IOT BASED TIMESHEET USING GOOGLE SHEETS

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Abstract-The Internet of Things is simply a plan of action that connects embedded objects to the internet in order for them to gather and allowance of data with one another. It enables devices to talk with, engage with, and learn from one another in the same manner that humans do. IoT used in all kinds of sectors like Manufacturing Industry, Agriculture Industry, Healthcare, and, Home Automation are just a few of the domains where IoT has shown to be cost-efficient and systematic in addressing fundamental problems and weaknesses. Based on the IoT model, an instance of a RFID based Smart Attendance System is developed to address the problems associated with manual attendance systems in educational institutes and companies by performing automated attendance track record generation, reporting, monitoring, and alert generation for various educational institute stakeholders. The attendance gadget is built portable so that it may be readily cycled among students to record their attendance, reducing the overall time necessary to take attendance in the class. The system has been put to the test, and the findings point to more research and study in this field.

Keywords: IoT (Internet of Things), Cloud Computing, RFID (Radio Frequency Identification), Node MCU

I. INTRODUCTION

A. Internet of Things

The internet of things (IoT) refers to ordinary objects that link to the internet, allowing us to control or receive data from them via our smartphones or computer. IoT not only helps us work smarter, live smarter, and achieve total control over our lives, but it also contributes to our overall well-being. Whatever smart IoT application you choose, you'll agree that the knowledge and convenience you get as a consequence have saved you time, money, and a lot of stress. The Internet of Things has seen steady expansion and interest as the price of computer gadgets, sensors, and the internet has decreased. At its foundation, the Internet of Things aims to solve real-world issues by providing sensing, processing, and networking capabilities to objects that would otherwise lack these capabilities. An object becomes an IoT device when these characteristics are added, allowing it to communicate with exterior devices and transfer data to the external

world, permit for smart data filtering and independent choices. As a result, IoT plays an important role in the creation of many helpful applications in sectors such as transportation, the environment, and health.

B. Cloud Computing

Cloud computing has exploded in popularity as a result of its numerous advantages. It's less expensive than on-site server installations and can deliver faster service than a traditional setup. There are several assisting platforms that can meet end-user requirements for on-demand resources.

Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS) are three alternative cloud computing paradigms (IaaS). IaaS refers to infrastructure that is available on demand, such as processors, storage, and networks. PaaS is concerned with the creation and categorization of cloud-based software applications, whereas SaaS is concerned with the direct use of cloud-based software applications without the need to download and install them on a local machine. All three models will be used in the proposed system.

C. Radio Frequency Identification (RFID)

RFID stands for radio frequency identification and data collection. To initiate a model that can be used to recognise, examine, provision, and catalogue objects, RFID uses radio frequencies and microchip technology. When detected by an RFID reader, it consists of a chip that holds specific characteristics that may be used as identification.
RFID consists of three parts: an RFID reader, an RFID tag/card, and a computer with a custom database. Depending on the type of tags/cards used, RFID allows data to be sent from the card to the reader at a distance of around 10 meters. Information is sent by radio waves, and a large number of tags may be read at the same time.

D. Problem Statement

In educational institutions and businesses, there is a casual and customary association between attendance and accomplishment throughout various grades. As a result, every educational institution or company must guarantee that all of its students/employees attend class on a regular basis and receive proper assistance from their professors. However, many institutions, particularly schools, continue to employ paper-based attendance, which has issues like as caricature, ripping, and misplacing of attendance sheets.

The most difficult component of installing an attendance monitoring system is ensuring that all approaches are current. In recent years, several technologies have been applied to construct systems to automate the attendance-taking process. Although these solutions enhance attendance dependability, they have a few disadvantages. The attendance record is stored in a drive for the institutions which limits access.

By storing attendance in the cloud, it becomes instantly accessible for other accomplishments like as disclosing, automatic attendance production, and real-time access to students and instructor.

The disadvantages and cons of the conventional system i.e; manual attendance register can be compensated through the proposed model by providing following benefits and services.

- Get rid of destroyed, lost, or stolen attendance sheets or files.
- Because the attendance device is potable, it takes less time to execute than paper attendance.
- Using Google Sheets to store student or employee attendance instead of local systems to minimize storage difficulties or infrastructure failure.

- Automatic attendance reporting to the institute's relevant authorities at a predetermined frequency on a spreadsheet.
- When a student is absent, an automatic SMS notification is issued to the parents.
- The company's employee attendance record is available in real-time on the mobile.

II.   LITERATURE REVIEW

A. Biometric based attendance system

 [10] proposes a movable fingerprint-based attendance system that collects and maintains attendance data locally on a multi-media card module coupled to the microcontroller. A low-cost and low-power cellular fingerprint attendance system may also be constructed with the aid of standard-based technology [12].

It's also feasible to utilize students' cell phones to track their attendance by utilizing the camera on the phone to recognize faces and Wi-Fi fingerprinting to determine their location [15]. Although this solution eliminates the requirement for the Institute to have an attendance device, it does require all students to have and bring their cell phones to the Institute.

Some of the perspective attendance tracking are based on a advanced approach [16,17], in which RFID is exploit to uniquely recognise a person, and subsequently face verification or voice recognition algorithms are employed for additional identification.

Although all of these systems are useful for tracking attendance, they lack the capacity to connect to other computations over the internet, which may be quite useful for institutes seeking for a cloud-based solution to decrease price and system defaults.

III.   SYSTEM DESIGN AND DEVELOPMENT

The hardware-based attendance models, along with building software to operate, save, and detailed view of attendance, are all part of the attendance system design.

A. Hardware Components

1) Node MCU

Node MCU is an open development firmware and expansion board for IoT goods that use the ESP8266. The ESP8266 cellular module is a low-cost microcontroller with WIFI functionality and a full TCP/IP stack, making IoT platform development easy. In comparison to Arduino and Raspberry Pi, Node MCU has built-in functionality for wireless networks. The Node MCU has additional RAM and 4 Mbytes of ROM. The Node MCU development board aids in the execution of prototypes that connect to a local server's database via Wi-Fi credentials. When linked to a local computer by micro USB cable, it must be configured in Arduino IDE by installing the esp8266 board and choosing the appropriate board, baud rate, and COM port. We'll need to install some software to connect the ESP8266 and the RC522 for database read and write tags.

2) RFID Module

The RFID reader and RFID tags with antenna serve as input devices. When a tag is swiped over an RFID reader, radio waves are used to read and collect data contained on the tag. As a result, RFID technology is used to decrease the time spent on manual attendance.

The RC522 RFID module is employed because it is inexpensive cost, small in size, and consumes little power. It is also portable and may be deployed anywhere it is needed. The entire system is comprised of an LF-passive RFID reader and inductively coupled RFID tags. The students must enter the classroom. As a result, passive tags are utilised since they do not include a battery and rely on the power created by the reader's magnetic field to read the tag ID.

3) OLED

A light-emitting diode made of organic materials (OLED). A light-emitting diode with an integrated electroluminescence layer that leads to light in response to an electric current is known as an integrated electroluminescent diode. This module was employed in the proposed system to aid teacher and student interaction with the attendance device. It includes confirmation, notifications, and mistakes, among other things.

4) Buzzer

A beeper is a type of auditory indicating device. The suggested system includes a buzzer to assist the teacher and students in interacting with the attendance device, which indicates that the card has been scanned and provides confirmation and notifications.

Fig-1: Model of RFID attendance system

B. System Design

The following block diagram describes the system's numerous gadgets and entities, as well as how they interact.
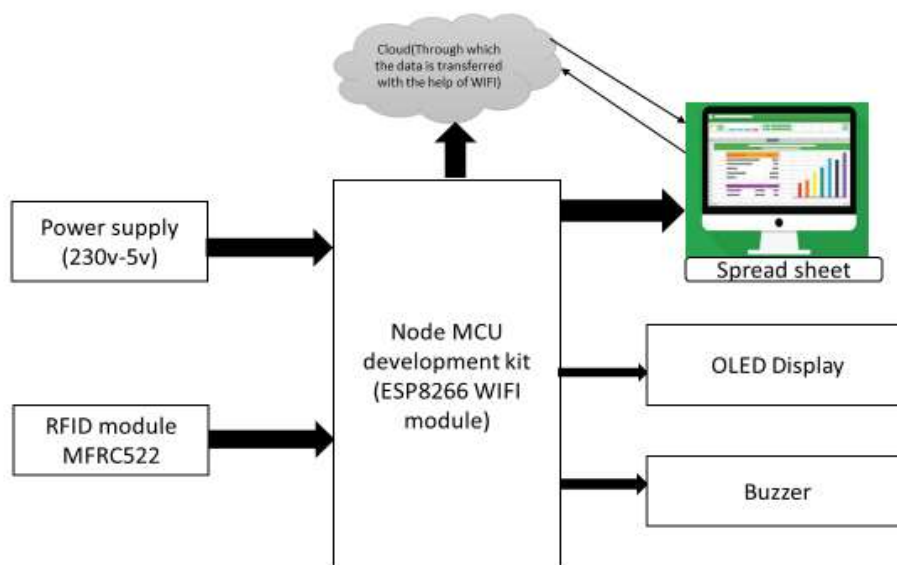

Fig-2: Block Diagram of RFID attendance system.

The heart and brain of the system is the Node MCU, which is an ESP8266 WIFI module that serves as an IoT platform. The RFID module that is interfaced with Node MCU has an RFID reader and RFID tags on the input side. In front of an RFID reader, this tag is scanned. Because the ESP8266 detects the serial number on the RFID tags, it must be configured in the Arduino IDE to allow access when both the correct and valid cards are recognized at the same time, and the LED blinks to confirm attendance. As a power supply, power circuitry is employed. Because of the step-down transformer criterion, the ESP8266 functions on 3.3V as hardware linked to the computer through a micro USB connection. Now, After the light blinks, the output side attendance is noted and shown on the institute's portal's Google spreadsheet. Graphical user interface (GUI) as shown on a computer display (local server) using the Chrome browser, with a downloaded excel sheet for faculty superior use.

C. Software Design

It is necessary to create a program that enables the transmission among all hardware tools. On the attendance device, the Lua scripting language and an event-driven based runtime are utilized to construct numerous function modules.

1) Device Functions: Here are a few software function modules:

Passkey(passkey) check function

Input: Passkey

Result: None

Function: An administrator uses this to open the attendance gadget. It compares the inputted Passkey with the Id present on the RFID card; if the comparision is successful, the scanning procedure begins; otherwise, the LED panel displays an error.

Store of functions Participation (Date, Time, student Id)

Input: Date, Time, Student ID

Result: None

Task: It is used to save attendance data to a Google spreadsheet in an indirect manner. It makes. Make a note of a confirmed student's attendance, including his Registered ID, Date, and timestamp.

1) Working

Admin swipes new student ID card over RFID reader to store and identify card's specific ID. The collected ID is subsequently entered into the database as a student's ID and assigned. After registering, students may keep track of their own attendance by swiping their ID over the scanner.

When a student's ID is swiped near the RFID reader, the system is activated. Every RFID tag of a pupil has a unique ID number, thus it obtains a unique ID. The student information is directly entered in the Google spreadsheet when the RFID card is scanned, and the student confirmation is shown on the OLED screen. Similarly, similar technology may be used in businesses to record employee timesheets on a different platform, such as Google Sheets.
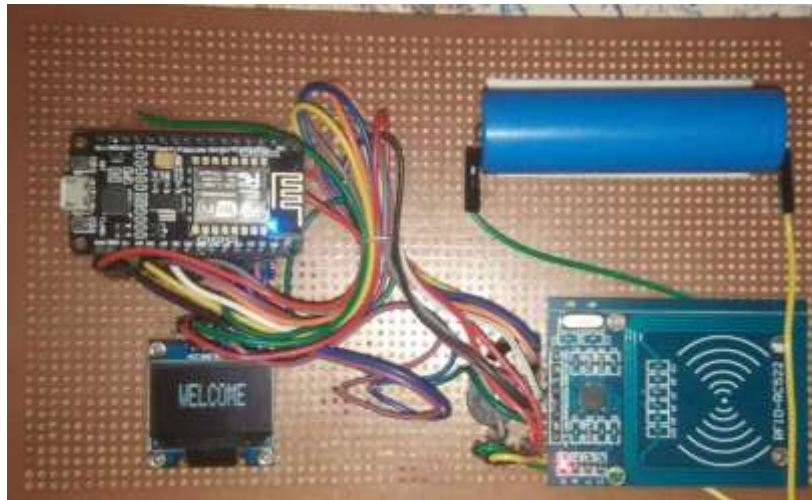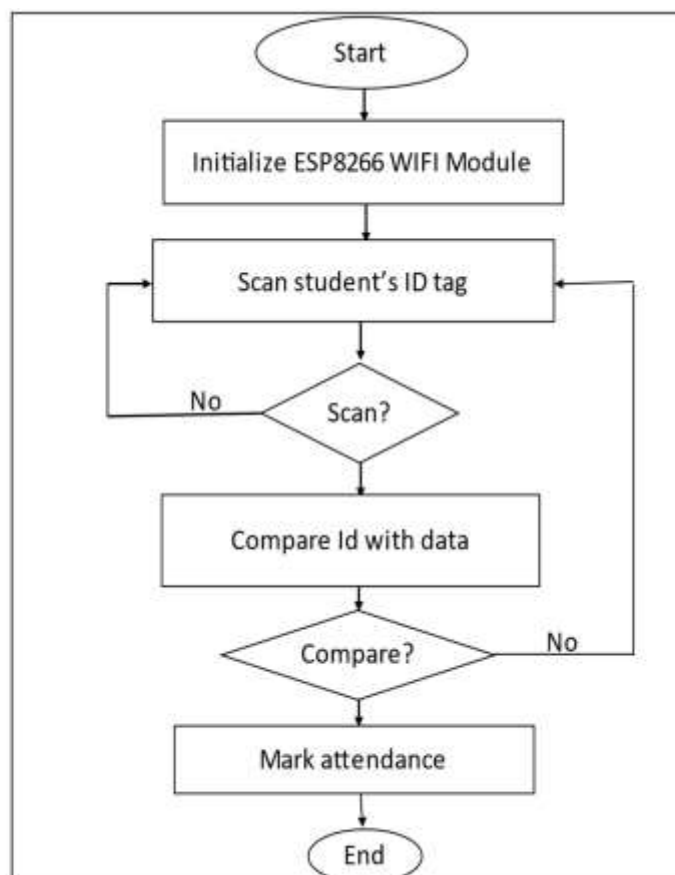

Fig-3: Working of attendance device

Fig-4: Attendance flowchart

IV.   PERFORMANCE OF THE SYSTEM AND OUTPUT

The following data represents the implemented attendance's performance by performing various kinds of operation.

Attributes	Mean Latency (ms)
RFID sensor	865
RFID card recognition	333
Storing attendance in spreadsheet after card scanning	261

Following picture shows the detailed view of attendance generated in Google spread sheet and OLED.
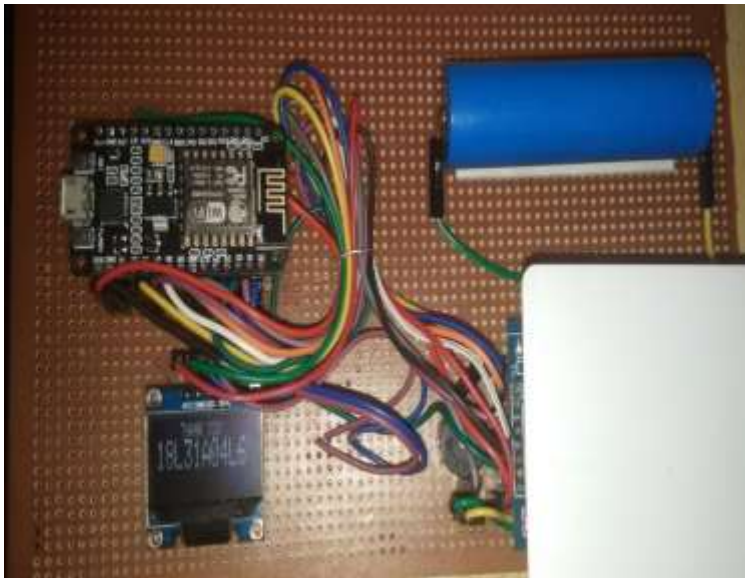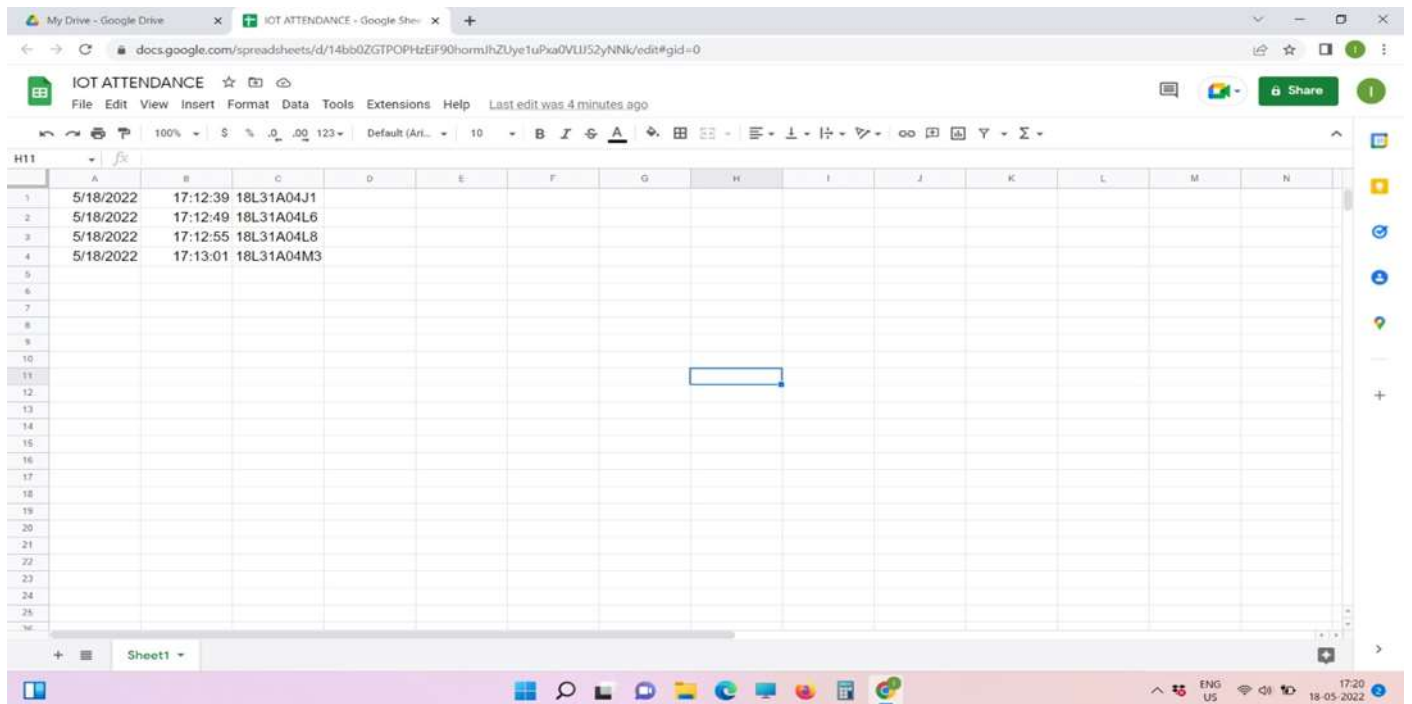

Fig-5: Output shown on OLED

Fig-6: Attendance record generated in Google spread sheet.

V. CONCLUSION

The article shows the systematic working of an end-to-end IoT system for managing the institutions and MNCs effectively. It has the potential to replace paper timesheets with more effective and dependable attendance systems. This highlights the way Internet of Things (IoT) might be used to make the attendance element smart. Since the data is saved in the spread sheet, it is easy to retrieve and use it for various purposes such as viewing, monitoring, reporting, and alerting. It simplifies the process of collecting attendance for both employees and students. Online and instantaneous access to attendance data can assist them in taking timely attendance corrective measures.

VI. FUTURE SCOPE

The suggested solution requires an active internet connection to function since it enters attendance data into a spreadsheet in real-time without sorting it on the device. A future gadget should be able to work in offline mode as well, storing data on the attendance locally when there is no internet connection and transferring it to the cloud when the device is connected. Developing a mobile app can improve things even further. A GSM modem can be used to transmit SMS for a notification alert, depending on hardware requirements. Thingspeak may be used to analyze data. The application of image processing increases RFID tag misuse authorization. Memory modem on SD card.

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