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Smart Contact-Less Attendance System

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Abstract
The advancement of technology, as well as the influence of contactless systems in our lives has been noticed across time. It has a very large impact on a variety of fields. Almost every work today is performed by a computer. Obtaining information and promptly converting it into a product that consumers desire is very relieving work and all of this is done nowadays. Since the Covid-19 outbreak , we are moving towards contactless instruments. Infrared thermometers have been used to examine individuals at airports, train stations, and other crowded places. These scans are being used to find potential Covid-19 or any other viral infectious patients. In this project, a smart contactless attendance system is made which can be used by employees of a firm or students in an institute for passing through a temperature test and without touching, register their attendance which further will

be stored in a database.

Keywords—Contact-less attendance system, RFID, Infrared Thermomete Temperature, attendance, database, PHP

I. INTRODUCTION

The global pandemic COVID-19 had a significant impact on people's health and economies all around the world. To prevent the disease from spreading further, schools, universities, small to major industrial companies, and businesses were closed. Corona virus has a significant negative influence on both economic growth and human survival rates. It is vital to make a return with sufficient safety precautions implemented by both the government and individuals in order to resuscitate the economy. We made the decision to advance safety precautions by developing a smart attendance system with a temperature monitoring feature as well.

The importance of attendance in a student's academic achievement cannot be overstated. This demonstrates the student's dedication to his or her education. Almost every university and educational institution has a tight attendance policy. To take the final test, the student must maintain the required percentage of attendance. As a result, the teacher or lecturer must keep track of attendance in each lesson. Manual attendance marking is still used in most educational institutions. It's typical to call out a student's name and indicate his or her presence. The issue with this approach is that calling each and every student takes time. Passing a student's name list on which they must sign is an alternative way that is commonly used in a classroom or laboratory, but again contact happens in this case. There have been several smart attendance marking systems created. A few of these necessitate the use of mobile applications, while others rely on biometric data. Despite the fact that we have a variety of options, new requirements continue to emerge. As a result, instead of using the standard attendance marking system, a smart attendance marking system should be used which includes contactless temperature measurement devices. The infrared temperature sensor is used by the majority of them. This gadget uses no physical contact to determine a person's temperature. The government made it essential to scan everyone before they entered a place of business, a school, or any other populated area. By preventing touch with the attendance machine, a contactless attendance system takes a step toward further prevention. RFID is used to scan the ID, which is a touch-free operation that completes quickly enough to save time. So, in this project, we have used NodeMCU, MLX90614 Infrared Thermometer, RC522 RFID Reader.

This paper consists of the review of how the project “SMART CONTACT-LESS ATTENDANCE SYSTEM”, has been made and it also contains the study of some of the models for recording attendance devised till now. At the very beginning of the paper, is the Introduction (I) in which the need of having contactless attendance system in addition to temperature measurement device is mentioned for preventory and time saving measures. Then is the Literature Review (II) section, which contains the summary of a few papers we studied related to this topic, the way they implemented the solution for this problem and the level up to which it was successful is mentioned in it. Then is the Methodology (III) section, which has the technologies and the methods we followed for designing our project. Then, the tools required for the project are also discussed in detail. Even with the help of flowchart, the overall structure of the system is explained. Detailed

working of the hardware components is also mentioned. Finally, we come to the Results and Discussion (IV) section, where the final screenshots of PHP database, serial monitor and the hardware system are attached plus final results are presented with analyzing the overall project. Even each of the screenshot is discussed in detail. Finally, after the conclusion (V) of the paper, with the Future scope (VI) of the project, explaining how the project can be extended further and can be made more user friendly. There are listed a few of the papers we referred to, in the References (VII) section.

II. LITERATURE SURVEY

Smart Contact-less Attendance System is an interesting field of work and many projects have been made and published under this topic. All of them have a different approach for implementing the attendance system with pros and cons for each of them. Here is the short description of all these papers.

Tamilselvan S, Ramesh R [1] in their project provides features such as contactless temperature monitoring, reduction in consumption of time in the attendance marking, and wide range of implementation using the MLX90614, NodeMCU and the ultrasonic sensor.
Vamsi Nandan, Archana [2] suggested a system which is built on the principles of health and layered security. Because we've combined facial recognition and thermal screening techniques and deployed them at a reasonable cost, it's accessible to everyone. This system is designed with security and health in mind, thus an alert email and SMS will be sent to the administrator.

Mahesh Patil, Shraddha Vibhute, [3] proposed a system and its test results are displayed in the discovery and acknowledgement sections. The faces that have been detected are then checked against the confront database. The accuracy of face recognition is around 90 percent. Body temperature sensing is vital in the Covid19 circumstance in terms of student safety.
Sri Madhu B.M, Kavya [4] in their paper figured out that combining RFID technology with the Internet of Things utilizing the Raspberry Pi 3 model eliminates the old method of registering attendance.

Sakshi Patel, Prateek Kumar, [5] proposed a model and designed the same. There are Python modules for OpenCV algorithms in this project. The model includes a straightforward command line tool for face recognition and has a 99.38 percent accuracy rate. It is vastly superior to generic algorithms because it only requires one image to work on and does not require the conversion of the image to grayscale. To determine the distance between points and pixels in an image, algorithms like the Haar cascade, LBPH, and Eigenface require millions of samples.
Abhishek S. Pachpor, P. M. Chawan [6] in their paper referred to their system which uses RFID and Face Recognition to represent a student's group action system. Professors could save time and money by marking students' group actions electronically. This facial recognition-based group action management system offers accurate group action information to students in a simple manner. This solution is user-friendly, simple to implement, and provides increased security. As the number of students' faces grows, the accuracy may suffer slightly.

Khushbu Gupta, Aakanksha S. Choubey [7] proposed an attendance system that demonstrates the usage of facial recognition algorithms for student attendance, and this record can be utilized in exam-related concerns in the future. The infrared thermometer is a sensor made out of a lens that directs infrared (IR) radiation onto a detector. The detector converts the energy into an electrical signal that, after being adjusted for ambient temperature change, can be shown in temperature units.

Chaudhari Sanket Kishor, Baviskar Krushnna [8] made a research on how the manual signing on the attendance sheet or fingerprint recognition based attendance is used in the majority of institutions, organizations, and hospitals.

Ho-Fai Tang, Kevin Hung [9] proposed a system which practically can be implemented. At the entrances to Hong Kong school campuses, the technology combines the tasks of non-contact body temperature measurement and logging with attendance taking. Experiments' findings demonstrate that the technology can accurately assess body temperature for screening purposes.

Afiqah Azahari, Arniyati Ahmad, Syarifah Rahayu [10] researched on this topic and its practical uses. The contactless attendance system is safe and used in all industries. According to the standard operating procedures of the Malaysian Ministries of Health (MOH) and International Trade and Industry (MITI), the system detects the temperature of employees as soon as they check in.

III. METHODOLOGY

There are two major domains in which this project is divided into. The first one in which temperature is measured and the second one in which attendance is recorded.
It is built using NodeMCU, RFID-RC522 Module, Jumper Wires, Breadboard , Arduino IDE, XAMPP server and a few additional plugins/libraries. It uses a non-contact infrared temperature sensor to detect an employee's body temperature and allows users to pass further for attendance recording.

The admin user is in charge of controlling all data records in this system, such as the student and their attendance list.

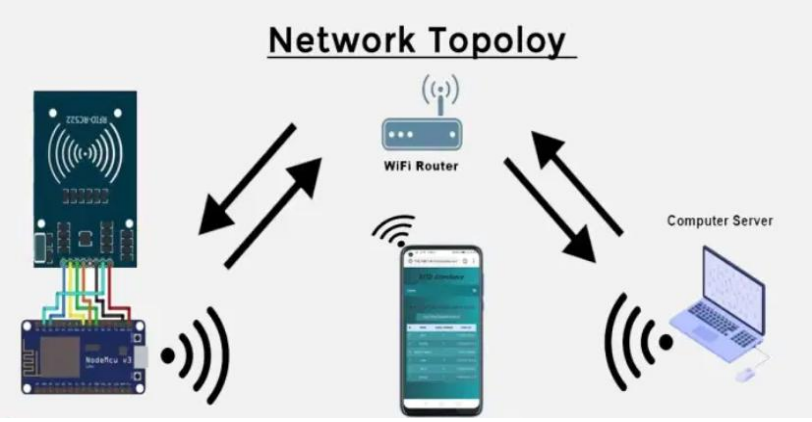

Fig 1 : Network Topology (Source : theiotprojects.com)

3.1 Hardware Components Required

- NodeMCU-ESP8266
- RFID-RC522 Module (Reader)
- RFID Tags
- Infrared Thermometer
- Jumper Wires
- Solderless breadboard

3.2 Tools & Technologies

- Arduino IDE
- XAMPP
- VS Code
- Embedded C
- PHP, HTML, CSS, JS
- MySQL
- Apache
- MFRC522 library
- ESP8266WiFi library
- WifiClient library
- SPI library
- ESP8266HTTPClient library

NodeMCU is an open source platform built on the ESP8266 that enables the connection of items and the transmission of data through Wi-Fi. Furthermore, it may be able to meet many of the project's requirements on its own by supplying some of the most crucial microcontroller functions such as PWM, ADC, GPIO, etc..

RFID (Radio Frequency Identification) modules transfer data between the card and the reader using electromagnetic fields. These tags can be attached to various objects such as keychains, cards, etc. and the RFID reader scans the tags whenever the object is placed in front of it. To complete the circuit, jumper wires and breadboard are used to connect the NodeMcu and RFID. For software requirements, we also use the Arduino IDE and the XAMPP server.

Arduino IDE - A text editor for writing code, a message box, a text console, a toolbar with standard task buttons, and a number of menus are all included in the Arduino Integrated Development Environment (IDE). It can upload and communicate with programmes and is connected to the Arduino hardware.

XAMPP stands for cross-platform, Apache, MySQL, PHP, and Perl. It is a local server that can be installed on your laptop or desktop computer to mimic a real web server. It's a free open source Apache server distribution that comes with MariaDB (previously MySQL), PHP, and Perl. XAMPP is a web server that runs on all major operating systems and is relatively easy to install and use.

3.3 Flow Diagram

Basic flowchart divides the project into two parts one for NodeMCU and RFID tag where students can mark their attendance using Tags and second PHP Web app where overall data is stored and managed for further use. So, an admin plays a crucial role for managing this system.

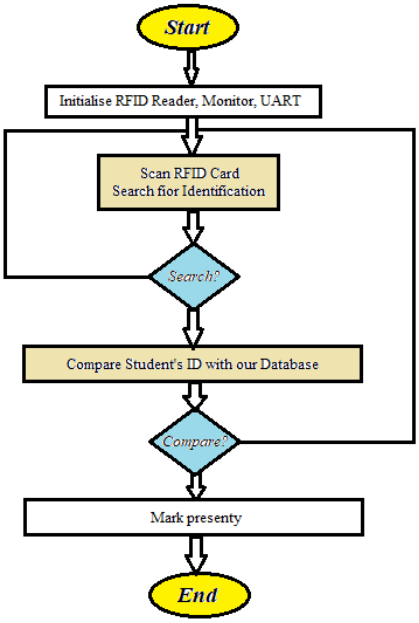

Fig 2 : Flow Diagram for Project

3.4 Working

Firstly, Jumper wires are used for connecting RFID RC522 to NodeMcu ESP8266 Module.

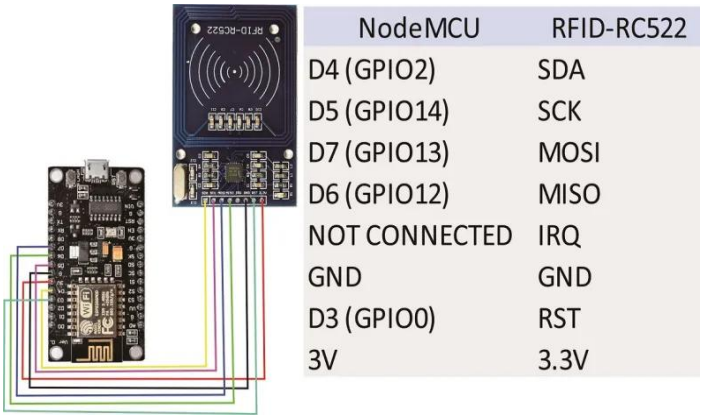

Fig 3 : Common connections for NodeMCU and RC522 (Source : miliohm.com)

Then, we installed the MFRC522 library to our Arduino Libraries folder and configured the Arduino IDE for the ESP8266 board.

The following step is to install XAMPP and Deploy PHP Web App on Hosting Server.

The main page displays the admin login page. The user will not be able to consider other options unless he or she logs into the system. As a result, the system is protected. The RFID attendance based system project's design is simple in general. The main admin side functions are:

- Login/Logout feature
- Reset Password
- Update profile

Users can be managed by admin using our PHP server.

IV. RESULTS AND DISCUSSIONS

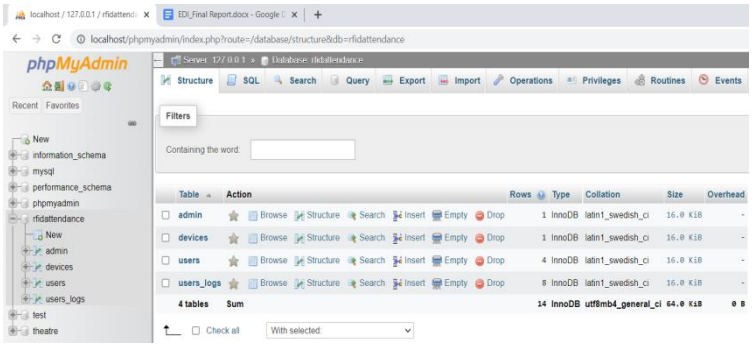

Fig 4 : Structure of whole Database

This is the structure of the whole database, which contains the above given tables.

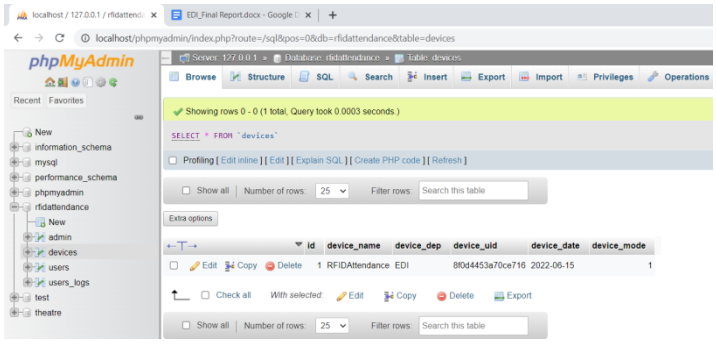

Fig 5 : Devices tab structure

This is the table which consists of the device details like identification number, device mode, name, department and date.

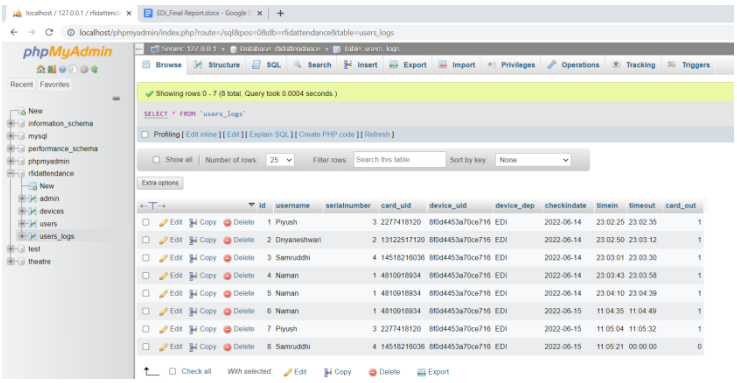

Fig 6 : User logs tab structure

This image contains the user logs, like their check-in timing and check-out timing and hence accordingly the attendance is marked stored in the database.

WEBSITE Screenshots

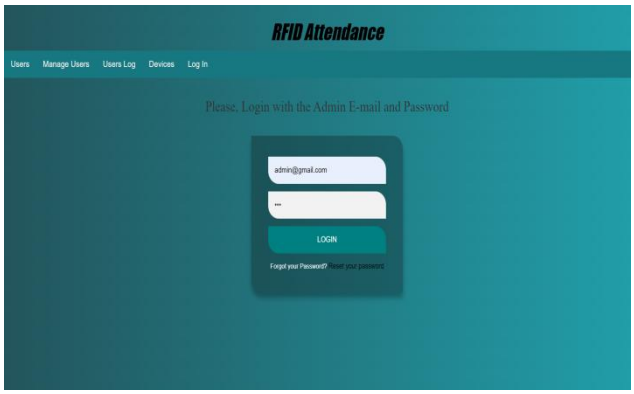

Fig 7 : Website homepage

This is the homepage of our website which is a login page/system for the administrator.

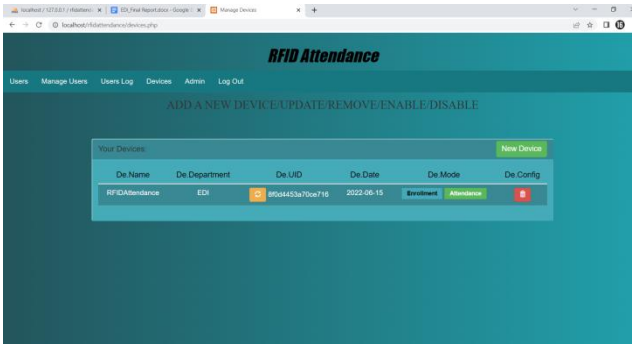

Fig 8 : Devices management page

This image shows the registered device which is currently in attendance mode.

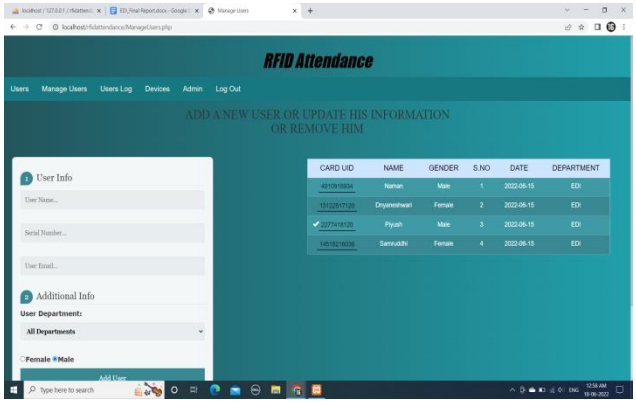

Fig 9 : User page

This shows the list of registered users with different card ID numbers.

Hardware screenshots

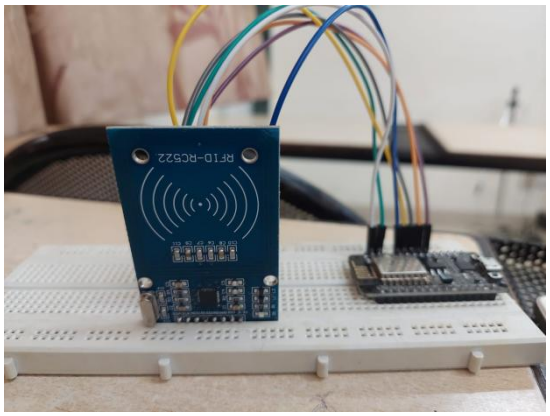

Fig 10 :RFID connections

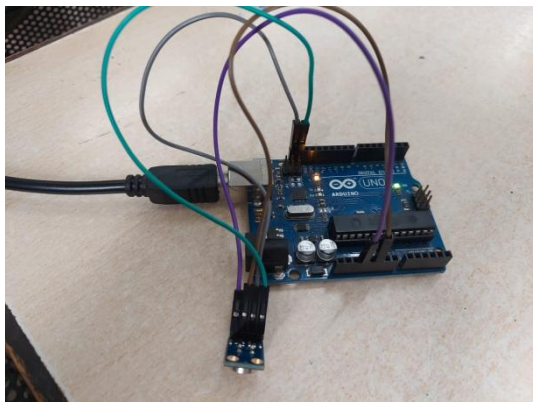

Fig 11 :Infrared Thermometer connections

V. CONCLUSION

Here, we have created an attendance system which gives students a more accessible and straightforward way to mark their attendance using contactless technology. It not only saves a lot of time but also reduces hectic work that needs to be done after taking manual attendance. This attendance tracking system demonstrates the use of contactless attendance techniques that can be used at many places including exam centers also. The student will have better access to their attendance if the attendance is posted on a website. It also minimizes the errors done by human mishandling and reduces further work.

VI. FUTURE SCOPE

Previously, attendance used to be filled manually but with the rise of technology we could move to a contactless attendance system. We could add Attendance Tracking with a Fingerprint Scanning machine or we could use a facial scanning machine to mark attendance of students. We could add an alert if the temperature of the student is higher than normal temperature to reduce further conflicts. or Voice alert, if an unknown person enters the organization.

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