SMSECURITY: SECURITY SYSTEM AND SMS NOTIFICATION CUM FACE RECOGNITION

Winston G. Domingo[1], Arnold Dela Cruz[2], Klaida Nicolas[2],
Jennifer A. Gamay MIT[3], Erwin N. Lardizabal[2] and Virdi C. Gonzales[4]

[1]Quirino State University, Maddela, Philippines
[2]College of Information Technology and Engineering, Cagayan Valley Computer and Information Technology, Philippines
[3]Senior High School Department, Cagayan Valley Computer and Information Technology, Philippines
[4]Southern Isabela Medical Center, Philippines

ABSTRACT

This study used the Rapid Application Development (RAD) Methodology ensured that the phases in system development are done in the software building process. A prototype was developed that is used in the pilot implementation and a questionnaire has been distributed to the respondents to gather the information that can be used to determine if the functions of the system can benefit the owner/user. The findings revealed t that the system requires functional requirements such as; the user must be computer literate and knowledgeable on how the security system works, the location must have a Telecommunication signal and USB dongle must have loaded. Non-functional requirements such as; easy to use and high cost but can be useful; Hardware and Software Requirements with the latest version of the software with the help of computers that has higher specifications that the user/homeowner requires to have a user account to access and operate the system the system has good technical performance as to functionality, reliability, efficiency, and usability. Furthermore, the system entailed efficiency and was easy to use by the respondents.

KEYWORDS

SMSecurity, Face Recognition, SMS Notification, Security System, Prototype, Surveillance Security, Face Recognition

1. INTRODUCTION

Studies have been conducted on the effect of a home security system. The results are that as much as 60% of burglars casing a potential target would indeed be deterred by an alarm system or by knowing that the target is installed with security systems. According to the Philippine National Police (PNP), based on statistics gathered from police blotter throughout the country, the crime rate dropped 16.82% from the period July 2016 to June 2017 to the period July 2017 to June 2018, as said by the PNP spokesman Senior Superintendent Benigno Durana "among the 8 focus crimes, the murder had the highest percentage drop, with 37.48% decrease from the period. The homicide rate slightly increased by 1.64% (from 2,444 to 2,484). Incidents of rape went down by 23.96% (from 9,204 to 6,999). Robbery rates also dropped by 27.52% (from 18,071 to 13,098). Incidents of physical injury also decreased by 26.37% (from 34,230 to 27, 374)". Even with the drop in crime rates in the country, the number of crimes that occurred is still alarming and still needs more attention.

In some households in Santiago city, the use of surveillance cameras is commonly used. Even if it consumes a lot of electricity, it has to be turned on the whole day to record and capture events in case a crime or malicious act will be monitored. Even so, some burglars are still brave enough to enter these houses and some are coping with these systems and learning how to counter them. So even with the whole day event recorded, if a crime happened, the surveillance camera can help in solving the crime but not in preventing it. Face recognition is a biometric approach that employs automated methods to verify or recognize the identity of a living person based on his/her physiological characteristics. In general, a biometric identification system makes use of either physiological characteristics (such as a fingerprint, iris pattern, or face) or behaviour patterns (such as hand-writing, voice, or key-stroke pattern) to identify a person. Because of the human inherent protectiveness of /the eyes, some people are reluctant to use eye identification systems. Face recognition has the benefit of being a passive, non-intrusive system to verify personal identity in a "natural" and friendly way [1]. Face recognition starts with the recognition of face patterns is occasionally cluttered scenes, proceeds by normalizing the face images to account for geometrical and illumination changes, possibly using information about the location and appearance of facial landmarks, identifying the faces using appropriate classification algorithms, and post-processes the results using model-based schemes and logistic feedback [1]. Real-time face recognition is part of the field of biometrics. Biometrics is the ability of a computer to recognize a human through a unique physical trait. Face recognition delivers the capability for the computer to recognize a human by facial characteristics. Today, biometrics is one of the fastest-growing fields in advanced technology. Predictions indicate a biometrics explosion in the next century, to authenticate identities and avoid unauthorized access to networks, databases, and facilities. A facial recognition is a device that takes an image or a video of a human face and compares it to other image faces stored in a database. The structure, shape and proportions of the faces are compared during the face recognition steps. In addition, the distance between the eyes, nose, mouth, and jaw, upper outlines of the eye sockets, the sides of the mouth, location of the nose and eyes, and the area surrounding the check bones are also compared [5].

The focus of this project was to develop a security system that helps these surveillance security systems be more functional by adding face recognition to detect if there's an intruder in your home. Once an intruder has been detected, the system will send an alert notification to the owner's mobile phone through SMS and will have the chance to immediately report or alert their guards or neighbours to check the house if something malicious is happening. This will increase the chance of preventing your house from being robbed or prevent larger losses.

The primary purpose of this study is to develop a security system with SMS notification and face recognition. A security system that would maximize the capabilities of surveillance security systems with low cost and will increase the level of security without major changes in required electronic devices. Thus, this study aims to implement a workable security system and sms notification cum face recognition that will address these issues.

1.1. Objectives of the Study

This study was designed to develop the SMSecurity: Security System and SMS Notification cum Face Recognition.

Specifically, this study aimed to:

1. Determine the information requirements of the proposed system;
2. Determine the functional and non-functional features of the proposed system;
3. Design the proposed system;
4. Evaluate the technical performance of the proposed system.

1.2. Research Paradigm

The research paradigm is presented in figure 1. It presents the input, process output of the study with the accompanying feedback from the evaluators expected to hasten the proposed system.
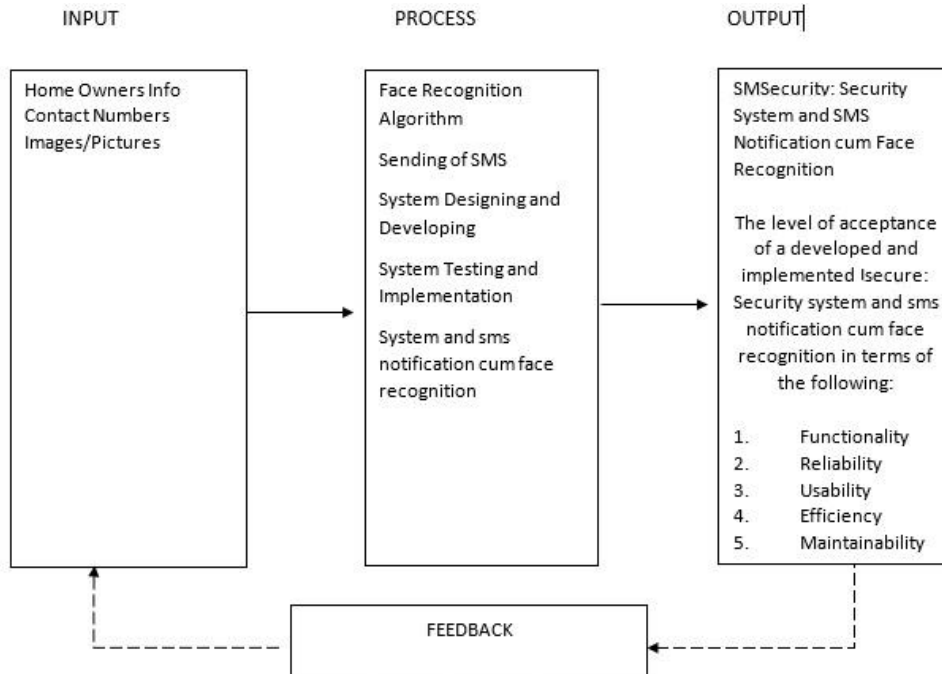

Figure 1. Research Paradigm

The figure represents the paradigm of this study. It represents 3 significant parts: input, process and output.

Input. The input part of the paradigm presents the Home Owners Info, Contact Numbers, Images/Pictures.

Process. This part of the paradigm presents the process of assessing the SMSecurity Face Recognition Algorithm, sending of SMS, System Designing and Developing, System Testing and Implementation, System and SMS notification cum face recognition.

Output. This part of the model presents the functional security system with face recognition and short message service (SMS) notification and it presents the main objective of the study which is assessing the level of acceptability of the developed and implemented smsecurity in terms of System Functionality, System Reliability, System Efficiency and System Usability

2. METHODS

2.1. RESEARCH DESIGN

This study used the developmental research design since it proposed a Security system and SMS notification cum face recognition. It introduced the system flowcharting with the use of symbols and descriptions in the different flows of activities. SMSecurity was described as a new invention of software. The system was created using the methods and procedure of rapid application

development (RAD). This research used the principles and methodologies of Rapid Application Development (RAD). This is shown in the diagram presentation given in figure 2.
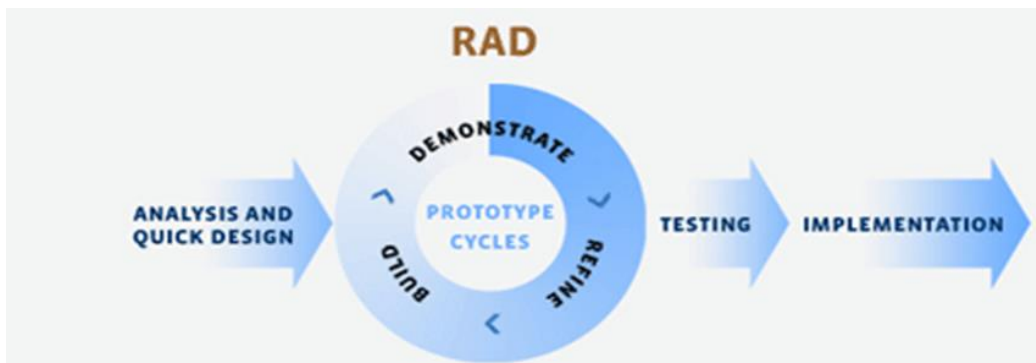

Figure 2. Rapid Application Development (RAD)

Analysis and quick design. The researchers gathered the needed information and analyse these to decide a quick design of the system.

Prototype Cycle. On the prototype cycle, there are three parts, the development phase, demonstrate phase and refine phase.

Develop. In this phase, the researchers have developed the system.
Demonstrate. The researchers demonstrated the developed system.
Refine. The researchers defined and identify the systems' possible refinements and then back to the development phase until there is no such refinement needed.
Testing. The system was tested in its environment.
Deployment. The last phase was deployment but this is not part of the study.

2.2. Research Respondents

The output of this study was tested in a single household in Santiago city and the respondent was the owner of the house where the system was implemented.

2.3. Research Instrument

The ISO 25010 Software Quality Standards was used as an instrument for assessing the **SMSECURITY**: security system and SMS notification cum face recognition.. The developed system evaluated only in the area of System Functionality, System Reliability, System Efficiency and System Usability. The results gathered were analyzed employing the 4-point Likert. (4 – Strongly Agree, 3 – Agree, 2 – Slightly Agree and 1 – Disagree)

2.4. System Architecture and Framework Design

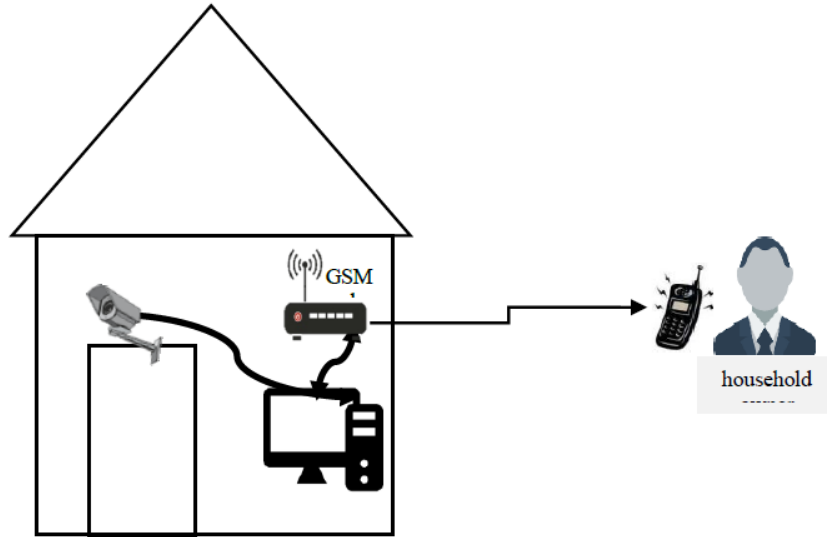### 2.4.1. System Architecture

Figure 3. Technical Framework of the System

Technical Framework. The technical framework of the system is shown in figure 3. The system monitors the house and the computer processes the data taken from the camera and detects the images if they are registered or unregistered. If unregistered, the system sends its command to send a notification/alert to the household owner.

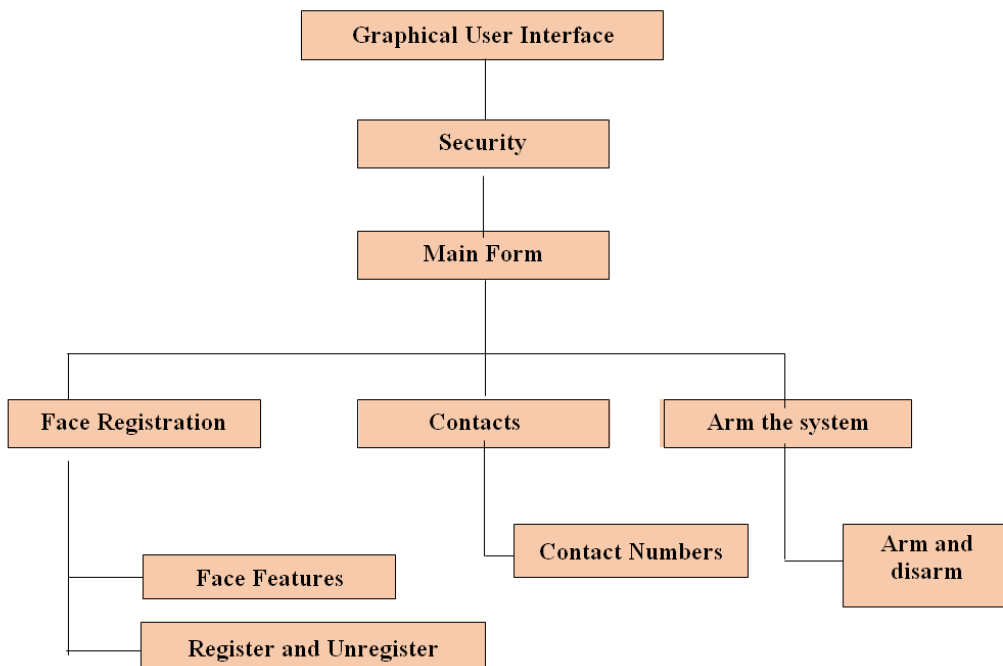### 2.4.2. Hierarchical Input Process Output

Figure 4. Hierarchical Input Process Output Diagram

Figure 4 illustrates the Hierarchical Input Process Output of the system: This figure shows how the system works and the components of each process. It shows the overall design of the system being implemented and the requirements needed. Home Owners module contains, the face features and face registration and unregister, contacts module contains the contact number, arm module contains the arming and disarming of the system

3. RESULTS AND DISCUSSION

3.1. Requirements of the Proposed System

3.1.1. Functional Requirements

- Users must be computer literate and can-do basic computer operations.
- Users must have a knowledge on how the developed computer security system works.
- The location must have a Telecommunication signal.
- Smart/Globe USB Type dongle for SMS Communication and must have loaded.

3.1.2. Non-Functional Requirements

- Easy to use and can be useful interms of security.
- High cost in terms of equipment and system requirements but can be useful and functional in terms of the security.

3.2. Hardware and Software Requirements

Table 1. Hardware and Software Requirements

Software	Requirement
Operating System	Microsoft Windows 8 or Higher
Apache Server	XAMPP
Database Server	MySQL
Microsoft Visual Studio Ultimate	Version 11.0.50727.1 RTMREL
Python	Python 3.7
Hardware	**Requirement**
DESKTOP	
Processor	Intel core i3 or higher recommended
Motherboard	GIGABYTE GA-H110-DS2 1151, DDR3, HDMI
Memory RAM	4GB DDR3 PC10600/1333 or Higher
Hard Disk Drive (HDD)	SP550 120GB SSD
Keyboard/Mouse	USB mouse/ PS2 keyboard
LCD Monitor	AOC/HKC 18.5 LCD Monitor
Automatic Voltage Regulator (AVR)	500VA AVR
CCTV camera	
Dongle with simcard	Powered by Globe or smart telecommunication

3.3. Cost Analysis

Table 2. Cost Analysis

Cost				
Category	**Item**	**Quantity**	**Price**	**Total**
Equipment	Laptop Computer	1	P 14,500	P 14,500
	CCTV Camera	1	P 1,600	P 1,600
	Broadband Dangle	1	P 999	P 999
Total Cost				**P 17, 099**

3.4. Features of the Proposed System

3.4.1. Login Form

The administrator could operate and access the system through the login form. This is a security feature of the system where the only authorized personnel can use and access the system.
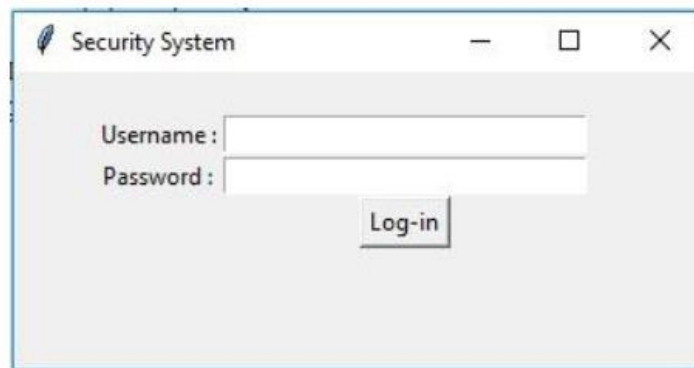

Figure 5. Login Form

3.4.1.1. Security System and Sms Notification Cum Face Recognition

The armed system can recognize registered and unregistered faces and send SMS notifications to the homeowner/user. In figure 6 the system detects a registered and unregistered face.
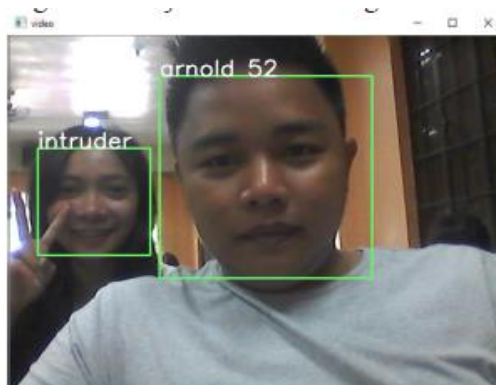

Figure 6. Face Recognition

In figure 7. SMS Notifications. The developed system will sends an SMS notification to the homeowner.
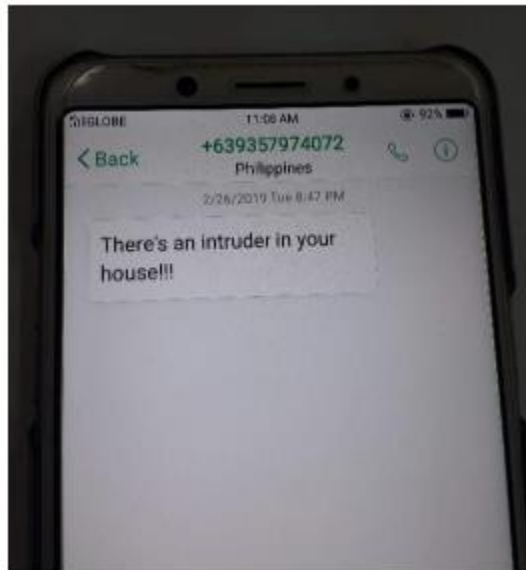

Figure 7. SMS Notifications

3.5. Development of the Proposed System

3.5.1. Pre- Development

In this phase, the researcher gathers the needed information through interviews and summarizes it. The information gathered is used to create a quick design of the system and identify the relevant features that the system must possess. This planning phase must be completed before proceeding to the development phase.

3.5.2. Development

This stage is the proper start of the development of the system. This phrase is where the developers start creating the design GUI's, modules, and database of the system. The researchers start to write codes for the system to work.

3.5.3. Post – Development

This stage of the development of the system where the researchers guaranteed that the software and hardware components of the system are properly working and compatible in its working environment. In addition, this phase determined the revisions and recommendations before the implementation of the system in the actual environment.

3.6. Assessing the Technical Performance of the Proposed System

Table 3. Mean Score on the Evaluation of Technical Performance of the Proposed System according to System Functionality

Indicators		Mean	Descriptive Interpretation
1	The developed system does what is appropriate	3.57	Strongly Agree
2	The developed system meets all available functions required	3.40	Agree
3	The developed system does what was proposed correctly	3.33	Agree
4	The developed system is precise in executing its functions	3.43	Agree
5	The developed system interacts with the specified modules	3.37	Agree
6	The developed system has the capacity for multiuser processing	3.00	Agree
7	The developed system has secure access through passwords	3.33	Agree
8	The developed system has an internal backup routine	3.27	Agree
Overall Mean		3.34	Agree

The ratings were as follows: 3.50– 4.0= Strongly Agree; 2.50 – 3.49 = Agree;
1.50 - 2.49 -= Slightly Agree; and 1.0 -1.49= Disagree

Table 3 presents the mean score on the Evaluation of Technical Performance of the Proposed System according to System Functionality. It can be seen that respondents revealed that the proposed system was functional since it vouched for high perceptions among the given indicators with an overall mean score of 3.34 which was equated as "Agree". Furthermore, "the system does what is appropriate " got the highest mean score of 3.57 which was interpreted as "Strongly Agree. even though all given indicators vouched for high results, it can be also noted that "the system has capacity for multiuser processing" got the lowest mean score of 3.00. Hence, this implied that the proposed system's technical performance was functional.

Table 4. Mean Score on the Evaluation of the Technical Performance of
the Proposed System according to System Reliability

Indicators		Mean	Descriptive Interpretation
1	The system has frequent failures	3.10	Agree
2	The system reacts when the malfunction occurred	3.33	Agree
3	The system notifies the users about invalid data entry	3.37	Agree
4	The system is capable to recover data when the failure occurred	3.10	Agree
Overall Mean		3.10	Agree

The ratings were as follows: 3.50– 4.0= Strongly Agree; 2.50 – 3.49 = Agree;
1.50 - 2.49 -= Slightly Agree; and 1.0 -1.49= Disagree

Table 4 shows the mean score on the evaluation of the technical performance of the proposed system according to system reliability. The foregoing results showed that the respondents agreed that the proposed system has good technicalities when it comes to reliability with a mean score of 3.10. More so, it can be observed that "the system notify the users about invalid data entry" got the highest mean score of 3.37. This can be attributed to the fact that the proposed system satisfactorily perform the task for which it was designed or intended, for a specified time and in a specified environment

Table 5. Mean Score on the Evaluation of the Technical Performance of the Proposed System according to System Efficiency

Indicators		Mean	Descriptive Interpretation
1	The system has frequent failures	3.67	Strongly Agree
2	The system reacts when the malfunction occurred	3.53	Strongly Agree
3	The system notifies the users about invalid data entry	3.53	Strongly Agree
Overall Mean		**3.58**	**Strongly Agree**

The ratings were as follows: 3.50– 4.0= Strongly Agree; 2.50 – 3.49 = Agree;
1.50 - 2.49 -= Slightly Agree; and 1.0 -1.49= Disagree

Table 5 shows the mean score on the evaluation of the technical performance of the proposed system according to system efficiency. Results revealed that the respondents strongly agreed that the proposed system entailed efficiency when it comes to its technical performance with a mean score of 3.58. This means that the system was efficient for the highest utility to the user.

Table 6. Mean Score on the Evaluation of the Technical Performance of the Proposed System according to System Usability

Indicators		Mean	Descriptive Interpretation
1	It is easy to learn how to use	3.67	Strongly Agree
2	It is easy to adapt the concept and application	3.4	Agree
3	It is easy to perform its functions	3.27	Agree
4	It is easy to operate and user friendly	3.33	Agree
5	The system meets the requirements needed	3.57	Strongly Agree
6	The system facilitates users' data entry	3.33	Agree
7	The system facilitates user data retrieval	3.47	Agree
Overall Mean		3.43	**Agree**

The ratings were as follows: 3.50– 4.0= Strongly Agree; 2.50 – 3.49 = Agree;
1.50 - 2.49 -= Slightly Agree; and 1.0 -1.49= Disagree

Table 6 shows the mean score on the evaluation of the technical performance of the proposed system according to system usability. Results showed that the respondents agreed that the proposed system can be easily used with a mean score of 3.43. Furthermore, results also revealed that the system is easy to learn how to use and the system meets the requirements needed which vouched for higher agreeable perceptions with mean scores of 3.67 and 3.57 respectively. On the other hand, it can be attributed to the fact that the proposed system has ease of use and learnability of a human-made object and it will result in satisfaction in a quantified context of use.

4. CONCLUSIONS

Based on the evaluation made by the respondents on the developed system, the researcher arrived at the following conclusions: that the system requires functional requirements such as; the user must be computer literate and knowledgeable on how the security system works, the location must have Telecommunication signal and USB dongle must have loaded. Non-functional requirements such as; easy to use and high cost but can be useful; Hardware and Software Requirements with the latest version of the software with the help of computers that has higher specifications that the user/homeowner requires to have a user account to access and operate the

system the system has good technical performance as to functionality, reliability, efficiency, and usability. Furthermore, the system entailed efficiency and was easy to use by the respondents.

ACKNOWLEDGEMENTS

REFERENCES

[1]   A. S. Tolba, A.H. El-Baz, and A.A. El-Harby (2002). Face Recognition: A Literature   Review,2(3), 12-16

[2]   S. Muruganantham, Member IACSIT and Dr. T. Jebarajan(2012). A Comprehensive Review of Significant Researches on Face Recognition Based on Various Conditions, International Journal Thesis, 2(4), 15-26

[3]   Ashraf Elfasakhany1,2, Jorge Hernández2, Juan Carlos García2, Mario Reyes2, Francisco Martell2 (2011). Design and Development of a House-Mobile Security System, International Journal Thesis, 12(8), 16-26.

[4]   Jayashri Bangali1 and Arvind Shaligram2 (2013). Design and Implementation of Security Systems for Smart Home based on GSM Technology, Department of Electronic Science, International Journal of Engineering Research and Technology, 3(2), 1406-1410.

[5]   Michel Owayjan, Amer Dergham, Gerges Haber, Nidal Fakih, Ahmad Hamoush, Elie Abdo (2013). Face Recognition Security System, AUST. International Journal of Engineering Research, 3(2), 14-26.

[6]   Abhishek S. Parab M.Sc Computer Science student Mithibai College Mumbai, Maharashtra, India Amol Joglekar (2015). Mithibai College. Implementation of Home Security System using GSM module and Microcontroller, International Journal Thesis, 7(5), 23-34.

AUTHORS

Winston Domingo, Instructor of Quirino State University – Maddela Campus

Arnold Dela Cruz, Student of Bachelor of Science in Information Technology, Cagayan Valley Computer and Information Technology

Klaida Nicolas, Student of Bachelor of Science in Information Technology, Cagayan Valley Computer and Information Technology

Jennifer A Gamay, MIT, Principal of Senior High School Department, Cagayan Valley Computer and Information Technology

Erwin N. Lardizabal, Dean of College of Information Technology and Engineering, Cagayan Valley Computer and Information Technology

Virdi C. Gonzales, System Administrator of Southern Isabela Medical Center, Isabela