



**BUSITEMA  
UNIVERSITY**  
*Pursuing Excellence*

**FACULTY OF ENGINEERING**

**DEPARTMENT OF COMPUTER ENGINEERING**

**FINAL YEAR PROJECT REPORT**

**TITLE:**

**AUTOMATED VEHICLE IGNITION USING FINGERPRINT AND RFID  
SMART CARD FOR ACCESS**

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## ABSTRACT

Theft of automobile is on the rise worldwide. Ways to efficiently combat car theft and ignition system hotwiring need to be developed. This paper presents the deployment of RFID technology for automatic automobile access and vehicle ignition using fingerprint sensor. The proposed system uses high frequency (HF) RFID readers and tags to enable a more secure way of accessing an automobile's ignition system. The proposed smart ignition key uses an eight (8) pin code technique that enables the entrance into the vehicle to be accessed after RFID authentication. This is a unique security feature that prevents vehicle theft and hotwiring. This system is also developed to control the ignition of the vehicle through the fingerprint scanner. This system consists of GSM SIM 900 that connects to the Arduino which is the microcontroller of the project. To make sure the system is secure, only authorized fingerprint is paired with the Arduino to start the ignition. Vehicles ignite when the enrolled fingerprint is matched against the fingerprints in the database while users with no match in the database are prevent from igniting the vehicle. A theft alarm from buzzer, a notification to the owner's mobile phone via GSM SIM 900 and status display in the LCD are the appropriate signal to the owner. This article describes briefly in detail about the design and implementation of the ignition system.

**Keywords:** vehicle ignition, Arduino, GSM, fingerprint, RFID tag, RFID reader, Access, hotwiring, vehicle, Security.

**DECLARATION**

I, **OKAO BRIAN** hereby declare this project report is my original work with exceptions of where citations have been made and this paper has not been presented to any institution of higher learning for the award of academic paper.

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**APPROVAL**

This is to certify that the project report entitled “**Automated vehicle ignition using fingerprint and RFID smart card for access**” has been under my supervision and has been submitted to the board of examiners with my approval.

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## LIST OF ACRONYMS

RFID	Radio Frequency Identification
ID	Identity
OBD	on-Board diagnostics
LCD	Liquid Crystal Display
IDE	Integrated Development Environment
PCB	Printed Circuit Board
CSS	Cascading Stylesheet
GSM	Global Systems for Mobile Communication
HTML	Hyper Text Markup Language
IC	Integrated Circuit
RF	Radio Frequency
ID	Identification
USB	Universal Serial Bus
HF	High Frequency
LF	Low Frequency
LED	Light Emitting Diode

## CHAPTER ONE: INTRODUCTION

### 1.0 INTRODUCTION.

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

### 1.1 Background

RFID is a word devised for short distance radio technology, used to transmit, and receive digital data, usually between a fixed setting and a flexible entity or between flexible entities. Irrespective of our apprehension, Radio Frequency Identification (RFID) is a fundamental aspect of modern technology that is inevitable. It has found use in payment systems, traffic management, access control, controlled parking, security, and record keeping. RFID technology has been in existence for a long time. It was discovered by some people as far back as the 1940s. The technology became quite popular in the 1970s and mass production of RFID based devices began in 1999. RFID devices have three fundamental components and they are; antenna, tag, and reader [1]. RFID is one of various technologies categorized under the term Automatic Identification. Others include barcode, magnetic inks, optical character recognition and voice recognition. Automatic identification is an electronic method of keeping track of materials, particularly in large production systems [2]. A keyless ignition system (also known as “Smart Key”) is an electronic access and authorization technique for starting the engines of motor vehicles. Siemens developed the first ever smart key in 1995 which was later introduced by Mercedes-Benz under the name “keyless Go” in 1998. A key fob (a little security device with built-in authentication capability) provides keyless entry, keyless ignition and an immobilizer system that keeps car thieves from stealing vehicles [3]. The increase in automobile theft has led to the introduction of RFID security framework in new vehicles by various immobilizer manufacturers.

Fingerprint recognition technology allows access to only those whose fingerprints are pre-stored in the memory. Stored fingerprints are retained in the event of complete power failure or battery drain. This eliminates the need for keeping track of keys or remembering a combination password, or PIN. It can only be opened when an authorized user is present, since there are no keys or combinations to be copied or stolen, or locks that can be picked. The fingerprint-based lock therefore provides a wonderful solution to conventionally encountered inconveniences. This project focuses on the use of RFID card to unlock locks and fingerprints to ignite the engine, as opposed to the established method of using keys [4]

The designed RFID security framework and use of fingerprints delivers vehicle protection against car thieves and invalid driver's by using a smart card with an RFID transponder. The smart card has a RFID

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