
FACULTY OF ENGINEERING

DEPARTMENT OF COMPUTER ENGINEERING

FINAL YEAR PROJECT REPORT

**TITLE: AN IOT CONTACTLESS DOORBELL AND HOME SECURITY SYSTEM
WITH ALERTS**

BY

AINEBYOONA RONARD

REG. NO: BU/UG/2018/4126

EMAIL: ronaldainebyoona22@gmail.com

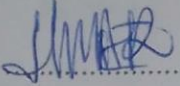
TEL: 0783242515/0758771774

SUPERVISOR: DR. OCEN GILBERT

*A Final Year Project Report Submitted to the Department of Computer
Engineering in Partial Fulfillment of the Requirements for the Award of
a Bachelor's Degree in Computer Engineering of Busitema University
December, 2022*

DECLARATION

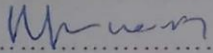
I **AINEBYOONA RONARD** BU/UG/2018/4126 hereby declare that this project report is my original work except where explicit citation has been made and has never been published and/or submitted for any other degree award to any other university or institution of higher learning for any academic award.

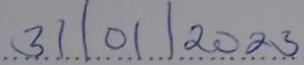
Sign: 

Date: 3rd / 01 / 2023

APPROVAL

The final year project proposal under the title “AN IOT CONTACTLESS DOORBELL AND HOME SECURITY SYSTEM WITH ALERTS” has been done under my guidance and is now ready for examination.

Signature 

Date 

Dr. Ocen Gilbert

Department of computer engineering.

AKNOWLEDGEMENT

My deepest gratitude goes to the almighty God who has kept me alive and provided all that was needed to complete my project successfully in time. Throughout the entire process, he took care of everything that would have stopped me from completing my project and also gave me strength even through some difficult times.

My sincere appreciation goes to my fellow colleagues for their help and support rendered to me throughout our course of study, my supervisor Dr. Ocen Gilbert, the head of the Department Mr. Matovu Davis, and the department as a whole for their guidance, and insight into the concepts of research and project management as well as technical knowledge applicable in the design of systems and without forgetting my dear parents for the financial support given. I say a big thank you to you all.

DEDICATION

I dedicate this project to God Almighty my creator, my strong pillar, my source of inspiration, wisdom, knowledge, and understanding. He has been the source of my strength throughout this entire program since 2018. I also dedicate this work to my Lecturers and my father; Beinomugisha Elisam who has encouraged me all the way and whose encouragement has made sure that I give it all it takes to finish that which I have started. To my mother; Twongirwe Flavia, my brothers and sisters for the support and endeavors you have done for me throughout my entire academic journey. Thank you. My love for you all can never be quantified. God bless you.

ABSTRACT

This report presents the design of an IoT Contactless doorbell and home security system with alerts. The main objective of this project is to develop and implement a highly effective doorway security system that allows real-time monitoring of all people and other things coming across or near the doors and gates of different homes with different intentions. Due to the coming of covid-19 in this 21st century, there has been an increased need for contactless and automated systems in the whole world where we shouldn't be touching anything from outside of our houses as we will be contributing more to the spread of germs everywhere around us which is not what we want right now.

The system consists of two units: Indoor Unit and Outdoor Unit. The outdoor Unit deployed an infrared proximity sensor and ESP32-CAM board with an LED flashlight over it. Usually, a visitor making a visit to someone's place reaches the doorstep and notifies the owner inside by ringing the doorbell available at the doorway. Here the same procedure will be followed except for a minor change that the doorbell switch has been replaced here with a contactless sensor-based switch. So, here the visitor needs to raise his/ her hand closer to the deployed sensor to trigger the doorbell. As soon as the sensor detects someone, the owner inside will be notified by a message on the Blynk project dashboard over the smartphone followed by a visitor's picture clicked by the ESP32-CAM.

The Indoor Unit has a servo motor in control of the user and another IR proximity sensor. The system empowers the user to unlock the door via the smartphone by using a virtual button provided in the Blynk application dashboard created for this project. Also, the user can click multiple pictures of the visitor if required by using another virtual button named 'Take Photo' on the same dashboard screen. The image clicked and the notification appeared on the same dashboard screen the via Blynk server. For the smooth working of this prototype both the devices i.e., ESP32-CAM and the user's smartphone must share the same Wi-Fi credentials, otherwise, there would be no connectivity between the two.

TABLES OF CONTENTS

DECLARATION	Error! Bookmark not defined.
APPROVAL	iii
ACKNOWLEDGEMENT	iv
DEDICATION	v
ABSTRACT	vi
TABLES OF CONTENTS	vii
LIST OF ACRONYMS	x
LIST OF FIGURES	xi
INTRODUCTION	1
1.0 Introduction	1
1.1 BACKGROUND.....	1
1.2 PROBLEM STATEMENT	2
1.3 PROJECT OBJECTIVES.	2
1.3.1 Main objective	2
1.3.2 specific objectives.....	2
1.4 JUSTIFICATION.....	3
1.5 Scope	3
1.5.1 Technical Scope.....	3
1.5.2 Geographical scope.....	3
1.5.3 Time scope.....	3
CHAPTER TWO: LITERATURE REVIEW.....	4
2.1 Introduction	4
2.2 MAIN CONCEPTS OF THE PROJECT	4
2.2.1 Microcontroller Technology.....	4
2.2.2 Contactless Doorbell.....	4
2.2.3 Internet of Things	4
2.2.4 Sensor	5
2.2.5 Camera module.....	5
2.2.6 IR Proximity Sensor Module.....	5
2.3 Existing Systems.....	5

2.4 The Developed System.....	9
CHAPTER THREE: METHODOLOGY	10
3.0 Introduction	10
3.1 Requirements Elicitation	10
3.2 Data Collection Methods.....	10
3.2.1 Literature Review	10
3.2.2 Interviews	10
3.4 Requirement Analysis	11
3.4.1 Functional requirements	11
3.4.2 Non-functional requirements	11
3.5 System Design.....	11
3.5.1 Hardware tools.....	11
3.5.2 Software Tools.....	12
3.5.3 System Block Diagram.....	12
3.6.1 Hardware implementation	13
CHAPTER FOUR: SYSTEM DESIGN AND ANALYSIS.....	14
4.0 Introduction	14
4.1 Functional Analysis	14
4.2 Requirement Analysis	14
4.2.1 Functional Requirements	14
4.2.2 Non-Functional Requirements.....	14
4.3 System Design and Analysis.....	15
4.3.1 Hardware analysis.....	15
4.3.2 Software analysis	15
4.3.3 Logical Design of the System.....	15
4.4 CIRCUIT DIAGRAM	18
4.5 Physical Design	18
CHAPTER FIVE: IMPLEMENTATION AND TESTING	19
5.0 INTRODUCTION	19
5.1 Design and Development Platforms.....	19
5.1.1 Arduino.....	19
5.1.2 Blynk application.....	19

5.1.3 Proteus	19
5.2 Testing	21
5.2.1 Unit Testing	21
5.2.2 Integration Testing.....	22
5.2.3 System Testing	22
5.2.4 System Verification and Validation	23
CHAPTER SIX: DISCUSSION AND RECOMMENDATIONS	24
6.1 Summary of the work done	24
6.2 Appraisal of the project	24
6.3 Recommendations for future work.....	24
Conclusion	24
References	25
Appendices.....	27
(a)Code For the camera and servo motor	27
(b)Code for LCD and IR sensor	34

LIST OF ACRONYMS

1. IoTInternet of things
2. LCD.....Liquid crystal Display
3. GSM..... Global System for Mobile Communications
4. IDE..... Integrated Development Environment
5. USB.....Universal Serial Bus
6. SMS.....Short Message Service
7. SMTP.....Simple mail Transfer Protocol
8. FTDI..... Future Technology Devices International Limited

LIST OF FIGURES

Figure 1: Shows Summary of the Existing Systems	8
Figure 2: System Block Diagram.....	12
Figure 3: Flow chart Diagram.....	17
Figure 4: Circuit Diagram.....	18
Figure 5: Blynk application	20
Figure 6: Showing Testing of LCD and Blynk application	21
Figure 7: Shows testing of buzzer, IR sensor and camera	22

INTRODUCTION

1.0 Introduction

This chapter includes the background, the problem statement, the objectives, the justification and the scope.

1.1 BACKGROUND.

A doorbell is a signaling device that is often installed near a building's entrance door. When a visitor presses a button or switch at the door way, an internal bell rings alerting the occupants of the visitor's presence at the door [1]. A doorbell before consisted of an actual bell that one had to pull with the rope in order to hear it chime, but nowadays, a doorbell consists of a button at the door or gate so that when someone presses it, it alerts the user of the presence of a visitor at the door [1]. Therefore, they allow visitors to announce their presence and request entry into a building as well as enables the occupant to verify the identity of the guests to help prevent home robbery or invasion at a moment's notice [2].

However, due to the coming of covid-19 in this 21st century, there has been an increased need for contactless and automated systems in the whole world where by we shouldn't be touching anything from outside of our house as we will be contributing more to the spread of germs everywhere around us which is not what we want right now [3]. Doorbells play an important role in protecting the security of modern homes since they were invented [4]. Doorbells are the foremost common germs-infected objects in homes, hospitals, factories and older homes because they are the first things to get in contact with visitor [5]. My mission was to create a far better and healthier world and this will be achieved through the use of this designed contactless doorbell as well as a safety system using IoT for automatic recognition and alerting homeowners.

A house feels like a home only when we feel safe in it. Human beings have tried to secure their homes in all available means and the currently accessible methods to secure our doors include traditional padlocks which have been used for centuries, or the more recent smart doorbell locking systems [2].

Being one of the most exceptional inventions in the 21st century, IoT is impacting our daily lives in every possible way and has cleared its path in mostly all fields ranging from health and fitness to smart cities and homes.

References

- [1] E. L. Baraño, MAEd, D. F. Alayon, S. Gabrielle V. Pelaez, and R. David P. Larrauri, “Contactless Doorbell with the Use of an Ultrasonic Sensor,” *Int. J. Res. Publ.*, vol. 97, no. 1, pp. 132–144, 2022, doi: 10.47119/ijrp100971320222974.
- [2] B. Quadros, R. Kadam, K. Saxena, W. Shen, and A. Kobsa, “Dashbell: A Low-cost Smart Doorbell System for Home Use,” 2017, [Online]. Available: <http://arxiv.org/abs/1706.09269>
- [3] “design and construction of an automatic door bell with object detection- for B.Sc, HND, and OND project topics and material | www.hyclasproject.com.” <https://hyclasproject.com/design-and-construction-of-an-automatic-door-bell-with-object-detection.html> (accessed Jul. 13, 2022).
- [4] T. V. N. Rao and K. R. Yellu, “Automatic Safety Home Bell System with Message Enabled Features,” vol. 6, no. 12, pp. 410–413, 2016.
- [5] Alsan Parajuli, “Contactless Smart Doorbell Using ESP8266 & Blynk,” 2020, [Online]. Available: theiotprojects.com/contactless-smart-doorbell-esp8266/
- [6] S. Dadhich, P. Dabre, R. Dabreo, and P. Raut, “Contactless IoT Doorbell for Covid-safe Household,” *IEEE Reg. 10 Humanit. Technol. Conf. R10-HTC*, vol. 2021-September, 2021, doi: 10.1109/R10-HTC53172.2021.9641565.
- [7] “Contactless IoT Doorbell for Covid-safe Household | IEEE Conference Publication | IEEE Xplore.” https://ieeexplore.ieee.org/abstract/document/9641565?casa_token=mhbnZZBVIQIAAA:AA:OtiMqKqlEetZth9DoByHcDZouBviBGhDi-11RIPfr_1wTxHlrCPyS0o7I90yYAmZy18nuH9dSjxF5g (accessed Jul. 20, 2022).
- [8] A. Enriquez, T. H. Tun, and L. Platzer, “Uganda’s National Transport Master Plan,” vol. 2000, no. February, p. 14, 2018.
- [9] A. Sharma, “An IOT Enabled Smart Doorway Security System,” vol. 8, no. 2, pp. 1–4, 2021.
- [10] “Smart Doorbell Security System using IoT | IoTDunia.” <https://iotdunia.com/smart-doorbell-security-system-using-iot/> (accessed Jul. 13, 2022).
- [11] P. Kantha & Priyanka, “Realization of an IoT System to Ensure Doorway Security by Integrating ESP32-CAM with Cloud Server,” pp. 1235–1238, 2020.
- [12] C. El Fiorenza, S. Bompelli, M. Sampath, and M. Ghogre, “Iot Smart Doorbell Surveillance,” *Int. J. Adv. Res. Innov. Ideas Educ.*, vol. 4, no. 2, pp. 2701–2706, 2018.
- [13] J. Kulsiriruangyos, V. Rattanawutikul, P. Sangsartra, and D. Wongsawang, “Home Security System for Alone Elderly People,” *Proc. 2016 5th ICT Int. Student Proj. Conf.*

ICT-ISPC 2016, pp. 65–68, Jul. 2016, doi: 10.1109/ICT-ISPC.2016.7519237.

- [14] A. R. Syafeeza, M. K. Mohd Fitri Alif, Y. Nursyifaa Athirah, A. S. Jaafar, A. H. Norihan, and M. S. Saleha, “IoT based facial recognition door access control home security system using raspberry pi,” *Int. J. Power Electron. Drive Syst.*, vol. 11, no. 1, pp. 417–424, 2020, doi: 10.11591/ijpeds.v11.i1.pp417-424.
- [15] U. Lokesh, M. Logeshwaran, J. J. Jeya Sheela, and S. SK, “Security based Contactless Covid-19 Doorbell using Internet of Things,” pp. 885–892, Jun. 2022, doi: 10.1109/ICICCS53718.2022.9788357.
- [16] Shaik Anwar and D. Kishore, “IOT based Smart Home Security System with Alert and Door Access Control using Smart Phone,” *Int. J. Eng. Res.*, vol. V5, no. 12, pp. 504–509, 2016, doi: 10.17577/ijertv5is120325.