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A Survey on Smart RFID System

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Abstract: The number of students enrolling in educational institutions is always increasing every year. As the attendance records of a student indicate the punctuality and discipline of a student, teachers use attendance in giving out final grades and so it has become necessary to device newer and better technologies for recording student attendance and maintaining records. Usually, attendance is taken using paper sheets and then the record is manually updated into a register or a system. This method is however time consuming and flawed in many ways. This paper focuses on harnessing the potential of the ever-increasing technology of into building a portable attendance system which tries to erase many of the flaws in the conventional method of taking attendance and makes the procedure more concrete and automatic. Portable devices like an enabled smart phone can be used to implement this project. In order to solve the problem that it is inconvenient to find books in the traditional library, a kind of book positioning system using RFID technology is designed to achieve fast search books in the library. The JRM2030 RFID reader module is used to locate and search books with electronic labels on the bookshelves. The system software is designed by using LABVIEW. And the book positioning system can search books by typing in the title of them, and get the distance between the tag and the reader referring to the strength of wireless signal. In this paper, the hardware and software of the system are designed in detail, and the experiment results are given. The results show that the system can quickly find the books that bookworms hid, and the books that are not timely put back on the shelves. The reader can also quickly find the books in the library. Upon testing, Web-based Laboratory Attendance System (LAS) is successfully facilitated the students' attendance and laboratory management on evaluation of student performance for experiment.

Key words: Facial Recognition, FID Tags, RFID Readers, Attendance system, Sensors, Library book index system .

1.INTRODUCTION

The most common Successful schools begin by engaging students and making sure that they will come to school regularly, so the attendance rate become very important. Attendance system is a system that is used to track the attendance of a particular person and is applied in the industries, schools, universities or working places. The attendance rate will be calculated based to the average percentage of students attending school in every class of the course. The attendance rate is important because students are more likely to succeed in academics when they attend class consistently. It's difficult for the lecturer and the class to build their skills and progress if a large number of students are frequently absent. Moreover, the students have given the right to have their own time management in university. This will cause the attendance rate of the class become a major problem because some student may choose to absent from the class. Therefore, students from university in Malaysia are required to attend the class not less than 80% per semester otherwise student will be barred from taking any examinations.

This paper described on the web-based Laboratory Attendance System (LAS) that utilize RFID and Arduino technology. LAS implementation consists of hardware and software system. The hardware system is implemented using RFID devices with Arduino UNO microcontroller board that can detect the unique ID in the student card and then print the information of the student on LCD panel of the system devices. For the software system, a web-based application is design to provide an interface for user to manage the attendance and laboratory modules such as grading, upload and download contents. The website is divided into four modules consist of Home, Admin Portal, Staff Portal and Student Portal.

There is a phenomenon in every library that it's difficult to find books. Sometimes people who borrow books can get call number in the retrieval system [1-4], but only to find that the book is not on that shelf. There are many reasons for that, including that the borrower place the book in a convenient location, or this book is being read by the other borrower, moreover, the administrator haven't returned the books to the shelf, which will bring much inconvenience to readers. Many of our current libraries use "bar code" and "magnetic" mode to manage books, and the librarian use a laser scanner affixed with a bar code on the book to scan the statistics of the book and update and input the information [5-8]. But it is difficult to locate the books. At present, the books are classified by the librarians, and then they put certain books in certain rooms, so that the borrower can go directly to the borrow room [9]. However, the number of books in one reading room is still very large, so we need to narrow the position range [10-12]. In order to solve this problem, we installed a search system in the computer, and the borrower can detect the call number and the state of the books in the system.

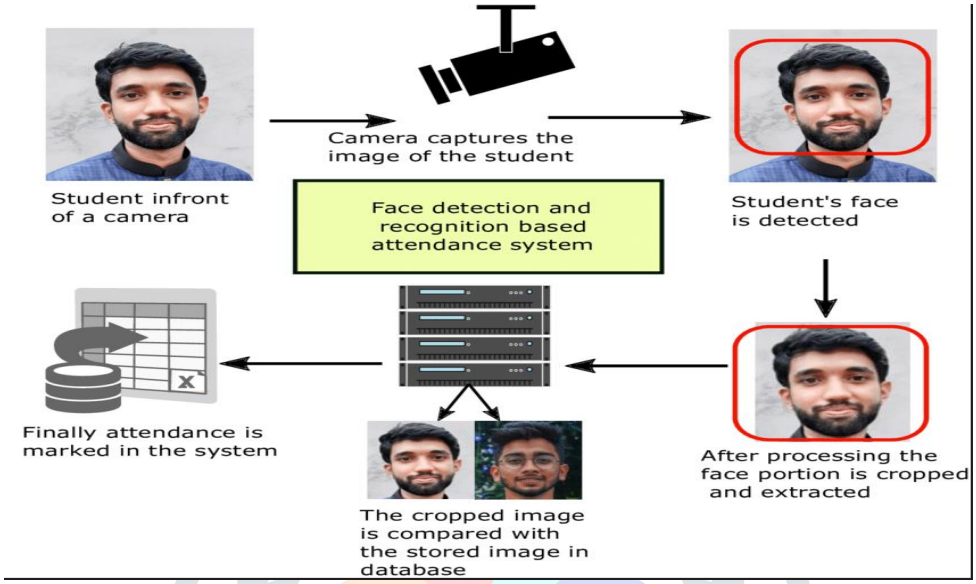

Figure 1: **System Architecture for Attendance Monitoring**

The proposed system is a solution to the above mention problem. By using this system, the student attendance is recorded by detecting the unique ID from the student card, which utilizes RFID technology . Then, the information is saved in the system database. This attendance record is automatically synchronous with the lab modules and evaluation for the grading process from the lab instructor.

2. METHODS OF DETECTION

System Architecture Enabled Student Attendance System

The proposed system in this project is a web based attendance system using technology in Android smartphones. The system has two main components which are reader unit and server unit which is hardware and software components respectively. The hardware component of reader unit are enabled Android smartphone and student materials card with NFC tag while the server unit is the computer that host web services and databases. This part of the paper consists of, how two sections that are User Interface which explains about the user interface of the project and the System interface which also explains about the System interface about how it works and how is it done.

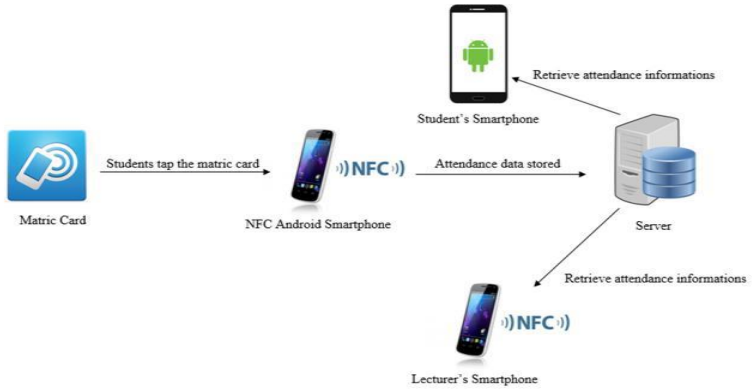

Figure2: **Existing block diagram enabled System Architecture**

The student has to tap the matric card towards the android Smartphone and automatically the attendance will stored in the server. For the lecturers to check the attendance of the student, the system will retrieve the attendance information from the server to the Lecturer's smartphones. The system also does give the information to student's as well to check for them whether the days they have attended and did not attend for their own record. In this project, the implementation strategy used is bottom-up strategy. The implementation starts from the lowest level of software unit such as view report, take attendance, generate reports and etc., which are the function within the student module and lecturer module. Then, all the lower units are linked together to form higher level units such as module, student module and lecturer module. Next, the modules were designed and implemented, followed by the subsystems and finally the complete system.

Peripheral Circuit of Radio Frequency Chip:

The radio frequency chip is JR20X0, and its interface circuit is shown in Figure 3. In Figure 3, J1 is connection port for antenna. The pin-11 is beep, which is the buzzer circuit input interface; The four capacitors are placed including energy storage and denoising between Vusb and GND. Among them, when the power suddenly increased and there is no capacitor, the voltage will get low and produce noise. noise when large capacity electric volume can be temporarily stored electrical energy is released, a stable power supply voltage; in addition, power supply circuit, in most cases, fluctuating and small capacity capacitance can be the noise bypass to and to improve the stability of the power supply voltage.

The system mainly uses the RFID technology to locate the books [13-15]. The hardware of the whole system is modularized, and the whole system is composed of the upper computer, the reader module, the antenna module and the electronic tag. The reader module comprises a controller module, a radio frequency front end and a baseband processing module. Antenna system to complete the transmission and reception of radio frequency signals between tags. Electronic label is the carrier of the information of books.

3. SURVEY PAPERS

In this section, RFID-enabled Attendance System Management presented by Meng and Mahinderjit-Singh[9] will be discussed. This project has two parts one is web page system and the others are smartphone and tablet application. After student enters or leaves the classroom by scanning RFID card lecturer could view the attendance situation of the class and the movement of different student through web page system, smartphone system and tablet system. Student could view his attendance only and movement only through web page system, smartphone system and tablet system. Besides that, lecturer or student could track the attendance history by both systems. This project is expected to provide a smart attendance system for different users to sign attendance and view situation of attendance. When the users enter the classroom or lecture hall, they have the option either to swipe their card on the reader or simply let the card detected by the reader. The card attached with RFID tag, which can be detected by the reader as long as certain range of distance between the tag and the reader is complying. Once the reader detect and obtain the information, it will be then saved to its own database automatically. In addition the lack of automated attendance system in the School of Computer Sciences especially in our lecture halls is our main motivation undesigning this prototype. Figure 3 shows the data flow of the whole system.

For web page system, Meng and Mahinderjit Singh [9] have used ASP.Net, CSS, and JavaScript through Microsoft Visual Studio 2013 to implement. The other two are Windows Phone application and Windows Surface application, in this application, we will adopt Windows Phone 8 platform to implement. The simulation algorithm, which is Monte Carlo, will be integrated as well. Monte Carlo simulation is a method for exploring the sensitivity of a complex system by varying parameters within statistical constraints.The system includes two different parts. The first part is the web page platform. The second is the ubiquitous platform. All this parts are integrated to function together. The system is able to function according to three different user roles. This roles and privileges follow the access control and authorization principles. We are following the Discretionary Access Control (DAC) model.*

The RFID tag has an embedded transmitter and receiver.Atypical RFID tag consists of two parts, an integrated circuitand an antenna. The integrate circuit is used for collecting and running information. And the function of the antenna is to receive and transmit a signal [4]. RFID tags can be of three types and they are active, passive, battery assistive passive [3]. RFID tags are equipped with non-volatile memory storage [5]. The RFID reader transmits an encoded radio signal to the RFID tag by using a two way transmitted receiver which is also known as transceiver and interrogate [1]. All the RFID tags that are available fall in three categories. They are classified according to the type of tag and reader. Those are, Passive Reader Active Tag (PRAT), Active Reader Passive Tag (ARPT) and Active Reader Active Tag (ARAT) [2]. We have used the second one for our proposed model.

The Facial Recognition is done using OpenCV library and running the respective codes on Python [14]. We have used OpenCV 2.4.0 and Python 2.7.13 specifically for this particular project, and the latter versions would need to have the codes changed [11]. In our project, we use Haar-like feature detection algorithm to detect faces. Even though single strong classifier can detect most facial features correctly, it still has considerable high false positive rates; hence we apply the cascading method [13]. Using cascade classifiers, our program scans every sub-window of the input feed image and classifies them as face, or non-face [14]. Majority of the non-face features is eliminated in the first few stages of cascading process, and then lets the program focus on the relevant face window. This method is very efficient since it is executed very fast and precisely.

System software includes database program, human-computer interaction interface and serial communication program, data receiving and processing program, etc. Among them, the database module is the core of the host computer software, storing the information of all books. Users access to books and administrators to increase the number of books, are achieved through the database. This paper uses office access to create the database, the book contains the call number, title, author, publication date and other information. Programming can achieve the database data to be read and change. Serial communication program to achieve the upper position machine and the lower position machine data communication, host computer through the serial port communication sends commands to the lower machine, the client to send the book data information to the host computer, the design of the answer pattern for reliable communication.

4. CONCLUSION

sensors based attendance system is presented. Two technologies, mainly the and RFID are used. Architectures and functionality of both technologies are discussed in depth. Benchmarking between these two technologies with other types of attendance systems are also given. Overall, a brief discussion on the security related to both and RFID is demonstrated. In the future, further work in adding functionality in term of security on the based attendance system will be done. sensors based attendance system is presented. Two technologies, mainly the and RFID are used. Architectures and functionality of both technologies are discussed in depth. Benchmarking between these two technologies with other types of attendance systems are also given. Overall, a brief discussion on the security related to both and RFID is demonstrated. In the future, further work in adding functionality in term of security on the -based attendance system will be done. In addition, the merges between biometrics identifiers such as facial features and sensors features such as and RFID will also be implemented. This new technology, based attendance system is projected to provide some beneficial to the current generation Y students in universities. The main contribution with such move is to completely utilized the smartphone capabilities to maximum and to take advantage with the current smartphone phenomena among young users. We propose a model to replace the smart phones and use the web based platforms for the complete system.

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