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IOT BASED STUDENT GATEWAY RECORD SYSTEM USING NEAR FIELD COMMUNICATION (NFC TAGS)

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Abstract: Scholar records management shapes many aspects of a university; even though it remains extensively recorded by way of hand. Whilst it's miles commonplace for a professor to pass round a signal-in sheet manually to Input in In/Out to a totally web-based application later, this results in an unreliable method, leaving many inconsistencies. With cutting-edge advances in generation, an automated In/Out recording and tracking gadget will substantially improve the efficiency and Reliability of In/Out tracking. Several different works have proposed answers using near field Communication however, many use a one-point at the start of a lecture to record In/Out. This is likely to cause bottlenecks and eat valuable time allocated to the course. A device is being applied that incorporates NFC, mobile-based services, and a utility interface for end users. This new design introduces a one-to-one approach the usage of scholar IDs with NFC tags to NFC reader placed at every classroom.

Keywords - In/Out, NFC, RFID, IoT, Mobile device.

I. INTRODUCTION

The issue of attendance registration in present-day institutions is really posing a great challenge in academic setting, because of the way the process is done and various hurdles surrounding it. The attendance is an important part of student's academic record; since in some institutions without a certain percentage student cannot sit for an examination, while in some other institutions it is part of the continuous assessment. However, the traditional way of attendance registration is time consuming and prone to cheat by some students. The process involves the lecturer passing a paper to the students in a class to write their names and sign, or find their names in the paper to sign along their names. In this situation some students may deceive the lecturer by signing attendance for their friends who are not present in the class. Another way which is more difficult and time consuming is the lecturer will be calling names from the list of the students that are enrolled into the course, and mark present for each and every student who is in the class. Imagine how many minutes it will take to register attendance in a class of like 100 students in this fashion. These are some of the challenges that call for an improvement in the attendance registration process[1].

Teachers have to put lot of effort to manage and maintain student's records such as attendance, leave, discipline, assignments, etc. An automated student management system which delivers real-time status updates of student activities help institutions to maintain the student records and manage the things in an efficient manner. Academic institutions are facing difficulty in managing the finances, track fee collections and record status of every student in library. App based administration management system can keep track of all the financial activities. App based management system considerably reduces the work load of the academic institution and help them focus and invest time on their actual goal[2].

Several technologies like Biometric, RFID, NFC, etc can be used to simplify and improve the attendance system, since user identification is the most important aspect that needs to be handled cautiously in this type of applications. In this proposed work, an app based student record system using Near Field Communication (NFC) technology. The NFC technology is now integrated into mobile devices which can be used for online payment, access control, user identification, transfer of personal and private information, etc. NFC is a new, short range, high frequency, low bandwidth, and wireless communication technology. NFC communication is activated by touching two NFC enabled devices together, or bringing them into close range. The range is usually few centimeters, and it operates at the frequency of 13.56 MHz. The maximum data transfer rate is 424kbit/s. NFC is based on Radio frequency Identification (RFID) thus its communication involves initiator and a target, the initiator actively generates a Radio Frequency (RF) field that can be used as a signal to power a passive target. The initiator (active) has its own internal power that can be used to power the ICs that generate the outgoing signal; while the target (passive) has only ICs with no internal power, which makes it to be in different forms like tags, stickers or cards [3].

1.1. **Objectives**:

- To develop mobile based student in out and record management system.
- To develop an effective NFC tag based solution for student data management.
- To develop and implement single chip for anywhere anytime.
- To develop and implement effective mobile and NFC enable system for student record.

II. LITERATURE REVIEW

This section presents a review of related literature to the study of student's attendance management system and students records; the review has been done in accordance with the research objectives which have impact of computerized data collection on maintenance of student record ,computerized information protection on student record and computerized record management in maintenance of students records in living stone international university.

Theoretical Under-pinning of the Study**:**

According to the university of Florida (2012) explained that student is an individual who is registered for a university credit course or program. A student record, also known as an educational record, obtains information directly related to a student, which means that the record is personally identifiable. Personal identifiers that relate a record to a student include student name, student id, student address, parent/family member names, and list of personal characteristics. Students records are maintained in multiple media including handwriting, print, computer's main memory, magnetic tapes, cassette, disk CD etc. Students records may be presented by student, submitted on behalf of the student, or created by the university. These records are use to assist offices in their support of basic institutional objectives and document student progress and achievement in the educational process of the university.

Computerized Record/Data Management on Maintenance of Student Record.

According to student records manual prepared by the University of South Florida the creation and maintenance of records relating to the students of an institution are essential to:

A. Managing the relationship between the institution and the student;

B. Providing support and other services facilities to the student;

C. Controlling the student's academic progress and measuring their achievements, both at institution and subsequently;

D. Providing support to the student after they leave the institution. In addition, student record contain data which the institution can aggregate and analyse to inform future strategy, planning and service provision. Educational universities and agencies are required to confirm to fair information practices. This means that person who are subjects of data systems must:

1. Be informed of the existence of such system.
2. Have identified for them what data about them are on record.
3. Be given assurances that such data are used only for intended purposes.
4. Be certain that those responsible for data systems take reasonable precautions to prevent misuse of data[4].

III. BACKGROUND AND RELATED WORK

Mobile devices are pervasive in our everyday life and have a high acceptance rate. Thus NFC enable mobile devices have the potential to be a new technology that would change the way do things, making things easier, more intuitive and more effective. NFC is a short-range wireless communication technology focused on around affirmed and full grown gauges in the field of RFID and smart cards. The RFID tag originally holds an antenna for receiving and transmitting the radio signal and an integrated circuit for processing and storing information and for modulating and demodulating the signal. The lack of affordable and regularly available mobile devices containing RFID readers, has led to the more or less prevalent absence and unattractiveness of the RFID technology. NFC is a derivative of RFID and uses the concept of magnetic induction for communication if the two NFC enabled devices lie in a close proximity.

A. RFID

RFID is a form of wireless communication uses radio waves to identify and track objects. This system has readers and tags that communicate with each other by radio frequency. An RFID System is made up of three components: Antenna, Transceiver and Transponder (the tag).

B. Magnetic Induction

In magnetic induction: A small electric current that creates a magnetic field around it is emitted by the reader. Another coil in the client device receives this field and turns it back into electrical impulses for the communication of data explains this concept. On activation of NFC, a signal is sent to the NFC chip inside the smartphone. Electricity flows through the circuitry of this chip that generates a magnetic field. At this stage, it is the smartphone that uses power to generate a magnetic field. Due to this a magnetic field is induced in the transponder or a device that does not have its own power supply. This results in the creation of radio field by the transponder that interacts with the electromagnetic field generated by the smartphone[5].

Researchers have developed the new Technology based systems for taking and maintaining students records and attendance. Some of them are shown below:

A Barcode Record System

The barcode system is a typical type of time and record system that can better estimate and track student time. The robotization with barcode innovation eliminates recent manual finance or attendance mistakes. Thus, the system accurately and reliably tracks student attendance or records. Moreover, the system's setup costs are minimal compared to the cost of financing or attendance errors. The barcode system is easy to use. Each student gets an ID/card with a barcode. The ID/card is traded on the time clock to enter or exit the grounds. Investigating quantifiable organic characteristics is called bio-metrics. Bio-metrics in computer security refers to verification methods that rely on quantifiable real qualities that may be afterwards verified[6].

B. Biometric Based Record System

Biometric-based attendance system recognize a person identity based on the biological characteristic such as fingerprint, hand geometry, voice, retina, iris and face recognition which reliably distinguishes one person from another or used to recognized the identity. They have five subsystems: data collection, signal process, matcher, storage and transmission. However, the biometric system is suitable for highly secured system and mostly the biometric system is expensive. To implement an attendance system based on iris recognition. The system takes attendance as follows ;a) a digital image of one person's eyes to be verified is captured ;b) feature extracting algorithm is carried out ;c) minutiae are extracted and stored as a template for verifying later; d) to be verified place his eye on the iris recognition sensor and e) matching algorithm is applied to match the existing record of student[7].

IV. METHODOLOGY

This section discusses the development process involved in developing the Student Gateway Record System , includes problem identification, proposed solutions and development technologies

4.1. Problem Identification

The problems were identified and summarized below:

1. Setting up and implementation costs – Most of the proposed systems require high implementation costs. RFID cards, RFID reader, thumbprint reader, etc. Thus, it is challenging especially for the university with a huge number of classrooms and halls.
2. Maintenance costs – The maintenance cost to keep the system fully operational at least five years before the system is replaced with new technology.
3. Accuracy, speed, and simplicity – Providing fast, easy, and accurate operations while consuming the least amount of valuable lecture time.
4. Flexibility and customization – The system's ability to be customized to meet the needs of individual teachers, and student attendance should be able to be stored/captured from a long distance without interfering with the teaching and learning process. This feature is essential as some faculties/universities often use large classrooms to fit more than hundreds of students.
5. Power shortage – All of the existing systems are highly depended on electricity, and there is no alternative solution in the case of an electricity outage during the attendance recording process. .
6. System security and data safety – Mitigation towards unethical registration of students being absent aka an integrity issue relating towards cheating and unhealthy

behaviour among students and Personal Identifiable Information (PII) collected from bio metrics systems which could be compromised and hacked for other usages

without owner consents.[8]

4.2. Proposed Solution

The mobile app has been proposed to overcome the challenges mentioned above. The development of this Android app does not require high setup cost and long term high maintenance costs. There is no extra card reader, capturing device, additional infrastructure, and renovation is needed. Only a NFC tag is needed for every student in campus which can replace the traditional ID Cards and costs way lesser than that. The combination of technologies has provided flexible attendance capturing, with no disturbance in lecturing execution, fees collection and pending fees status, library management and overcoming the power shortage problem. The app provides actual In/Out status of every student on just scanning the NFC tag near mobile app installed in any NFC enabled device. It shows the exact time of incoming and outgoing of the student in every lecture. Other than that, there is a library feature which enables the librarian to search the books which are available and quickly assign them to student by just NFC tag. Total fees status and pending amount of the student can be derived from accounts section on scanning the NFC tag of any student with the help of this app.

Basically, goal behind proposing this system is minimizing the complexity of student record management by introducing NFC tag which can be universally used by every department of educational institute to gather, analyse and operate the data

More efficiently. The Architecture of NFC based Student Record System is shown in Fig 4.1.

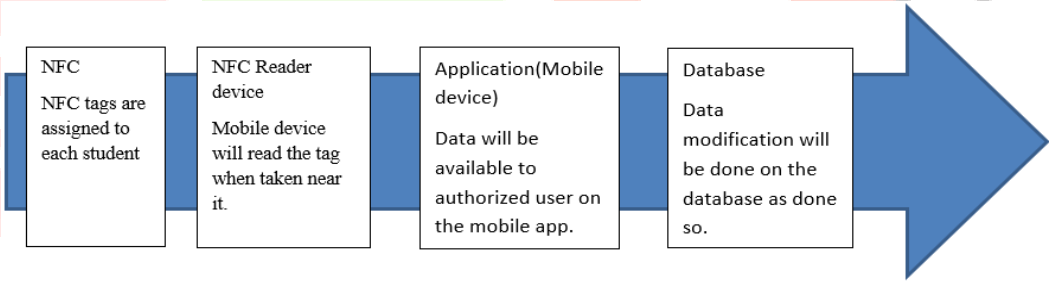

Figure 4.1 Architecture of NFC Based Student Record System

4.3. Development Technologies

The Android Studio Software Development Kit (SDK) is used to develop the Android-based mobile app. The smartphone user should have at least 1 GB of RAM, a 5MP camera(back), NFC technology, with at least 3G connection. An android application was created using the XML and java with Android Studio, and the data was saved in the MySQL database. Hence, any NFC enabled mobile device can be installed on the gates of every classroom or any teacher can just take it with himself/herself and then traverse this device in class to record the In/Out status of every student.

S/W requirement
1. JDK 8.0
2. Android Studio

H/W Requirement(minimum)
1. RAM: 8 GB
2. Processor : i3 6th Gen
3. HDD : 500 GB
4.NFC Tags : As per student strength

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VI. CONCLUSION

A smart method for Student data Management has been proposed in this paper. The greatest advantage of this method is that it combines all the aspects of the student life cycle in an educational institution on a single point reducing the complexity of data handling and operating.

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