# LYCEUM OF THE PHILIPPINES UNIVERSITY – LAGUNA STUDENT ELECTRONIC ATTENDANCE AND LOGGING SYSTEM (LPU-LAGUNA SEALS)

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## ABSTRACT

*This study was developed to create an electronic attendance and logging system using Radio Frequency Identification (RFID) and Short Messaging Service (SMS) with a Web-based management system portal that allows user to access real time data to ensure campus security and smart information management. The students will use RFID card system to check in and out of the main entrance, to both track attendance and log time and prevent unauthorized entrance therefore utilize the RFID technology. The LPU-LAGUNA SEALS system developed in this study has six main functions: (1) to use the student RFID chip in the ID's as gate pass, (2) to send daily SMS to parents about the student entry and exit time record, (3) to efficiently manage and monitor student attendance and logs thru intranet and internet, (4) to integrate Web-based system portal to access real time logs and attendance, (5) to provide printed reports and electronic files of attendance and logs, and (6) and implement the system in Lyceum of the Philippines – Laguna. This program was designed and developed using various programming languages and technologies such as Visual Basic 2010 (VB .NET), Hypertext Mark-up Language 5 (HTML5), Cascading Style Sheet 3 (CSS3), Hypertext Pre-processor (PHP) scripting language, JQuery, MySQL database engine, RFID and GSM (Global System for Mobile) module. This system is implemented at the main gate of LPU-Laguna using client-server technology which comprises the reader, the tag, the GSM module, a client PC and a database server. The researcher applied Rapid Application Development (RAD) method as the system framework model that focuses on the system development utilizing prototypes thereby flexibly adjusting requirements as the need arises. The system was successfully implemented by utilizing the use of both RFID and SMS technology in the process which resulted in an efficient monitoring and managing of attendance and logs of the students that provides campus security and efficient information management.*

***Keywords:*** *Radio frequency identification, electronic attendance, electronic logs, logging system, short messaging.*

## INTRODUCTION

Today, software is an essential way and innovative solution through which most of the organizations whether private or public use in their system processes to have an efficient and effective information management. Furthermore, the integration of the Radio Frequency Identification (RFID) technology in various system processes is widely used nowadays to build a smart system that can be used for effective identification, monitoring and security of data. In fact, the study of Arulogun et al. (2013) affirms that RFID is not a new technology and consequently constitutes system integration because of its low cost and feature advances in various computing fields that open up other application assimilation. In fact, RFID technology is the medium used by students' in LPU-Laguna as identification card. Consequently, time and attendance tracking are important factors of an effective organizational performance and management.

The Lyceum of the Philippines – Laguna is currently using a Student Monitoring System using the low frequency RFID technology to keep track of the student entry and exit within the school premises. However, the system is not fully utilized because of the current system limitations. For example, the system does not support a client server technology and only uses a stand-alone database that poses inefficient retrieval and management of data. This process is time consuming, tedious and laborious because the administrator constantly access the data using flash drive in the stand-alone database server. Furthermore, the Short Messaging System (SMS) functionality is not functional hence it does not provide data utilization primarily to notify parents of the student entry and exit in the campus and their where about. This problem is worthy of consideration because all

parents and administrator are always concerned and worry about their student attendance, tendency of cutting classes, safety and where about of the students. In addition to these problems, strict implementation of the "no identification no entry" policy and riddling of unauthorized entry in the campus concerns the administration and provide careful consideration.

By careful consideration of the above problems, the researcher conducted this study to fully utilize the use of RFID, client-server technology and SMS technology to efficiently and effectively manage and monitor the attendance and logging of the students once they enter and leave the school premises and thereby ensures student safety and where about in real time thus give the parents information about the presence of their student in school. Furthermore, the system has the capability of providing printed and electronic reports of students' attendance for specific purposes. The system will fully utilize client-server technology using a central database server that will serve as the core of the system that maximizes the accessing of data effectively. Hence, the system has an online system portal that can be accessed by different departments to post specific announcements to students' made visible at the entrance television screen once they tap their RFID. Moreover, the online system portal provide parents, faculty and various departments login access where they can access student real time logs, post messages and announcements directed to a particular student to call their attention.

**Conceptual Framework**

The researcher used input-process-output (IPO) model as shown in Figure 1 as a guiding tool hence the electronic attendance and logging system was developed. The input contains the knowledge in software development, knowledge in hardware and Information Technology

infrastructure, knowledge in optimizing the RFID, SMS and client-server technology, knowledge in attendance and logging management, Web-based application development and database design.

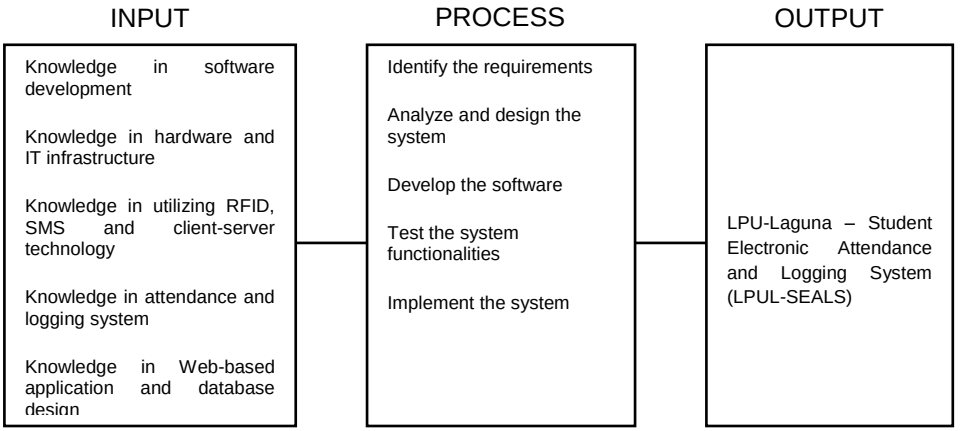


**Figure 1. Developmental framework**

**Objectives of the Study**

The study was designed and developed to create an electronic attendance and logging system in Lyceum of the Philippines – Laguna using RFID and SMS with a Web-based management portal that allows user to access real time data, ensure campus security and information management.

The specific objective of the LPU-LAGUNA SEALS development is to:

1. use the student RFID chip in the ID's as gate pass;
2. send daily SMS to parents about the student campus entry and exit time record;
3. efficiently manage and monitor student attendance and logs thru intranet and online;

4. integrate online system management portal to post messages and access real time logs and attendance;

5. provide database generated printed reports and electronic files of attendance and logs; and,

6. implement the system in Lyceum of the Philippines – Laguna.

## METHODOLOGY

### Research Design

The researcher has used the Rapid Application Development (RAD) shown in Figure 2 as the method of developing the system. The RAD method is a system process model that focuses primarily on the system development portion thereby utilizing the use of prototypes and therefore adjusting requirements as the need may arise.

Building from this method, the researcher takes full advantage of this powerful and agile application development tool to develop the project rapidly without compromising the systems inclusive quality. Furthermore, prototyping is used to help intended users visualize and request changes to the system as it is being built thus allowing applications to evolve incrementally and iteratively.

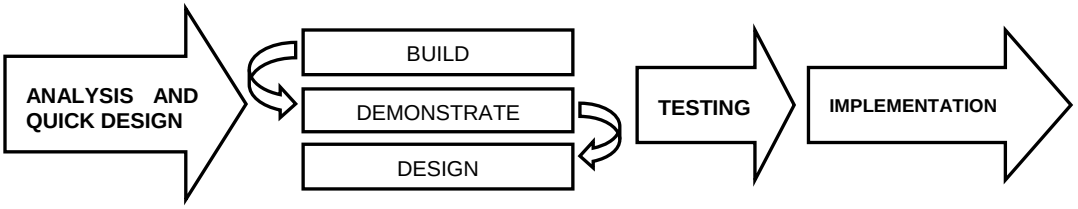


**Figure 2. Rapid Application Development Process.**

Moreover, the RAD structure lifecycle is carefully considered and applied to ensure that the researcher builds the system and its needed technology to meet what the users really need and the system functions offered. In effect, this methodology lifecycle through the four stages includes all of the activities and tasks required to scope and define business and necessary requirements to design, develop, and implement the application system that supports those requirements in order to finish the system and provide the necessary improvements.

**Research Development Process**

The development process step by step procedure is presented as shown in Figure 3. The process follows the identification of the developmental research objectives, then following the analysis of the system requirements, constraints, features and functionalities and then followed by the design stage. The succeeding part is the actual development of the system after which a series of tests was conducted to ensure that the overall system features and functionalities were met.

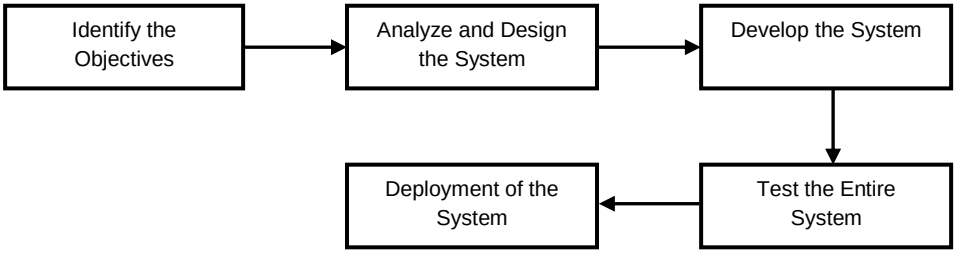


**Figure 3. Flowchart of the project activities**

## RESULTS AND DISCUSSION

The LPU-LAGUNA-SEALS utilizes the use of RFID, SMS and client-server technology to meet the required system functionalities.

According to the study of Zedally et al. (2009) RFID technology is moving rapidly from a limited number of applications to many new areas of applications.

### *A. The RFID*

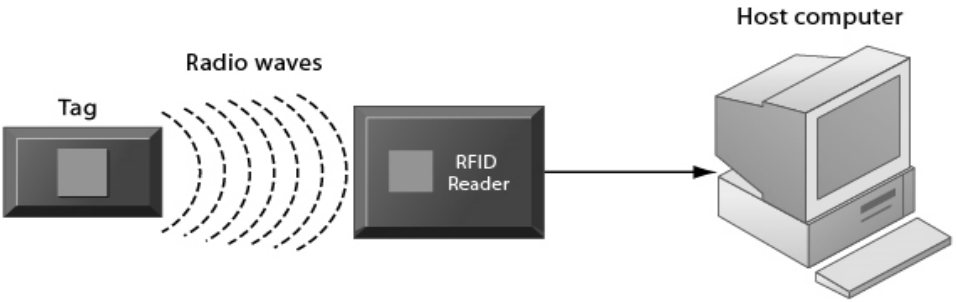


**Figure 4. The Radio Frequency Identification Flow**

The RFID is an acronym for "radio-frequency identification" and usually refers to a technology whereby digital data encoded in RFID tags captured by a reader via radio waves as clearly shown in Figure 4. Moreover, according to the study of Wyld (2006) the RFID is an emerging and widely applied technology that is forecasted to grow exponentially in use over the next decade. The RFID which uses radio waves to identify objects is projected to rapidly supplant bar code technology as the principal means of identifying items in the supply chain and in a wide variety of applications. This explicit overview of the fundamentals of RFID and the technological knowledge and skills of the researcher gives motivation and impetus to diligently endeavor to finish this research.

### *B. The Server, Client, RFID Reader and SMS*

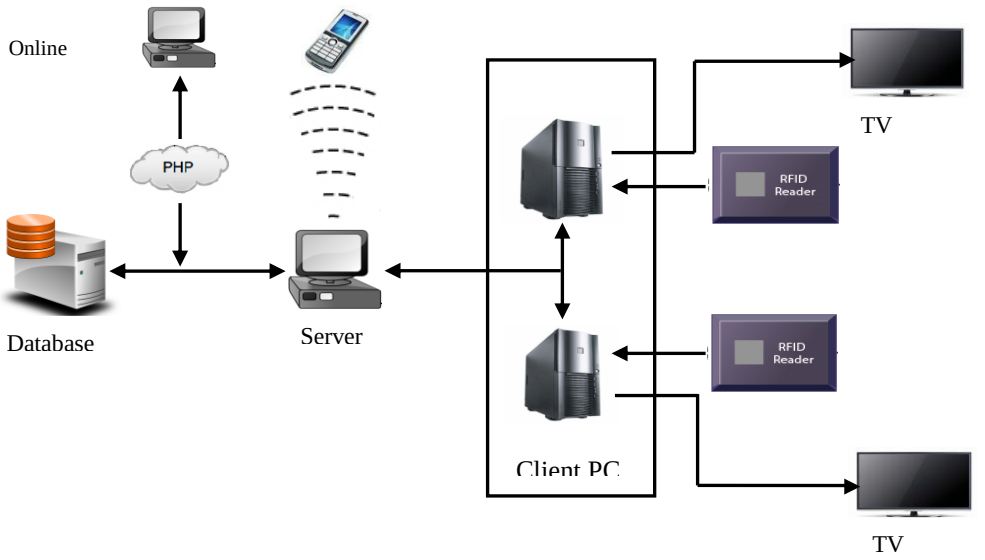


**Figure 5. The System Architecture.**

The diagram as shown in Figure 5 is the actual setup of the system and explains how the system interacts and functions collectively in the infrastructure. The RFID reader is connected to the client computer which retrieves the data from the database server once the RFID taps in the reader. The system validates the input data by checking and comparing the student identification with the RFID code and after a match is found the information is sent back to the client which then be displayed in the television monitor screen. Furthermore, an SMS message will be sent automatically to the cellphones of the parents that is registered in the system once the RFID taps into the system. The report of attendance and logs is also available at

the system server and in the online system portal upon validation of the user login to the server and online portal.

## CONCLUSION

The researcher created an electronic attendance and logging system with the utilization of RFID as students' gate pass and SMS with an integration of online management portal and client-server technology with a database server that provides reliability and security of data.

The system sends daily SMS to parents about the database generated student log-in and log-out time recorded by integrating GSM module and hence the students' attendance and logs is efficiently manage and monitored.

The system has incorporated ubiquitous online system management portal accessed by the different departments where they can post and view messages and announcements. Moreover, parents can readily access attendance and logs in real time in the online system portal using their personal login accounts.

The program provides flexible real time reports of attendance and logs of the students in electronic copy and printed copy format which enhances the system functionality and utilization that helps the institution in information dissemination and management.

The system is implemented in Lyceum of the Philippines – Laguna.

## RECOMMENDATION

The researcher recommends to evaluate the effectiveness of the system using the ISO 9126 model or the Hewlett-Packard model in terms of system performance, functionality, usability, reliability and extensibility.

Moreover, the researcher also recommends the use and integration of turnstile in the system. Hence, the system was developed to ensure security and to track unauthorized entry at the gate entrance it is therefore imperative to recommend to the future researchers to incorporate turnstile into the system that will hold the RFID tag so that campus security will be enhanced.

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