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DESIGN AND CONSTRUCTION OF DIGITAL CODE LOCK FOR A CAR IGNITION SYSTEM (WITH WRONG INPUT ALARM)

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ABSTRACT

This project "design and construction of digital code lock for car ignition system (with wrong input alarm) is centered on the use of an integrated circuit CD4013. The high-power transistor used in this project is 2v 3904 with the incorporation of a transistor logic integrated circuit 74LS08 containing four district AND gates. The output of the AND gates go high only when all inputs are high. The integrated circuits (40131Cs), two dual flip flop packages were connected in series in such a way that the input of the first flip flop is armed once the circuit is on and would be loaded

INTRODUCTION

Security is a precaution taken to keep somebody or something safe from crime, attack, or danger. This simply means safety from harm and is a term that has different dimensions in psychology, public safety, defense and military matters, and information access. As man works every day to acquire food, shelter, clothing and other necessities of life, the safety of his Life and all he has acquired occupies a large place in his mind and it poses a great challenge to his entire pursuit of a peaceful and accomplished life.

Personal security is a basic human need and a basic reason behind Society. Individuals, communities, governments and international bodies come together from time to time to find solutions and means of ensuring safety at the work place, on high ways, at home, etc. and this plays a vital role in every facet of life.

Much money is pumped into projects involving safety by individual Governments, private organizations and other international agencies and alliances such as the United Nations, North Atlantic Treaty Organization, Warsaw Pac, Southeast Asia Treaty Organization, Organization of American States, Commonwealth of Nations, African Union, Organization for Security and Cooperation in Europe, etc

Computer security is one major issue these days where lack of it leads to loss of vital and top secret informations to wrong hands, financial crimes and other deadly misuse of stored data by hackers and thein Subordinates.

MOTIVATION

The need for good security as a precaution taken to keep some one Something save from crime, attack or danger, made me desire to

as soon as the first switch is momentarily pressed, while the AND gate which is the final output of the entire logic system, biases the transistor. Hence, the principal aim of this project is to design and construct an efficient, functional, usable, practicable and application digital code case security system capable of overcoming loss of vital information to wrong hands, financial crimes and other deadly misuse of stored data by hawkers.

Embark on a research to find out how digital code number for car locked car ignition (with alarm input) is done.

Nonetheless, it was my heart desire to know the reason and secret behind security/alarm systems, stages involve in attaining an optimum, practicable and functional digital code locked for car ignition (with wrong Input alarm system).

Lastly, I was set in motion to come with the design and construction of number locked car ignition (with wrong input alarm system) due to Man's need for good safety from theft in cars and motor vehicles.

AIMS AND OBJECTIVES

Security systems are inevitable in a wider world due to their varieties of applications in the mechanical, electrical, analog electronics and digital electronics world and hence the aims and objectives targeted by this project are to design and construct an efficient, functional, usable, practical and applicable number locked security system for car ignition.

This project is also aimed at either delay access to the ignition system or, raise an alarm when excessively touched while the security system is armed.

Lastly, this project is aimed at overcoming lost of vital and top security informations to wrong hands, financial crime and other deadly Misuse of stored data by hawkers and their subordinates due to lack of Good security systems.

LITERATURE REVIEW

Security is any of various means or devices designed to guard persons and property against a broad range of hazards, including crime, Fire, accidents, espionage, sabotage, subversion, and attack (Encyclopaedia Britannica, 2020).

Most security and protection systems emphasize certain hazards more than others. In a retail store, for example, the principal security concerns are shoplifting and employee dishonesty (e.g, pilferage, embezzlement, and fraud). A typical set of categories to be protected includes the personal safety of people in the organization, such as employees, customers, or residents; tangible property, such as the plant, equipment, finished products, cash, and securities; and intangible property, such as highly classified national-security information or "proprietary" information (e.g., trade secrets) of private organizations. An important distinction between a security and protection system and public services such as police and fire departments is that the former employs means that emphasize passive and preventive measures.

DEVELOPMENT OF SECURITY SYSTEMS.

The origins of security systems are obscure, but techniques for protecting the household, such as the use of locks and barred windows, are very ancient. As civilizations developed, the distinction between passive and active security was recognized, and responsibility for active security measures was vested in police and fire-fighting agencies (Microsoft Encarta, 2021).

By the mid-19th century, private organizations such as those of Philip Sorensen in Sweden and Allan Pinkerton in the United States had also begun to build efficient large-scale security services. Until the advent of collective bargaining in the United States, strikebreaking was also a prime concern. The Sorensen organization, in contrast, moved toward a loss-control service for industry. It provided personnel trained to prevent and deal with losses from crime, fire, accident, and flood and established the pattern for security services in the United Kingdom and elsewhere in Western Europe (Microsoft Encarta, 2021).

TYPES OF SECURITY SYSTEMS.

Security systems can be classified by type of production enterprise, such as industrial, retail (commercial), governmental, government contractor, or hospital; by type of organization, such as contract security or proprietary; by type of security process, such as personnel or physical security; or by. Type of security function or emphasis, such as plant protection (variously defined), theft control, fire protection, accident prevention, protection of sensitive (national security or business or business proprietary) information. Some of these categories obviously overlap (www.howstuffswork.com).

Physical security

Some of the most effective advances in security technologies cluring the past few decades have been in the area of physical security-i.e., protection by tangible means. Physical security has two main compornents: Building architecture and appurtenances; equipment and devices (Security Journal, 2021)

Keypad provided on the vehicles dash board. An alarm system is triggered on when the "Enter" key is pressed after inserting a wrong code.

Automobile Security

Motor vehicle theft is an increasing problem for owners, insurers, and manufacturers. The annual number of thefts increases almost every year, and the rate of thefts may be expected to exceed 1 out of every 100 registered vehicles per year in the United States by the end of the 20th century. The problem is, however, not new, the 1900 Leach automobile featured a removable steering wheel that the driver could carry away to prevent unauthorized vehicle use. More recently, sophisticated electronic alarms, some of which incorporate radio beacons, and more tamper-resistant wiring and electronic locks have been produced.

HISTORY OF LOCKS

According Encyclopaedia Britannica (2020), To the earliest lock in existence is an Egvptian lock made of wood, found with its key in the ruins of Nineveh, in ancient Assyria. In construction it is

the prototype of the modern cylinder lock. Locks and keys are also mentioned in the Old Testament, and the Greeks and Romans used locks of simple design. Medieval artisans designed locks of exquisite detail, the perforations and carvings often having no relation to the working of the lock. With the exception of the development of ward locks, however, little was done to improve the efficiency and convenience of locks until the late 18th century. In the 19th century ward locks were improved, and tumbler or lever locks, pin-tumbler or cylinder locks, and keyless locks were invented and improved. Subsequent development has focused on mass production, improvement of materials, and increasing complexity of the working mechanisms, including the increasing use of automatic electronic alarm and safety devices.

MECHANICAL BOLT LOCK

In his book, Digital Evidence and Computer Crime", Casey (2000D) explains; A bolt lock functions when a key is inserted into the notch, or talon. The key moves the bolt backward or forward, depending on whether the user is opening or closing the lock. The simplest form of lock is a ward lock, which is essentially a bolt containing a notch known as a talon. The Bolt is moved backward or forward by engaging a key in the talon. A back spring attached to the bolt holds it in place once it is released by the key. The tumbler or lever lock, similar to the ward lock, contains one or more pieces of metal of different heights, known as tumblers, levers, or latches, which intercept the bolt and prevent it from being moved until the tumblers are raised or released by the action of an appropriate key. The so-called pin-tumbler cylinder lock, or Yale lock, introduced about 1860 by the American inventor Linus Yale, was the first device to employ a small, flat Key in place of a large, cumbersome one. The Yale lock Consists essentially of a cylindrical plug placed in an outer barrel. The plug is rotated by a key and in turn moves the bolt of the lock by means of a cam. In order to rotate the plug the inserted key must raise five pins of different sizes into corresponding holes in the plug. Five similar pins are contained in the upper part of each of the holes. If the pins are not raised to the circumference of the plug, the plug cannot be turned.

ELECTRONIC LOCKS

These are devices made from electronic components (transistors, integrated circuits, etc), with the soul aim of electronically sensing and carrying out some given tasked following some set instructions. The easiest and most effective electronic locks circuits malke use of logic gates and/or microcontrollers. In places where simple logic gates are used, one can easily analyze the operation of the gates and determine the output of the entire process using truth tables. In the case of microcontrollers. However, this could be more tedious and this incorporates very large number of logic gates with various inputs and diverse outputs which control a large variety of other electronic and electrical devices (Stallings, 1995).

ELECTRONIC COMBINATION LOCKED CAR IGNITION SYSTEM WITH WRONG INPUT ALARM

Combination locks, according to Balch (2003), are devices that are locked and unlocked using certain sets of numbers and wheels in some cases. There are basically two types of combination locks based on the number input source; mechanical number lock (which uses wheels and tumblers to feed in the right digits in the right order) and the electronic number lock (which makes use of

digital codes through logic devices in order to send a "lock" or unlock" signal to an electro-mechanical devices which completes the mechanical movement of a shaft, bolt, etc to lock or unlock the system or to a relay which then allows electric current of higher magnitude and form to flow into a previously isolated circuit).

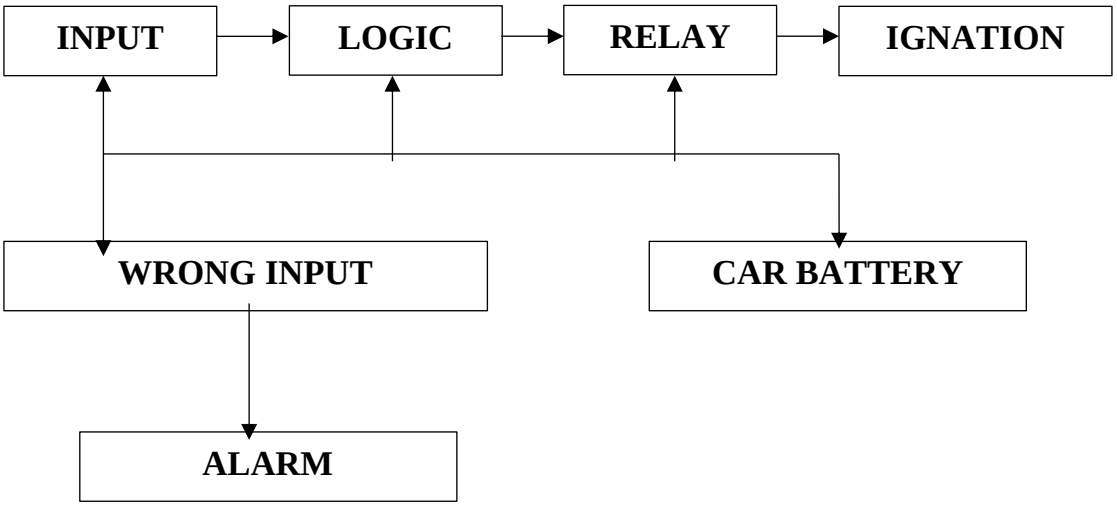

Fig. 1: Block Diagram of Electronic Combination Lock/Alarm System

Input Circuit

The keypad through which numbers are fed into the logic circuit to determine it they are right or wrong, The input keypad is wired to use the number 3914" followed by the "BNTER" key to unlock the car ignition (reconnect the battery to the ignition through the relay). The keypad is made of numbers 0 to 9, reset and enter keys.

Logic Circuit

This is the brain behind the entire security system. To obtain a four-digit input, two dual D flip flop packages (4013 ICs) are connected in series in such a way that the input of the first flip flop is armed once the circuit is on and would be loaded as soon as the first right switch (3) is momentarily pressed. This output now arms the input of the second flip flop as it waits to be loaded by pressing 3 on the keypad to arm the input of flip flop 3. This process is repeated (if the right sequence 3914 is followed) until the output of the last flip flop goes high. The final output of the flip flops is then fed to one of the inputs of an AND gate whose output remains low until its second input is made high by pressing the ENTER Key.

Relay Circuit

The output of the AND gate, which is the final output of the entire logic system, biases the transistor which in turn allows current to flow through the from its collected to the emitter and hence energizing the coil of the relay which mechanically reconnects the previously open battery-ignition line.

1gnition Circuit

This is a mechanical switch used to make electrical contacts that will energize the ignition coil which in turn rotates the engine momentary to start by turning a small key. Prior to inputting the access code, even when this contact is made by turning the key they engine does not start because the battery line was disconnected along the line.

Wrong Input Decoder Circuit

The results of pressing each wrong key on the keypad are collected through a set of OR gates stored at the first input of a second AND gate which will also be turned on when the enter key is pressed. Its output then triggers the alarm circuit to notify the owner of an intruder.

The Alarm System

This calls for attention in the event of code error. Whenever a wrong code is fed to the system and the wrong number decoder senses it, the second AND gate only waits for the ENTER key to be pressed and its output goes high to trigger the alarm system. This section is made up of the 555 timer connected in a stable mode (its frequency is set by a 100kΩ variable resistor and the fixed I μF capacitor used to ground pins 2, 6 and 7) and an 8 ohm tweeter (speaker).

DESIGN AND CONSTRUCTION

Every project embarked upon follows some set rules in order to obtain the desired requirement. This chapter gives detailed information of all calculations, projections and methods applied to achieve the set goal

POWER SUPPLY

This project is designed to be battery powered following the fact that It is to be used in a car where the only source of electric power is the battery and hence no power supply unit with transformers and rectifiers is required and no capacitors are required for smoothening or ripple control as these are not found in battery sources. However, the designer decided to run the circuit on 9 volts (for the relay section) and 5 volts (for the logic circuit because of the TTL chips – 78 LS 08 and 78 LS 35) which will break down if voltage exceeds 5v) instead of the 12 volts from the source battery. This was done to reduce the power drawn by the entire circuit from the battery and was achieved using the 78XX family voltage regulator IC's (7809 and 7805). These voltage regulators are designed to keep source voltages ranging from 9.5v to 35v (for 7809) and 5.5y to 35v for 7805) at exactly 9v and 5v respectively, and no more. These ICs would rather breakdown when the input voltage exceeds 35v rather than allowing their output to exceed their set limits. The maximum output current produced by each 78XX series IC is 1 ampere (National Semiconductors Data Sheet, 2020).

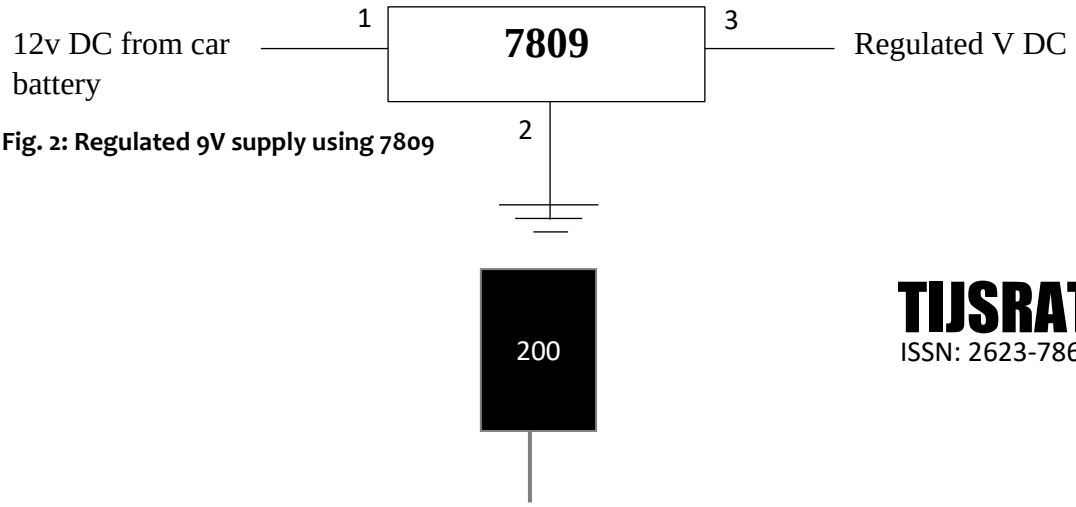

Fig. 2: Regulated 9V supply using 7809

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The below shows the external connection for 555 operating as an astable multivibrator, also called a timer circuit or clock. The threshold input and trigger are connected together. In the astable mode, the timing capacitor charges through $R_A = R_B$ until v(t) reaches (73)V^+. The threshold comparator output then goes high, forcing the flip flop out Q' to go high the discharge transistor turns on, and the timing capacitor discharges through R_B and the discharge transistor. The capacitor voltage decreases until it reaches ($^1/_2$)V^+, at which point the trigger comparator switches state and Q goes low. The discharge transistor turn off, and the timing capacitor begins to recharge. When v(t) reaches the threshold level of ($^1/_2$)V^+, the cycle repeats itself.

THE LOGIC CIRCUIT

This is made up of the following components as the basic building Block:

1. 4013 (Dual D Flip Flop)
2. 74LS 08 (Quad AND gate)
3. 74 LS 32 (Quad OR gate)

THE WRONG INPUT DETECTION CIRCUIT

This part detects when a wrong input is made using the keyboard. The OR gates collect all wrong inputs from all the wrong number points (keys other than the right inputs keys). This makes us of the functionality of the OR gate which makes it possible to pass a "wrong input signal" to the AND gate which then waits for its second input via the ENTER key.

THE ALARM SYSTEM

This makes use of the 555 timer connected inastable mode to serve as a buzzer which is triggered on through a transistor whose base is triggered by the output of the AND gate in the wrong input detection section and hence switching on the alarm until the right input is fed into the System. Below is a circuit diagram of the alarm section.

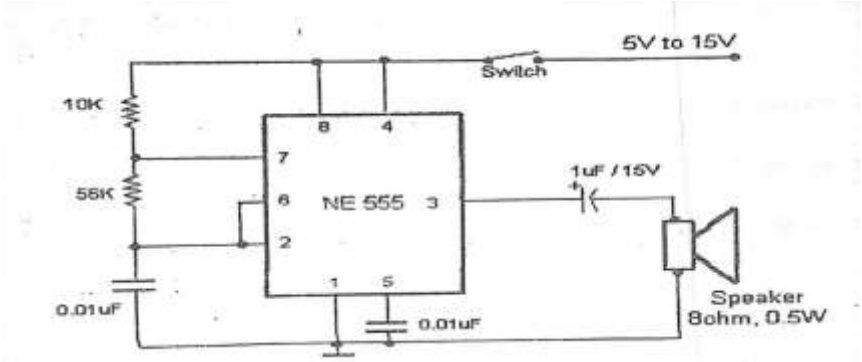

Fig 6: The Alarm Circuit

TESTING, CONSTRUCTION AND RESULT

TESTING

The digital code lock for car ignition system (with wrong inpu alarm) was first tested bn a breadboard using a D.C. supply. A problem or unwanted alarming sound was observed. This

problem was rectified by careful loose at the circuit diagram as the alarm circuit was being reworked on the breadboard. After this rectification, the circuit was transferred into a veroboard and carefully soldered.

CONSTRUCTION

All the circuit components on the breadboard were carefully transferred into the veroboard by the use of soldering iron and lead. The constructed project was later tested and small areas of dry joints were resoldered for proper connection.

RESULT

After the construction, the system was powered on using D.C. supply source. At inputting a wrong input code, the wrong input detected the error and this caused the switching ON of the alarm until right input was fed into the system, a bulb feed into the system was the right input, a small noise noticed at the speaker of the alarm system.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

CONCLUSION

This project (Digital lock for car ignition system) was designed and constructed to be a good security system as a precaution taken to keep someone or something safe from crime, attack or danger.

Above all, this project will give an insight into hoe ICs can be correctly and conveniently handled in order to ensure man's need for good security/safety in cars and motor vehicles is met.

PROBLEM ENCOUNTERED

The difficulties encountered during the course of this project were non availability of components, expensive nature of the available components and lack of resources viz a viz finance.

RECOMMENDATION

This project is recommended for use in cars and motor vehicles for good safety. For convenient, a 12v D.C battery was used in this project. It is therefore recommended that this project 1s not restricted to the use of 12v D.C. battery as a well-constructed 12v power supply could be used for students that may want to improve on this project.

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