Development of a Class Attendance Monitoring System Using Barcode with SMS Notification

Bonna S. Guevarra[1], Fely T. Corpuz[2]
[1,2]Isabela State University, San Mateo, Philippines

Corresponding Author:
Bonna S. Guevarra,
Department of Information and Communication Technology,
Isabela State University San Mateo Campus,
San Mateo, Isabela, Philippines.
Email: gvhon3089.bg@gmail.com

Abstract
The new trend of technology is embraced by many users considering its advantages. One of those is the attendance monitoring system which is developed in different methods globally to solve student's absenteeism. Involving technology inventions is a key to motivate student's awareness, attention, and interest in learning to solve their problems, especially in their daily life. Implementing this kind of system is indispensable to Isabela State University- San Mateo Campus because students are prone to absences for varied reasons observed and their parents or guardians are not immediately informed about the absences of their children. Moreover, the faculty used a piece of paper or class record to document the daily attendance of their students. Hence, this Class Attendance Monitoring System Using Barcode with SMS Notification was designed and developed to provide convenience and ease in monitoring class attendance. It allows the students to place their Identity Barcode on the scanner, then it will be saved in the database and directly send a message to the parents via Short Message Service (SMS) using Global System for Mobile Communications (GSM) network containing the time and date when their child enters the class for a particular subjects or events. This system will also generate an attendance report containing the time-in and time out of the students by course and section, subject, semester, and even by school event.

Keywords: Barcode, Class Attendance Monitoring System (CAMS), Database, SMS Notification

1. INTRODUCTION

An attendance monitoring system is a vital process in almost all the organization and institutions [1]. Isabela State University has a standard policy in terms of attendance, tardiness, and absenteeism of the students. First, the minimum of 80% attendance of the total contract hours in the subject is required (Checking is done every meeting); Tardiness of fifteen minutes is equivalent to one hour period of absence; A minimum of three consecutive absence without valid reason requires a promissory note from the guidance coordinator; 6 consecutive class absences mean "drop" in the subject; Failure to take the prelim exam preceded by absences means "drop" in the subject; and last, Failure to attend regular classes after taking the prelim exam means of the grade of 5.0 in the subject [2]. The importance of class attendance within the Higher and tertiary education sector cannot be under-estimated. This is essential because of the crucial role contact classes play in ensuring knowledge acquisition in a conducive environment [3].

One of the factors that encourages the success of the learning process is the participation of students, and if students are always absent, then the information they get becomes less and can't grasp the material that has been learned, the one that triggers the absence of students is their ditch [4]. The invention of this method is very important to introduce at Isabela State University-San Mateo Campus, where most students are prone to absences for a variety of reasons, such as; they think it's a boring class; laziness to attend classes; some students prefer to go to computer shops to play games rather than attend classes; some students cannot refuse the power of a friend. Any of these reasons parents or guardians are not aware of the absences of their children. Also the faculty used only a piece of paper and a book to document their students' everyday attendance. According to authors in [5], the first case leads to a student who has forgotten his identity, while the latter leads to a false attendance record. Also to authors in [6] attendance management scheme, which involves the signing of attendance forms results to unsystematic, unreliable and unsecured attendance records. Since the student attendance record is held on paper, it can easily be manipulated [7].

The Development of a Class Attendance Monitoring System Using Barcode with SMS Notification for Isabela State University-San Mateo Campus was started to address these issues. This study also aimed to design the system which allows the students to enter the class using a barcode containing their student identification number and saved it into the database and directly send a message to the parents via Short Message Service (SMS) using Global System for Mobile Communications (GSM) network containing the time and date when their child enters in the class in particular subjects or events. This system will also generate an attendance report containing the time-in and time out of the students by course and sections, subject, semester, and even by school event.

The authors in [8] stress that computer software has the capability efficienlty reduce the time spend in monittoring and recording attendance. And also the authors in [9], automation of the Attendance System has boundaries over the traditional method as it saves time and also can be used for security purposes. This also helps to prevent fake attendance. Therefore, the substantial key is to apply the invention to solve the problems and facilitate our daily life. Moreover, it makes stimulating attention, awareness, and interest in learning [10].

In addition, the introduction of attendance accountability mechanisms, such as the electronic attendance tracking system, is a single approach that has a positive effect on academic performance in college. Electronic attendance tracking is a viable method of assisting students and encouraging academic performance [11].

2. RESEARCH METHOD

The Methodology of this study is shown in Figure 1. As displayed in the Venn diagram, the current class monitoring system was observed in order to identify the difficulties and issues which have to be addressed in designing the flow and features of the Class Attendance Monitoring tool. The following platforms were used in the system: Pre-Processor HyperText for Web Scripting Language; MySQL as the database of the program; PHP Designer to write the code of the system; XAMPP as the (Web Server –

offline) were used creating and running the system; Barcode scanner to scan barcodes for student entry; and Broadband Stick for SMS notification. Additionally, the Class Attendance Monitoring system was tested to identify possible errors of the system.

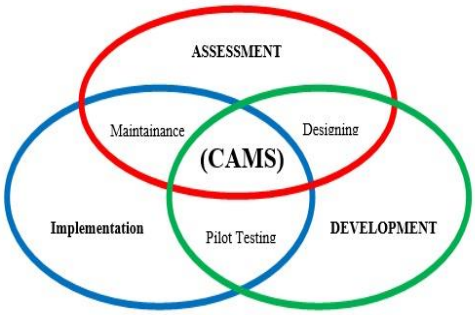


Figure 1. Software Development Methodology

3. RESULTS AND DISCUSSION

3.1. System Architecture

The system architecture is shown in Figure 2. It comprises of a server that parses the system program. The database or the data storage of the Class Attendance Management System stores information of the clients (Student and Teacher) which can be displayed using a barcode scanner that is connected to the computer. By the use of a smart broadband stick, the system directly sends a message containing the time and date when the student enters the class in a particular subjects or events to the parents via Short Message Service (SMS) in a Global System for Mobile Communications (GSM) network.

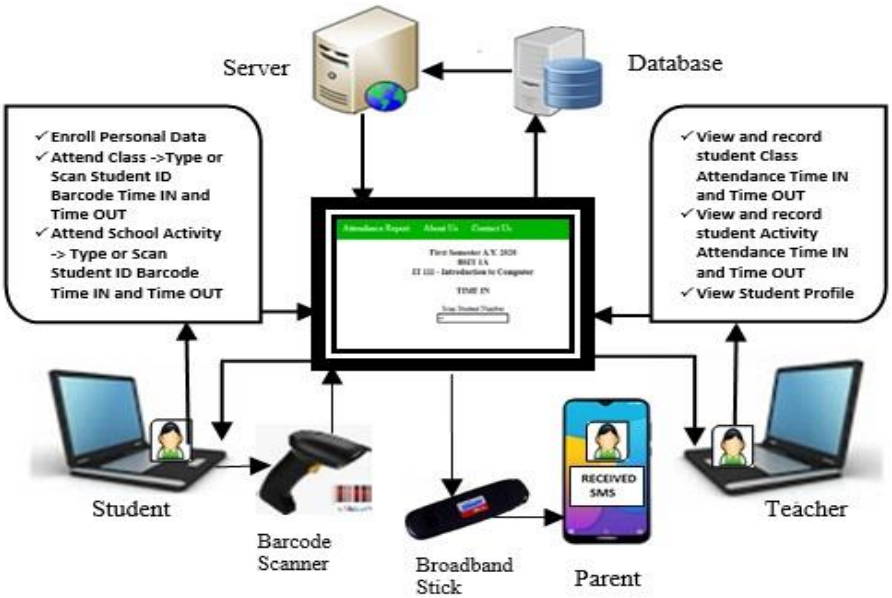


Figure 2: The Architecture of Class Attendance Monitoring System Using Barcode with SMS Notification

3.2 System Features and Functions

The features and functions of the developed system are the following: the system can add, edit, and delete student information, subjects, course year level, and school events. It also scans student Identity barcode and sends SMS Notification using Smart Broadband Stick. It also views student list report of attendance by class subject Time-In and Time-Out.

3.2.1 System Database

Figure 3 shows the system database. PhpMyadmin is used to administer MySQL to collect and store the data. It contains tables and fields related to the system.

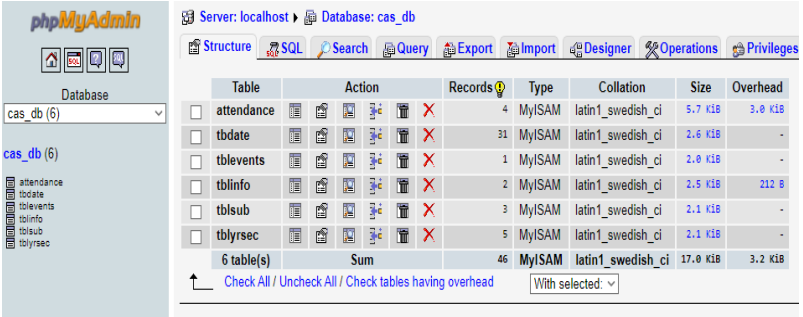


Figure 3: System Database Interface.

3.2.2 System Graphical User Interfaces

In this study, the following figures are the System Graphical User Interfaces (GUI). It is viewed in a web browser. Xampp software is used to develop the system. It allows you to create web programs. Good design of system interface is very essential to the end-users, according to the authors in [12], this may help in improving the design of plans and classroom reservation decisions.

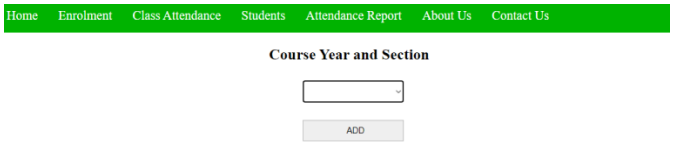


Figure 4: Course Year and Section Enrollment.

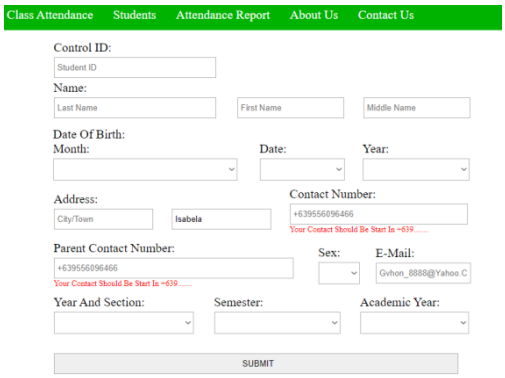


Figure 5: Student Enrollment.

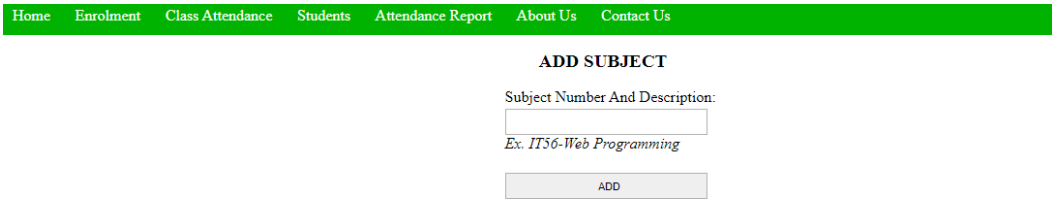


Figure 6: Subject Enrollment.

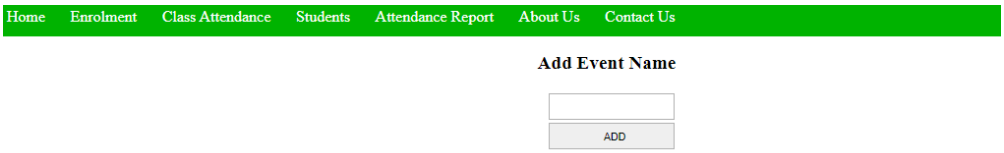


Figure 7: Event Enrollment.

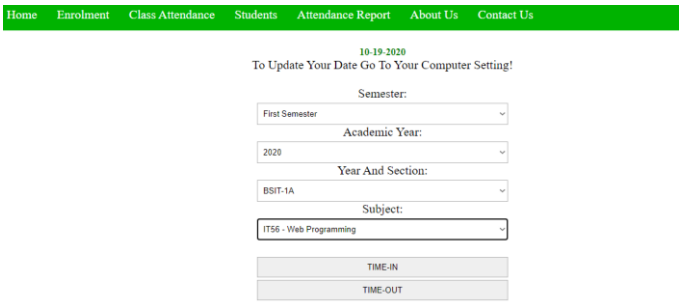


Figure 8: Setting Class Attendance.

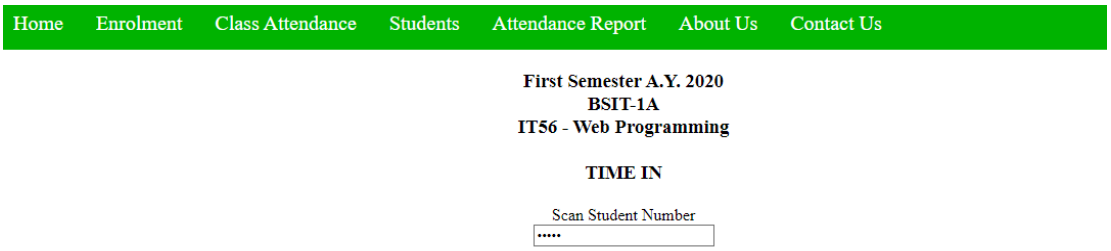


Figure 9: Scanning Student Identity Barcode Time-in.

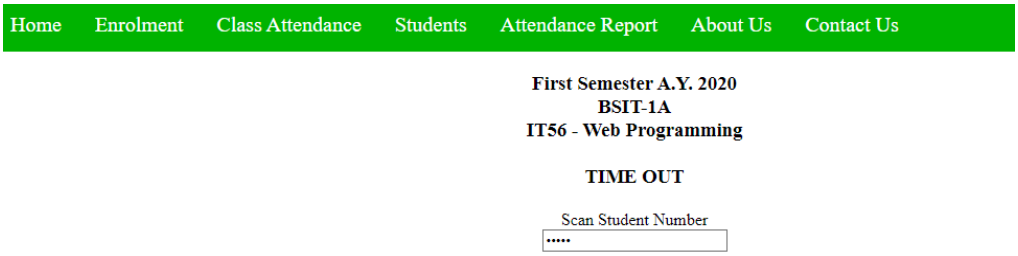


Figure 10: Scanning Student Identity Barcode Time-out.

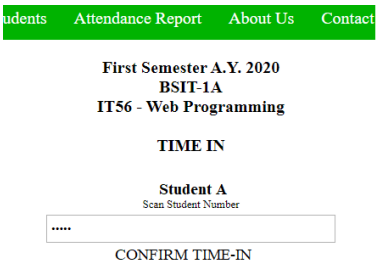


Figure 11: Student Confirmation Time-In and Sending Message.

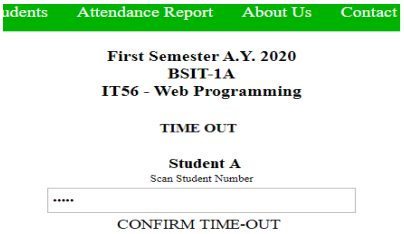


Figure 12: Student Confirmation Time-Out and Sending Message.

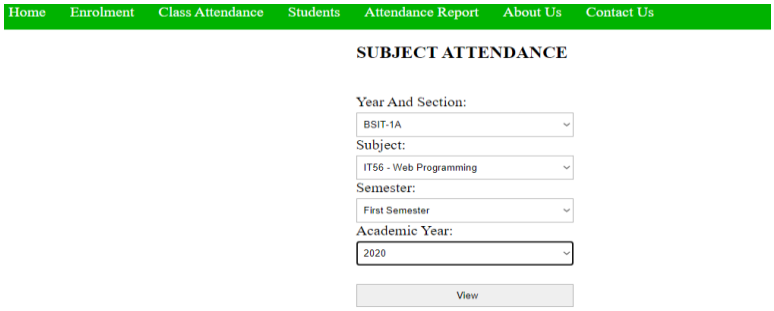
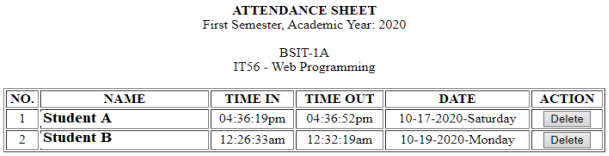


Figure 13: Setting Subject Details to View Report.



ATTENDANCE SHEET
First Semester, Academic Year: 2020

BSIT-1A
IT56 - Web Programming

NO.	NAME	TIME IN	TIME OUT	DATE	ACTION
1	Student A	04:36:19pm	04:36:52pm	10-17-2020-Saturday	Delete
2	Student B	12:26:33am	12:32:19am	10-19-2020-Monday	Delete

Figure 14: Viewing Student Class Attendance Report.

3.2.3 System Testing

3.2.3.1 Using Barcode

Figure 15 shows the scanning of the barcode printed in the students' ID using a barcode scanner. According to authors [12], barcode Identification is one of the automatic identification technologies which is popular nowadays. A secured and accurate barcode technology model is needed for the implementation of the system.

Figure 15: Scanning Student Identity Barcode.

3.2.3.2 SMS Notification

Figures 16 and 17 show SMS testing with the use Smart Broadband Stick. It has a SIM card number with Global System for Mobile Communications (GSM) network to directly send notification to parents regarding the time and date when their child enters the class or attends a school activity. According to authors [13], the integration of this system with SMS is very useful as it can directly notify the parents regarding their children's attendance problems. With this, parents do not have to bother anymore to come to school just to know the presence or absence of his son/daughter [14].

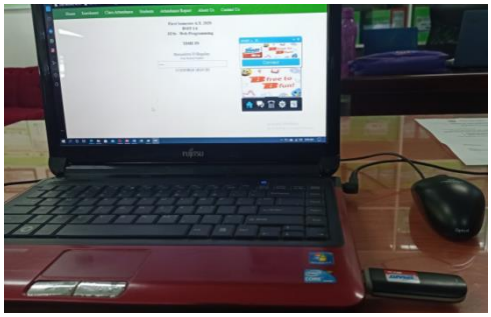


Figure 16: Sending Message Using Broadband Stick Connected to The Computer.

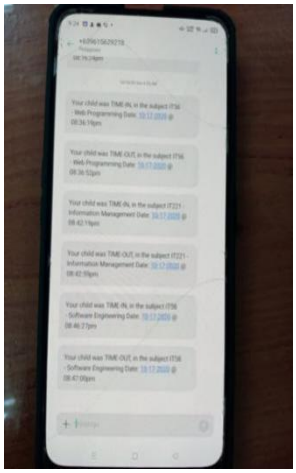


Figure 17: Mobile Interface Containing a Message Received by the Parent.

3.2.4. System Output Analysis and Future Works

The system output is designed with different features in which the best combination is the use of barcode in entering the class and sending a short message to notify parents that their child is present in the class. It also provides a class attendance report which can be used as a record or reference to teachers.

This study addresses the problem on students' absenteeism. It also motivates their awareness, attention, and interest in learning.Students, being the relatively younger generation, are more likely to be familiar and early adopters of latest technology. However, technology is only a tool and thus can be a double-edged sword [15].

4. CONCLUSION

Based on the findings of the report, the device design was the tool used by the institution to conduct a class attendance search. It is recommended to further assess its efficacy for implementation. Tests and performance analysis were carried out to check the reliability of the system [16].

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