BUSITEMA UNIVERSITY

FACULTY OF ENGINEERING

DEPARTMENT OF COMPUTER ENGINEERING

GSM BASED DOOR LOCKSET MONITORING SYSTEM

BY

MWESIGWA JONATHAN

BU-UG-2012-79

JUNE 2016

DECLARATION

I MWESIGWA JONATHAN BU/UG/2012/79 hereby declare that this project report is my original work except where explicit citation has been made and it has not been presented to any institution of higher learning for any academic award.

Signature…….

Date……

APPROVAL

This is to certify that the project report under the title “GSM Based Door Lockset Monitoring System” has been done under my supervision and is now ready for examination.

MWESIGWA JONATHAN.

Signature:…….

Date:……..……...

Mr.Lusiba Badru.

ACKNOWLEDGEMENTS

Great appreciation goes to my family members especially Dad, Mum, friends e.g Caroline Namale, Lule Steven, coursements and relatives for the support and encouragement.

I also thank Mr. Lusiba Badru and the entire staff of Busitema University computer engineering department for the knowledge, guidance and support during the preparation of this proposal.

May the ALMIGHTY GOD bless the works of your hands.

Thank you very much.

ABSTRACT

The GSM Based Door lockset monitoring system is a system capable of alerting three household members/ heads whose mobile numbers have been registered into the system in case a key, wire or any metal is entered into the door lockset hole. It also alerts neighbours with an alarm from a buzzer. The contribution or significance of this system is that it performs real time monitoring of the system then alerts household members even in far distant areas within the country and neighbours that is if electric power and good telephony network are reliable.

TABLE OF CONTENTS

DECLARATION i
APPROVAL iii
ACKNOWLEDGEMENTS iv
ABSTRACT v
LIST OF FIGURES ix
LIST OF ABBREVIATIONS. x
CHAPTER ONE 1
INTRODUCTION 1
1.1 Background 1
1.2 Problem statement. 2
1.3 Objectives 2
1.3.1 Main objectives 3
1.3.2 Specific Objectives 3
1.4 Justification/Significance 3
1.5 Scope 3
1.5.1 Content Scope 4
1.5.2 Geographical scope 4
1.5.3 Time scope 4
CHAPTER TWO 5
LITERATURE REVIEW 5
2.0 Introduction 5
2.1 Door 5
2.1.1 Types of doors 5
2.1.2 Features of a door 6
2.2 Door Security 9
2.3 Review of available door lockset security systems 9
2.3.1 Mechanical Door lockset security systems. 10
2.3.2 Electronic door lockset security systems. 11

2.4Weaknesses of the systems. 12
2.4.1 Mechanical Door lockset security systems. 13
2.4.2 Electronic door lockset security systems. 14
2.5 Description of the GSM based door Lockset Monitoring System. 14
2.6 Technologies to be used in door lockset security systems. 14
2.6.1 Global System for Mobile Communications (GSM) technology. 14
2.6.2Arduino board with Microcontroller technology 15
CHAPTER THREE 17
METHODOLOGY 17
3.0 Introduction 17
3.1 System Study 17
3.1.1 Requirement elicitation. 17
3.1.2 Requirement Analysis 18
3.2 System Design 18
3.2.1 Hardware components. 19
3.2.2 Design and development tools. 20
3.3 System Implementation 20
3.4 System testing and validation 20
3.4.1 Unit testing 20
3.4.2 Integration testing 20
3.4.3 System testing 21
CHAPTER FOUR 22
SYSTEM ANALYSIS AND DESIGN 22
4.0 Introduction 22
4.1 System requirements specification 22
4.1.1 Functional requirements 22
4.1.2 Nonfunctional requirements 22
4.2 Deployment Requirements 23

4.3 System design 23
iv) Keypad 26
4.3.1 Dataflow Diagram 27
4.3.2 Circuit diagram 28
CHAPTER FIVE 29
IMPLEMENTATION AND TESTING 29
5.1 Development platforms 29
5.1.1 Proteus 29
5.1.2 Arduino 1.5 29
5.2 Code Designs 29
5.3 System Testing and Verification 32
5.3.1 Unit Testing and verification 32
5.3.2 Integration Testing and verification 32
5.4 Validation 33
5.5 Evaluation 33
5.5.1 How the system solves the weaknesses talked about in chapter two. 33
CHAPTER 6 35
DISCUSSION AND RECOMMENDATION 35
6.1 Work Summary 35
6.2 Conclusion 35
6.3 Recommendations 35
REFERENCES 36
APPENDICES
a) Project Code Design.
b) Circuit Diagram.
c) Interview Questioneer to Busia Police DPC or O.C or any available officer.
d) Interview Questioneer to a house hold head or member in Busia district.
e) Interview Questioneer to validate the system.
f) Interview Questioneer to evaluate the system.

LIST OF FIGURES

Figure 2.1: Parts of a hinge. Source:[8]. 7
Figure 2.2: Types of hinges: Source:[8]. 7
Figure 2.3: Offset pivots: Source: [8] 7
Figure2.4: Center hung pivots: Source:[8]..... 8
Figure 2.5: GSM architecture. Source:[18]..... 15
Figure 4.6: System Conceptual diagram. 24
Figure 4.7: LCD to display results. 25
Figure 4.8: GSM MODEM 26
Figure 4.9: Keypad for inputting phone numbers 26
Figure 4.10: Flow Chart. 28
Figure 4.11: System Circuit diagram 28
Figure 5.12: System Evaluation 33

LIST OF ABBREVIATIONS.

ADC	Analog to Digital Convertor
AUC	Authentication Center
BSCS	Base Station Controllers
CCTV	Closed Circuit Television
CPNI	Centre for the Protection of National Infrastructure
DPC	District Police Commissioner
EIR	Equipment Identity Register
ESS	Electronic Security System
GPRS	General Packet Radio Service
GSM	Global System for Mobile Communications
HLR	Home Location Register
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LV	Liverpool Victoria
MSC	Mobile Switching Centers
PBAS	Physical Barrier Attack Standard
PWM	Pulse Width Modulation
RX	Reception Transmission
SIM	Subscriber Identification Module
TX	Serial Transmission.
VLR	Visitor Location Register

CHAPTER ONE

INTRODUCTION

1.1 Background

Often in time when going to work or for functions, we lock our houses in order to ensure security and safety of our property. Insecurity in a house can be caused by a number of factors including burglars who enter and steal property, it can also be caused by animals which may enter and destroy our property or later cause un comfort to the house hold when found in. In 2004 the Bureau of Justice Michigan city reported that: 77% of all crime was property related, 17% of all crime domiciles were violated by a burglar and 85% of all burglaries the offender gained entry into the house or other building[1]. It was noted that Uganda had a slightly higher rate of attempted burglary of 10.5%, followed by Zimbabwe with 7.2% while South Africa's rate is again considerably lower at 3.7% of the interviewed sample size. One can only speculate why burglary rates are higher in Zimbabwe and Uganda and it appears that South Africa, being a more developed country, spent more on crime prevention measures such as burglar bars, door locks, etc. The survey shows that 33.8%South Africans installed secure door locksets and 43.8% window or door grilles while the corresponding figures in Zimbabwe are 20.8% for door locks and 20.4% for window or door grilles. Only 10.8% Ugandans installed door locks and 4.2% window or door grilles. Entrance of burglars can be either in the presence of people at home especially during night hours when everyone is asleep or during day when no one is present in a home [2].

Thousands of families are burgled each year by thieves using poorly hidden house spare keys. These spare keys are either stolen at an earlier date or found in a hiding place near the premises such as under a plant pot, doormat, in holes or with trusted friends so that incase theirs are misplaced these spare keys can help out in opening the house. Selwyn Fernandes a managing director of LV home insurance said that "While the number of burglaries is falling overall, it is alarming to see that the number of thefts where the burglar used a key is increasing. Official United Kingdom police figures show that more

REFERENCES

[1] J. N. Bingham, Best Home Security System, Salem Ct Michigan: Clinton Gilkie, 2010.

[2] Gateway and Sabinet, "THE INTERNATIONAL CRIME (VICTIM) SURVEY IN SUB-SAHARAN AFRICA," *Acta Criminologica,* vol. 11, no. 1, pp. 4-5, 1998.

[3] Agency, "Rise in burglaries blamed on house keys left under mat," 08 January 2015. [Online]. [Accessed 08 November 2015].

[4] S. States, Security and Emergency Planning for Water and Wastewater Utilities, Denver: American Water Works Association, 2011.

[5] R. J. Robert J. Fischer, Loss Prevention and Security Procedures: Practical Applications for Contemporary Problems, Oxford: Butterworth-Heinemann, 2000.

[6] Farlex, "TheFreeDictionary," Farlex, 5 November 2012. [Online]. [Accessed 4 November 2015].

[7] R. N. Reid, Facility Manager's Guide to Security: Protecting Your Assets, Georgia : The Fairmont Press, Inc., 2005.

[8] E. Sarviel, Construction Estimating Reference Data, Carlsbad: Craftsman Book Company, 1993.

[9] Decker and Black, Customizing Your Home: 25 Step-by-Step Projects for Turning Your New House Into a Home, Quayside, 2002.

[10] B. Global and CPNI, Door Security Hardware. A GUIDE TO SECURITY DOORSETS AND ASSOCIATED, vthiseas, 2015.

[11] T. A. Ricks, B. E. Ricks and J. Dingle, Physical Security and Safety: A Field Guide for the Practitioner, CRC Press, 2014.

[12] D. Bonderud, "4 Common types of front door locks," 24 January 2013. [Online]. [Accessed 2015 November 2015].

[13] Purpura and P. P., Security: An Introduction, CRC Press, 2011.

[14] ABLOY and ASSA, Mechanical Door Hardware, Stockholm: Assa Abloy Group,

1994.

[15] J. M. Edgar, W. D. McInerney and J. A. Mele, The Use of Locks in Physical Crime Prevention: National Crime Prevention Institute, New York : Elsevier, 2013.

[16] W. Allsopp, Unauthorised Access: Physical Penetration Testing For IT Security Teams, Hoboken: John Wiley & Sons, 2010.

[17] Sivarao, "Critical Review of Electro-Mechanical Door Locking System and Proposal towards Development of Innovative Super Energy Saving Door Locking System," *International Journal of Engineering and Innovative Technology,* vol. 2, no. 5, p. 1, 2012.

[18] U. o. Pittsburgh, Signaling Overload Control for Wireless Cellular Networks, Ann Arbor, Michigan: ProQuest, 2008.

[19] J. Nussey, Arduino For Dummies, Hoboken, New Jersey: John Wiley & Sons, 2013.

[20] Barrett and Steven, Arduino Microcontroller: Processing for Everyone! Second Edition, San Rafael: Morgan & Claypool Publishers, 2012.

[21] I. Dey, Qualitative Data Analysis: A User Friendly Guide for Social Scientists, London: Routledge, 2003.