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CAVITE STATE UNIVERSITY – TANZA CAMPUS COMPUTER LABORATORY FINGERPRINT LOG-IN SYSTEM

CHARMAINE T. BANAG
Cavite State University-Tanza Campus, Cavite, Philippines

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ABSTRACT

The Cavite State University – Tanza Campus computer laboratory fingerprint log-in system was developed to monitor and control the use of computers in the laboratory. The study was specifically conducted to determine the features that should be included in the system; evaluate the system in terms of functionality, reliability, usability, efficiency, maintainability, and portability; and determine if the developed system will help in the maintenance of the computer laboratory as perceived by faculty members concerned.

The researcher used the agile software development process to develop the system. Through the self-administered questionnaires, necessary information was collected from faculty members and students. After the system was created, it was prepared for end-users evaluation. A total of 89 participants, of which three were faculty members and 86 were students, rated the system according to its functionality, reliability, usability, efficiency, maintainability, and portability.

The faculty members who utilized the computer laboratory must provide their full name, employee number, designation, and the department where they belong. They must also provide their fingerprint so as to log in before the use of the laboratory. An alternative log-in module is provided such that the faculty members have to provide their username and password. On the other hand, students must provide their student number, full name, curriculum year, and course. The system features are blocking of programs, commands, and message sending, time limiting of a program that is being used, and file transfer. It also has a database for storing the records of authorized users and time logs of each computer user.

The participants evaluated the over-all functionality of the system to be excellent; over-all ratings of other criteria such as reliability, usability, efficiency, maintainability, and portability were likewise rated as excellent. Moreover, all the faculty members utilizing the computer laboratory agreed that the developed system will help in the maintenance of the computer laboratory.

Keywords: fingerprint scanner, computer laboratory, login system

1.0 INTRODUCTION

Cavite State University – Tanza Campus (CvSU-TC) was established in 2007. Through the years, there is an increase number of students enrolled in the campus. With this, the challenge

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of maintaining good teaching methods arise since it is harder to teach many students compared to lesser number on the first years of establishment.

Technology continues to emerge and already became part of human lives. With this, technology-related subjects were realized to be necessary to be taken up by every student. Different computer specialization courses are also offered in almost all Universities and colleges.

CvSU-TC, like any other Universities and colleges, maintain a computer laboratory for facilitating the needs of the students to learn and master their course through the use of computers. The laboratory is mostly used only when there are classes and there is a need for the instructors and students to use the computer to perform their assigned activities and for the instructors' broad discussion. However, some students are using the computers for different purposes rather than participating in the discussion and doing other activities. They also sometimes use the computers in the laboratory without the permission of the instructors or the person in-charge in the laboratory.

With this, the researcher came up with the idea of developing a Computer Laboratory Fingerprint Log-In System for Cavite State University – Tanza Campus which will be used for the instructors' access to computers in the laboratory and for monitoring and controlling the use of programs on the students' computers.

Generally, the study was designed to develop a Cavite State University – Tanza Campus Computer Laboratory Fingerprint Log-in System that monitors and controls the use of computers in the laboratory.

Specifically, the study aims to:

1. Determine the features that should be included on the system?

2. Evaluate the system in terms of:

   a. functionality?
   b. reliability?
   c. usability?
   d. efficiency?
   e. maintainability?
   f. portability?

3. Determine if the developed system will help in the maintenance of the computer laboratory as perceived by the faculty members concerned?

2.0 METHODOLOGY

Internet, books and other related studies were consulted by the researcher to gather useful information for the development of the system.

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Questionnaires were also used to specify the customers' requirements and acquire more information and allow the customers to express their ideas.

Visual Basic was used for writing the code of the system. MS Access was used as the database and Adobe Photoshop for the design of the interface.

For the hardware components, computers, network cable for connecting computer in a network, and TF-MD-M1 fingerprint scanner to read and store the fingerprints of the instructors who are using the system were used.

Agile software development process model was used in the development of the system. The process involves the following:

2.1 Requirements

This is the first step in the agile software development process where the researcher distributed questionnaires to the instructors and students of Cavite State University – Tanza Campus who utilized the computer laboratory during their classes. This is done to collect data and suggestions on what features the system must have. The observation of the researcher also helped in identifying other requirements. The researcher surfed the internet to gather information from the related studies.

The fingerprints of the instructors were registered and stored in the system. This is for verification of the identity of the authorized users. The necessary security of the system was provided to protect the confidentiality of the information recorded in the system.

2.2 Architecture and Design

After recognizing requirements, having background of the campus and understanding how the computer laboratory operates, the system included the following modules: the Log-in, Monitor, Admin and Record.

The Log-in module is where the authorized users access the system by placing their registered finger to the scanner or using the alternative log-in where they are allowed to input their username and password.

The Monitor module contains the options that can be used to monitor or control the students' computers such as opening programs, sending a message, and shutting down the student's computers.

The Admin module is for the administrators' access and control in the system. This contains adding, modifying, or deleting user account or registering or removing client's computers.

The Record module contains the records of the authorized users and the information such as their time logs per subject and the programs or applications that they are allowed to open.

Adobe Photoshop was used to design the system. The dominant colors that were used in the modules are purple and blue to make the data clearer to read.

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2.3 Development

In this phase, evolutionary method of development was used in the system. Adobe Photoshop was then used to design the physical aspect of the system including backgrounds and buttons. Visual Basic was used for the source code and Microsoft Access for the database of the system. At this stage, the fulfillment of the architecture and design was done based on the requirement specifications.

2.4 Test and Feedback

This is where the testing of the development phase product was done. The end-users were asked for their feedback while the system was being developed. The functionality of the system was tested until no error is detected. After this, end-users evaluated the system for acceptance. Evaluation forms were provided to rate the system based on the ISO 9126 quality model of evaluating products with criteria namely functionality, reliability, usability, efficiency, maintainability, and portability.

In order to draw conclusions about the evaluation made by the end users, the weighted mean for each criterion was computed and was interpreted as shown in Table 1.

Table 1. Descriptive Interpretation of the Mean

Numerical Scale	Interpretation
4.21 – 5.00	Excellent
3.41 – 4.20	Very Good
2.61 – 3.40	Good
1.81 – 2.60	Fair
1.00 – 1.80	Poor

3.0 RESULTS AND DISCUSSION

After the data were gathered, they were organized accordingly. Results are presented in the succeeding statements.

3.1 Information Needed to Develop the System

Prior to system development, a self-administered questionnaires were distributed to the faculty members and students to determine the information needed to develop the system. Figure 1 presents the different system features that the end-users wanted to include in the system. It can be seen that most of the participants recommended to include the program blocking, command, and message sending. End-users also suggested to include other features such as file transfer, search box engine and limited time for computer use.

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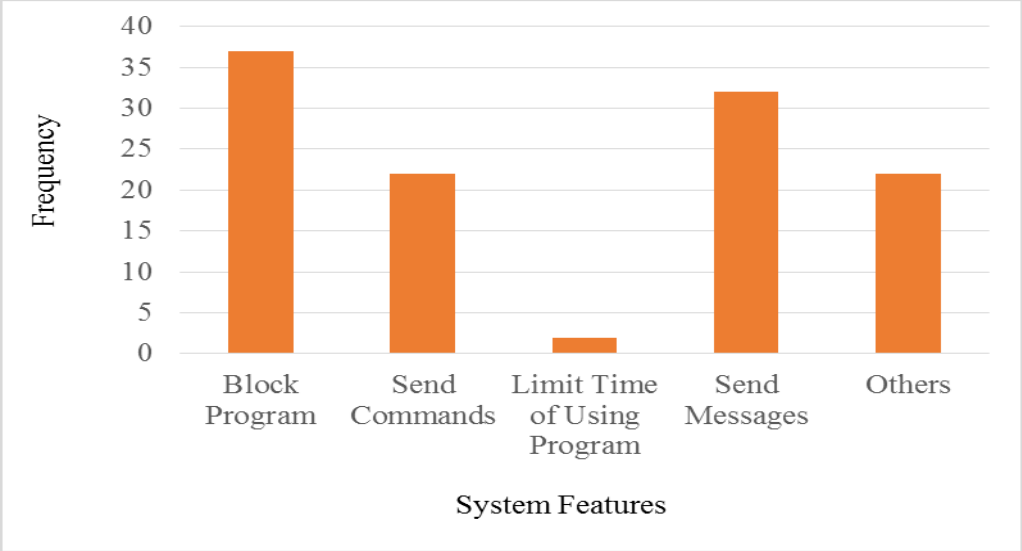

Figure 1. Recommended system features

3.1.1 Instructor's Information

The fingerprint of the instructors, who are using the laboratory, must be registered in the system. The system will allow them to log-in using the fingerprint scanner with their registered finger or an alternative log-in, providing their valid employee number and password. Also, designation and the department where he/she belongs to are required.

3.1.2 Student's Information.

Students who utilize the computer laboratory must provide their student number and full name before having full access to the computer. Also, their curriculum year and course must be provided.

3.1.3 System Features

Faculty members can limit the programs that can be opened and used by the students' computers. After logging – in, the time and information about the instructor and the programs that he/she is allowed to open are recorded. These programs are those software applications that are installed on the server and client computers. They can also limit the time the application can run and also create blank screen after. There is also a warning feature that will allow them to send a message to a specific client's computer to give instructions or warning. This is a one-way communication, where only the server is allowed to send a message to client. A file transfer is also included that enables the server to send files to client that can be useful for student activities.

3.2 Evaluation Results

The functionality of the system was measured in four dimensions: suitability, accuracy, interoperability, and security. As presented in Table 2, the security of the system was rated as excellent, with a weighted mean of 4.45; the other three measures were rated as very good,

with weighted means of 4.10 to 4.15. The over-all rating of the system in terms of its functionality gained a weighted mean of 4.33 and was interpreted as excellent. End-users found the system to be well-secured.

Table 2. Functionality of the system

CRITERIA	WEIGHTED MEAN	INTERPRETATION
Suitability	4.15	Very Good
Accuracy	4.10	Very Good
Interoperability	4.12	Very Good
Security	4.45	Excellent
Over-all Functionality	**4.33**	**Excellent**

The reliability of the system was measured in three dimensions: maturity, fault tolerance, and recoverability. As presented in Table 3, the maturity of the system was rated as excellent, with a weighted mean of 4.29; the other two measures were rated as very good, with weighted means of 4.03 to 4.20. The over-all rating of the system in terms of its reliability gained a weighted mean of 4.24 and was interpreted as excellent. End-users found the system to be excellently matured.

Table 3. Reliability of the system

CRITERIA	WEIGHTED MEAN	INTERPRETATION
Maturity	4.29	Excellent
Fault Tolerance	4.03	Very Good
Recoverability	4.20	Very Good
Over-all Reliability	**4.24**	**Excellent**

The usability of the system was measured in three dimensions: understandability, learnability, and operability. As presented in Table 4, the three measures of usability were rated as excellent, with weighted means of ranging from 4.29 to 4.35. The over-all rating of the system in terms of its usability gained a weighted mean of 4.35 and was interpreted as excellent. End-users found the system to be excellently operable.

Table 4. Usability of the system

CRITERIA	WEIGHTED MEAN	INTERPRETATION
Understandability	4.29	Excellent
Learnability	4.38	Excellent
Operability	4.30	Excellent
Over-all Usability	**4.35**	**Excellent**

The efficiency of the system was measured in two dimensions: time behavior and resource behavior. As presented in Table 5, the two measures of efficiency were rated as excellent, with

weighted means of ranging from 4.24 to 4.28. The over-all rating of the system in terms of its efficiency gained a weighted mean of 4.34 and was interpreted as excellent. End-users found the system to be excellently efficient.

Table 5. Efficiency of the system

CRITERIA	WEIGHTED MEAN	INTERPRETATION
Time Behavior	4.28	Excellent
Resource Behavior	4.24	Excellent
Over-all Efficiency	**4.34**	**Excellent**

The maintainability of the system was measured in four dimensions: analyzability, changeability, stability, and testability. As presented in Table 6, the measures of analyzability, changeability, and testability were rated as excellent with weighted means of 4.23, 4.21, and 4.27, respectively. On the other hand, the stability was rated as very good with a weighted mean of 4.20. The over-all rating of the system in terms of its maintainability gained a weighted mean of 4.26 and was interpreted as excellent. End-users found the system to be excellently maintainable.

Table 6. Maintainability of the system

CRITERIA	WEIGHTED MEAN	INTERPRETATION
Analyzability	4.23	Excellent
Changeability	4.29	Excellent
Stability	4.20	Very Good
Testability	4.27	Excellent
Over-all Maintainability	4.26	Excellent

The portability of the system was measured in four dimensions: adaptability, installability, conformance, and replaceability. As presented in Table 7, the four measures were rated as excellent with weighted means ranging from 4.24 to 4.30. The over-all rating of the system in terms of its portability gained a weighted mean of 4.35 and was interpreted as excellent. End-users found the system to be excellently conformable.

Table 7. Portability of the system

CRITERIA	WEIGHTED MEAN	INTERPRETATION
Adaptability	4.24	Excellent
Installability	4.24	Excellent
Conformance	4.30	Excellent
Replaceability	4.28	Excellent
Over-all Portability	**4.35**	**Excellent**

When faculty members who utilized the computer laboratory were asked if the developed system helped in maintaining the computers in the laboratory, all of them agreed that it was indeed a great help as presented in Table 8.

Table 8. Maintenance of computers in the laboratory

RESPONSES	FREQUENCY	RELATIVE FREQUENCY (%)
Yes	3	100.00
No	0	0.00
Total	**3**	**100.00**

4.0 CONCLUSION

The results showed that the developed system is excellent as perceived by the intended users. All the faculty members agreed that the system was indeed a great help in maintaining the computers and their use inside the computer laboratory. With this, it can be concluded that the developed computer laboratory fingerprint login system successfully met the necessary features useful to the instructors utilizing the computer laboratory of the campus. Further research can be conducted to incorporate a feature where the instructors can easily check the work of the students without checking on computers one by one can be added by the next researchers of this study.

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