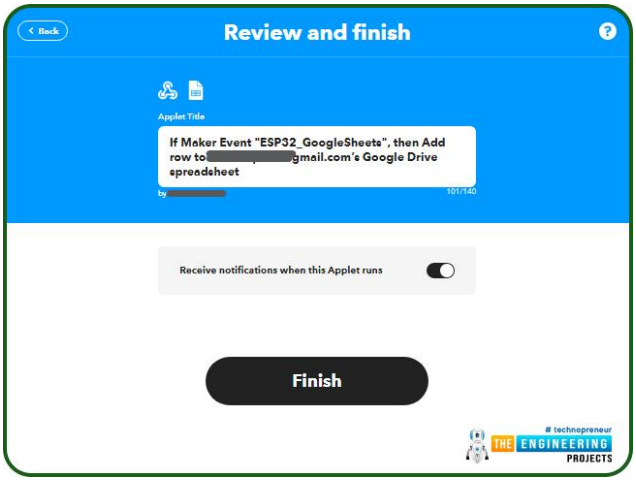

The microcontroller is the heart of an embedded system Microcontroller is the heart of an embedded system [1]. Keeping up with the rapid evolution of modern communication systems necessitates the use of highly efficient, compact antenna structures capable of transmitting a large amount of data quickly. Since conformal antennas can be mounted on any surface, they are more appealing to scientists than the more conventional microstrip patch antennas [2]. When compared to traditional systems, reconfigurable antennas have fewer antennas and a smaller footprint [3] because a single antenna can perform the functions of multiple receivers. Micro, small, and medium-sized businesses (MSME) play a crucial role in the growth of the world's largest economies. MSME are the most common type of business, as reported by the G20 SME conference held in Australia in 2014 [4]. The Internet of Things is an exciting new development in technology. Network inconsistencies are no longer a problem for today's plethora of connected smart devices. The environment can be sensed by smart devices, and they can share that data over a network [5]. Building a fork-shaped radiating patch on top of a rectangular ground plane yields a simple fork-shaped Bluetooth and UWB antenna with dual-band characteristics and the desired bandwidth [6]. The signal strength is increased by a high-gain antenna, while the range of a low-gain antenna is greater [7]. When it comes to learning and completing engineering projects, NI myRIO is a versatile and reusable tool [8]. When it comes to keeping people safe, vehicles should be the first priority, which is why they should be fitted with cutting-edge safety features. There are a variety of warning alerts and alarms built into cars and trucks to warn us of things like going too fast or impending danger [9]. Large digital images need to be compressed before being sent over a channel with limited bandwidth. Digital media files, such as photographs, music, and videos, necessitate a lot of space on the computer's hard drive [10]. Efficient, compact, and versatile antennas are required for Bluetooth, WLAN, GSM, LTE, satellite, and military uses [11]. A meander line antenna consists of both horizontal and vertical lines. Both horizontal and vertical lines are used to create the turns. Higher efficiency is achieved at the expense of a lower resonant frequency as the number of turns in a meandering line increases [12]. In 1828, animators used paper and rope to create what is now known as 3D animation. It has emerged as the central component of today's digital classrooms. Research on two-dimensional image manipulation, especially for animation, has seen a surge in popularity in recent years [13]. Reconfigurable antennas are highly

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desirable [14] due to the rapid growth of wireless communications and the need to integrate multiple wireless standards into a single platform. To put it simply, metamaterials are artificial materials that exhibit unusual or unprecedented characteristics. Metamaterials and metasurfaces, like photonic band gap structures (PBG) and frequency-selective surfaces, do not belong to the classical periodic structure class (FSS). Instead, double-negative (DNG) materials, characterised by negative permittivity and permeability in a given frequency band, define a class of metamaterials [15]. Complex antennas are essential for wireless applications. Small mobile units, such as cell phones, laptops, and remote sensing devices, fall into this category. Miniaturization is essential for most technologies [16]. Broad impedance array, high port insulation, secure radiation pattern, low cross-polarization, and a low profile are all desirable characteristics in base station antennas because of the explosive growth of electronic communication. Mobile base stations employ dual-polarized antenna shares to boost system performance via polarisation diversity [17]. Two issues must be addressed in order to design an absorbing material: how to maximise the absorption of the incident electromagnetic wave rather than its reflection, and how to maximise the rate of absorption and attenuation. The first enquiry is concerned with attenuation, while the second is concerned with surface matching. They cannot exist without one another. Since the material has a high imaginary dielectric constant (because of its good attenuation), it is also a good dielectric. Intense interface reflection occurs when there is an impedance mismatch [18]. Health care, disease monitoring, and other therapeutic uses in wireless body area networks can all benefit from the use of radio frequency (RF) technology (WBANs). WBANs allow doctors to keep constant tabs on their patients' vital signs. Wearable sensor hubs are one example of how WBANs can reliably convey correspondence between devices and embedded system components. [19]. To expand the usefulness and adaptability of wireless communication systems, scientists are developing reconfigurable antennas. The operating frequency, impedance bandwidth, polarisation, and radiation pattern of reconfigurable antennas can all be altered [20]. Researchers are working on reconfigurable antennas in response to the growing popularity and flexibility of wireless networks. The frequency range of reconfigurable antennas [21] can be altered by electrical and mechanical mechanisms.

II. HARDWARE REQUIREMENTS

The ESP32 is an updated version of the 2014 "surprise" chip ESP8266. The original ESP8266 was introduced on a module called the ESP-01, which had little English documentation. Once the documentation was translated into English, experimenters realised the ESP8266's power, and it became popular. The ESP32 design was improved in several ways. It has Bluetooth and BLE, while ESP8266 only has Wi-Fi (which, of course, the ESP32 also has). Dual-core, faster. It also has an ultra-low-power mode for battery-powered applications.

ESP 32 Features:

1. Single or Dual-Core 32-bit LX6 Microprocessor with clock frequency up to 240 MHz
2. 520 KB of SRAM, 448 KB of ROM and 16 KB of RTC SRAM.
3. Supports 802.11 b/g/n Wi-Fi connectivity with speeds up to 150 Mbps.
4. Support for both Classic Bluetooth v4.2 and BLE specifications.
5. 34 Programmable GPIOs.
6. Up to 18 channels of 12-bit SAR ADC and 2 channels of 8-bit DAC

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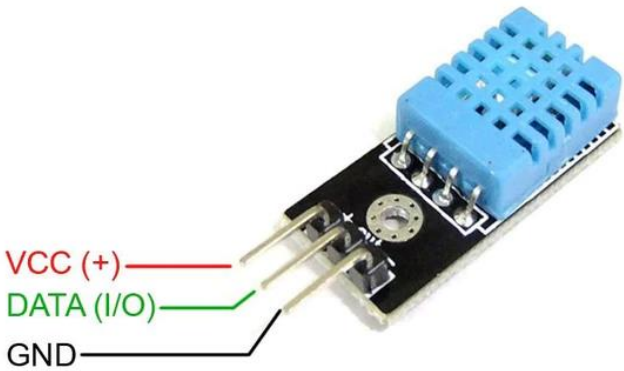
7. Serial Connectivity include 4 x SPI, 2 x I2C, 2 x I2S, 3 x UART.
8. Ethernet MAC for physical LAN Communication (requires external PHY).
9. 1 Host controller for SD/SDIO/MMC and 1 Slave controller for SDIO/SPI.
10. Motor PWM and up to 16-channels of LED PWM.
11. Secure Boot and Flash Encryption.
12. Cryptographic Hardware Acceleration for AES, Hash (SHA-2), RSA, ECC and RNG

***Fig. 1** ESP 32*

DHT Sensor

Low-cost humidity and temperature sensor. It includes a thermistor and capacitive humidity sensor. Two-second data is an advantage over other sensors. It's easy to use; connect the first pin to power and the second to data. Last pin ground. Its accuracy and precision allow it to replace the expensive imported SHT10 sensor. To meet demand, this sensor measures temperature and humidity. It's reliable and stable. It's easy to use with a temperature and humidity sensor Arduino expansion board. DHT22 is an analogue humidity sensor.

It's a 4.7 K to 10 K resistor that pulls up the data pin to Vcc.



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Connecting Wires

Connecting wires allows an electrical current to travel from one point on a circuit to another because electricity needs a medium through which it can move. Most of the connecting wires are made up of copper or aluminum.

Breadboard

A breadboard, or protoboard, is a construction base for prototyping of electronics. Originally the word referred to a literal bread board, a polished piece of wood used when slicing bread. In the 1970s the solderless breadboard (a.k.a. plugboard, a terminal array board) became available and nowadays the term "breadboard" is commonly used to refer to these.

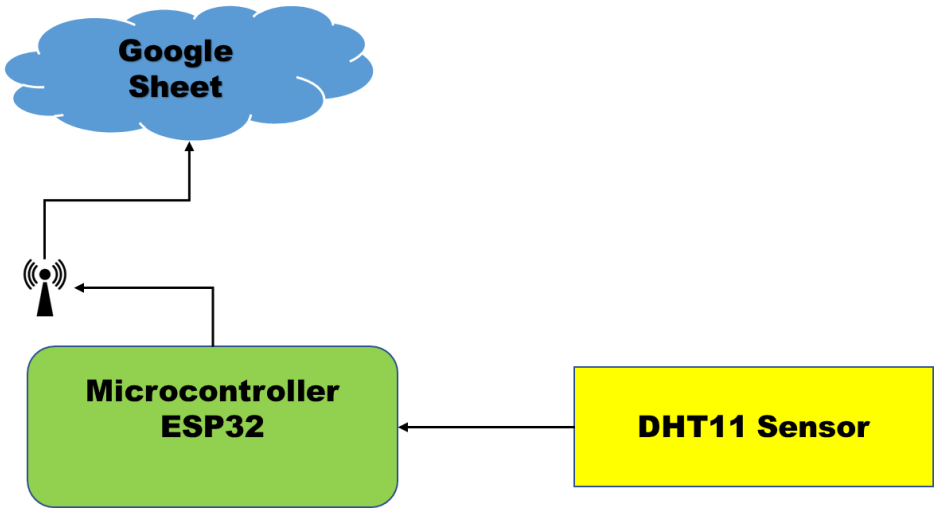

***Fig. 2** Block Diagram*

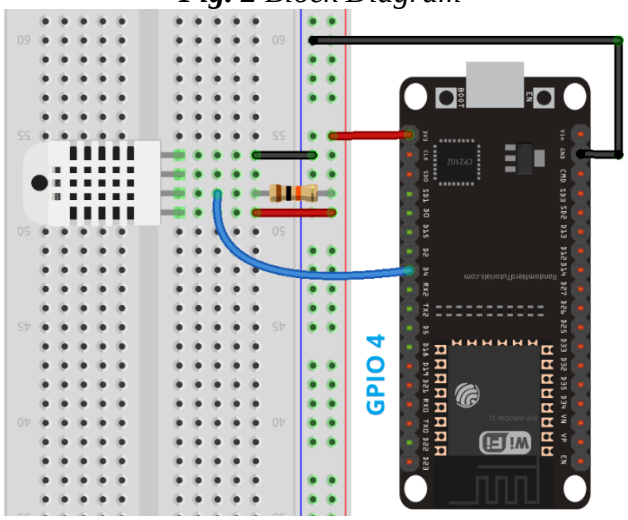

***Fig 3.** Connection Diagram*

III. CODE

```
#include <WiFi.h>
#include <HTTPClient.h>
#include "DHT.h"

#define LDR_PIN   2
#define DHTPIN    4
```

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```
//our sensor is DHT11 type
#define DHTTYPE DHT11
DHT dht(DHTPIN, DHTTYPE);

const char * ssid = "Nayak_don't_dare";
const char * password = "sonu2010";

String server = "http://maker.ifttt.com";
String eventName = "Dht_data";
String IFTTT_Key = "ksh7eLVf1EJWlzWBDU_wttng-3pMNvmo7hdqj_9fnrS";
String
IFTTTUrl="http://maker.ifttt.com/trigger/temp_data/with/key/e272MXJrh4_et5KUm56LmY
HjJrNRtj9BjxUT5u6Njr7";
int value1;
int value2;
int value3;
void setup() {
  Serial.begin(115200);
  dht.begin();
  WiFi.mode(WIFI_STA);
  WiFi.begin(ssid, password);
  while (WiFi.status() != WL_CONNECTED) {
    delay(500);
    Serial.print(".");
  }
  Serial.println("Viola, Connected !!!");
}
float getLightPercentage(void)
{
  int ldrRawVal;
  float percentage;
  ldrRawVal = analogRead(LDR_PIN);
  percentage = ((float)((ldrRawVal*100)/4096));
  return percentage;
}
void sendDataToSheet(void)
{
  String url = server + "/trigger/" + eventName + "/with/key/" + IFTTT_Key + "?value1=" +
String((int)value1) + "&value2="+String((int)value2) +"&value3=" + String((int)value3);
  Serial.println(url);
  //Start to send data to IFTTT
  HTTPClient http;
  Serial.print("[HTTP] begin...\n");
  http.begin(url); //HTTP
  Serial.print("[HTTP] GET...\n");
  // start connection and send HTTP header
  int httpCode = http.GET();
  // httpCode will be negative on error
```

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```
  if(httpCode > 0) {
    // HTTP header has been send and Server response header has been handled
    Serial.printf("[HTTP] GET... code: %d\n", httpCode);
    // file found at server
    if(httpCode == HTTP_CODE_OK) {
      String payload = http.getString();
      Serial.println(payload);
    }
  } else {
    Serial.printf("[HTTP] GET... failed, error: %s\n", http.errorToString(httpCode).c_str());
  }
  http.end();
}
void loop() {
  value1 = dht.readHumidity();
  value2 = dht.readTemperature();
  value3 = getLightPercentage();
  Serial.print("Values are ");
  Serial.print(value1);
  Serial.print(' ');
  Serial.print(value2);
  Serial.print(' ');
  Serial.println(value3);
  Serial.print(' ');

  sendDataToSheet();
  delay(10000);
```

IV. Result Analysis

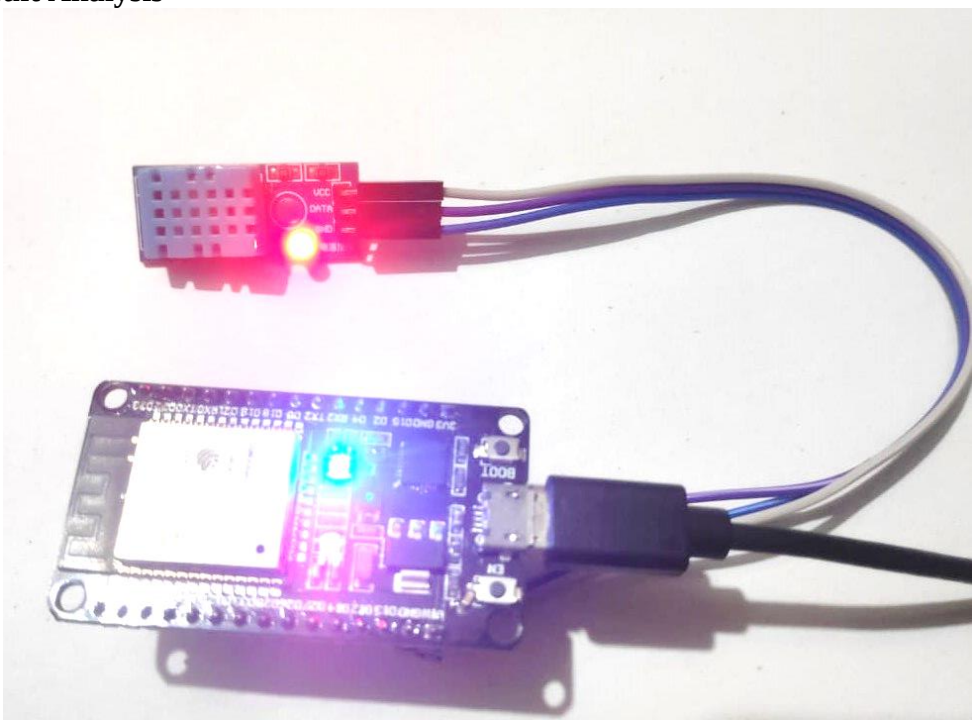

Fig 4*. Working Model*

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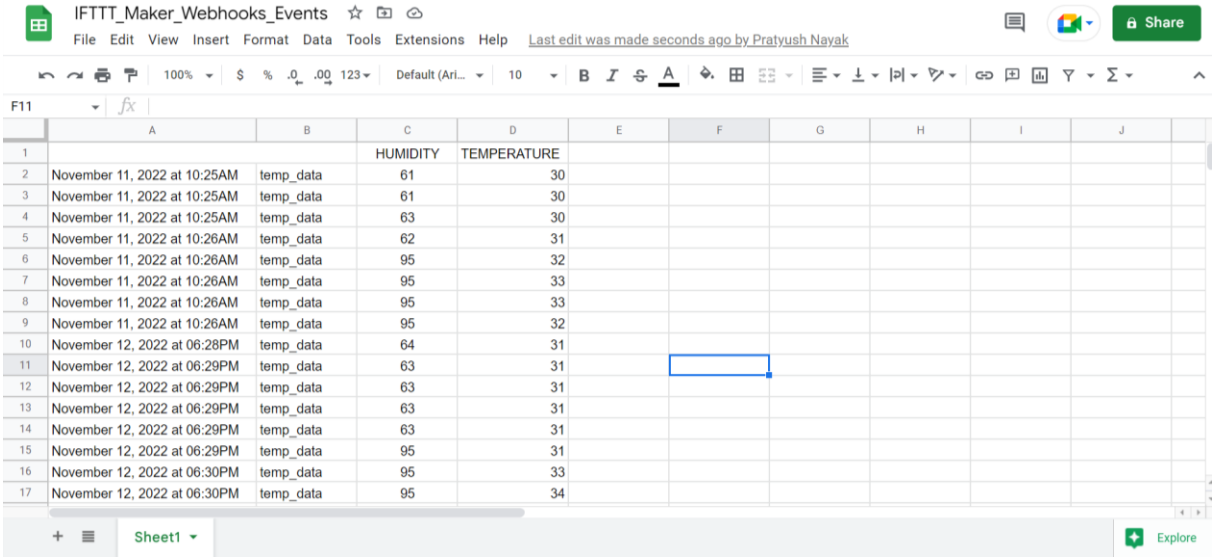

IFTTT_Maker_Webhooks_Events

File Edit View Insert Format Data Tools Extensions Help Last edit was made seconds ago by Pratyush Nayak

Share

F11

	A	B	C	D
1			HUMIDITY	TEMPERATURE
2	November 11, 2022 at 10:25AM	temp_data	61	30
3	November 11, 2022 at 10:25AM	temp_data	61	30
4	November 11, 2022 at 10:25AM	temp_data	63	30
5	November 11, 2022 at 10:26AM	temp_data	62	31
6	November 11, 2022 at 10:26AM	temp_data	95	32
7	November 11, 2022 at 10:26AM	temp_data	95	33
8	November 11, 2022 at 10:26AM	temp_data	95	33
9	November 11, 2022 at 10:26AM	temp_data	95	32
10	November 12, 2022 at 06:28PM	temp_data	64	31
11	November 12, 2022 at 06:29PM	temp_data	63	31
12	November 12, 2022 at 06:29PM	temp_data	63	31
13	November 12, 2022 at 06:29PM	temp_data	63	31
14	November 12, 2022 at 06:29PM	temp_data	63	31
15	November 12, 2022 at 06:29PM	temp_data	95	31
16	November 12, 2022 at 06:30PM	temp_data	95	33
17	November 12, 2022 at 06:30PM	temp_data	95	34

Sheet1

Explore

Fig 5. *Recording of Data in Google Sheet*

V. CONCLUSION

Using an ESP32 board, the readings from the sensor are going to be published to Google Sheets. Using the DHT11 sensor as an illustration, we have sent readings of temperature, humidity, and pressure to a Google Sheets spreadsheet every 10 seconds. To integrate Google sheets with ESP32, we have used IFTTT, which is a web service provided by a third party.

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