BUSITEMA UNIVERSITY

FACULTY OF ENGINEERING

DEPARTMENT OF COMPUTER ENGINEERING

A FINAL YEAR PROJECT REPORT

TITLE: AN AUTOMATIC PUBLIC TOILET CLEANING SYSTEM

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A Final Year Project Report Submitted to the Department of Computer Engineering in Partial Fulfillment for the Award of the Bachelor of Computer Engineering of Busitema University.
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DEDICATION

I dedicate this report to my beloved Mum Mrs.Nantongo Margret. Her love and support will not cease inspiring me to pursue excellence. She has always been there for me in good and bad times, I love you mum and may the almighty God reward you profusely.

DECLARATION

I, **Tumwiine Emmanuel,** do hereby declare that this project report is my original work and has never been published or submitted for any academic award to any University or institution of higher learning before.

Signature ..... Date 03/09/2019

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APPROVAL

This is to certify that this project entitled "AUTOMATIC PUBLIC TOILET CLEANING SYSTEM" has been done under my supervision and is now ready for examination.

Signature ..... Date 03/09/2019

Name .....

Department of Computer Engineering

Faculty of Engineering

Busitema University

ACKNOWLEGEMENT

I am so grateful to God the Almighty who has seen me through these four years and who by His grace, I keep shining.

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Additionally, special regards go to Mr. James for the time offered during consultation.

LIST OF ACRONYMS

LED	Light Emitting Diodes
DC	Direct Current
IR	Infra-Red
DOF	Degree Of Freedom
RFID	Radio Frequency Identification
PIR	Passive Infra-Red

LIST OF FIGURES

Figure 1The Block Diagram of the proposed System 11
Figure 2Flow diagram for the system 15
Figure 3Schematic diagram of the system 20

LIST OF TABLES

Table 1 Existing system comparison table 7

ABSTRACT

Toilet hygiene is one factor for the user to use the toilet. Most public toilets in Uganda have poor hygiene though various campaigns have been carried out to improve cleanliness. But these things rarely happen due to inevitable way of usage of the users, or as a result of the users' own attitude. Therefore, automatic public toilet cleaning system consist of robotic mechanism has been created aimed to help in keeping public toilets clean.

The application of integrated robotics is becoming increasingly common place in day to day applications. The idea presented in this report seeks to provide a convenient and a hassle-free means of cleaning public toilets whereas maintaining hygienic and sanitary standards. By using an infrared sensor to detect the moving in and out of humans in a toilet, the cleaning operation is fully automated and requires low operational power. Furthermore, a robotic arm is part of the module, so as to thoroughly clean the toilet bowl. Such a provision will limit the role of manpower in maintenance of public toilets to a great degree, and thus, serves as a win-win situation; a revolting objective is accomplished with considerable ease.

TABLE OF CONTENTS

DEDICATION i
DECLARATION ii
APPROVAL iii
ACKNOWLEGEMENT iv
LIST OF ACRONYMS v
LIST OF FIGURES vi
LIST OF TABLES vii
ABSTRACT viii
CHAPTER ONE: 1
INTRODUCTION 1
1.1 Background 1
1.2 Problem statement 2
1.3 Objectives 2
1.3.1 Main Objective 2
1.3.2 Specific objectives 2
1.4 Justification 3
1.5 Scope of study 3
1.5.1 Technical scope 3
1.5.2 Geographical scope 3
1.5.2 Time scope 3
CHAPTER TWO: 4
LITERATURE REVIEW 4
2.1 Introduction 4
2.2 Concepts and descriptions 4
2.3 Existing methods of public toilet cleaning in Uganda. 6
2.3.1 An automatic lavatory-cleaning system. 6
2.3.2 Automatic Mechanical Urinal-Toilet Flusher "NEERFLUSH" 6
2.3.3 Automatic self-clean toilet seat 7
2.4 The research gap 7
2.5 The proposed system 8
2.5.1 Operation of the proposed system 8
CHAPTER THREE: 10
METHODOLOGY 10
3.1 Introduction 10

3.2 Data collection 10
3.3 Requirements analysis 10
3.3.1 Functional requirements 10
3.3.2 Non-functional requirements 11
3.4 System design 11
3.4.1 Block diagram of the system 11
3.5 System implementation 11
3.5.1 Hardware components 11
3.5.2 Software components 12
3.6 System testing and validation 12
3.6.1 Unit testing 12
3.6.2 Integration testing 12
3.6.3 System validation 12
CHAPTER FOUR 13
SYSTEM DESIGN AND ANALYSIS 13
4.0 Introduction 13
4.1 Functional analysis 13
4.2 Requirement Analysis 13
4.2.1 Functional requirements 13
4.2.2 Non-functional requirements 13
4.3 System Design 14
4.3.1 Logical design of the system 14
4.3.2 Physical design 16
4.4 Components Used in Hardware Design 17
4.5 Circuit Diagrams 20
CHAPTER FIVE 21
IMPLEMENTATION AND TESTING 21
5.0 Introduction 21
5.1 Development Platforms 21
5.2 Code Designs 22
5.3 Testing 27
5.3.1 Unit Testing 27
5.3.2 Integration testing 27
5.3.3 System Testing 27
5.4 System Verification and Validation 28
5.5 System evaluation 28

CHAPTER SIX 29
DISCUSSION AND RECOMMENDATIONS 29
6.0 Introduction 29
6.1 Summary of Work Done 29
6.2 Critical Analysis /Appraisal of The Work 29
6.3 Recommendations 30
6.4 Conclusion 30
REFERENCES 31

CHAPTER ONE:

INTRODUCTION

1.1 Background

In Uganda, as well as other developing countries, the increasing population most especially in urban areas stimulates the construction of public toilets and sanitation systems to cater for human well-being[1]. However, in urban centers such as Kampala, both residents and tourists spends full days away from home, moving between destinations and in general people are becoming increasingly mobile, with more and more social groups being liberated from the home. If public toilets are not meeting basic standards, it can seriously affect someone's quality of life, by limiting their freedom to go out, limiting the time that they can spend away from home, and by limiting their movements to places where they know that adequate facilities exist[2]. A public toilet is a room or small building with toilets (or urinals) that does not belong to a particular household. Rather, the toilet is available for use by the general public, customers, travelers, employees of a business, school pupils, prisoners etc. Public toilets are commonly separated into male and female facilities, although some are unisex, especially for small or single-occupancy public toilets[3].
In many urban areas of Uganda, public toilets are of the squat type[4], the prevalence of squatting toilets in these areas seems to be higher than in private since they are regarded by some people as more hygienic than sitting toilets[5]. Also, squatting toilets are easier to clean, therefore potentially more appropriate for general public use[6].

Most of public toilets in urban areas of Uganda are run by private individuals, with caretaker who charge a fee ranging from shs 500 to shs 200 from the public, for both long calls and short calls, depending on the location of the toilet facilities and they are typically found in taxi and bus parks, bars, restaurants, nightclubs or filling stations as well as shopping centers[7].

Public squat toilets are valuable assets that should be kept comfortably used by the public. Bad attitude of some users and not being a responsible polluter is the cause of the unhygienic and untidy toilet, public toilets should be kept clean and comfortable to use, toilet hygiene is important to prevent the spread of germs and bacteria[8]. Another study of sanitation in Kampala, Uganda found that the majority of residents were dissatisfied with the high traffic and low levels of cleanliness of their shared toilet facilities [9].

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