International Journal of Scientific Engineering and Science
Volume 1, Issue 6, pp. 61-65, 2017. ISSN (Online): 2456-7361

Design and Construction of RFID Wireless Car Security System

Abdurrahman S Hassan[1], Mubarak Auwwal Saleh[2]
[1]School of Electrical and Telecommunication Engineering, Kampala International University, Uganda
[2]Department of Electrical Engineering, Kampala International University, Uganda

Abstract**—** *This project implements the function of wireless car security system using RFID. An ATMEGA8 microcontroller, RFID reader, RFID tag is used for the smooth implementation of the scheme. The ATMEGA8 microcontroller was used to serve as the entire control of the system which holds the unique RFID card number and controls the system as a whole. A driver is used to secures the car ignition system, and the buzzer was used to alert the vehicle owner whenever there is an intrusion attempt. Consequently, with this kind of system, the security of our automobiles can be more sensitive to secure and protect our vehicles more from any intrusion and theft in electronic-based approach.*

Keywords**—** *ATMEGA8 Microcontroller, Buzzer Alarm, Radio Frequency Identification.*

I. INTRODUCTION

The significant problems in the present society are robbery, theft and crime that increasing. This raises the security system issue(Said et al., 2012). Basically, almost available security systems are personal monitoring by security guards. The disadvantages of these systems are some 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 technology(Said et al., 2012), which 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. A typical RFID system consists of a reader and transponder. RFID is a leading automatic identification technology. RFID tags communicate information by radio wave through(Sravani, n.d.) antennae on small computer chips attached to objects so that such objects may be identified, located, and tracked (Loko et al., 2015).

Owing to the RFID technology provides the security systems significant benefit and feasibility, therefore, this(Said et al., 2012) project applies the RFID technology into the security system in the car which is "Wireless Security Car using RFID System" to secure from car theft problem. Car is the important personal property of most people(Engineering, 2014). 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(Loko et al., 2015). It can also be said to acts as a key which only a certain frequency can activate the car(Loko et al., 2015).

Another security and privacy of the RFID technology is authentication and access control which is applied in this work. Replacing keys with electronic cards or budges has some advantages. The main 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.

II. MATERIALS AND METHODS

Block Diagram of the System

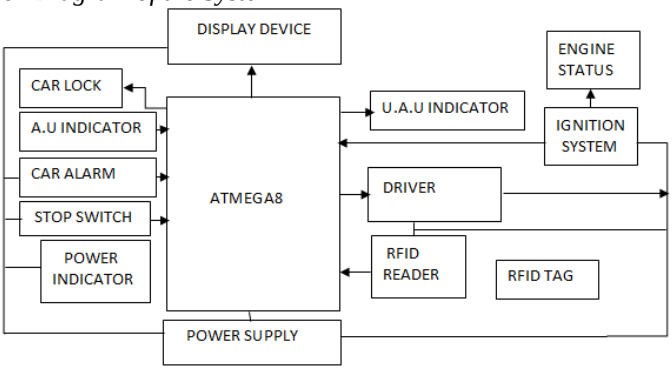

Fig. 1. Shows block diagram of the system.

Components Description

The design and implementation of each of the fundamental circuit units and how the program was implemented to control the design and perform the required functionality.

The steps involve in designing this project involves:

- Power supply unit
- Components selection
- Control unit
- Principle of operation

Power Supply Unit

An adapter of constant output voltage of 12V will be used as a power source to the overall system. Two reference voltage where used via; 5V and 12V. The 12V D.C will be fed directly to the ignition system, D.C fan, and buzzer. The 5V D.C (regulated voltage) will be used by the ATMEAG8, LCD, RFID reader.

Adapter features:

Model……. LE-1220

Input voltage……...100-240V A.C, 50/60Hz

International Journal of Scientific Engineering and Science
Volume 1, Issue 6, pp. 61-65, 2017. ISSN (Online): 2456-7361

Output voltage and current……12V, 2A D.C

RFID Reader

The RFID reader is a low power consumption, small size and easy to use device ideal to develop an RFID system. Once powered it can detect any RFID card within range and with the defined frequency same as that of its working frequency (125kHz). It can interact with a microcontroller in any one of the two supported protocol namely TTL Serial and WIEGAND 26 as per the system design. RFID reader also has a detection pin (BUZ) that could be used to simply detect a valid RFID card.

TABLE 1. EM-18 features.

Size	(32x32x8) mm
Operating frequency	125kHz
Operating voltage range	3.3V-5.5V DC
Current Rating	< 50mA
Reading distance	10-15cm
Communication parameters	9600bps, 8-N-1
Supported cards	Tags which work at 125kHz

Software Design

The Software used in programming the microcontroller is Atmel studio, using basic C programming language.

The Crystal Oscillator

In applications where great time precision is not required, Crystal oscillator offers additional savings during purchase. The standard crystal oscillator gives an accurate frequency and in this 4MHz crystal was used, in microcontroller to get frequency crystal, an XT crystal of 4MHz oscillator was chosen is shown in figure 2

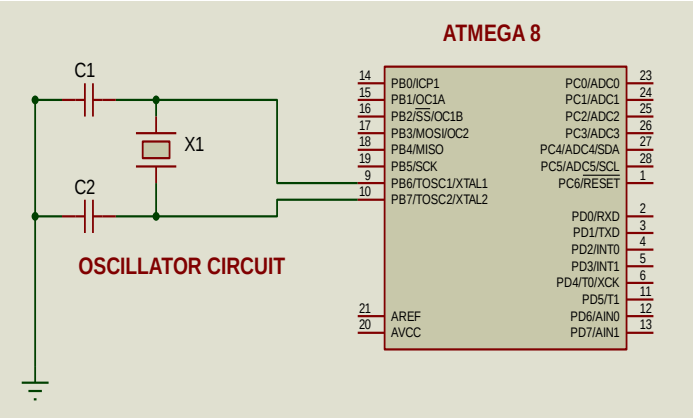

Fig. 2. Crystal oscillator connections.

The above diagram shows how XT oscillator is connected with Atmega16. With value of capacitor 22pF, oscillator can become stable, or it can even stop the oscillation. A clock of the oscillator must be divided by 4. Oscillator clock divided by 4 can also be obtained on OSC2/CLKOUT pin, and can be used for testing or synchronizing other logical circuits.

$$The\ frequency = \frac{1}{4} \times 4 \times 10^6 = 1MHz$$

The Master Clear:

The master clear (MCLR) is used for putting the microcontroller into a 'known' condition. This practically means that microcontroller can behave rather inaccurately under certain undesirable conditions. To continue its proper functioning, it has to be reset, meaning all registers would be placed in a starting position. Reset is not only used when microcontroller doesn't behave the way we want it to, but can also be used when trying out a device as an interrupt in program execution, or to get a microcontroller ready when loading a program. So for this case the connection in figure 3 below is utilized

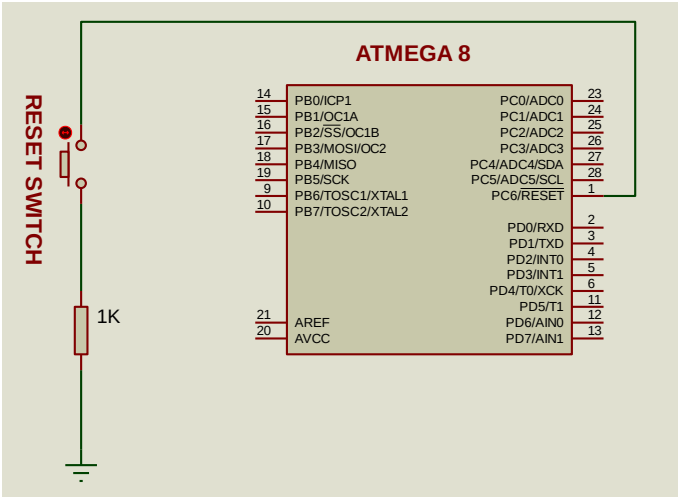

Fig. 3. Resetting the ATMEGA32 VIA MCLR.

Pin Assignment

The project makes us 17 out of the 28pins (ports) of the ATMEGA8 microcontroller, out of which 5pins are used as input and the remaining pins were used as output. The pins assignment are shown below in table 2.

TABLE 2. ATMEGA8 interface with the system components.

PORT PIN	ASSIGNMENT	INTERFACING COMPONENTS
XTAL1 and XTAL2 (pin9 and pin10)	Input	Crystal oscillator
PB2-PB4 (pin16-pin18)	Output	LCD (RS, RW, E)
PC0-PC3 (pin23-pin26)	Output	LCD(D4-D7)
PD7, PD6, PD5 (pin13, pin12, pin11))	Output	Authorized, unauthorized and Car lock LEDs
PB0 (pin14)	Output	Alarm (buzzer)
PB1 (pin15)	Output	Driver
PD0-PD1 (pin2 and pin1)	Input	RFID READER (Rx, Tx)
PD2 (pin16)	Output	Stop switch
RESET (pin1)	Input	Reset switch

3.1 Principle of Operation

The 12V DC from the adapter will serve as the overall power supply to the entire security system. The Wireless Security Car Using RFID System operates when the passive RFID tag is placed near to the RFID reader, the RFID tag will receive the radio frequency via the antenna inside RFID tag.

International Journal of Scientific Engineering and Science
Volume 1, Issue 6, pp. 61-65, 2017. ISSN (Online): 2456-7361

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 (Loko et al., 2015) ATMEGA8 microcontroller. The microcontroller processes the tag ID such as username and password. For authorize tag, the microcontroller will unlock the car door and send a signal to the driver (BJT) which will amplified the signal to the required value to drive the D.C fan when ignition switch is on. When tag for the second time, the connection will be disconnected and the car door will be locked. For unauthorized tag, the car door will be closed and the buzzer will sound a continuous alarm, this alarm can be stopped either by pressing the stop switch or tagging the authorize tag.

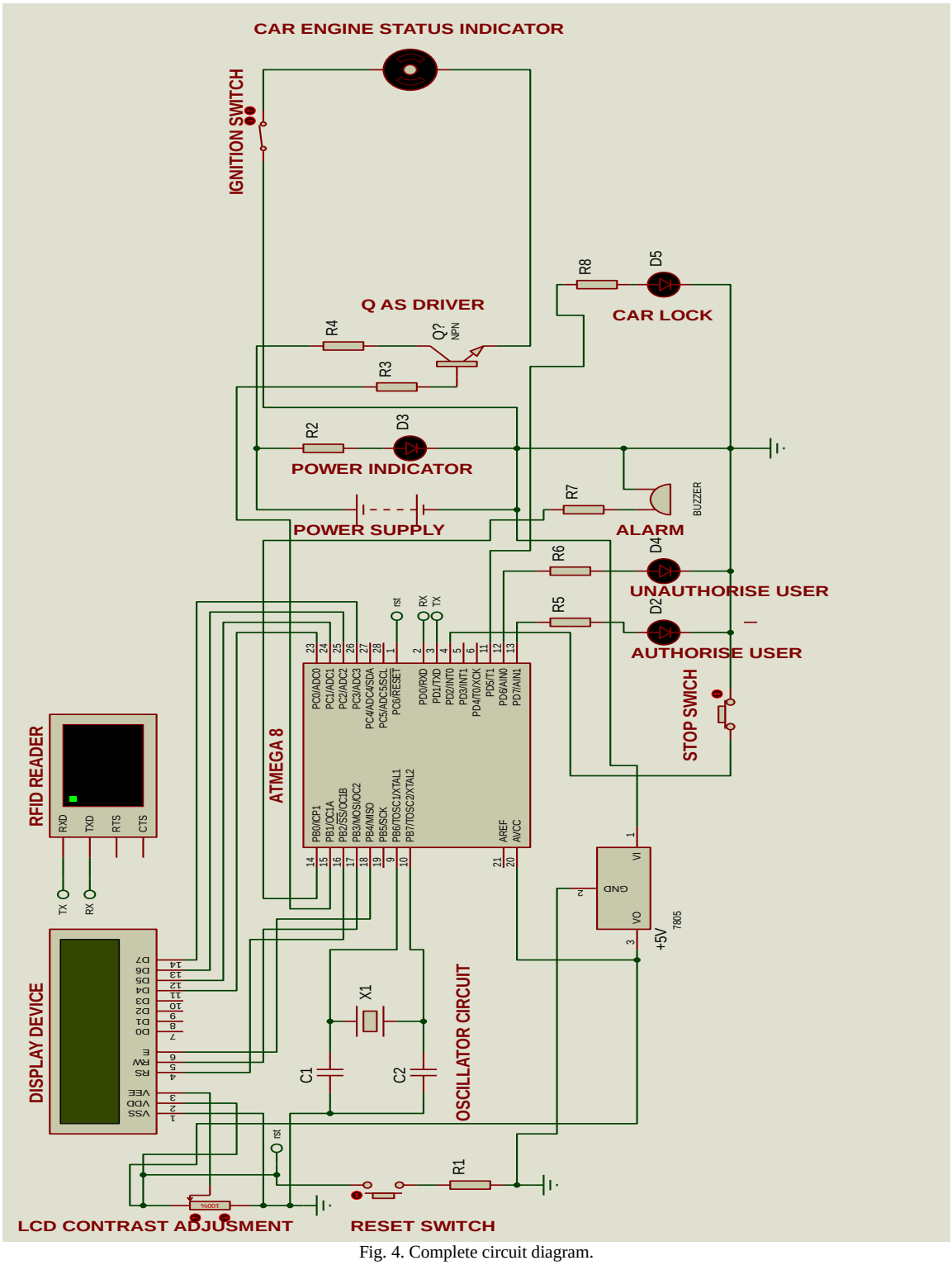

Fig. 4. Complete circuit diagram.

Volume 1, Issue 6, pp. 61-65, 2017. ISSN (Online): 2456-7361

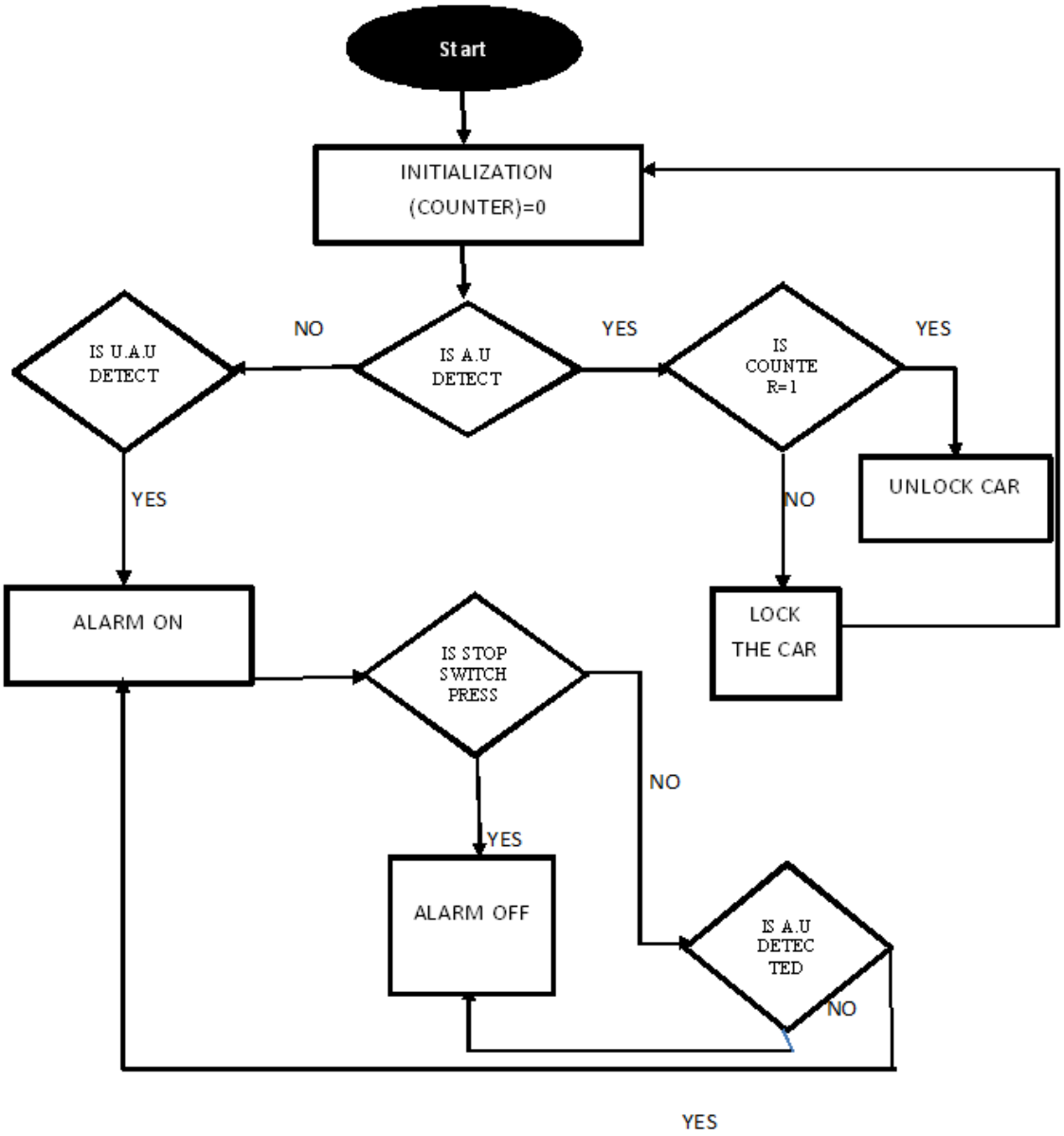

Fig. 5. System flow chart.

III. Results and Discussion

4.1 Construction

The construction of the project circuit is done based on the component layout, components assembly on Vero board, and soldering process followed on making up the circuit to make sure that all components are permanently mounted.

4.2 Testing

Testing of project is the process of measuring the workability of the components as well as the complete system, the project was tested in two ways;

1. The workability of the system
2. The reading accuracy of the RFID reader and the reading distance.

4.3 Result

After testing the project, the system was found to be working effectively and efficiently.

For the RFID reader, two tags are used and found that it can detect recognized and unrecognized tag with high accuracy, with a reading distance of up to 9.5cm.

IV. Conclusion

After completing this project, the objectives of this project were successfully accomplished with complete and timely.

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. "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.

REFERENCES

[1] Engineering, C. (2014). Vehicle Tracking And Accident Alert, May.
[2] Loko, A. Z., Bugaje, A. I., & Abdullahi, U. (2015). Microcontroller Based Smart Card Car Security System, 29(3), 150–153.
[3] Said, M. A. M., Othman, M. A., Ismail, M. M., Sulaiman, H. A., Misran, M. H., & Ahmad, W. N. A. W. (2012). Wireless Security Car Using RFID System, 2(1), 302–305.
[4] Sravani, N. (n.d.). ARM7 Based Vehicle Theft Identification with Location Alert, 272–276.
[5] Engineering, C. (2014). Vehicle Tracking And Accident Alert, May.
[6] Loko, A. Z., Bugaje, A. I., & Abdullahi, U. (2015). Microcontroller Based Smart Card Car Security System, 29(3), 150–153.
[7] Said, M. A. M., Othman, M. A., Ismail, M. M., Sulaiman, H. A., Misran, M. H., & Ahmad, W. N. A. W. (2012). Wireless Security Car Using RFID System, 2(1), 302–305.
[8] Sravani, N. (n.d.). ARM7 Based Vehicle Theft Identification with Location Alert, 272–276.