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Expansion of Seat Registration System by QR Code for Corona Disaster to Attendance Management System

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Abstract: In response to the COVID-19 pandemic, a QR code-based "Seat Registration System" was introduced in April 2020 to track student seating. While convenient, it faced issues such as easy misuse through copied QR codes. To improve security while maintaining ease of use, an enhanced "Attendance Management System" was developed, adding features like classroom layout and real-time attendance status. Launched in April 2022 for general education and expanded in October 2022, the system has been operating smoothly, and this paper reports on its development and implementation.

Keywords: Attendance Management System, QR code, preventing improper use

1. Introduction

In response to the COVID-19 pandemic, a QR code-based "Seat Registration System" was rapidly developed in early 2020 to track student seating. While easy to use and widely adopted, it had a critical flaw—students could register from anywhere by copying the QR code, making it unreliable for attendance. To address this, a new "Attendance Management System" was designed to prevent improper attendance while maintaining ease of use, by showing real-time attendance status with classroom layouts. This paper introduces the development and operation of the new system, which began parallel use in 2022. The content of this paper is a translation into English of a non-refereed poster presentation already made in Japan (Nakano et al., 2022), in addition to updating log-related data.

2. Design and Development

The "Attendance Management System" was developed based on the earlier "Seat Registration System," in collaboration with university departments, to meet increased demand for using the system for attendance. While QR codes remained convenient, measures were introduced to reduce improper attendance—such as real-time display of seating layouts for instructors to confirm student presence visually. The new system, launched in April 2022 and expanded in October, integrated classroom schedules, instructor data, and student information, while retaining compatibility with the existing system. From a research perspective, the system leverages QR codes and SSO authentication efficiently, and adds features like visual attendance tracking and student self-checks for issues like lateness or duplicate registration.

3. Functions of the system

The "Attendance Management System" retains the QR-based simplicity for students: they

scan a code and tap “Join” to register attendance. Unlike the older system, it now displays the relevant course and attendance history. Professors can view real-time attendance mapped onto a classroom layout, with student names, IDs, and timestamps color-coded by status (present, late, or duplicate). Additional features include CSV export, manual edits, and student messaging. Administrative functions allow managing user permissions, classroom layouts, and timetables, with course data synced daily from the school system.

4. Operational status

The “Attendance Management System” began limited operation in April 2022 and expanded university-wide in October 2022. It now handles around 15,000 QR code-based attendance registrations per day. Usage trends vary by weekday and are affected by academic calendars and COVID-19 measures. Compared to the older system, students now register attendance more precisely at class start times due to lateness rules. Some classrooms have exceeded 100,000 registrations (Fig.1), and heatmap-like data shows distinct seating patterns (Fig.2), reflecting layout and COVID-era seating restrictions.

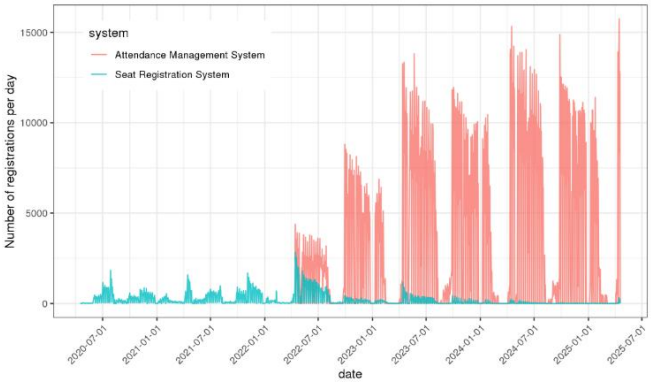

Figure 1. Number of QR code registrations per day for Seat Registration System and Attendance Management System.

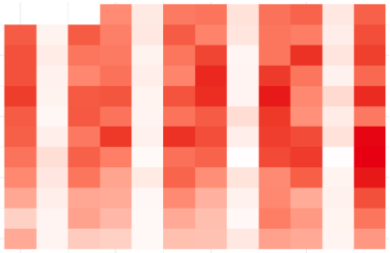

Figure 2. Example of registration status per classroom seat.

5. Summary and future issues

The “Attendance Management System,” developed from the earlier QR-based “Seat Registration System,” has been in stable operation since 2022, helping reduce improper attendance while maintaining convenience. Though generally successful, minor issues have surfaced, and improvements are planned based on faculty feedback—such as better handling of class changes and integration with LMS. Moving forward, the system’s detailed attendance data may be leveraged for learning analytics and student support.

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References

Nakano, H., Kita, T., Nakamura, J., Ishimoto, T., Sato, D., Tsuruta, H., Kawagoe, A., & Taira, H. (2022), Expansion of Seat Registration System by QR Code for Corona Disaster to Attendance Management System (in Japanese). *Proceedings of the AXIES 2022 Annual Meeting, 13PM2P-6*, 340-244, **https://axies.jp/_files/conf/conf2022/paper/13PM2P-6.pdf**