BUSITEMA UNIVERSITY

FACULTY OF ENGINEERING

DEPARTMENT OF COMPUTER ENGINEERING

An Automated Post Office Box Mail Detection and Notification System

By

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DECLARATION

I Namuyomba Victoria Reg No BU/UG/2012/85 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 this project report under the title "*an automated post office box mail detection and notification system"* has been done under my supervision and is now ready for examination

Department of Computer Engineering

Sign:………………………………….

Date:……………………………………..

ACKNOWLEDGEMENT

Firstly, I thank the almighty GOD for His divine wisdom, and direction; I owe my life to him.

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LIST OF ABBREVIATIONS

AC-DC   -   Alternating Current-Direct Current

GSM   -   Global System for Mobile

ICT   -   Information and Communication Technology

IR   -   Infrared

MODEM   -   Modulation Demodulation

PCB   -   Printed Circuit Board

PIC   -   Programmable Interface Controller

PO   -   Post Office

SIM   -   Subscriber Identity Module

SMS   -   Short Message System

UBOS   -   Uganda Bureau of Statistics

UCC   -   Uganda Communication Commission

UPL   -   Uganda Post Limited.

LCD   -   Liquid Crystal Display

EEPROM   -   Electrically Erasable Programmable Read Only Memory

LED   -   Light Emitting Diode.

PC   -   Personal Computer.

USB   -   Universal Serial Bus.

IDE   -   Integrated Development Environment

A/D   -   Analog Digital

USART   -   Universal Asynchronous Receiver/Transmitter.

RISC   -   Reduced Instruction Set Computer

ISP   -   In-systems Programmer.

ABSTRACT

Modern technology of using embedded systems has taken root in almost every sector in Uganda today and this is because of advancement in technology. Much as Posta Uganda has tried to improve most of its services and it has not yet catered for the post office box rental services in a sense that the service still requires the presence of the box owner in order to find out the status of their box. The owner has to make probability trips to the postal office station to find out whether they have mail or not. And for the cases where they don't find any mail in their box, they become frustrated since they have wasted their time coming to check. Therefore there was a need for a system that can inform them whether they have received mail or not so that they come with the assurance that they have mail. Therefore having been interested in solving this problem came up with an automated post office box detection and notification system that can notify the owner of the box with an SMS that they have received mail together with the weight of the mail they have received. All the information in this report was gathered from the internet and consultations from Posta Uganda counter personnel. The system was designed in Proteus ISIS software and code written in Arduino using C++. The system was tested using the following tools Arduino Uno board, serial monitor, and digital multimeters. The system was then validated and verified to see if it's actually doing what it is supposed to do. This project was developed in a period of 5 months.

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CHAPTER ONE

1.0 INTRODUCTION

The post remains vital in the socio-economic development of our country because the post provides letter post, parcel and express services. [1] In Uganda, it is handled by Uganda Post Limited trading as Posta Uganda.

The volume of letters handled by Posta Uganda increased by 54.3 percent from 2.4 million in 2010 to 3.7 million in 2011. Parcels received from abroad increased by 45.7 percent from 12,931 in 2010 to 18,800 in 2011. The biggest volume of total letters was posted internally either from up-country offices to the general post office. [2]However, it has been noted that the volume of letters handled by Posta Uganda has dropped over the past years. In 2013 UBOS recorded that letters handled by Posta fell from 30 percent from 3.7 million in 2011 to 2.6 million 2012.

Despite the general decline of the volume of letters, parcels handled had increased substantially from 194,856 in 2011 to 256,089 in 2012.Much as there is widespread use of emails, when it comes to exchange of physical items people still need to use postal services whether it is through ordinary postage or Posta's expedited mail option "Ms Akullo said" [3]

In addition, according to the UCC, only 41 percentage of the 131 post offices countrywide receive daily mail deliveries while 40 percentage receive letters four times a week and 19 percentage receive mail once every week. [4]

The reason as to why the postal sector is still lagging behind is because there has been less integration of ICT in its services especially the post office box rentals. Engineer Jonas Bantulaki director, completion and consumer affairs UCC encouraged private sector participation in the postal sector. He noted that there are 32licencesd postal and courier service providers. He said that letter box penetration rate stands at one box for every 94 households.

He continued to say that the most outstanding challenge of the postal subsector is the insufficient use of ICT. This has made the postal sector less efficient as compared to telecommunications and internet. He said the commission wants the postal and courier companies to modernize their services in order to keep in touch with the market through provision of affordable and reliable postal and ICT services to the customers. [5]

1.1 BACKGROUND

Posta Uganda is the most extensive provider of postal services in Uganda, having an extensive network of postal delivery outlets down to sub-country level. Letters or packages are delivered to over 70,000 active post office boxes all over the country in 334 post offices. [6]Post office boxes are rented at a fee of 35100 Ugandan shillings for a small box and 46800 Ugandan shillings for a big box per year. To acquire a box, one needs to go to the Post Office station of your choice and fill out an application form and then immediately be allocated a P.O Box Number.[7]

 Some of the postal stations or outlets include main branch near Bank of Uganda, Mulago, Clock tower, Wandegeya, Nakawa, Mengo, kyambogo, Entebbe and others spread out in the rest of the country for example Mbale, Mityana, Arua,Jinja, Mbarara, kasese, Hoima etc. [8]The boxes are individually and uniquely numbered within each post office outlet. They are physically located in the post office station building and user usually gains access to their boxes through the post office station building. Each box requires a key to gain access to its contents.

 After the mail handler drops mail items in their boxes, there is no means by which they are notified that they have mail. So for the user to find out that they have mail, they make a trip to the postal office station building that holds their box to check for any received mail. The user makes these trips on probability whether to find or not to find any mails in the box. For circumstances where they find no mail, it's frustrating and costly because they have put their time, money and energy to get to the post office station and yet don't find anything in their boxes.

 However, some customers take the initiative to call the customer care personnel via the Posta Uganda help line to inquire if they have received any mails. This is not very effective because the customer care personnel are not there to monitor every person's box who is receiving mail since they have other responsibilities they handle. Posta Uganda has also put up the post alert service that alerts users when they receive mail. It's a service subscribed for at a cost. A person who may want to use it fills an application letter which has to be accepted by Posta Uganda. When the letter is accepted, the person gives in the details of their name and phone number or email address (optional). Upon full subscription

to the service, a label on the user's post office box showing that they are subscribed to the post alert service. [9]

Whenever the mail man comes to drop the letters into the user's box, he uses a gadget to send the user's box number to the server that has all those people subscribed to the post alert service and then the server in return sends the notification to the receiver that they have received mail via email or SMS on their mobile phone.

However, this service cannot enable the user to query the box for its status i.e. whether there is mail and also the weight of the mail in their box. Therefore this arises the challenge that Posta Uganda needs to provide better services to its customers to increase their convenience and continuously be updated of the status of their boxes. One of the major solutions is to integrate new technologies with the current ongoing systems in the physical post office boxes. Employing an automated post office box mail detection and notification system is one of the ways services offered by Posta Uganda can be improved. This removes the old traditional system of coming to the postal station building where you own a box with the possibility of either finding or not finding mail in your box to being sure that you have mail with the intention of avoiding unfruitful journeys and also being updated of the events that are within or happening to your box at the postal station.

1.2 PROBLEM STATEMENT

Apparently, the current post office boxes are still fashioned in the old traditional way of not having any modern technologies integrated with them to be specific communication technologies for this matter. As a result users of post office boxes can't know the status of their box remotely i.e. whether it has mail or not. Therefore users has to move to the post office box stations to find out whether they have mail or not. This brings about the problem of time wastage whenever the user comes to the postal stations but finds no mail in their box.

1.3 OBJECTIVES

1.3.1 Main objective

To design and implement an automated post office box mail detection and notification system that updates the user about the status of their box.

1.3.2 Specific objectives

      I.   To review the existing literature on the post office box system and identify the requirements necessary for designing the proposed system.

     II.   To design a module for detecting and measuring the approximate weight of mail in a user's post office box.

    III.   To develop the algorithm for notifying the users about the availability of mail in their box using GSM.

    IV.   To integrate the module and algorithm in order to achieve the proposed system

     V.   To test and validate the system.

1.4 JUSTIFICATION

People still use the post office boxes for posting and receiving mail and whereby those who use them actively always expect to receive something in their boxes. Therefore it's very important that they are kept updated of whatever is happening to their box.

However since the current post office box system was still fashioned in the old traditional way, there are no means by which the user gets to know the status of their box. Therefore for the user to find out all this, they make probability trips to the postal station with the hope of either finding or not finding mail in their box. This becomes frustrating especially in the times when you go to the postal office but only to find your box empty or to find that the mail you are expecting has not yet reached. So there is a need for a system that omits the frustrations and probability trips made to the postal station by assuring and updating the user about the presence of mail in their box.

Still some users are sluggish when it comes to picking up mail from their boxes reason being they live in ignorance of what they receive. They never get to know the kind of packages they receive therefore attach no value on them thereby seeing no reason to hurry and rush off to the postal office to pick them up yet they would be of importance to them. This means that stopping on just notifying the user about the presence of mail in their box does not benefit those who are slow to pick their mail, those who are busy. Which means there is a need for a system that could show the user the weight of mail received so that they value it accordingly.

1.5 SCOPE

This scope was limited to developing an automated post office box mail detection and notification system.

The system is able to detect any mails received in the user's box then after notify the user on his/her mobile phones that they have received mail via an SMS. The system is able to send the approximate weight of the mail received in the notification message.

The system was designed within a time period of 5months and has been developed for users of post office boxes in Posta Uganda.

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