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**FACULTY OF ENGINEERING**  
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RFID Based Automated Supermarket Self-Billing System

By

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## **Declaration**

I Ssekamwa Umar Reg. No BU-UG-2012-95 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.

Sign: .....

Date: .....

## Approval

This is to certify that the project Report under the title “*Rfid Based Automated Supermarket Self-Billing System*” has been done under my supervision and is now ready for examination.

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Sign: .....

Date: .....

## **List of Acronyms**

RFID	Radio Frequency Identification
PCB	Printed Circuit Board
LCD	Liquid Crystal Display
IDE	Integrated Development Environment
LED	Light Emitting Diode
IEEE	Institute of Electrical and Electronics Engineers
WI-FI	Wireless Fidelity
POS	Point Of Sale

## **List of Abbreviations**

TV	Television
OS	Operating System
PC	Personal Computer
3D	Three Dimension

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## **ABSTRACT**

The main objective of the study was to design and implement a system that will automatically bill the customer's goods, using RFID technology. This report categorically describes the tasks that led to the design and implementation of an RFID based supermarket self-billing system.

The major steps involved included the following:

1. Choosing the project
2. Planning, executing and management of the project
3. Documentation

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# CHAPTER ONE: INTRODUCTION

## 1.0 Introduction

This chapter comprises of background, problem statement, justification and objective of the study.

### 1.1 Background

One regular task where human beings spend considerable amount of time in is shopping, according to a survey conducted by US Bureau of Labor, on an average, human beings spend 1.4 hours every day on shopping especially in supermarkets and shopping malls [1]. According to a study conducted by CISCO Internet Business Solution Group, the top four reasons for shoppers to use supermarkets are to; find best price (63%), save time (47%), find best assortment (26%) and find best quality (25%) [2].

The growth of supermarkets is a phenomenon that characterizes many developing countries. The growth of supermarkets in Uganda can be attributed to the country's favorable investment climate coupled with the increase in supermarket demand factors such as the rise in urbanization, the growth of the middle class, and the increase in the number of employment opportunities [3]. This growing number of supermarkets has led to a big percentage of people in Uganda resorting to using supermarkets for shopping than the other shopping centers because of the better services provided. The current Shopping environment can simply be classified into two categories; shopping in-person and shopping in absentia. Shopping in absentia is supported in numerous ways including online shopping, tele-shopping, etc. wherein a shopper does not have to be physically present in the shopping area. Shopping in-person involves customers entering the supermarket and selecting the commodities they want on a self-service basis [4]. These commodities are then presented to the counter for billing and packaging. At the counter, some supermarkets have barcode readers that help cashiers in carrying out the billing by reading the special bar codes tagged on each commodity. While in others, attendants use a manual way with the help of their eyes to check the price tags on the items and feeding those prices into the calculator to get the total cost of things purchased by a particular customer [5].

The available systems present a large number of shoppers in queues at the exit counters as they wait for their items to be tallied hence wastage of customer's time [6].

A survey done by Visa in 2005, points out that 70% of the customers will walk out of the queue if it is too long, and 10% are “seriously annoyed” the moment they step in a queue [7].

Long customer queues can lead to dis-satisfied customers and lost businesses thus need to take measures to reduce queues and improve operation. A study by A. Goldman revealed that how well queues are managed in the service industry can have a tremendous impact on the customer service since nobody enjoys waiting in long lines [6]. Just like in business, time is precious hence need to understand the impact of queues and the effect they have on customers and business. The proposed system will be able to reduce these long queues by eliminating the time wasted at the billing counter as cashiers try to count item per item and in packing the items.

## **1.2 Problem statement**

Supermarkets nowadays are crowded almost every hour of the day due to the increasing number of supermarket users in Uganda. Customers have to wait in long exit queues as the cashier checks out each commodity using a barcode reader or a price tag, and then sends them to the counter assistant for packing before they are given to the customer. This leads to wastage of valuable customer time in supermarket queues. This system therefore will address this problem by introducing automatic self-billing of all commodities in the shopping bag of the customer using RFID technology.

## **1.3 Objectives**

### **1.3.1 Main objective**

To design and implement a system that will automatically bill the customer’s goods, using RFID technology.

### **1.3.2 Specific objectives**

- i. To review, identify and analyze the requirements for the design of an automated supermarket self-billing system.
- ii. To design the user interface, hardware and database modules of the proposed system.
- iii. To develop the proposed system by integrating the different modules.
- iv. To test and implement the proposed system.

## **1.4 Justification**

With the everyday increasing level of technology, there is need to think of an immediate technical solution that can solve problems faced by people in the day to day life hence making life more comfortable.

There was need to develop a system that can make shopping in supermarkets easy, more enjoyable and interesting by reducing on the time spent by shoppers in exit queues. There was also need to reduce on human effort required during billing and packing of commodities at exit counters by automating the billing process and eliminating the packing effort, hence increasing cashiers' efficiency and reducing on supermarket operation expenditure. The developed system is able to meet the above needs.

## **1.5 Scope of the study**

### **1.5.1 Content scope**

This system was developed for only billing counters of large supermarkets in Uganda which have a well-organized environment and quite a big number of potential customers.

The system bills only items which can fit in shopping bags available in supermarkets today and single items of medium size (approx. 1 square meter) presented in its reading range.

The system was designed for “single-customer” use at a time i.e. one customer approaching the counter at a time.

### **1.5.2 Time Scope**

The project was scheduled to be developed in eight months starting September 2015 to May 2016.

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