

Wireless Security Car Using RFID System

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Abstract—This Paper presents the function of Wireless Security Car Using RFID System. This project is designed to enhance vehicle safety systems available. Thus, this project consists of some combination of equipment and components to create a car security system that meets the security features and use more advanced. RFID (Radio Frequency Identification) is the most reliable way to electronically identify, data capture, control, track, and inventory items using RF communication. Thus the project was produced by using RFID (Radio Frequency Identification) is used to switch on the car system using radio frequency systems.

Index Terms—RFID Reader, Passive RFID Tag, PIC Microcontroller, Epic Software.

I. INTRODUCTION

The significant problems in the present society are robbery, crime and theft that increasing. This raises the security system issue. Basically, almost available security systems are personal monitoring by security guards. The disadvantages of these systems are a number of security guards to serve the increasing problems and low efficiency due to unprofessional guards. Therefore, several of security types have studied, applied and implemented automatic systems and modern technologies to secure assets against theft RFID (Radio Frequency Identification), one of the promising technologies, that has been widely applied into the access control and security systems. RFID is a technology that helps to identify the animate or inanimate through radio waves [1]. A typical RFID system consists of a reader and transponder [2]. RFID is a leading automatic identification technology. RFID tags communicate information by radio wave through antennae on small computer chips attached to objects so that such objects may be identified, located, and tracked [3].

Owing to the RFID technology provides the security systems significant benefit and feasibility, therefore, this study applies the RFID technology into the security system in the car which is "Wireless Security Car using RFID System" in order to secure from car theft problem. Car is the important personal property of most people. The number of cars increases with the increasing number of the peoples. This project is a safety system which is filled with features complete and this system will be process without using any wired between the RFID reader and the RFID tag. The project is specifically designed to solve a car theft, especially on luxury cars. RFID is used to car security system which equipped with the RFID (Radio Frequency Identification), which function as key sensors which can activate the car by using radio frequency signals. It can also be said to acts as a key which only a certain frequency can activate the car [4].

Another security and privacy of the RFID technology is authentication and access control which is applied in this project. Replacing keys with electronic cards or budes has a number of advantages. The primary one is that cards are more difficult to forge and can be revoked more easily when compromised or lost than having to change the lock as is the case for mechanical keys [5].

The principle of the system is when the passive RFID tag has placed near to the RFID reader, it will transmit the radio frequency to the RFID reader and RFID reader will read that signal and send to the PIC via serial communication. Then the PIC will control all the system inside car. The engine of car only can be start when tagging the passive RFID tag on the RFID reader. Without tagging the engine cannot be start and the car door also cannot be open. Thus, this system is a several features which are quite difficult for intruders.

II. DESIGN CONSIDERATION

The Wireless Security Car Using RFID System operates following the figure shown in Figure 1. When the passive RFID tag is placed near to the RFID reader, the RDIF tag will receive the radio frequency via the antenna inside RFID tag. The radio frequency received will be converted into electrical power that is enough for the RFID tag to transmit the data back to the RFID reader. Then, the RFID reader read the RFID tag. Further the RFID reader sends the tag ID of car owner to the PIC16F84A microcontroller. The PIC microcontroller process the tag ID such the user name, password and so on. Then, the PIC also controls the car motor, alarm, and car lock. For the car lock, PIC will control in order to unlock the switch central door automatically after tagging the RFID tag on the RFID reader and also automatically lock after the user start the engine.

This project is designed to remind the user whenever the car door and the car bonnet improperly lock. By applies the RFID technology into the security car, it can avoid from being invaded because this technology is very secure because the car engine only can start after tagging the Passive RFID tag on the RFID reader and without tagging, the car engine cannot be start. This situation can prevent from car theft problem.

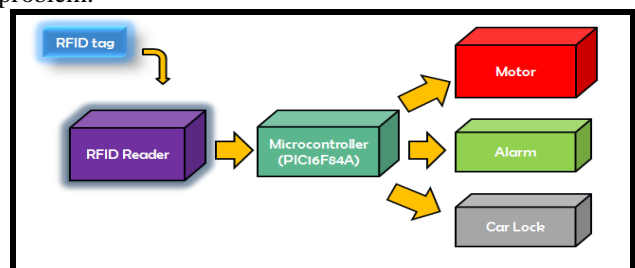


Fig 1: Process of Wireless Security Car using RFID system

A. The System Components

The design of this project consist of RFID reader, Passive RFID tag, PIC microcontroller which is 16F84A, 24 Volt power supply, three relay Single Pole Double Throw, ULN 2803, Regulator 7805 and Regulator 7812, alarm, Crystal Oscillator and two batteries 9V to support the car motor and alarm system. Figure below show the project model of “Wireless Security Car Using RFID System”.

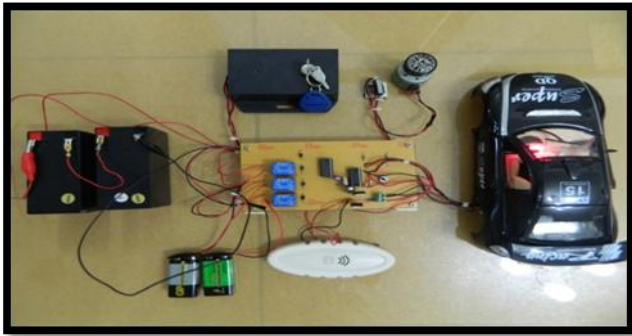


Fig 2: Implementation of Real Model

Other that, the project begins by programming the microcontroller for serial communication with PIC 16F84A interface using EPIC software. PIC Kit Programmer also used for programming and debugging the PIC microcontroller in order to burn the programming into the PIC microcontroller using the burner and connected them to the supply.

B. The Component Details

1. RFID Reader

- The RFID reader is the most common and easy to use. This RFID reader use DC12V-24V power supply. The RFID Reader Module can be used in a wide variety of hobbyist and commercial applications, including access control, automatic identification, robotics, navigation, inventory tracking, payment systems

- Passive RFID tag**-Passive tags do not have an internal power source and need to draw power from an RFID interrogator. The interrogator emits electromagnetic waves that induce a current in the tag's antenna and power the chip on the tag. When the power to the tag's chip passes the minimum voltage threshold, the circuit turns on and the tag transmits its information to the reader.

- PIC Microcontroller**-PIC microcontroller is used to program for every each output such as the motor of window, switch of car door and the ignition part. Other than that PIC also control the entire security system inside the car. It is the main brain, where it will control the whole of system. Train system will produce output according to what is programmed on the PIC.

- ULN 2803**-ULN 2803 is an integrated circuit which has 8 input pin and 8 output pin. This ULN comes in 18 pin IC configuration and pin 9 is grounded. ULN 2803 as an interface between the PIC microcontroller and relay and this ULN is used because to change the signal in digital form issued by the PIC microcontroller into an analog signal that to be sent

to the relay because relay only receives the analog signal form to operate.

C. Designing of Circuit

For the circuit design as show the figure below, it use of appropriate circuit components that can meet the expected features and specifications for the Wireless Security Using RFID System.

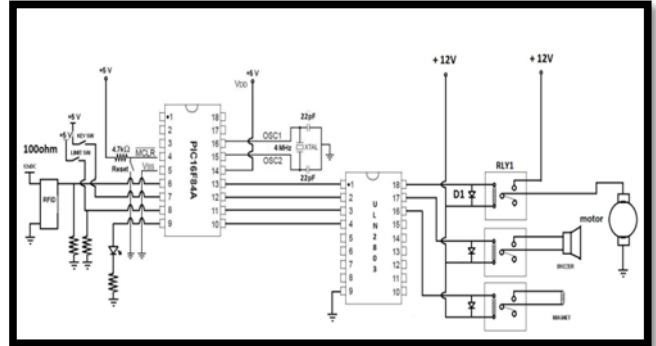


Fig 3: Circuit of project

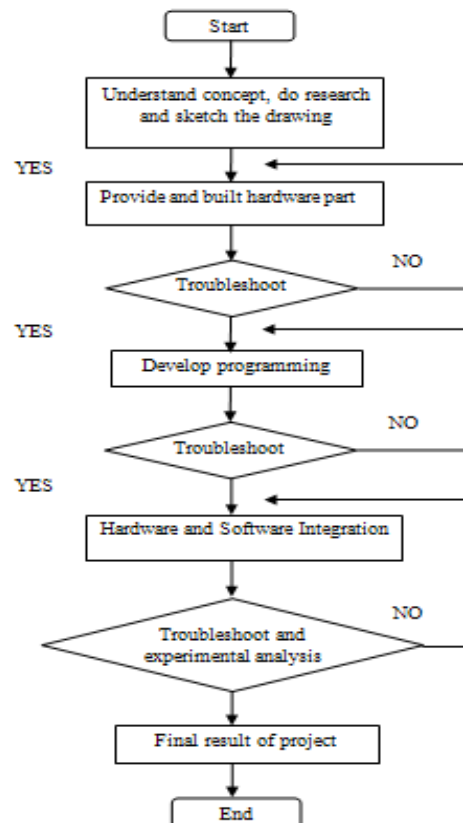


Fig 4: Flow Chart in Developing the Wireless Security Car Using RFID System

Based on the flow chart in figure 4, firstly understand the concept of RFID technology and then do a research by collecting the data and information related to the “Wireless Security Car Using RFID System” based on the journal, books and internet sources. After that the drawing of the model project is sketched. Then, provide and built the hardware using the PIC microcontroller, RFID reader, Passive RFID tag, Relay, Regulator and other IC

components. After completion developing the circuit, then troubleshoot is made by testing the circuit in order to know the circuit is work or not. Next, develop a programming by using Basic Compiler Programming in order to program the system of RFID in this project. EPIC Software is used for PIC microcontroller and used notepad to write all process of this project and save in file “.bas” because the EPIC Software only can read in this file.

PIC Kit Programmer for programming and debugging the PIC microcontroller is used and the program must import into file “.hex” in order to burn the programming into the PIC microcontroller using the burner and connected them to the supply. After programming, do a troubleshoot once again in order to check the system is work properly or not and if any error occurred, the programming is developed again until it successful. Then, Hardware and Software Integration, means combine them together. After that, do troubleshoot and experimental analysis which is the final step before it can be presented. Lastly, the final result of project is successfully worked without facing any error.

III. RESULTS AND DISCUSSIONS

The security system in this study is implemented and tested in the environment that are simulated the real operating area. This regarding parameters are defined during the installing and testing procedures for the optimal conditions relating the real operating situation. The result of the test by condition the environmental parameters at the beginning stage are included in the table 1. There are five parameters including: reading range, accuracy of tag reading in percentage, position of the reader, elevation of the reader, processing time and optimum distance between the reader and the processing unit.

TABLE 1. Testing Parameters and Results

TEST PARAMETERS	TEST RESULT
Reading Range	8 inch
Percentage of Tag Reading Accuracy	80%
Position of Reader	Above the reading area
Elevation Angle of Reader	45 Degrees
Processing Time	5 Seconds
Optimum Distance between Reader and Processing Unit	3 meters

From the test operating the wireless security car using RFID technology including system parameters variation, it shows that performance, efficiency and reliability of the system depend on the system physical parameters. Therefore, these should be taken into account to develop and improve the high system efficiency. The following consideration lists the effects of the system parameters:

Reading Range: As the effective reading distance is limited, initially solved this limitation by using horn aperture. This reflects and combines waves to increases enough in this use. However this consideration is an interesting issue of extending the effective reading range including: The pattern of wave radiation from the transmitting end at the reader should be explored. Then the proper reflecting materials

should provide high efficiency in wave radiation. The design of the antenna at the reader contributes the further the reading range.

Percentage of Tag Reading Accuracy: In the real system, the accuracy of reader should be 100% including the case several tags in the reading range. From the test reading is obtained only 80%.

Position and Elevation Angle of the Reader: At the beginning, the system is operated in trial and error for the optimum angle of the reader. The radiation pattern should be explored and then this should support the optimum solution of the position and the elevation angle of the reader.

Optimum Distance between Reader and Processing Unit: The reader position is located at the proper distance of 3meters, in the real situation, from the security box in which the processing and monitoring units is installed.

Furthermore, RFID technology in UHF band has some limitations that should be taken into account in designing system. For example, the radio frequency in UHF band cannot propagate through water and metal materials. Based on the design of this hypothetical project, it is the system easy to handle and user friendly. RFID systems can be used on all types of cars. Therefore, the results of this project it became one of the alternative sources of sophistication to rival the security systems have been available in the market. The “Wireless Security Car Using RFID System” is a modern inventory security car system because RFID technology is now widely used especially as a replacement barcode in order to identify the physical object that the tag is attached.

RFID also offers improvement in handling inventory, security logistic and operations that are now being used. By adding the RFID technology into the security car system, the intruders are more difficult to steal the car because the RFID system has their secrecy and privacy which is it is very secured because it cannot access to the data means only authorized entities such as people or system can read and write the information. The mode of security of RFID technology used is the wireless radio frequency electromagnetic field to transfer data from a RFID tag to the RFID reader.

This “Wireless Security Car Using RFID System” is suits the level of usage for individual or any organization in order to increase the safety of their car. These systems there are several features which are quite difficult to be encroached upon because by adding RFID technology it is more secure because it cannot access into the data that means only authorized entities such as people or systems can read and write the information.

IV. CONCLUSION AND RECOMMENDATION

After completing this project, the objectives of this project were successfully accomplished with complete and timely. Although there are some problems but it can be implemented properly without any error occurred. With this project, hopefully it can provide many benefits and gains to consumers where they can save time to users and ease of use and provide a more secure safety for users. Based on the

results of planning, implementation and results of a systematic discussion to design and produce the project "Using RFID Wireless Car Security System" was successfully implemented. In conclusion, the user "Wireless Car Security System Using RFID" clearly shows improvements in the use and effectiveness as it is more systematic and effective than the existing security system. This is due to "Wireless Car Security System Using FRID."

To solve the crime problem that is rampant car theft as a result of a security system is not complete. Humans should be protected to make life in a state safe and avoid the threat. Recognizing inherent privacy or security threats of RFID systems will be also helpful for decision-making regarding the obligations of RFID manufacturers and the privacy rights of end users. The "Wireless Security Car Using RFID System" in this study evaluates the possibility of applying RFID technology into securing program against asset theft

In order to obtain the higher performance of the system, some suggestions are included here as a guide and plan for further developing the system. To apply this project into the car need to use own external wiring without disturbing the wiring that already fix in the car. So, maybe it can give extra work and more expenses to the customer because need to do extra wiring. So, that it need to do more research how to apply this project direct to the wiring that already been in the car. In addition, one of limitations of RFID with UHF band is that the RF cannot propagate through water and metal materials. The solution of this limitation is using the RF in MF band (13.56MHz) that is better than the UHF in travelling through such the mentioned media.

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