PROJECT REPORT

ON

<u>Smart Automatic RFID Attendance System</u>

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Abstract

This project is developed by using Radio Frequency Identification (RFID) system and student card to get student attendance. Before this project, lecturers needed to use paper to get the student attendance. There were a lot of problems when using the paper as student attendance such as cheating. This project can help lecturers to reduce these problems by the design of an automatic attendance using RFID and student card. The project system runs by the process of getting the code of the student card to compare with the database in XAMPP Control Panel. Graphical User Interface (GUI) was developed using NetBeans IDE 8.1 to make the database easier to access. Firstly, lecturer needs to fill forms in an interface like lecturer name, subject, and subject code. This part is important because we need the information in this part to use in the next interface. In the next interface, lecturer needs to choose port and speed to make connection with RFID reader. After the reader is ready, process to get attendant will start. Students need to swipe their card on the reader and the code from the card will use to compare with database in XAMPP Control Panel. When the code is match with database, the student information like ID number and time will show on interface and that information will trigger into a list and it will lead to the opening of the class room door. This list will use as a student attendance. In that list, all information like student name, ID number and time will be saved in the database of the server. If the code does not match with the database, it means that the student is in the wrong class or he (or she) is not yet registered for that course. When this happen, lecturer can register that student by using registering form and the information of that student will be update into database. This project will help lecturer taking the student attendance
more easily and automatically. As a conclusion, RFID technology can be used in student attendance application.

INTRODUCTION

RFID (radio frequency identification) is a new technology that incorporates the use of electromagnetic or electrostatic coupling in the radio frequency (RF) portion of the electromagnetic spectrum to uniquely identify an object, animal, or person. RFID tags are not an "improved bar code" as the proponents of some technologies would like you to believe. An RFID system consists of three components: an antenna and transceiver (often combined into one reader) and a transponder (the tag). The antenna uses radio frequency waves to transmit a signal that activates the transponder. When activated, the tag transmits data back to the antenna. RFID technology differs from bar codes. RFID can read the tag using RF, meaning that the RFID reader can be read from a distance, right through your clothes, wallet or purse. Besides the RFID tag consist of unique ID for each tag. The technology used in RFID has been around since the early 1920s. In our country, this technology is less frequent and the mostly use technology is the biometric systems using finger print. Our government less applies this technology by using RFID as I.C (identification card). In some places of our country, people prefer to use Barcode which is cheaper than RFID. Technology spread very fast and in few years, the possibility that RFID replaces the barcode system will just breality.

Nowadays, there are many of universities around our country and each of this university consists of student up to 10 thousand. To handle a large amount of student may be problems specially to get the attendance. Now, process to get attendance in majority universities still used the manual process. The manual process means that when the class (or lecture) starts, lecturer will give a piece of attendance paper and students will check their name and then will sign on it. At the end of class, lecturer will take back the attendance paper and keep it as a record. Normally, the attendance paper need much time to be signed by all students especially for classes with a lot of student. Students also forget to sign that attendance and they are assumed absent for that class. The problem also will happen when lecturer forget to bring the attendance paper to class. Students need to write their name on a piece of paper and sometimes student will take this opportunity to cheat during the process of getting the attendance. The suitable solution for this problem is to design a system that will record attendance automatically. In this project, which is based RFID system is used to record student attendance automatically. This project will use student ID card as RFID tag and a RFID reader. This RFID system will be integrated with a software. This method is more effective to prevent problems in the process of getting the attendance manually.

AIM AND OBJECTIVE

Unlike the manual process, the proposed system easily helps management/administrators to analyse students' attendance details as per requirement. The system shall help administrators save time and money The system would reduce staff workload and increases efficiency. The system also omits the consumption of physical space required to store and maintain attendance records.

PROBLEM DEFINITION

Detailed Problem Statement Attendance in colleges or any educational/workplace institutes and organizations is generally paper-based which is then maintained in a file or a register which may cause some human errors. Taking attendance manually consumes more time and is inefficient as well. It increases the workload and consumes a lot of physical space for storing in these institutes/organizations. Hence to overcome these problems; An attendance system that uses RFID technology to take E-attendance.

Scope of the Project

 The Future Implications are very vast of this type of technology.

• The system is portable, which provides a good mobility across the institute/organization

• It is easy to set-up and use which helps to reduce and eliminates the hassle of coding/connecting APIs

• The system can also be used for a library management for a few extra lines of code
• The data collected by the system can pe used for data processing and analyzing for current and future track of performance.

DESCRIPTION OF PROJECT

 Proposed System In this project, we will make a remotecontrol roverthat has a directional sense via an attached ultra-sonic sensor. It can be driven by a computer situated in a remote location. We implemented this project at our university where the wifi connectivity was accessible across the entire campus grounds. This will allow us to drive the rover for outdoor surveillance that it could connect to the wifi. Practically you can implement this project and control the rover from your remote PC anywhere that is within reach of that wifi network.

LITERATURE SURVEY

The writer has proposed and applied IoT primarily totally based scholar attendance machine for the clever university campus. They have designed a transportable tool with a fingerprint scanner to understand the attendance of college students at the biometric parameter and the captured attendance of the lecture can be despatched to the far-off server with the use of Wi-Fi. Also, this tool is circulated withinside the lecture room for each lecture to take the fingerprint of college students. The captured fingerprints are in comparison with fingerprints withinside the database and attendance of college students in phrases of enrolment numbers are despatched to a far-off attendance machine. [1] The authors have applied gadget wherein all of the legal college students are given an RFID tag. The statistics saved on this card is referred because the identification/attendance of the person. Once the scholar locations the cardboard in the front of the RFID card reader, it reads the statistics and verifies it with the statistics saved withinside the microcontroller from the 8051 family.. If the statistics matches, then it presentations a message at the LCD confirming the access of that scholar else presentations a message denying the attendance. The fame of a scholar's attendance may be retrieved from this gadget via way of means of urgent the fame button interfaced to the microcontroller. Students' attendance is without delay saved withinside the database. [2] The writer has proposed and applied IoT primarily based totally student's attendance device for the clever university campus. The attendance device for academics and college students may be applied to control room records, music the attendance of academics and college students, examine college students for field in attendance, offer lecture agenda records that's all completed incorporated and dependablemanner. By the use of Raspberry Pi 3+ because the embedded device, the device works very well, specifically in phrases of the presence of academics and college students, scheduling courses, and the room usage. The device may be used for on line educational functions with the aid of using the use of the prevailing community infrastructure, in order that records may be accessed in no time and precisely. The device may be multiplied with the aid of using duplicating one device, both hardware or software. Also this device may be evolved with numerous functions inclusive of get entry to control, show with signate-board, computerized payment, attendance records for academics and college students, and others. [3] The creator has proposed a machine of worker attendance & protection machine the use of face and Biometric incorporated with Smart RFID playing cards the use of Arduino with this proposed machine the disadvantage of current RFID attendance machine along with twin or multi access with unmarried card or omit use of the playing cards may be prevented. The current RFID primarily based totally attendance machine has been better with the combination of face popularity of the unique worker together along with his specific worker number. With integration of finger print authentication (Bio-metric) into the machine, protection has been better. Audio welcome message at the legitimate Employee attendance registration has been delivered & for unauthorized access Audio alert has been delivered at the side of Sound Alarm (buzzer). [4] The writer has proposed and applied RFID primarily based totally Attendance machine the usage of IoT.
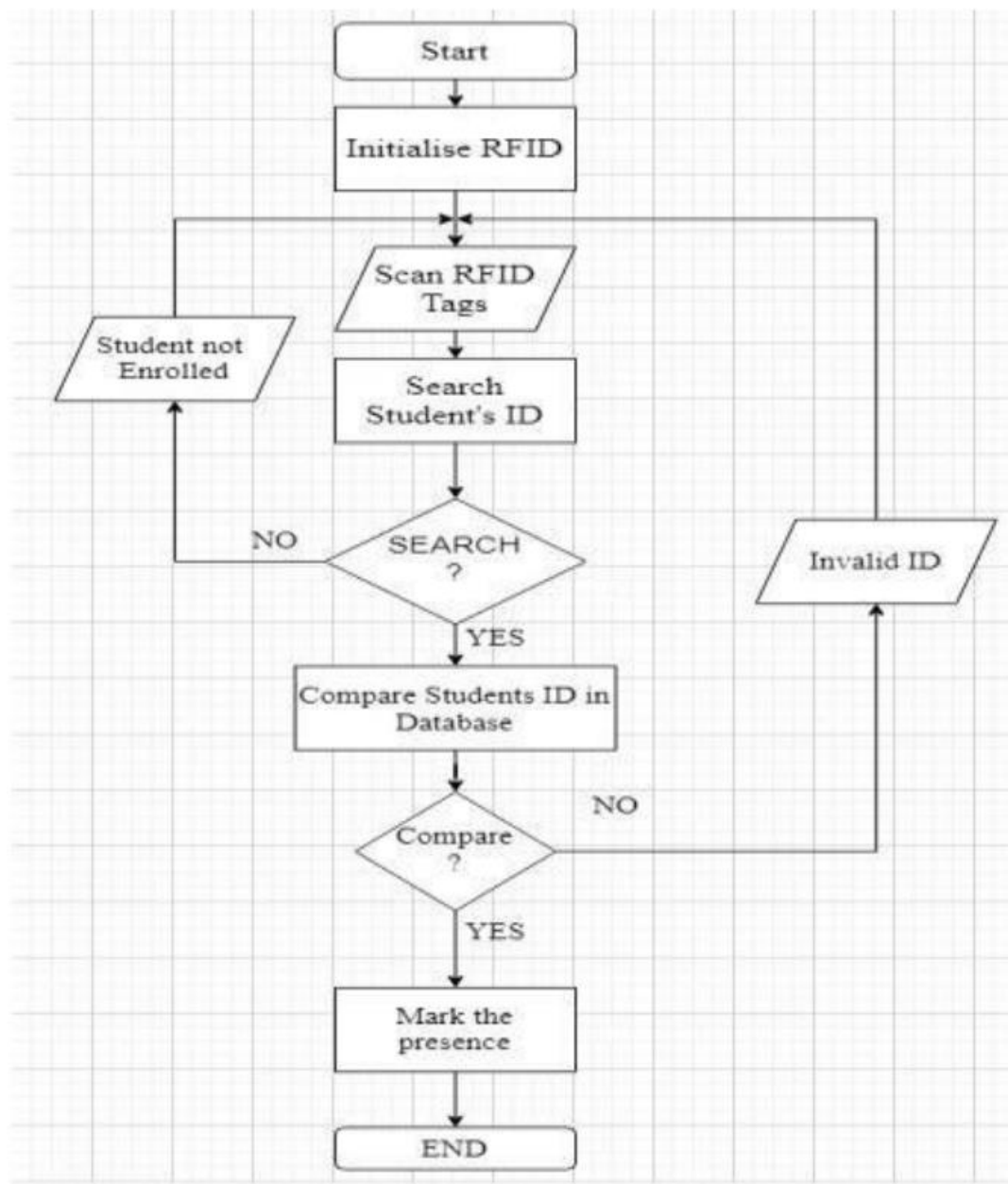
Fig:-1 Flow chart

The above figure gives a basic insight into how the logic of RFID based attendance system will be developed and how the components will interact with each other.

Required Analysis

Hardware Requirements

• NodeMCU ESP8266

 • RFID Reader

 • RFID Tag

• Jumper Cables

 Software Requirements

• Arduino IDE

• Google sheets

 • Google app script.

DESCRIPTION ABOUT COMPONENTS

NodeMCU

Today, IOT applications are on the rise, and connecting objects are getting more and more important. There are several ways to connect objects such as Wi-Fi protocol.

NodeMCU is an open source platform based on ESP8266 which can connect objects and let data transfer using the Wi-Fi protocol. In addition, by providing some of the most important features of microcontrollers such as GPIO, PWM, ADC, and etc, it can solve many of the project's needs alone.

The general features of this board are as follows:

- Easy to use
- Programmability with Arduino IDE or IUA languages
- Available as an access point or station
- practicable in Event-driven API applications
- Having an internal antenna
- Containing 13 GPIO pins, 10 PWM channels, I2C, SPI, ADC, UART, and 1-Wire.
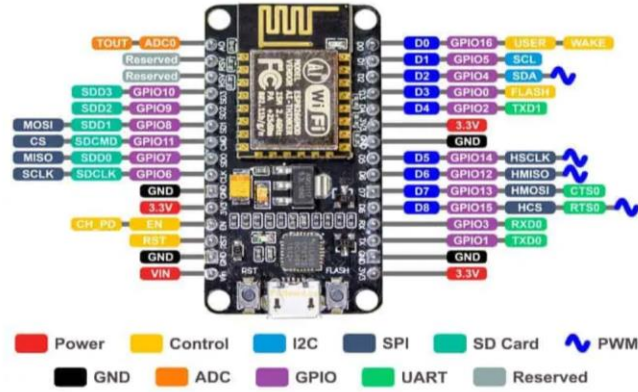
Fig:2: NodeMcu pin configuration.

Fig-3: Technical Specification of NodeMcu

RFID READER

The RFID reader sends a pulse of radio energy to the tag and listens for the tag's response. The tag detects this energy and sends back a response that contains the tag's serial number and
possibly other information as well.

In simple RFID systems, the reader's pulse of energy functioned as an on-off switch; in more sophisticated systems, the reader's RF signal can contain commands to the tag, instructions to read
or write memory that the tag contains and even passwords.

Fig-4:RFID Chip

Fig-5:RFID pin Configuration

RFID TAG

The tag, also known as the transponder (derived from the terms transmitter and responder), holds the data that is transmitted to the reader when the tag is interrogated by the reader. The most common tags today consist of an Integrated Circuit with memory, essentially a microprocessor chip. Other tags are chip less and have no onboard Integrated circuit. Chip less tags are more effective in applications where simpler range of functions is all that is required; although they can help achieve more accuracy and better detection range, at potentially lower cost than their Integrated Circuitbased counterparts.
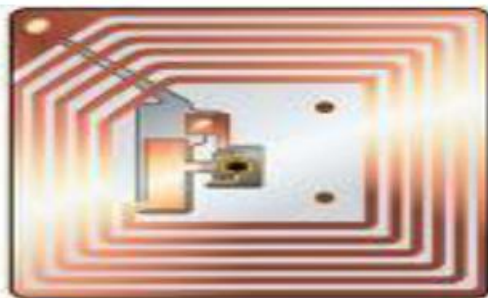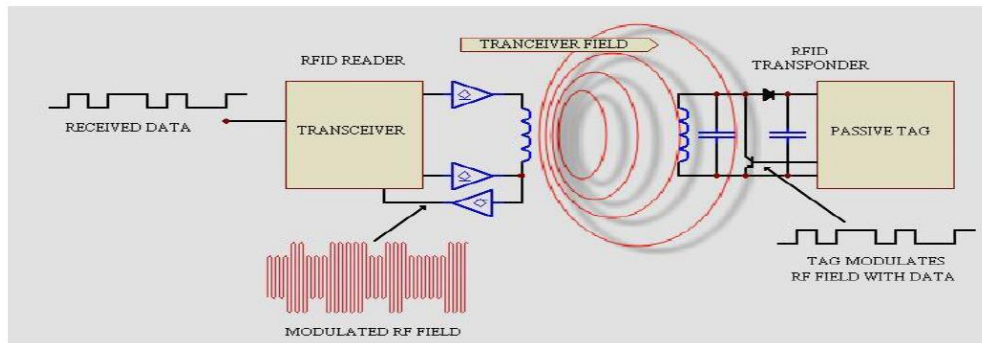

Fig-6 EM CHIP

Fig:-7 Working Diagram

RFID WORKING:

RFID belongs to a group of technologies referred to as Automatic Identification and Data Capture (AIDC). AIDC methods automatically identify objects, collect data about them, and enter those data directly into computer systems with little or no human intervention. RFID methods utilize radio waves to accomplish this. At a simple level, RFID systems consist of three components: an RFID tag or smart label, an RFID reader, and an antenna. RFID tags contain an integrated circuit and an antenna, which are used to transmit data to the RFID reader (also called an interrogator). The reader then converts the radio waves to a more usable form of data. Information collected from the tags is then transferred through a communications interface to a host computer system, where the data can be stored in a database and analyzed at a later time.
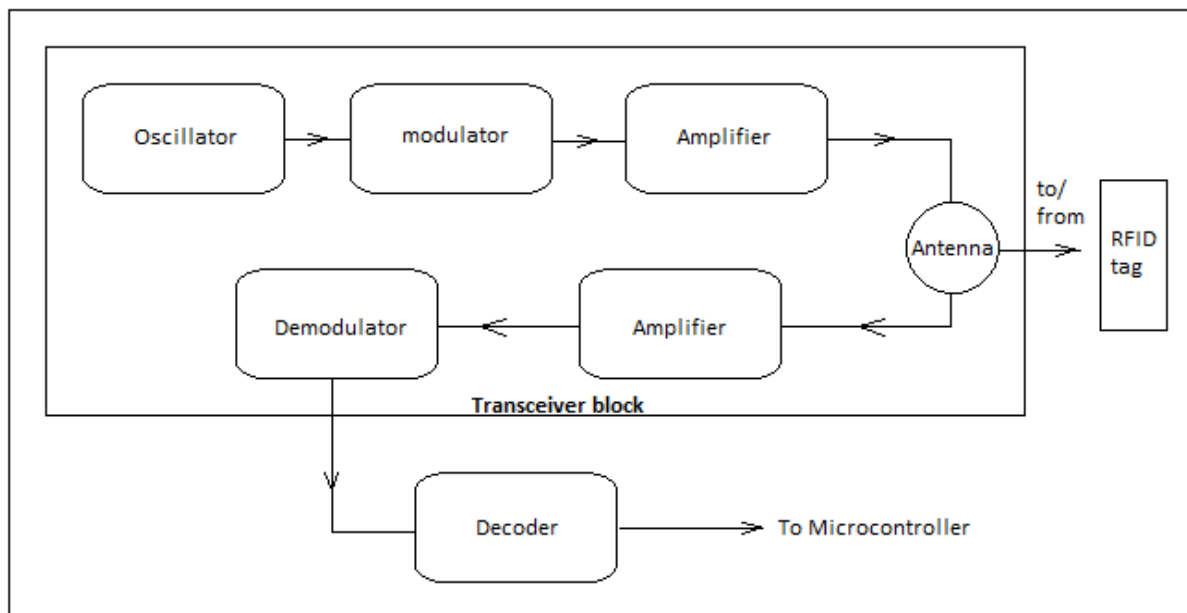

Fig-8 Block Diagram

Connections:-

NodeMCU	RFID-RC522
D4 (GPIO2)	SDA
D5 (GPIO14)	SCK
D7 (GPIO13)	MOSI
D6 (GPIO12)	MISO
NOT CONNECTED	IRQ
GND	GND
D3 (GPIO0)	RST
3V	3.3V

The following figure is a circuit representation that shows us the necessary connections of the above-listed components and the jumper cable network between them.
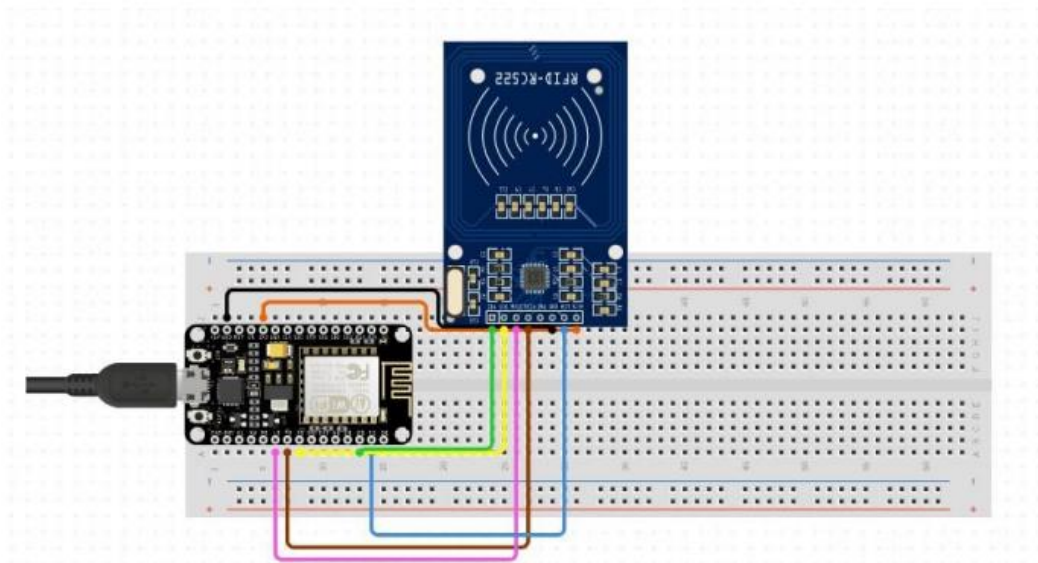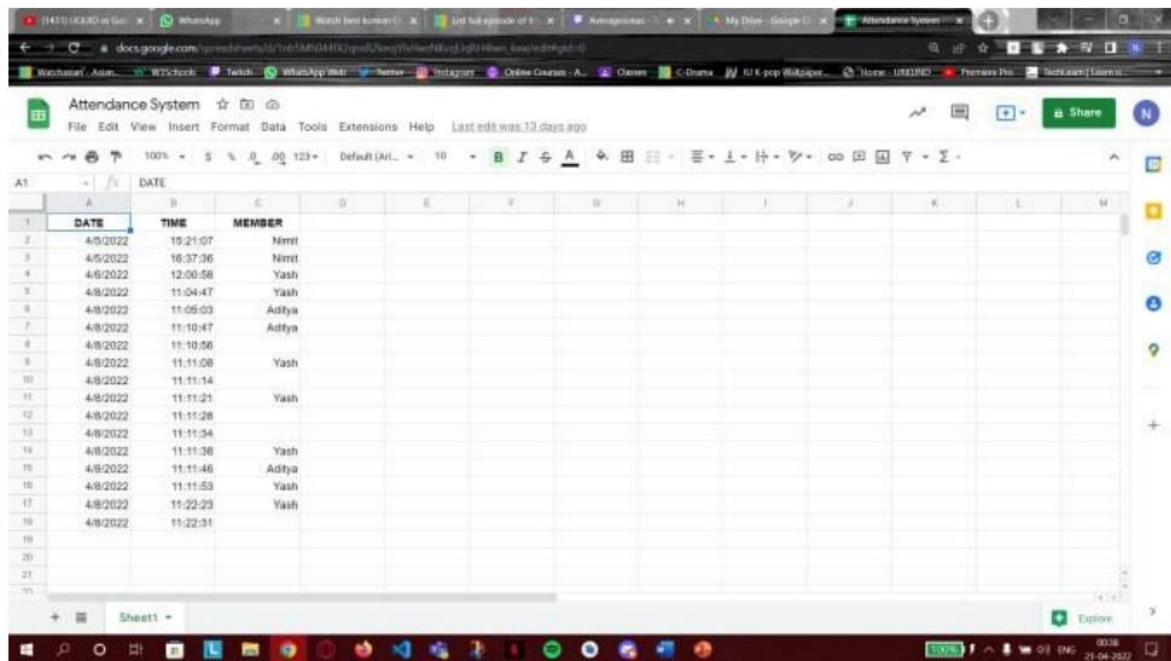
Fig:-9 Circuit Diagram

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After the necessary coding of the components, we connect the google sheets and the circuit using the google API and the system is ready to run. The code can be either coded from scratch or can be salvaged from the internet.

Fig-10:snapshot of Google sheets

GOOGLE SHEETS

Google Sheets is a web-based application that enables users to create, update and modify spreadsheets and share the data online in real time.

Google's product offers typical spreadsheet features, such as the ability to add, delete and sort rows and columns. But unlike other spreadsheet programs, Google Sheets also enables multiple geographically dispersed users to collaborate on a spreadsheet at the same time and chat through a built-in instant messaging program. Users can upload spreadsheets directly from their computers or mobile devices. The application saves every change automatically, and users can see other users' changes as they are being made.

Google Sheets is included as part of the Google Docs Editors suite of free web applications. This suite also includes Google Docs, Google Slides, Google Drawings, Google Forms, Google Sites and Google Keep.

GOOGLE APP SCRIPT:-

Google Apps Script is a rapid application development platform that makes it fast and easy to create business applications that integrate with Google Workspace. You write code in modern JavaScript and have access to built-in libraries for favorite Google Workspace applications like Gmail, Calendar, Drive, and more. There's nothing to install—we give you a code editor right in your browser, and your scripts run on Google's servers.

Apps Script is versatile. Among other things, you can:

- Add custom menus, dialogs, and sidebars to Google Docs, Sheets, and Forms.
- Write custom functions and macros for Google Sheets.
- Publish web apps — either standalone or embedded in Google Sites.
- Interact with other Google services, including AdSense, Analytics, Calendar, Drive, Gmail, and Maps.
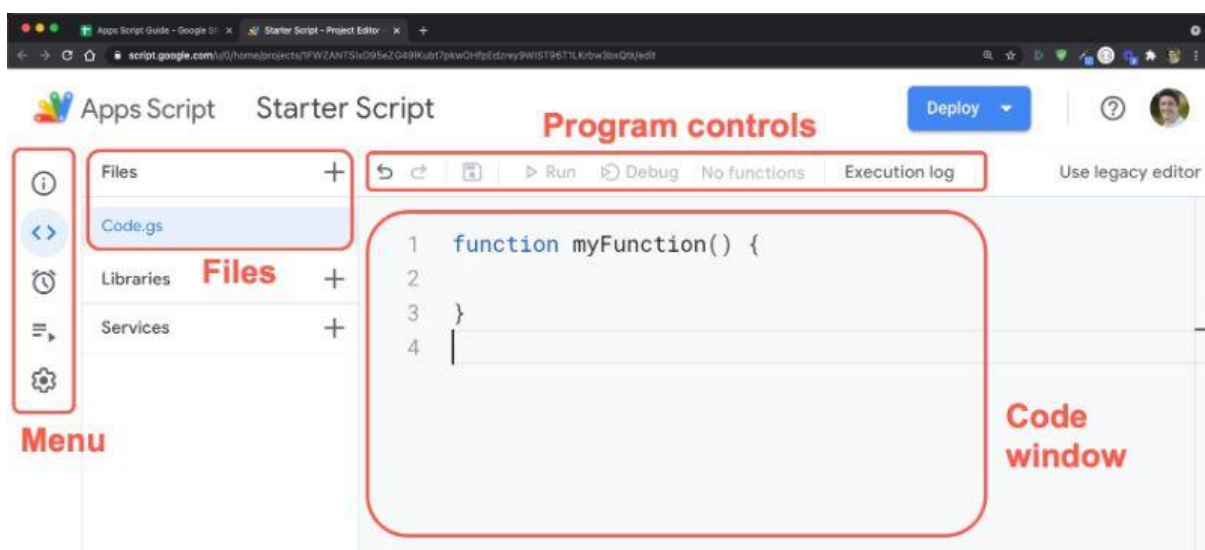- Build add-ons and publish them to the Google Workspace Marketplace.

Fig-11:-Google app Script

WORKING OF PROJECT

The Attendance system mainly consists of 4 hardware components, ESP32 is the brain or microcontroller of the system. RC522 is an MFRC522 based RFID Reader Module. RC522 is a highly integrated RFID card reader which works on Non-Contact 13.56MHz Communication, and it is designed by NXP as low power consumption, low cost, and compact size read and write chip. The module uses a 3.3V power supply. The Reader Module is connected to the ESP32 board using SPI Communication. The system also contains 2 LEDs as indicators. All the wiring is done on the BreadBoard. The programming part of the Microcontroller is done in Arduino IDE Software using external open-source libraries. The connection or data transfer between the ESP32 and Google Spreadsheet is done using the IFTTT platform. It connects to the ESP32 board using Webhook API services with an authentication code and then the webhook establishes a connection to the specified Spreadsheet API. Hence IFTTT helps in automating the services by creating an Applet. The system is powered by a 5V USB power supply. It can also be powered using a Li-ion battery for external usage.

Initially, when the ESP32 is powered up it tries to connect to a particular WiFi network of 2.4GHz band with a predefined Username and Password. Hence the user has to set this beforehand. The Peculiarity of this system is that, to establish a connection between the system and the online server, a mobile hotspot is sufficient. When the system gets connected to the specified WiFi network, the green LED starts blinking 5 times. Otherwise, the red LED blinks 5 times. After that, when the employee swipes the RFID tag, Green LED will blink for a few seconds indicating that the data has been read and sent successfully to the spreadsheet server. Otherwise, the Green LED will blink continuously without stopping, indicating that it failed to send data to the server. Hence, WiFi or Internet connection has to be re-checked and the Attendance system has to be restarted.

When the attendance data is transmitted to the Spreadsheet server it gets stored there, then using Google Apps Script the data is manipulated. In our case, we have three columns inside a Spreadsheet. One is for storing person's name or id second one is fro entry and third one is for exit data of people individually.

CONCLUSION

RFID technology is evolving and the applications of RFID technology are vast. The proposed approach provides a method to mark the attendance of workers without physical contact and recording. Everything is automated. So the system will be helpful at tough times like this pandemic. This project is to simplify the attendance recorder system by using Radio Frequency Identification (RFID) technology and easily calculate the wages of the employees. The end-users,i.e. the workers just need to swipe their card over the RFID reader and automatically their attendance or presence will be marked. Since the system is portable and easy to carry, it can be transported anywhere. This system can shift the paradigm of monitoring everyone and helps to conserve time and effort.

Our aim is to broaden a secure, transportable and prepared to install RFID-primarily based totally attendance. The machine offers a realistic and green answer for trackingpupil attendance on a big scale. The proposed attendance tracking machine makes use of the idea of IoT to log and fetch records at the server/cloud and make it to be had for the person whenever and anywhere. For destiny work, we might also like to present get admission to college students approximately their attendance, so that it will log in and test their attendance remotely. We could combine the complete machine with a cell smartphone utility so that everyone capability is o the cell itself. Also, we would really like to combine this machine with Canvas or Blackboard the usage of XML interface.

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