브라우저/서버 기술 바탕의 효율적인 출석 시스템

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An Efficient Attendance Management System Based on Browser/Server Technique

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ABSTRACT

This paper proposes a convenient and efficient attendance system using Browser/Server(B/S) technique. The system enables the management of attendance records through the use of Hyper Text Markup Language (HTML) 5 and Radio Frequency Identification (RFID). The existing attendance systems lacks efficiency as they require students to manually sign the attendance list. As a result, students often skip lectures after signing the list causing false attendance to be recorded. Therefore, this system proposes automatic capture of student's photo with web-camera when students check their card at RFID reader. Such system provides great help to the lecturers to keep track of students' attendance records correctly.

1. INTRODUCTION

The attendance system is an important aspect to keep track of students' attendance in a lecture. However, currently existing systems lack efficiency and convenience in checking attendance. Hence, we propose an efficient attendance management system based on B/S technique. Using RFID and capturing image at the same time in the attendance system has improved the effectiveness and performance of attendance checking. This design is different from [1] which only used RFID. Whereas the proposed system adapts ASP.NET framework in designing the system and implemented an automatic image capturing through the use of the canvas feature in HTML5. The system is also compatible with different browsers such as Firefox, Chrome and Internet Explorer [2]. Such system enables lecturers to correctly record students' attendance as well as to import and view the records in a spreadsheet. The system also enables administrators to import and check the information about teachers, students and courses. In addition, administrators can process the request for leave through the system. When a student card is checked by the RFID reader linked to a computer through a USB interface, the camera will capture the image of the card owner automatically at the same time. Then the computer will display the captured image and store the picture on the server using Ajax [3]. Therefore, it can prevent students from faking the attendance. This attendance system replaces manual roll calls, improving the efficiency of attendance management and increasing the rate of students' attendance.

2.ARCHITECTURE OF ATTENDANCE SYSTEM

In general, institutions and organizations consider the attendance record as an important factor and it is one of the most important criteria which students and employees have to follow. Previous approach of managing the attendance records manually has become a very inconvenient task. Nowadays, the use of RFID in attendance systems implemented in various places. However, there exist problems in correctly checking the attendance. Only by implementing RFID is still inefficient to do checking, thus there exist a threat where imposters which replace others on the attendance records.

The system enables the status of students, lecturers and administrators to be determined from accessing the login page. The system consists of features such as attendance checking page, absence application form page, and access to the attendance records for lecturers and administrators in spreadsheet format. When student card is swiped, the camera will automatically capture the image of the student. The system will display the captured image of the card owner and send the image to the server. Then, the captured image is compared with

the student card existing image. Hence, the efficiency of checking the attendance increases.

The attendance management system apply the heterogeneous communication protocols in its operations. The system consists of a website, camera embedded on a computer, RFID reader and Web server. The users of different permissions can be distinguished through its privileges. However, the implementations of a camera and RFID reader must be embedded separately in personal computer (PC). Figure 1 shows the communication architecture of the system.

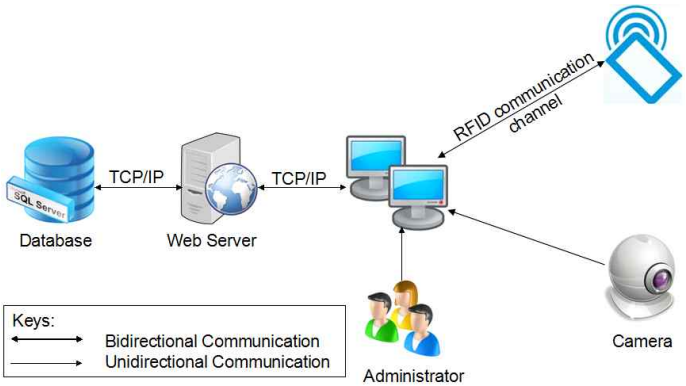

Figure 1. Communication Architecture of the System

Different from [4] where bluetooth and NFC tag has been used, 13.56 MHz RFID is used in this research because the RFID card is cheaper than NFC tag. In [5], NXP Mifare1 Card(M1 card) introduced which act as student cards which consists of the student's information. Its frequency is 13.56 MHz which belongs to the high frequency category in the frequency chart. Moreover, baud rate is 19200 Bd for capturing data from M1 card. The user identification should be captured by RFID reader within 10cm distance of range.

3.SYSTEM ANALYSIS AND DESIGN

3.1 RFID Reader

A web page cannot be called as serial communication where a serial port not exist. When the card is swiped, the data is read with the used of USB communication protocol. The RFID reader is directly connected to the PC through USB cable. This device mainly simulates the keyboard inputs to 10 bits in decimal numbers for detecting and saving the student identification numbers. When the process is completed, the TextChanged function is triggered, calling a JavaScript function to capture the image. According to [6], we have found that other attendance systems get the data of users from RFID register. Therefore, administrators should store data for every hardware. However, in this research RFID reader is used to get user id and user data that will be stored in the SQL Server database at Web server.

3.2 Features of Attendance System

We have found that an attendance system includes checking attendance, capturing images, leaving application/records, students' information management and so on. This system is developed in order to increase the conveniency of checking the attendance by lecturers and we can expect to the increase on the rate of attendance. In addition, the system is accessible on the Internet and the privileges of the users are clear. However, there exist question on how should students ask for a leave online and how to increase the rate of attendance.

3.2.1 Lecturers Page

The lecturers able to access the attendance page to do checking on the absence of student before the start of lecture. The lecturers first select course name and attendance date before calling the roll. The item searches in the roster accessed from the database. The student which has already checked on the attendance for the class, their name would be displayed in the system. Meanwhile, there is a text box which is used to display the number of attendances and the total number of student in the class. Student can also access the system by swiping the student card on the RFID reader. Then, the system display the decimal user-id of the card in a text box. At the same time, once the enter button is pressed the input state is automatically triggered from Javascript code implementation and thus the system is executed to complete its processes. If the student's information existing in roster of this class, it will update the attendance record on the SQL database. Otherwise, it will be showed a caution about "This student did not register this class!". However, whether the attendance success or not, camera will capture the image of student face and display the student photo on screen which is already exist in database. The lecturers can compare with two photos to distinguish card owner information. Lecturers can artificially compare with the attendance students. If not the holder of card checking attendance, the lecturer should change this attendance record. Through this method the authenticity of attendance records improved. This feature is different from existing attendance

systems as it enables lecturers to effectively prevent impostors from checking the attendance.

Through the use of canvas feature in HTML5, the camera is called and the images are captured. Users do not need to install a plugin at first time for calling camera on browsers due to the use of canvas feature in HTML5 [7]. Users are able to call the camera on browser conveniently. However, users will have to update their browsers version for this system due to the HTML5's compatibility issues. Then by setting a listener event, the function will call video.play() which exists in HTML5 to open web camera. When student swipes the card at RFID reader, video canvas container will capture an image and store it in the server.

After a class session has ended, the lecturers should check the record of absent students from the absence record page. Student will be able to apply for emergency leave without disturbing the lecture in session. Checking attendance records is designed to facilitate the statistics of attendance information. With the data which were stored in SQL database, we can display the statistical results in the GridView control view. In addition, lecturers are able to export a Excel file to a location disk for convenient statistic. According to import/export page, lecturers conveniently use it to import list into system, Meanwhile, the attendance records can be easily exported to Excel format. The lecturers don't need to mark for everyone.

3.2.2 Students Page

The students can login in this system for looking over records, leaving application and upload their photo to database. The function that can be used to upload student's photo through FileUpload controller in ASP.NET[8]. It can easily implement to click the button of browse to upload the photo. Through changing the value of ContentType, the type of photo which can be uploaded is bmp, png, jpg etc. The photo will be renamed with student number when it posted on Sever. Convenient application for leave, students can use application to get leave permission. While the leave information is submitted, administrators can approve these applications.

3.2.3 Administrators Page

Administrators are able to use system for courses management, users management, checking the attendance records and leaving audit.

Administrators can audit these leave applications with a very efficient way. When the lecturer checks the leave information and the leave applications is already approved then this record will be displayed in leaving information. In addition, for monitoring the administrators can review the student attendance records.

4. CONCLUSION AND FUTURE DIRECTIONS

We have covered the technologies in RFID and HTML 5 for the attendance system. Because of the increasing demand of new technology and methods, we have introduced RFID and HTML 5 for better and efficient attendance system in this paper. We can fully utilize the attendance management system with our proposed system. This system can increases the rate of attendance and is beneficial to students to avoid any inconvenience. The system simplifies the tedious steps of traditional attendance system. It can be improve for future development, we may be able to add face recognition technology to our system.

REFERENCES

[1] Lim, T. S., S. C. Sim, and M. M. Mansor. "RFID based attendance system", IEEE Symposium on Industrial Electronics & Applications, pp.778-782, 2009

[2] Lubbers, P., Albers, B., and Salim, F. "Pro HTML5 programming", New York, NY, USA, Apress, pp.107-133, 2011

[3] Garrett, J. J. "Ajax: A new approach to web applications", Adaptive Path, pp.1-6, 2005

[4] Bhalla, V. Singla, T., Gahlot, A. "Bluetooth Based Attendance Management System", International Journal of Innovations in Engineering and Technology, vol.3, pp. 227-233, 2013

[5] Want, R. "An introduction to RFID technology." IEEE Pervasive Computing, vol.5, no.1, pp.25-33, 2006

[6] Yeop S. M. K., "Smart Attendance System by suing RFID." Asia-Pacific Conference on Applied Electromanetics, pp.1-4, 2007.

[7] Pfeiffer, S. and Conrad P. "Accessibility for the HTML5 <video> element." Proceedings of the 2009 International Cross-Disciplinary Conference on Web Accessibililty (W4A), pp.98-100, 2009

[8] Esposito, D. "Programming Microsoft ASP. NET 4." Pearson Education, New Jersey, NJ, USA, 2011