TRAILER CONTAINER LOCK MONITORING SYSTEM

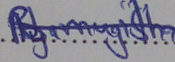By

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A Project Report Submitted in Partial Fulfilment of the Requirement for the
Bachelor's Degree in Computer Engineering of Busitema University

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Declaration

I **Byamugisha Nathan** Reg No **BU/UG/2012/59** hereby declare that this Project report is my original work and has not been presented for a degree in any other University or any other award.
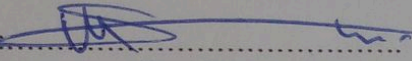
Sign: ...~~Byamugisha~~.....

Date: 7th |06|2016

Approval

The undersigned certify that I have read and hereby recommend for acceptance of Busitema University a Project report entitled Trailer Container Lock Monitoring System.

Dr. Semwogerere Twaibu

Department of Computer Engineering

Sign:...

Date:.......07/06/2016..................

Dedication

I dedicate this report to my beloved parents Mr. Byamugisha Arthur and Janet, Ainembabazi Catherine, Ms Grace Kakuru and to all who prayed for me.

Acknowledgements

First and foremost, I thank the ALMIGHTY GOD who has blessed me with life up today and the wisdom to do this project. Great appreciation goes to my beloved parents Mr. Byamugisha Arthur and Mrs. Byamugisha Janet for your contribution to my education which is wonderful, encouraging and promising a bright future in my life. May the almighty God bless you richly and reward you abundantly, thanks very much. I also thank my supervisor Dr. Semwogerere Twaibu and the entire staff of the Department of Computer Engineering, Busitema University for the knowledge, guidance and support during the preparation of this report.

BYAMUGISHA NATHAN

Abstract

Most of the time individuals or companies ship luggage from overseas to their native countries. Most of the luggage is put in a container which is normally transported at the back of a trailer to its destination place in their country. Some of the containers have fallen off the back of a trailer destroying the property inside, killing people outside, damaging the road among many other losses that happen. The driver of the trailer does not intend for this to happen but due to lack of a real time monitoring system of the container locks such accidents which would be avoided are still happening. This project was therefore designed to come up with a real time monitoring system that reports the status of the trailer container lock at all times. Since most of these containers fall off without proper knowledge of the driver this system solves that problem. It is specific on a trailer that is carrying one container with four locks. This projects looks at two scenarios before the Trailer has started and after it has started and it is moving. Before the Trailer can start if all the trailer locks are locked then the Trailer will start, if any of the locks are open a buzzer is sounded then the specific locks which are opened are displayed on the screen, the Trailer will not start. When the Trailer has started and any of the locks are opened a buzzer is sounded then the specific locks which are opened are displayed on the screen, the Trailer keeps moving without switching off the engine. This report is arranged in six chapters Chapter one having Introduction about the project, Problem statement, Objectives (General and Specific), Justification, Scope (content and time), Chapter Two having the literature review having analysis of existing systems and their weaknesses, Chapter Three consists of the methodology of the project. The methodology includes Requirements gathering methods, requirements analysis, and system design, implementation of the design and testing, Chapter Four is made up of the system analysis and design. This involves functional and requirements analysis along with the system design which has diagrammatic representations of the system in form of the flowchart and Schematic diagram, Chapter Five is titled implementation and testing, this involves the details on how the prototype was implemented using the various development environments interlinked, and how the prototype was tested and validated to ensure optimal performance and accuracy. Chapter Six tables down the discussions, summary of the work done in developing the system, critical analysis of the system as well as the recommendations for future improvements.

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List of Acronyms

AVR	Alf Vegard Research
DDRAM	Display Data Random Access Memory
DFD	Data Flow Diagram
LCD	Liquid Crystal Display
AC	Alternating Current
DC	Direct Current

CHAPTER ONE

INTRODUCTION

This chapter includes the description of the background, problem statement, general objective, specific objectives, justification and the scope of the Trailer Container lock monitoring system.

1.1 Background

From around the world individuals or companies ship luggage from overseas to their native countries. Most of the luggage is put in a container which is normally transported from the back of a trailer to its destination place in their country. For example cartons, crates, wooden cases, palletized cargo, drums, plastic cans, sacks and bales, rolls and coils, steel plates, vehicles, sheets of glass, wet hides and skins, liquids, bulk freight, long cargo and live animals [1].

The security and safety of the container as it travels from place to place and before it leaves for its destination deeply depends on the trailer driver to check whether the container is fully locked. Surprisingly from time to time containers fall off the trailers due to many reasons ranging from the locks not being locked, over speeding and many other reasons.

Scenarios from around the world where these accidents have happened include these listed and explained below:

In Dubai, UAE, on April 20th 2015, two containers fell off the truck on a main road called Al Muhaisana, luckily enough no one was injured. The two containers that fell from the trailer were containing tins of paint. As the containers fell they damaged the road signs and symbol boards [2].

A western expatriate was killed when his car was smashed by a container that fell off a trailer when it lost balance while negotiating a turn on the Doha Corniche. The expatriate was a sole occupant of the car at the time of the accident. Two similar tragedies had been reported from Qatar over the past 15 years. The first was in the year of 2000 when three or four occupants of a taxi including a driver were killed when a container fell off the trailer near Salwa road. The second at Mamoura claimed one life [3].

One person reportedly killed after a shipping container fell on the top of a truck on the north east side of Oklahoma City. The second person who was in the car was rushed to hospital for immediate attention [4].

Two people were killed when their truck crashed into a container that fell from a trailer on a mountain pass in central Vietnam on Thursday 23rd July 2015 [5].

On 9th June 2015, another person died on Rutherford after a container fell off the bridge and landed on his car which was travelling under the bridge leading to his car to be smashed and his instant death. The person who died was driving a 2014 Honda [6].

In Africa also similar accidents as mentioned above about a container falling off from the trailer are mentioned below:

On 2nd September 2015 a container fell off from Ojuelegba bridge in Nigeria as it was trying to cross the bridge killing a couple immediately who were in a car below the bridge [7].

On January 23rd 2015 in the Ketu area of Lagos Nigeria, four people were killed when a 40ft container fell on two commuter buses picking passengers on the highway. Among the people killed was a woman with her baby strapped on her back [8].

In Uganda there has also been a scenario of a container falling off the trailer ending up destroying property inside and outside the container killing people. A scenario is explained below:

In October 2014, a container fell off a trailer which was heading to Kampala at Bweyogerere on the Jinja highway road [9].

Therefore this calls for coming up with a system that can prevent such accidents from happening and save people's lives and prevent damage made to the property inside the container and outside.

1.2 Problem Statement

Many times a container has fallen off the back of a trailer destroying the property inside, killing people outside, damaging the road among many other losses that happen. The driver of the trailer does not intend for this to happen but due to lack of a real time monitoring system of the container locks such accidents which would be avoided are still happening. There is need to avail a real time monitoring system that can alert the driver about the status of the Trailer Container locks.

1.3 Objectives

1.3.1 Main Objective

To design a Trailer Container lock monitoring system that reports in real time on the lock status.

1.3.2 Specific Objectives

    i.   To study the inherent weaknesses of the existing monitoring method for Trailer Container locks.

    ii.   To identify the requirements necessary for designing the user interface and develop a hardware module for the Trailer Container lock monitoring system then design a user interface module and develop the hardware module for the Trailer Container lock monitoring system.

    iii.   To implement and test a prototype of the Trailer Container lock monitoring system based on its ability to respond in real time.

1.4 Justification

The current monitoring methods for Trailer Container locks have a weakness that there cannot be able to monitor the status of the container locks in real time.

Hence a container can get unlocked and the trailer driver would never get to know until it is too late and the container has fallen off the trailer. If the container locks are not locked and the trailer driver just drives away minus first checking the container locks, there is no system which can notify him or try to first check the container locks before the trailer driver can start the Trailer, so the driver drives away and the container ends up falling off the trailer bed.

There is therefore need to design a system that can notify the trailer driver about the status of the container locks in real time that is before driving and also when the driver is driving the trailer truck.

1.5 Scope

1.5.1 Content Scope

This prototype design focuses on a single container with four locks which normally travel long distances to their destination.

The prototype design is able to monitor all the four locks on the container in real time that is before the container can move if any lock is not locked the trailer truck does not start, as it is moving if any lock gets unlocked a buzzer is sounded and the driver checks his display and is able to know which lock is unlocked. There is an assumption that the driver is a systematic driver who responds to the notification.

1.5.2 Time Scope

The prototype for the project was developed in a period of 6 months that is from November 2015 to April 2016.

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