



## WEB-BASED ATTENDANCE MONITORING SYSTEM

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### ABSTRACT

*Wireless attendance monitoring system is a system developed to track student attendance during school days. This project features student's ID Card tapping in the terminal and displays student profile in the portal. An area for announcements is also added in the portal aside from sending it via SMS. More so, it also features an admin panel, including a dashboard that displays reports in graphical view for easy system monitoring as well as it has full wireless computing technology. The software and technologies used in this project are Raspberry Pi, Database Server, RFID Reader, Arduino NMCU, Python, PHP, MySQL, Bootstrap, and CSS.*

*Keywords: Wireless technology, Web-Based attendance, Raspberry pi server, Micro-computer, Radio Frequency Identification, Web Application, Philippines*

### INTRODUCTION

One of the problems in educational institutions is the students' irregular attendance. It becomes even worse when parents were not informed of their absences in classes. This usually happens to higher education institutions, wherein the students are geographically far from their parents.

Previous studies (Fadellelmoula, 2018; Oghuvbu, 2017) correlated students' attendance and overall academic performance. Hence, absenteeism can cause the institution to lose its reputation as well as resulting in inadequate learning on the part of the student.

In educational institutions in Bohol, conventional attendance system requires teachers to use pen and paper for class attendance or students to manually sign the

attendance sheet during school events. This system lacks automation, where several problems may arise. For instance, time is unnecessarily consumed by teachers or students when manually inserting, validating data to attendance sheets. Furthermore, a hardcopy form of attendance sheet could easily be misplaced. Hence, it is important for educational sectors to have solutions that simplify and increase the speed of attendance monitoring.

Notwithstanding, web-based applications have been prolific in education and other sectors due to its portability, adaptability and flexibility. They have now become one of the preferable technologies that are used to ease the process of managing data and records (Rjeib et al., 2018). Additionally, previous inventions also (Jones and Rickenbacker, 2003; Dobson, Ahlers and DiDario, 2005) suggest the use of Radio

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Frequency Identification (RFID). Yuru et al. (2013), Kurniali et al. (2014) and Patet et al. (2012) similarly proposed the same type of applications which integrated web applications with RFID technology in monitoring attendance of students. This is because, this type of applications provides valuable online facilities for easy record maintenance.

However, existing web-based attendance monitoring systems with integrated RFID technologies still lack the wireless capabilities. This means that desktop computers or laptops need to be installed to where the RFID readers are placed. These systems commonly use Arduino microcontroller to connect with real-time database environment (Rjeib et al., 2018). Hence, this problem leads to the motivation of this research. This study aims to develop a web-based attendance monitoring system that will be connected to a Raspberry Pi single board computer in order to enable wireless capabilities.

**OBJECTIVES OF THE STUDY**

The study aimed to develop a web-based attendance monitoring system. Specifically, it sought to:

1. design hardware architecture for wireless attendance monitoring;
2. design a web-based system interface to display reports regarding attendance of students; and
3. develop an SMS-based notification feature of attendance monitoring system.

**MATERIALS AND METHODS**

This project used Agile: Scrum methodology of software engineering. It is a type of methodology that enables the researchers to deal with a task by breaking it into phases which includes consistent effort with project stakeholders and constant development and iteration in every phase. The phases of this methodology include stakeholders' meetings, product backlogs, sprint planning, sprint backlogs, the actual project sprint, daily standup meetings, sprint review and the potential shippable product. With this methodology, the

researchers did the following activities in each phase.

*Product Backlog.* The researchers and the end users listed the initial features of the system in a form of stakeholder, developers and user stories

*Sprint Planning.* After the product backlogs, the researchers conducted a meeting for sprint planning. This resulted to another backlogs called sprint backlogs in which all the stories are given priorities and time span.

In this phase, the team leader assigned the priority features of the system for the first sprint of the development. This results to a sprint backlog in which all of the deliverables based on stories are listed including the time span of the development.

The researchers defined the requirements by creating use case model, sequential diagram, process Flow, system architecture block diagram and system flow to come up with a plan in delivering the feature requirements before proceeding to a full blown sprint.

*Use Case Model.* For the specifications of features of the developed system, the use case model for a web-based attendance monitoring system was utilized as illustrated in Figure 1.



Figure 1. Use-case Mode



**Sequential Diagram.** For the detailed process flow of the web-based attendance monitoring system, sequential diagrams were utilized for each use case so as to guide the

developers in implementing the system. Figures 2-4 display the sequential diagrams for student login, admin web login, admin reports and announcement management.

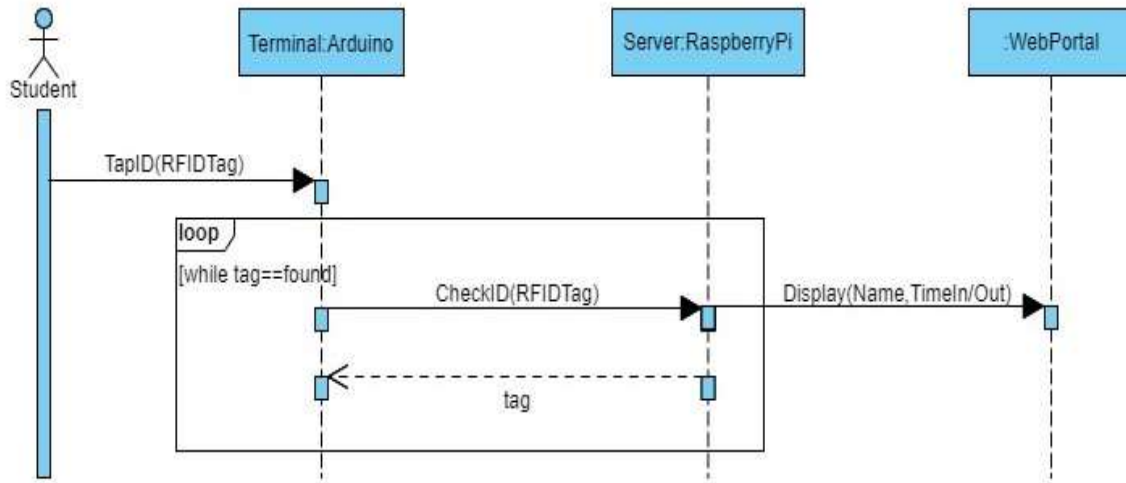


Figure 2. Student Login

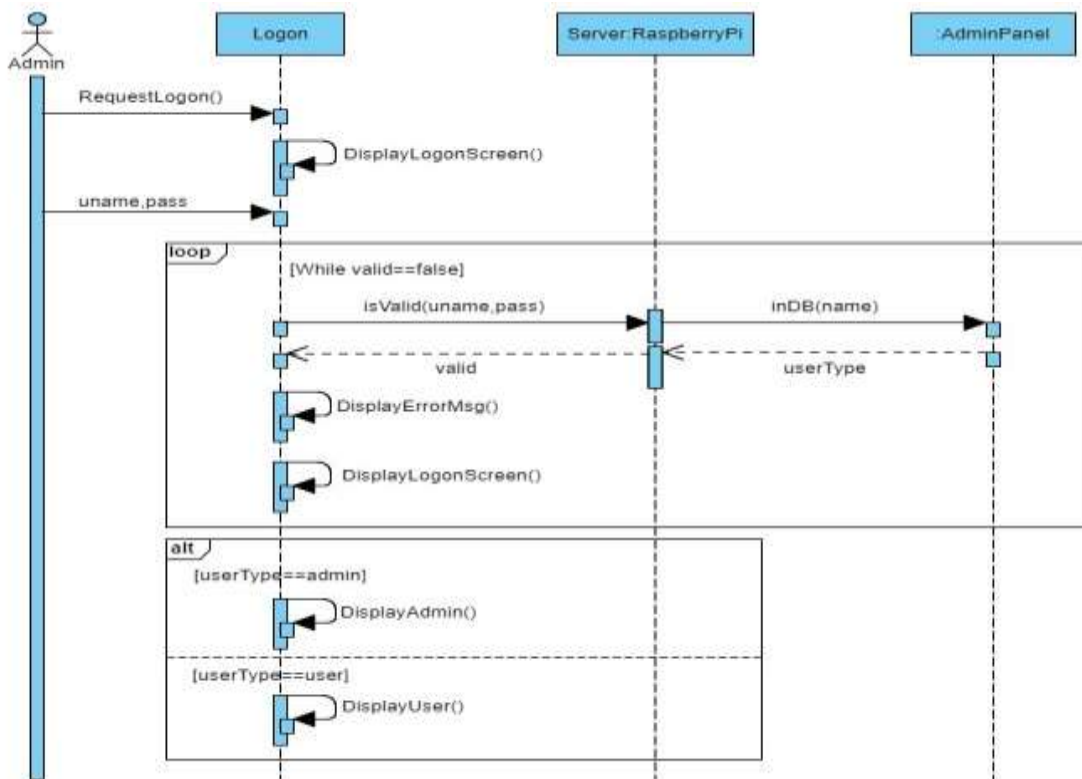


Figure 3. Web Admin Login

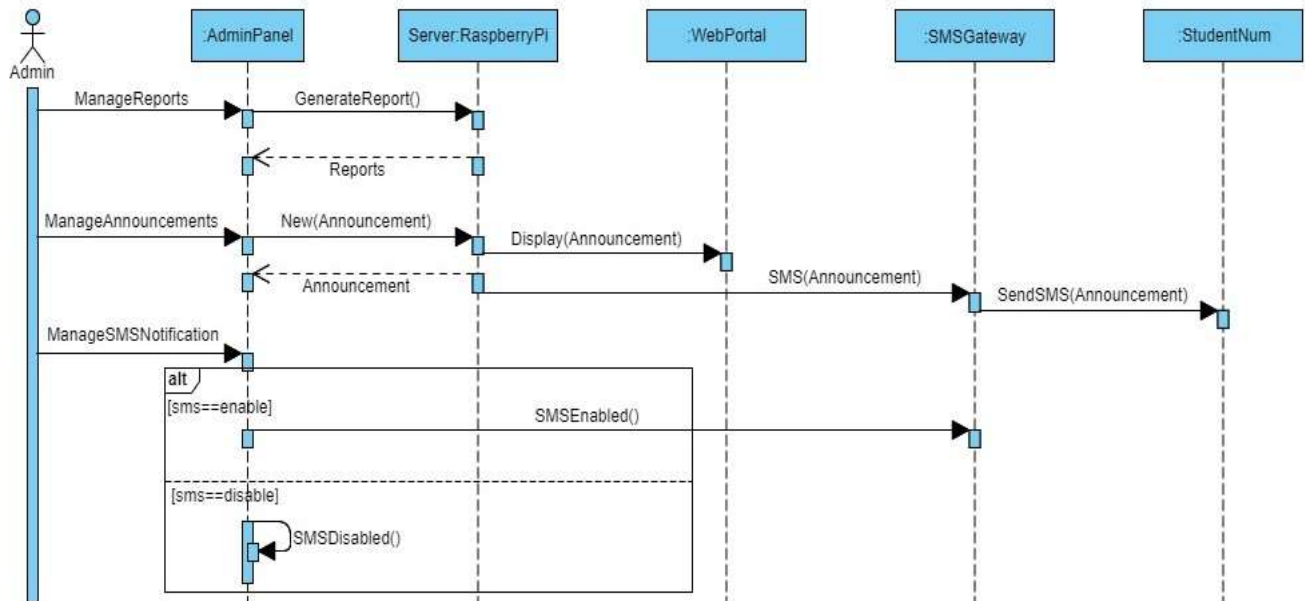


Figure 4. Admin Reports and Announcement Management

**Process Workflow.** To illustrate the overall process of the system, the process workflow diagram, system architecture diagram and system flow diagram are illustrated in Figure 5-7. The reading process involves the tapping of students' RFID tag with the terminal. It is followed

by MC and transmission process which transmits the students' data wirelessly into the server. The server will then store, validate and evaluate the data sent. Finally, the web application will display information coming from the server process.

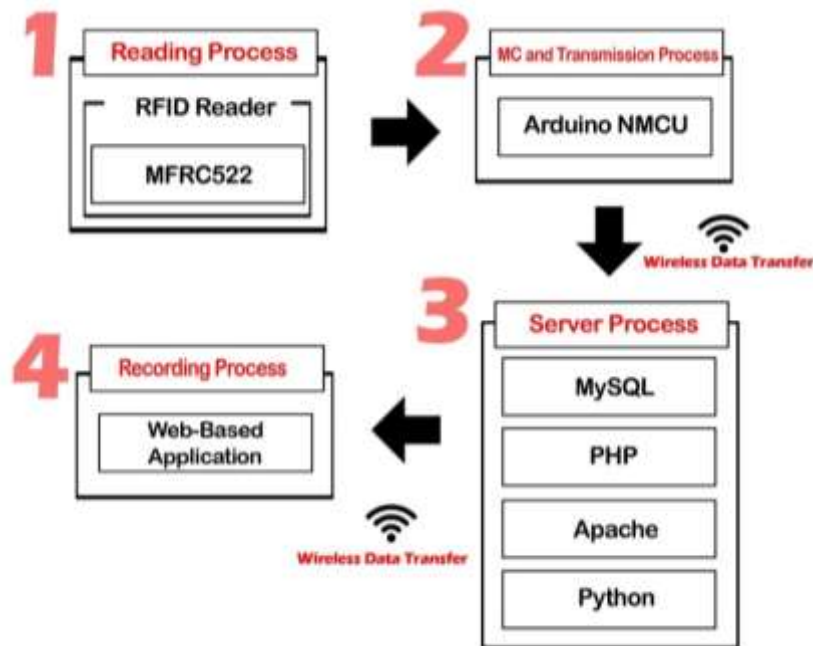


Figure 5. Process Workflow

**System Architecture Block Diagram**

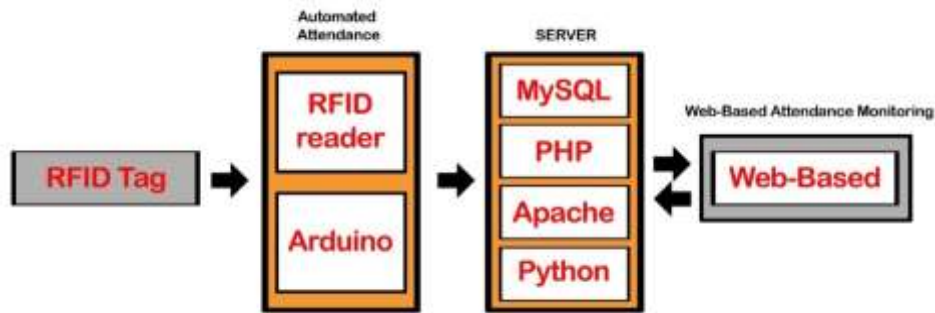


Figure 6. System Architecture Block Diagram

**System Flow**

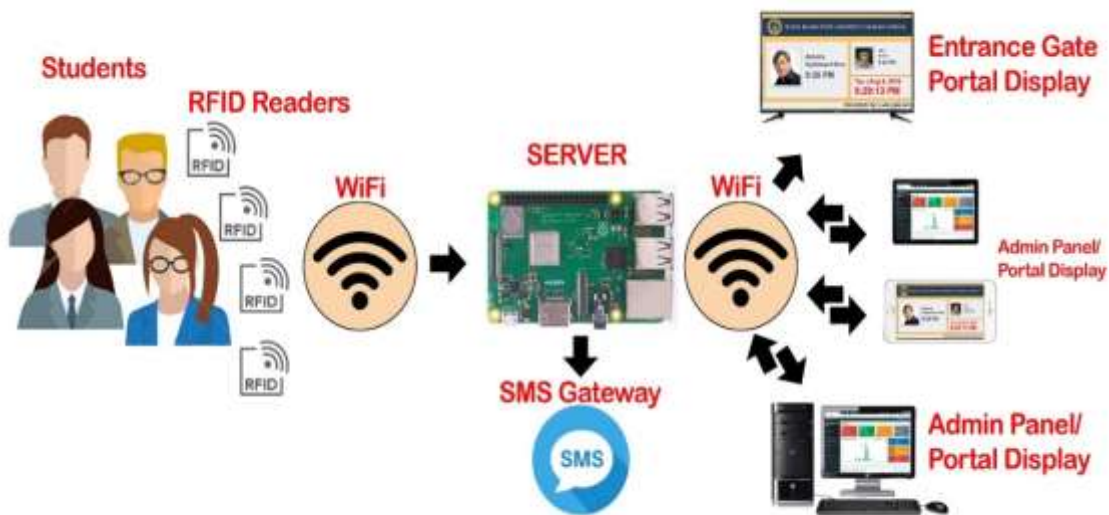


Figure 7. System Flow Diagram

**Daily Sprint.** This is the phase where the researchers started the development of the project. In every sprint, a team leader is present and a daily scrum meeting in a form of short talks

in the office and artifacts update were conducted in order to monitor the development of the project to ensure that the project is on track.

**Backlog Refinement.** The team leader together with the rest of the team checked the product if all of the deliverables in the sprint were

delivered. If not, the project will proceed to next sprint with the refined backlogs as the new target of the daily sprints.





**RESULTS AND DISCUSSION**

The following section describes the results in every phases of the development using the agile: scrum framework.

**Product Backlog.** The stories gathered were put in a tabular view with story numbers and the stories gathered which then became the basis for the features that must be included in the development. Below are the stories gathered.

**Table 1**  
*User Stories*

Story No.	Story
1	I want an attendance system that is web based
2	I want the system to be in an up to date technology
3	Using the system, student taps the id card into the terminal as attendance
4	I want the system to have multiple terminals in order to eliminate student traffic during peak hours
5	I want the student to view a confirmation after they login
6	I want the system to display images of the student's profiles in the screen after they tap ID cards in the terminal
7	I want a portable and secured system
8	The system must have an admin panel
9	The system must a dashboard for a quick monitoring of the student attendance and other activities in the system
10	Must be able to display announcement in the screen located in the terminal
11	The system must be able to send SMS notifications to students
12	The system must have a control panel for the user level access

**Sprint Planning.** Sprint backlogs are shown in Table 2 that indicates which stories

were given priorities with their corresponding time span.

**Table 2**  
*Sprint Backlog*

Priority	Sprint Backlog Items	User Story No.	Story	Estimate Hours
1	Selection of technology to be used and the availability of the modules	2	I want the system to be in an up to date technology.	5
		1	I want an attendance system that is web based.	
2	Server and database development using Raspberry Pi, Python and server configuration	7	I want a portable and secured system.	80
3	RFID terminal Development	3	Using the system, student taps the id card into the terminal as attendance.	28
4	Web portal development for student confirmation and announcement	5	I want the student to view a confirmation after they login.	32
		6	I want the system to display images of the student's profiles in the screen after they tap ID cards in the terminal.	
		10	Must be able to display announcement in the screen located in the terminal	
5	Admin Panel Development	8	The system must have an admin panel.	30
6	Dashboard	9	The system must a dashboard for a quick monitoring of the student attendance and other activities in the system.	8
7	Adding more terminals	4	I want the system to have multiple terminals in order to eliminate student traffic during peak hours.	18
8	SMS Module	11	The system must be able to send SMS notifications to students.	20
9	Control panel	12	The system must have a control panel for the user level access.	28

## Screenshot

After several sprints, the following are the results:



Figure 8. Admin Panel and Portal Display



Figure 9. Entrance Gate Portal Display

## CONCLUSIONS

A wireless web-based attendance monitoring system was developed using the scrum framework of Agile methodology. Aside from its wireless feature which is not implemented in existing systems, the system also has prominent features like SMS notification, reports management and announcement management. This could help not only in monitoring the attendance of students but also in generating reports. Hence, this system would likely support academic institutions which

would need to monitor students' attendance daily.

## RECOMMENDATIONS

The project must be implemented in Bohol Island State University in order to cope up with the fast pace of technology both in the academe and in the industry and to smoothen the process of monitoring the student attendance, information dissemination and the printing of reports. Since this system introduced new technology, therefore, personnel training (e.g. System administration) must be conducted.

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