CAR ALARM SYSTEM: ADD ON MODULE (STARTER MODULE)

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DEDICATION

Special dedication to my beloved father and mother, my entire sibling and my kind hearted supervisor MR.AZMAN B AWANG TEH and my dearest friends

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ABSTRACT

This project study is to invent an Add-On Module of basic car alarm system that concern about car safety issues regardless of car stolen and carjacking. This add on module will use PIC16F877A microcontroller as it main brain together with other circuit such as voltage regulator, switching and other. The basic principle of this system is likely an immobilizer, which is the car cannot be start if wrong sequence or key is applied. This Add-On module will integrate with the stock alarm system in a car together with switch key and car starter. The main objective of this project is to enhance car safety issues from been stole by the thief. Even though there are a lot of car alarm systems in market nowadays, very much of systems are only provide alarm sound blaring if it been illegally open, yet this system can be override by the thieves easily. The advance alarm system does provide GPS that can track the car if it had been illegally taken. Yet, this system is highly expensive and maintenance also costly. Thus, this Add-On system will solve these two constraints. This system can archive it objective by using the same trick as thieves used but with technology by manipulating the switch key, stock alarm system, and starter. System will get input from switch key and stock alarm system and then will produce output to starter. Starter will switch the engine on if the inputs are correct corresponding with the program code inside the system. This system use 12 VDC as it power source together with 5V voltage regulator to stabilize voltage for PIC16F877A.

ABSTRAK

Kajian projek ini bertujuan untuk untuk merekacipta sebuah modul tambahan kepada sistem asas penggera kereta yang menitikberatkan isu keselamatan kereta daripada jenayah curi kereta dan rampasan kereta. Modul tambahan ini menggunakan PIC16F877A mikro kawalan sebagai otak utama bersama-sama litar lain seperti litar pengatur voltan, litar suis dan sebagainya. Prinsip asas sistem ini bertindak seperti immobilisasi, yang mana kereta tidak dapat dihidupkan sekiranya turutan atau anak kunci yang salah diaplikasikan modul tambahan ini diamilasikan bersama sistem penggera kereta sediaada bersama-sama suis kekunci dan 'starter' kereta. Objektif utama projek bertujuan untuk menambahbaik isu keselamatan kereta daripada dicuri. Walaupun di pasaran sekrang telah banyak sistem penggera kereta, sebahagian besar daripada system ini hanya menyediakan bunyi pengera jika kereta dibula secara tidak sah, tetapi pencuri boleh mengesampingkan system ini dengan mudah. System yang maju menyediakan GPS yang mana boleh mengesan kereta jika kereta telah diambil secara tidak sah. Tetapi, system ini sangat mahal dan kos penyelengaraan juga tinggi. Justeru, modul tambahan ini akan menyelesaikan kedua-dua kenkangan. Objektif sistem ini dicapai dengan mengaplikasikan helah yang digunakan oleh pencuri tetapi menggunakan teknologi dengan memanipulasikan suis kekunci, sistem penggera sediaada, dan juga 'starter'. Input system ini diperoleh daripada suis kekunci dan sistem penggera sediaada, justeru menghasilkan output kepada 'starter'. 'Starter' seterusnya menhidupkan enjin kereta sekiranya input yang diberikan memenuhi kod program di dalam sistem. Sistem ini menggunakan 12 VDC sebagai bekalan kuasa bersama-sama 5V pengatur voltan untuk menstabilkan voltan kepada PIC16F877A.

TABLE of CONTENT

1   INTRODUCTION

2   LITERATURE REVIEW

3   **METHODOLOGY of PROJECT**

LIST of FIGURE

ABBREVIATION

GPS - Global Positional System

ECU - Electronic Control Unit

PIC - Programmable Intelligent Computer

VDC - Voltage Direct Current

T&C - Test & Commission

PSM - Projek Sarjana Muda

R&D - Research & Development

OEM - Original Equipment Manufacturer

LCD - Liquid crystal display

LED - Light Emitting Diode

PIN - Personal Identification Number

DIP - Dual Inline Package

EEPROM - Electrically Erasable Programmable Read-Only Memory

RAM - Random Access Memory

ROM - Read Only Memory

VSM - Virtual System Modeling

AC - Alternating Current

DC - Direct Current

IC - Integrated Circuit

ADC - Analogue to Digital Converter

GSM - Global System for Mobile communications

PCB - Printed Circuit Board

LIST of APPENDIX

CHAPTER 1

INTRODUCTION

Car alarm system is a basic security requirement of a car. Nowadays, newly car that freshly produce from factory are definitely equip with the system. Basically the system work as an alarm that produce sound if any outsider disturbance had been made to the car. Some of car (mostly continental or import car) are also equip with advance type of system that have GPS, immobilizer and ECU that can prevent the car from stolen.

Some of cars are not equip with the advance system in which can be installed at high price depending of features that available for a system offer. Thus, some of car owners will install a basic car alarm system which is cheap price and assuming that the system will provides a security to their car. Technically, the system produces a sound blaring if disturbance occur. In addition, some of this system also provides other features such as brake lock, central lock and etc without governing the safety issue of car itself from be stolen. In market today, some of retailers sell Add-On module that can be integrated with any alarm system but yet, these Add-On Modules more only focused on style and accessories than security. The Add-On Modules available now are power window module, hazard light module and auto-start module.

Thus, this study had been made to improve the security system of a car that affordable and defendable. Yet, this newly system will perhaps widely implemental, distributable and marketable.

1.1 Introduction

Car Alarm System; Add-On Module (Starter Module) is an Add-On Module that take seriously about safety issue of car. This module works on as an immobilizer principle but in different way of implementation and work done.

Immobilizer is an electronic device that fitted to an automobile which prevents the engine from running unless the correct key (or other token) is present. This prevents the car from being "hot wired" after entry has been achieved. Hotwiring is the process of bypassing an automobile's ignition interlock and thus starting it without the key. Although it is not illegal if performed with the consent of the car owner, the activity is usually performed by criminals who intend to steal the vehicle.

1.2 Objectives

The objectives of this study are:

a. To improvise car security system

Car security issue is important for car owner. Thus, they installed various types of car alarm system. Some provide a better security protection and some are not efficient enough. Thus for inefficient alarm system, this project

is to improvise the inefficient to become efficient car security system. This will be achieved without uninstall previous car security system

b. To provide a low cost security Add-On module.

Potential security module is still on going marketable. But, the security issue will increase the need of security and protection of all system. Add-On module for car alarm system in term of security module is costly and rarely in Malaysian's market. Thus, this project is to provide low cost security Add-On module that mainly to improvise car protection and reduce amount of money wastage for a security Add-On module that provide same level of protection. If this module success, this will alert car accessories retailer and perhaps national car maker like Proton and Perodua to implement this low cost system that act as an immobilizer.

c. To optimize the usage of stock alarm system.

Stock car alarm system does provide protection to car. Stock car alarm system that mention here is the basic type which is consist of remote control, control box and siren or speaker. This alarm triggers high frequency of sound if hijacking is taking place. Thus, alerting peoples around. But, this requires public and owner attention. Still, carjacker can override this system and drive it away after hotwiring is applied. Thus, with this module, the stock alarm system will be optimized it usage to avoid carjacking success possibility. This module takes the stock alarm system as input and then only will produce output to turn the engine on.

1.3   Problem Statement.

Stock car alarm system only provides basic protection for a car itself. Car maker industrial only install this system as it cheap and believe this system will avoid carjacking and stolen crime. Some of continental do have the better security system that some had been install with immobilizer. This is a story of fresh car produced by factory plant.

Story of a car which is not installing with alarm system or install with basic type car alarm system is different. This system is not invincible and can be override by the carjacker. Losses from this crime can be high. Carjacker can override this system after breaking the car in several type of way. After break in, they disable the system alarm sound by plug off the control box which placed under the radio console or steering rack. Moreover, they can disable the system without break in via the front hood itself by cutting down the siren. Then, they hot-wire the ignition via switch key and take off.

Yet, the advance alarm system already in market and some of them was installed in national product car; Proton Perdana model including the enhance model. The advance system as it name advance in technology and protection, but also in money flow. This system is expensive and highly maintain. Not all car owners are ease in money, thus a basic car alarm system will be their best solution to make in order to protect their car. This system is cheap and they assume it can protect their car also.

In addition, owners also consider upgrading their stock alarm with add-on module. But, the add-on module in market today only an accessories modules such as power window module, brake lock module, central lock and etc. this module only for accessories and style rather than concerning about the protection from carjacker. As this study was carried out, there in none add on module that in market.

Thus, will this all problem statement state, an aggressive step must be taken to solve this problem in order avoid car losses, carjacker and car stolen crime and thus increasing the security protection of a car.

1.4   Scope of Work

The scope of this project is divided into **FOUR** body phase as per list below:

a) Construct a circuit that contain 5V voltage regulator, programmed PIC16F877A, switching circuit and integration of stock car alarm system

This module consists of several circuits that will e place on a same board. The circuits are 5V voltage regulator, programmed PIC16F877A and switching. The integration from stock alarm car will be the input of this module. The 5V voltage regulator is a must circuit to protect the PIC from blow. This due to the source use is 12 VDC from car battery and the limitation of PIC source is 5 VDC. The programmed circuit will use TWO ports as it input and output. Meanwhile the switching circuit consist relay that triggers the output.

b) Installation and wiring procedure between ignitions switch key and starter.

The installation and wiring procedure apply between the ignitions switch key and starter. The module takes place between these two important parts to ignite the car. The actual picture of starter of Malaysian's model Proton Saga and actual picture of ignition switch key are shown below:

Figure 1.1 Proton Saga Starters

Figure 4.2 Switch Key

c) Implementation procedure on Malaysian's model: Proton Saga 1.5S 1989 with registration number: JBT 7377.

The implementation procedure use Malaysian's Model: Proton Saga 1.5S with assuming the model doesn't have ECU box. Assuming also is the car only have direct starter to distributor and single type carburetor. Also assumptions are the battery of car and starter are power enough as this is the old car. Below is the car's picture:

Figure 1.3 Proton Saga 1.5S

d) T&C with designated Test case 1 (right condition) and Test case 2 (wrong condition).

T&C is the final phase of this system to ensure the module functionality. This module will be test using two test case that designate to ensure module

functionality. Test case 1 is the right condition in which the car can be turn on if the right input had been applied. Meanwhile, test case 2 is vice versa of test case 1.

1.5   Methodology Briefing

The methodology for this project can be simplified into **SIX** body parts:

a) Literature Review.

The review involves the study of several parts of a car including car ignition system, basic car alarm system operational and immobilizer. Also, some circuit's theory will be powered up in terms of circuit operational used in this project. Moreover, theory and concept also will be discussed here.

b) Software.

The circuit will be constructed first in the software. Then, write the program of the module in software mode. After debugging produce no error, the source code will be loaded into circuit software mode to test the program functionality. If not, correctness takes place.

c) Hardware.

The hardware parts will be assembled on a breadboard according to software's diagram and practically test. If the circuit operates according to specification, the circuit will be implemented on the printed circuit board (PCB).

d) Integration.

The software will be integrated with the hardware part. The software is the C language of PIC16F877A and the hardware is the circuit that runs the simulation in real time situation. This will check the system functionality.

e) Result Analysis.

The data success and failure will be gathered and analysis procedures take place. The analysis involves the software and hardware characteristic after implementation.

f) Report Writing.

Report writing consists of all steps from the beginning of this project to last action taken for project completeness. This includes all the requirements as the faculty line out.

1.6   Report Structure

This report structure built on **FOUR** chapters. Each chapter detailing the core of the title and have continuity between each other. The following is the description of chapters itself.

Chapter one is a simplified introduction that consists of several sub chapters that literally overview about this project. This includes introduction, objectives, problem statement, scope of work and lastly methodology used to accomplish this study.