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Mess Management using NFC Tags

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ABSTRACT–A mess system is a system that is used to monitor the entry of a specific person and is applied in schools and universities. The traditional way of taking attendance has a disadvantage which is the data from the attendance record cannot be reused and the student's authorization cannot be traced. An entry system based on technology such as sensors and biometrics reduces human involvement and errors. So in this project NFC based Mess system is presented. A study on NFC is also thoroughly discussed, especially from the point of view of project architecture, features, advantages and disadvantages. Overall and NFC Mess entry system increases efficiency in authorization & verification. NFC system provides more convenience and cheaper infrastructure in operation and installation costs.

Keywords –Mess Management, Authorization, bio-metrics, NFC (Near Field Communication)

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I. INTRODUCTION

There exist endless drawbacks of The Traditional Attendance system, including reusing of the data concluded after taking attendance, calculating resource consumption using the system, and many other problems are faced such as Human error as everything is manually controlled and monitored, wrongly interpreting data which is obtained with usage of unfair and corruptive means to manipulate data. There are various types of attendance systems already in working at mostly every private as well as Government institutions to monitor and record entry exit of their employees and staff. Mostly Government offices are still limited to the old punch card system of attendance or mainly manual register entry system which is of a very poor quality data, though many of the offices lately are adopting newly introduced systems like The Biometric system, which uses human

fingerprints in order to maintain authentication using extraction techniques. Such systems are very brilliant because they provide security, reliablility and an efficient method of Data Management [1].Apart from Biometric systems of Authentication many technologies like Radio Frequency Identification (RFID) system that consists of an RFID Reader, RFID Tag, LCD display and microcontroller unitsare also used these days, as they serve the same problem much efficiently [2]. RFID systems need a microcontroller to carry out its operations through Universal Synchronous, Asynchronous Receiver Transmitter (USART) [2].

We are using Near Field Communication(NFC) tags to manage the attendance and records of students from the College mess. NFC, is a wireless communication interface for the devices that equipped with in built or separately attached NFC tags [3]. The working distance for NFC Tags is about 10 centimeters and the process time is just less than 0.1s [3]. Here two modes exists which are active mode and passive mode [3]. Passive NFC devices are the ones that draw power from the fields produced by active devices, but their range is short. We have used NFC tags which will be installed in the Id cards of the mess and 1 2 this will help to control the unauthorized person to enter the mess and also only one meal per Id card for a particular meal.

The principle technology used in NFC is known as Radio Frequency Identification (RFID), which works mainly on electro-magnetic induction between a transmitter and receiver to transfer information [3]

Such attendance systems based on NFC tag is a whole new revolution in comparison to the traditional methods of Attendance recording. Every aspect of human error, cost management, and maintaining the record show the NFC method to be the best when compared to other means [4].

NFC technology provides a very fast establishment of the connection and as the range in NFC is very short, which has its own use case as now the user can only be authenticated if he/she actually comes very close to the receiver end [5]. Currently, the NFC technology is limited to NFC Data Exchange Format (NDEF), which is a message format for every other message that is transferred. Such formats are used as it is very lightweight for the system to process

NFC tags are a type of passive device that utilizes the proximity of an active NFC device, such as a smartphone, to power on. These tags can come in various forms, like stickers, credit cards or wristbands. In the context of web NFC, the NDEF Reader object acts as a gateway for preparing and executing operations related to reading and writing data on NDEF tags. The NDEF Reader object is utilized for interacting with NDEF tags that are within range, such as reading or writing data.

An NDEF-enabled NFC tag is similar to a post-it note as it can be read by anyone, and if it is not marked as read-only, it can also be written on by anyone. Such tags contain one NDEF message that holds one or more NDEF records, which are binary structures that holds a data payload and associated type information. Web NFC is compatible with many standard recording formats including Url, smart poster, local and Text format.

II. PREVIOUS WORK

The biometric system, as it is highly expensive but yet super secure [6]. But may researcher have already passed there researched to future generations that mention the sheer comparison between all the methods.

Kadry and Smaili, developed a iris recognition method to take attendance, which took attendance using algorithms to firstly, capture the image of the iris and convert it to a digital image format. Secondly, implementation of their proprietary algorithm to detect and verify the user, and register the user. The image data was stored within the database. Later whenever the user needs to pass the authentication barrier, user has to scan his eyes on the receiver end and the algorithm will verify the user [7].

Talaviya, whereas implemented a fingerprint sensor module which works as same as the Biometric system but without the use of actual need of regular scanning the fingerprint of the user [8]. Chintalapti and Raghunadhn just like that implemented an Attendance management system using face detection algorithms [9]. In conclusion, all the RFID based attendance systems are very costly and requires mandatory infrastructure [10]

The concept is based somewhat on the brute force way of authorizing whether the person is the legitimate person to eat the food in mess. The usual way is to see the identification cards of the students and let them go in, but this way of authorization leads to duplicity and redundancy as more than one student could enter the mess using one identity card.

NFC, or Near-Field Communication, is a technology that enables electronic devices to communicate with one another over short distances. It utilizes RFID technology, which allows for the communication and control of passive electronic tags using radio waves. One of the unique features of NFC is its use of Electromagnetic Induction to induce electric currents within passive devices, eliminating the need for a separate power supply. NFC has various practical uses, such as security

measures, convenience, and transactions. One example of its application is in automated entry systems, which can increase efficiency and security in buildings by streamlining the check-in process for personnel. NFC technology has had a significant impact on various industries by making processes more efficient and secure.

III. METHODOLOGY USED AND THE DATABASE

A.PHYSICAL

It is one of the major parts of our project. It is used in Scanning and Writing NFC Tags. This part of the project is coded in JavaScript. It is only after scanning the NFC Tag, the entry of the student is made in the database. This sub-part of our project can run on any mobile device but will be fully functional if the device is NFC enabled. The purpose of creating this part is to remove the usage of a separate NFC Reader. Any NFC Tag's information can be scanned using this app. We will be putting a unique Id (Enrolment Number) corresponding to each student. After scanning the NFC tag the scanned information is verified and then passed to the database.

NFC is a wireless technology that works on 13.56 MHz and has a short range of transmission, which allows communication between the two devices approximately 10cm apart and shows a transmission speed up to 424 Kbit/s. Web NFC gives websites the ability to read and write to NFC tags when they are nearby proximity to the user's device (typically 5-10 cm, 2-4 inches). Current range is limited to NFC Data Exchange Format (NDEF), a lightweight binary message format that works across multiple modes tag formats.

ADMIN PANEL

The admin panel is designed to be used by the Mess In charge. It is linked to the database.Adding the student option contains a form containing fields such as name, enrolment number, and Year. When the form is submitted, the details are added to the database. Viewing student details show the Name, Enrolment number, and Academic year of the already registered and entered student in the database. Meal information of each student shows the details of the meals the student had by now in this month.

INTERNET OF THINGS

Internet of Things(IoT) is basically a non-physical network establishment between two devices via Internet or Bluetooth. These two devices mentioned could be anything compatible with internet, embedded sensors and numerous other technologies. IoT can nowadays be found just anywhere, including Home appliances like TV, Kitchen, bathrooms, Housing Lights. Iot has a very vast Industrial Usage, when talk about the communication industry and Wireless technologies IoT plays a very mandatory role.

We have used NFC tags to manage the entry and exit of people from the mess. NFC stands for Near Field Communication, which is short-range high-frequency wireless communication technology that enables the exchange of data between devices at a distance of approx. 10 cm. Electromagnetic fields can be used to transmit data or induce electrical currents in a receiver apparatus. Passive NFC devices draw power from fields produced by active devices but range is short. We have used NFC tags which will be installed on mess ID cards and this will help prevent unauthorized person to enter the mess and also only one meal per ID card for a specific meal.

B. DATABASE

The Database used in the project is MongoDB, which is a cross platform, document oriented database. It uses JSON-like documents and is classified under the category of NO-SQL databases. MongoDB provides a very user friendly services with a built –in architecture.

IV. RESULT ANALYSIS.

The problem statement stated above is solved and successfully implemented. The screenshots of the active project are attached below. The direct comparison between the traditionalBiometric method and NFC method has been listed in table 1. Table 2 shows a comparative summary for RFID and NFC techniques.Table 3 lists various parameters tested on the model presented here. NFC is hence concluded to be a more efficient and cost-friendly way to optimize authentication and keep a count on students as well as Mess System management.

V. CONCLUSION

The system is completely developed that fulfills the objective to restrict the entry of unauthorized persons into the mess and keep a record of the meals eaten by the student's/ mess members. This system can also help the mess to keep track of student's/ mess members. The admin of mess can assign every member with Id cards enabled with the NFC tags which contain the unique id of student/ mess members. The persons can enter the mess only with these Id cards as there will be a scanner at the gate to scan the cards.

VI. FUTURE SCOPE

The project has a very vast scope in the future such: In / Out time will be monitored to see how much time a person spends inside the mess. Automatic Gate will be amalgamated with the software to restrict an unauthorized person from entering.

TABLE I. COMPARISON OF DIFFERENT TRADITIONAL METHODS AND NFC TECHNIQUE

Attendance Systems	Able to take Student Attendance	Reuse Data	Prevent Human Errors	Cost
Traditional	Yes	No	No	Low
Biometric	Yes	Yes	Yes	High
Barcode	Yes	Yes	No	Low
Smart Cards	Yes	Yes	No	Low
RFID	Yes	Yes	No	Low
NFC	Yes	Yes	Yes	Low

TABLE II. COMPARISON BETWEEN RFID AND NFC

Properties	RFID	NFC
Hardware required	RFID Readers and Tags needed	Smartphones with built-in NFC tag
Setup	Hard	Easier
Application	Good	Excellent
Cost	High	Low
Recording and Monitoring	Excellent	Excellent
Security	Highly Secure	Less secure as compared

TABLE III. VARIOUS PARAMETERS TESTED ON PROPOSED MODEL

User	Function	Description	Working
	Select User type	Select the user based on their type	YES
Lecturer	Login	Login ID and Password	YES
	HomePage	Display option for Lecturer	YES
	Create attendance sheet	Select the course, Time, and date to create a new attendance sheet	YES
	Take attendance	Able to manually take attendance or read student's NFC tag	YES
	Proceed to take attendance on the current sheet	Continue to take attendance without creating a new sheet	YES
	Generate report	display a list of students who are attending the course	YES
	View particular student attendance report	Click on the student in the report to view a detailed report	YES
	Filter attendance by date	Display the list of students present in the class	NO
Student	Login with NFC tag	Scan NFC tag to veiw report	YES
	View personal attendance	Display attendance of the student	YES
	View date and time of Class, attendance and absence	Click on the attribute to view Date and Time	YES

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