IoT based E-Attendance System by using RFID

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Abstract-Radio Frequency Identification (RFID) based attendance system provides us with a solution that caters to issues like proxy attendance. This paper describes the design of an RFID based attendance monitoring system which uniquely identifies each employee/student based on their RFID tag which is attached to their ID card. This makes the mechanism of recording the attendance effortless, quicker and protected as compared to conventional method. This system is designed to be used at different educational institutions, corporate offices, government offices etc. The employees or students just need to place their RFID card or tag on the reader and their attendance will be recorded for the day. Also, the attendance recorded will be more accurate as the system is synced with a real-time clock. Radio Frequency Identification (RFID) is a new technology in communication system which can be define as a medium used to identify and track the special tag implanted into an object or a living thing by using radio frequency wave. It is a wireless mean of communication that use electromagnetic and electrostatic coupling in radio frequency portion of the spectrum to communicate between reader and tag through a variety of modulation and encoding scheme. From that, by integrating various components which are RFID reader, RFID card, microcontroller and Secure Digital Card (SD Card), a portable RFID based attendance system can be set up and become the solutions to address this problem. Uniquely identify each person based unfed tag is one of its special ability that can make the recording attendance process become faster and easier compared to conventional method.

I.INTRODUCTION

One of the factors that support the success of the learning system is the presence of students, because if students are often absent then the material they received becomes less and can't understand the material that has been taught, one that causes the absence of students is they ditch, so the attendance monitoring system becomes very important because with this process the attendance of students can be monitored properly. It becomes easier, fast and accurate. So that all parties who need information such as lecturers, parents, and energy the administration can immediately find out if there are students who skip classroom, it can immediately be prevented so that the next meeting does not ditch again. In recent years, RFID technology has been widely used in various sectors, such as in-education, transportation, agriculture, animal husbandry, store sales and other sectors [1-4]. For demonstrating the results, the system is built using RFID card reader module of the model RC522 RFID card reader and RFID cards/tags. The RFID system consists of RFID tag/card and RFID reader. The tag/card has a unique ID which is initially stored in the database before assigning it to the user. The user has to place the tag at a specific distance from the RFID reader so as to log the attendance. The tag consists of a microchip that helps to store unique sequence number that is useful in identifying objects. The microchip includes micro circuitry and an embedded silicon chip. The tag has a rewritable and permanent memory which can be repeatedly programmed by multiple times. The RFID reader is the most fundamental part of the RFID system. The RFID reader used in detection has a maximum range of around 5cm above the reader and operates at frequency of 125 kHz and 12V power supply. RFID tag/card is used to exchange data with the RFID reader using the radio waves where the tag is made up of the antenna which receives the radio waves and the other component is an integrated circuit which is mainly to process and store the data with this monitoring system if there are students who are not present can be immediately discovered and can be taken immediate action. Attendance in many organizations, colleges and schools are paper-based attendance system [1-6]. The RFID reader is the most fundamental part of the RFID system. If any cheating is done by any one of the students their RFID card will be locked because thievery individual students should be very clear while putting the attendance if any one done mistake while tapping by answering the question the card will be blocked to a particular students. This type of simple system where scanning of the tag towards the reader makes the work quite easier and improves the rate of error. It is cut short to a single move. The smart attendance management system removes the traditional way of registering the attendance. It also provides a secure, error-free method of attendance management.

II. OBJECTIVE

- ✓ TodesignandbuildaportableRFIDreaderwithdatastorageforthepurposeofrecordingstudentsattendance.
- ✓ To enable the communication between Node CU and a computer via serial port Universal Asynchronous Receiver/Transmitter(UART)
- ✓ To design and build a portable RFID reader with security locking system by avoiding the cheating and malpractices by an individual students.
- ✓ TobuildadevicethatcanbeimplementedinUTPinordertoimprovemanagementsystemespeciallyin recording student's attendance.

III. PROBLEM STATEMENT

University Technology PETRONAS (UTP) is one of educational institution that use manual method in recording the attendance which is by writing name on paper. Basically, recording of student attendance can be tedious and time consuming if done manually, especially for large classes. There are a few latest technology that also involve in recording students E-attendance such as bar code system and fingerprint system but all of them are very high maintenance and costly. If a portable computer assisted system with afford able cost issued, data can be recorded and stored accurately, so that time consuming problem can be avoided. The data can be monitored and stored in the cloud it should be erased at a particular time even a month or a week. By introducing an RFID the attendance data sheet should be hand over to the staff's by twice a week or month with the help of Internet of Things.

IV. LITERATURE REVIEW

Zhang Yuri, Chen Delong and Tan Lipping (2014) are proposed the "Research and Application of College Student Attendance System based on RFID Technology". Combined with the actual situation of college student's class attendance system, the design of student attendance system nodes based on RFID has be proposed. In this paper, the hardware node of system and the develop processes of related application have been detailed presentation. The designed system not only can improve the work efficiency, but also can save human and material resources.

Singh Aarti and Malhotra Manish (2012) are proposed "Cloud computing promises a more cost effective enabling technology to outsource storage and computations". Existing approaches for secure outsourcing of data and arbitrary computations are either based on a single tamper-proof hardware, or based on recently proposed fully holomorphic encryption.

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V. EXISTING SYSTEM

Biometric system that reads finger prints to monitor attendance in an institution, but these systems aren't efficient and safe considering the post covid pandemic. There are also several projects and existing models that uses barcode for this attendance tracking. Smartphones can also be used for this purpose but, it seems there are chances to make fraudulent access in the system. Many types of the research proposed video and image based automated monitoring where it's not economically feasible and depend on location of the camera, the posture of the student and sometime it may fail when there are two or more students with similar facial features [18].

VI. PROPOSED SYSTEM

This figure 1.1 shows that, the Wi-Fi module Node MCU ESP8266 and a GSM module. By enabling GPS module connection with the controller, the location of the RFID card which gets read by the reader and send location to the database. A Passive RFID card is read by the RFID reader and the data is sent to the database and software application for further data processing. The Wi-Fi module Node MCU ESP8266 is selected as a primary data transmission method. The data is transferred to the Google Server Cloud. The student database is designed in such a way that the parallel attendance reader system can be used for attendance monitoring at the different entrance of an institution and never produce any redundant data in the cloud storage. This enables data collection, aggregation and processing faster [6-15]. The system can send a notification to the

professor with just a click of a button. Maintaining the attendance of the students in an institution is a hefty task. Always there is a difficulty in handling attendance manually. This project aims at designing a smart attendance system that automatically monitors and manages attendance of the students in an institution efficiently. The whole system is developed with a Node MCU microcontroller and RFID readers. Unique RFID tags can be deployed in student's ID card. Also, Wi-Fi communication modules are used to make convenient communication depend on the availability of the network. Database of students must be created. A GSM Module is used to send messages to parent's mobile about the student's attendance status. A GPS module is used to detect the live location of the student. This system will reduce a lot of manual work of teachers and administrators of any institution. The proposed work comprises of two most popular trend in technology research, IOT and RFID [11].

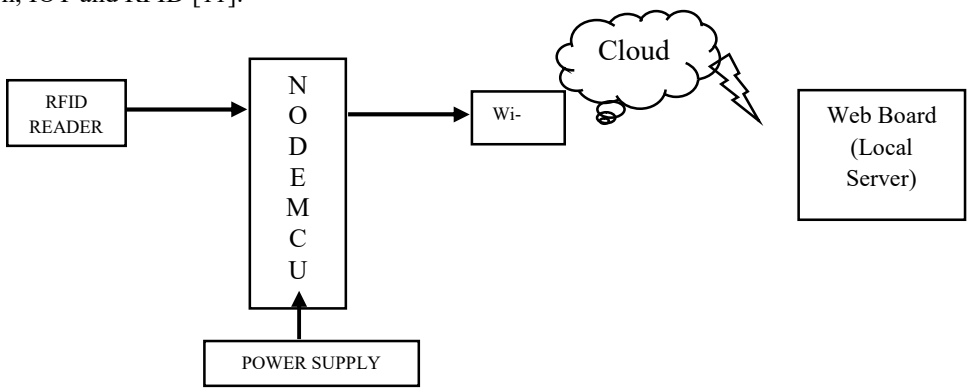


Figure 1.1 Block diagram

VII. RFID READER MODULE

ThemainfunctionofRFIDreadermoduleistoreadthedatainstalledinsidethe card. It's working flow started by sending a command from Node cu (ESP826612e) to the reader module together with authorization key where UART interface is used as a medium. The rest, ''card error'' will display at the serial monitor.

7.1.2 LCD Display Interface

In this project, if the authorized RFID card was swiped, LCD display will shows the identification number and student 's name with date and time whereas "CARDERROR will shows when the system unable to detect the card. For the case of unauthorized card the system shows "UNKNOWNCARD" on the LCD display [13].

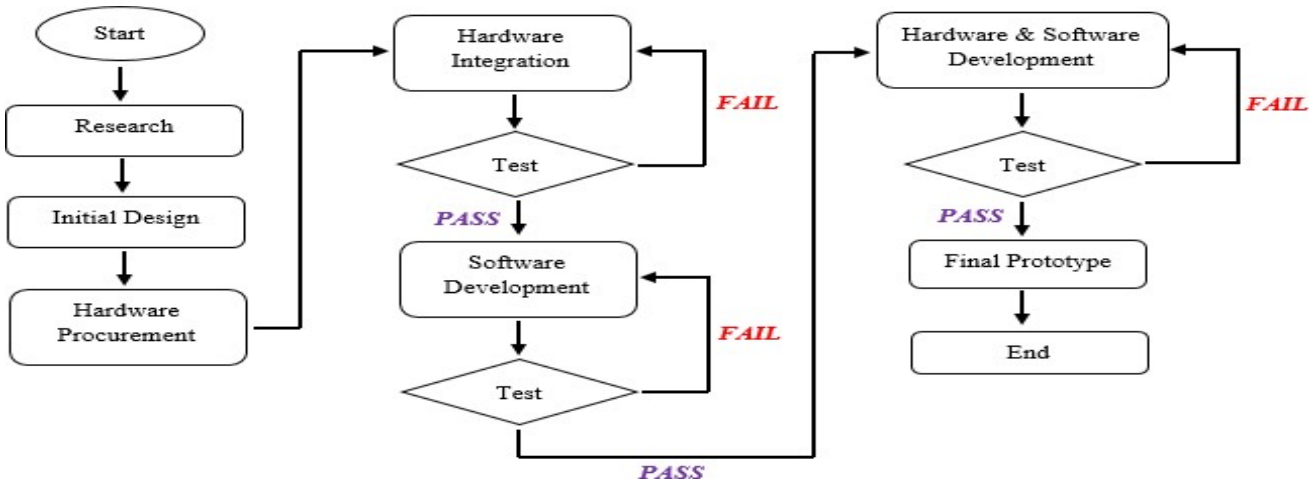
7*.1.3 Micro SD Card Interface*

A 1GB Micro SD Card is used as a storage part which is connected together with micro controller through SPI protocol powered by 3.3v power supply. Its format isFAT32 file system and this routine implemented on the microcontroller. Due to the different power supply required for Micro SD card and micro controller voltage divider network inserted between them. Besides, in text file called database.txt and templog.txt.

7.1.4 Real-Time clock

The DS3231 serial real-time clock (RTC) is a module that provide I2C interface with standard and fast integration. Furthermore, this RTC not only for the time saver but it also stored the years, months, weeks, and days.. It provide AM/PM indicator with format used either 24-hour.

7.2 Project Flow



A specific approach of executing is required in this project like any other software hardware integrated project. This approach emphasizes on step-by-step development by finishing one step before advancing to the other until it reaches the final stages of prototyping. In this phase, the project title had confirmed and then specify the problem statement work will be done. The problem statement for this project is 'How to create a device that used RFID system to record student attendance efficiently? 'After done the specifying problem statement, research on the theory and concept from any trusted sources will be made. Deeper understanding is very important to make sure the project follow all the basic theory [17-23].There are several designs had listed down such acrid attendance design stick at the wall, RFID attendance design using Bluetooth and many more. Then, the final design had decide which is portable RFID attendance design that can store data and using USB as a medium in transferring data to personal computer. In this phase, the list of components used had finalized. Then, all the components will be bought from the manufacturer. Hardware Integration can be divided into four part which are integration between Node cu with RFID shield with Micro SD card shield, Node cu with USB shield and combination three of them. Each part of the hardware integration need to be completed with the presence of software development that also called as coding part. Hardware and Software. This is the crucial part in this project where authored to combine all the modules become one device and also adjusting coding simultaneously. In the same time, testing and troubleshooting work must be done repeatedly. After the combined module integration completed, a marketable prototype will be setting up in the form of permanent circuit board. Figure 1.2 shows that project flow [10-16].

VII. RESULT & DISCUSSION

Using the concept of IOT Based Attendance system this system is capable of taking the attendance and recording it on server in real time. Server is capable of calculating the attendance percentage and storing it. Any student can check their attendance in real time via an android application. Even teachers can provide assignments on the same application and students can check their assignments. The simulation work of this project is done with embedded C to make sure that the logical works in a proper way and brings the correct output the program for the Node MCU was implemented using Arduino ide software. Finally, the prototype is developed and set up to transfer instance RFID readings to a webserver via the Internet. The data can be viewed in the server using login id and password. When the RFID tag is placed on the RFID Reader the data is read by the reader and transferred to the Node M CU. The RFID tag has unique information and details. The GPS module is used to get the real time location of the student and it is displayed in the web page. The data read is transferred to cloud using Node MCU. Also the SMS is sent to the parent's mobile using a GSM module. The administrator can check the attendance details of students by logging into the server using a password and a user name.

VIII. CONCLUSION

Therearesevеralrecommendationstobemaderegardingthisproject.Recommendation are not meant to be used to change this project wholly, but to allow improvements in certain aspects and to put some factor into

consideration. One of the recommendations for future plan is to develop the design of the prototype become smaller and lighter so that the prototype can be commercialized. On the other hand, the system is recommended to improvise in the uploading the data directly to the personal computer. A through research is needed to be made in order to make it successful. Through the proposed IOT based smart attendance system using RFID the existing manual system of registering the attendance can be transformed into an efficient and error-free attendance management system. The proposed system will be of great help in schools, colleges and any organizations to monitor their students or employees. Although there are different methods of managing the student's or employee's attendance, the proposed system is easy to handle and very convenient for any organization. The proposed system is time-saving, user-friendly and reliable to use.

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