Portable attendance system with FeliCa reader

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Abstract

Taking attendace of a large number of students in schools prevents the classes from smooth starts. With application of RFID and embedded system with web technology can improve those procedures quicker and easier. This project demonstrates efficacy of the proposed sytem during the workshops of research groups in SFC. Several core modules are introduced in this paper.

1. Introduction

Taking attendance of students in classes is a usual practice of schools to give extra credits to the attendees and subtract score from those who do not. However, as the class becomes larger the time to be consumed before the class starts also increases.

Being a coordinator for my research group's periodical workshop with approximately 100 attendees, I have implemented a portable standalone attendance system to smoothen the process of attendance management in order to fully utilise the workshop period.

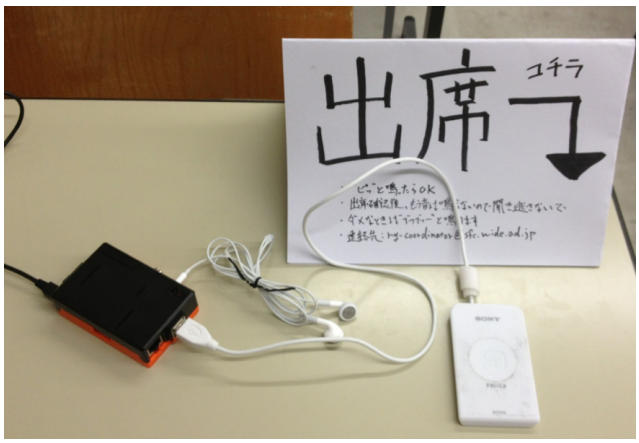

Figure 1: Attendance system appearance

2. Background

Attendances are usually taken by paper sheets in most classes. Students just write their names and student numbers, and then class assistants or the instructor count them manually. That is absolutely a waste and ineffective method, especially when being practiced in large classes or workshops.

Student ID carried by all the students has an IC chip to indicate ID number and the process can be automated by reading their chip information just like entering gates at train stations.

Figure 2: Attending in practice

3. Attendance system

3.1 FeliCa

Felica is a de facto standard for RFID smart card system from Sony and commonly used in electronic transportation money cards. The IC chip on the studend ID can be easily read by Sony PaSoRi card reader to identify the students attending. C library called libpafe is provided by third party to access the reader control from programs. [1]

PaSoRi controller and ID processing is implemented on Raspberry Pi model B.

3.2 Registration system

The registration system is written on Ruby onRails framework on Cloud. Before start taking the attendance, we have to know who is taking the class. Registration of FeliCa ID (student ID) is then mapped to

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student name and other profile information to be processed in attendance viewer application on the web. The interface and system runs locally and only accessible by the administrator.

3.3 Attendance reader

The reader system is used for the registration and further attending process. As soon as a card is within the inventory effective distance from PaSoRi, its Felica information is accessible so that the card-id and datetime can be transmitted to the attendance server on Cloud. It also has an audio output for playing sounds to notify reading status for students.

3.4 Attendance server

RaspberryPi transmits student IDs to the attendance server after being successfully read by the reader. Registered information is stored in the database, and the server look up the ID received from the reader at every transmission, and then update the student attendance status for the day. If the ID does not exist in the tabe for the date of read, the ID is newly accepted as attended, and it replies the reader with a "success" flag. If the ID is already attended, "read again" flag is returned. Likewise, "invalid" is returned if the card ID is not registered.

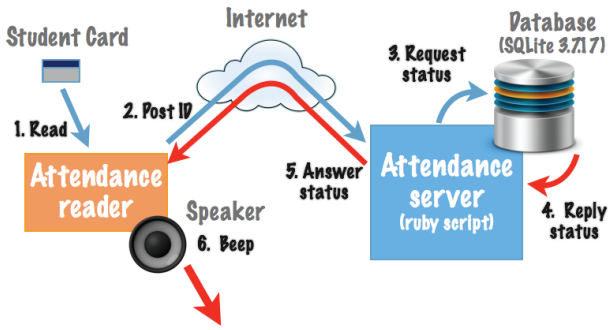

Figure 3: System overview

3.5 Attendance web

After the class, all the attendance status is exported as a csv format and dumped to the web's data reference, so that the attendance status is always updated at the time of access. [2]

4. Summary

I have successfully demonstrated the efficacy of introducing RFID - Web system to resolve redundant tasks in real world. With the system proposed it becomes easier to review the attendees and simplify the management tasks.

The whole system and operation procedure is publicly available and from the repository to be reused with the documentation and source codes. [3]

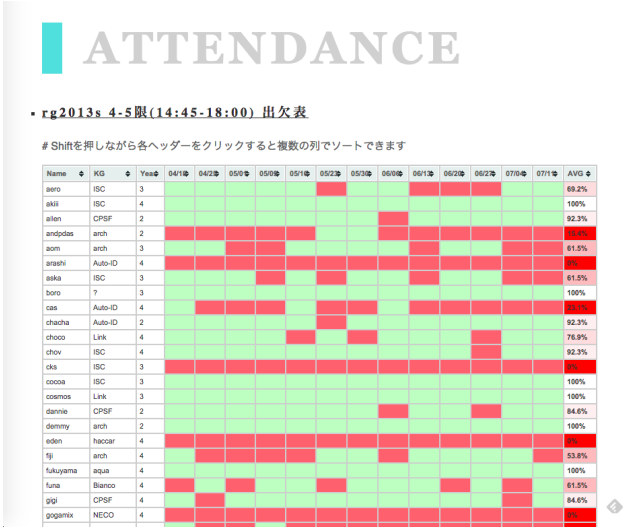

Figure 4: Attendance web application viewer

References

[1] libpafe (C library for PaSoRi reader) http://homepage3.nifty.com/slokar/pasori/libpafe.html Accessed on June 15th, 2013.

[2] rg2013s 出欠表 http://rg.sfc.keio.ac.jp/rg/2013s/attend/

[3] rg-coordinator - rg-git https://git2.sfc.wide.ad.jp/rg-coordinator