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Arduino Based Advanced Security System for Moped with Fingerprint Sensor & Keypad Dual Authentication

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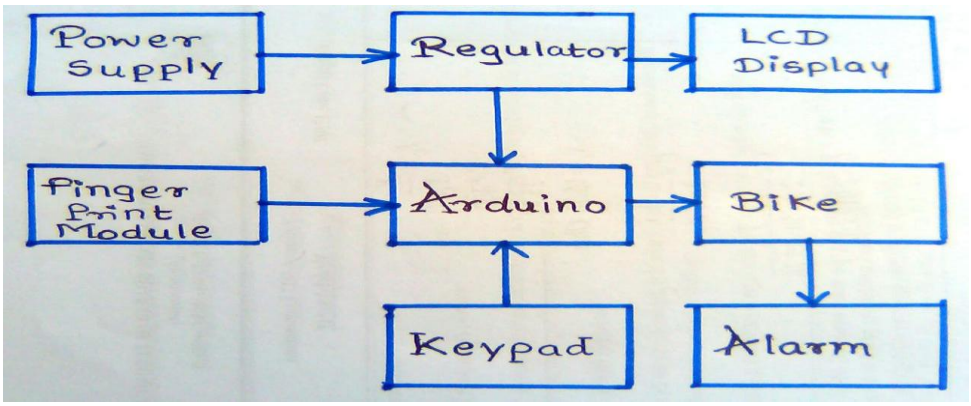
ABSTRACT

Vehicle security is an important issue these days due to the rising number of thefts of vehicle. Here we propose a solution to this problem by using a fingerprint authenticated vehicle starter system. An important and reliable human identification method is fingerprint identification. Every person has unique fingerprint. So this will help in identifying a person and improving the system security. The system provides a secure and hassle free way to start the engine securely. We have used arduino to control our system. There is no need to carry any keys to start or stop the engine, so there is no need to worry about misplacing of keys.

I.INTRODUCTION

In this system user just need to scan finger to start the "Gearless Bikes", the system only allows authorized users to start the vehicle. Owners can get primary/administrative access to the vehicle by scanning fingerprints. The system allows multiple users to register as secondary authorized users. When the system enters monitoring mode, it waits for users to scan. On scanning, the system checks if User is an authorized user and starts the primary power of the system. Here we have used arduino. The fingerprint scanner is connected to the arduino and we also have an LCD display along with a keypad which is also being used as an emergency override for the person whose fingerprint is not registered.



II.BLOCK DIAGRAM

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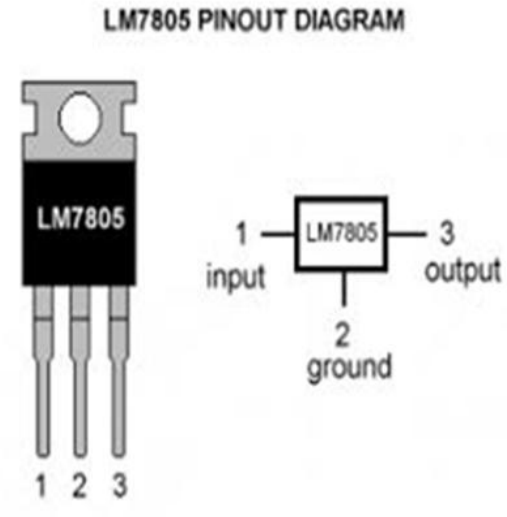
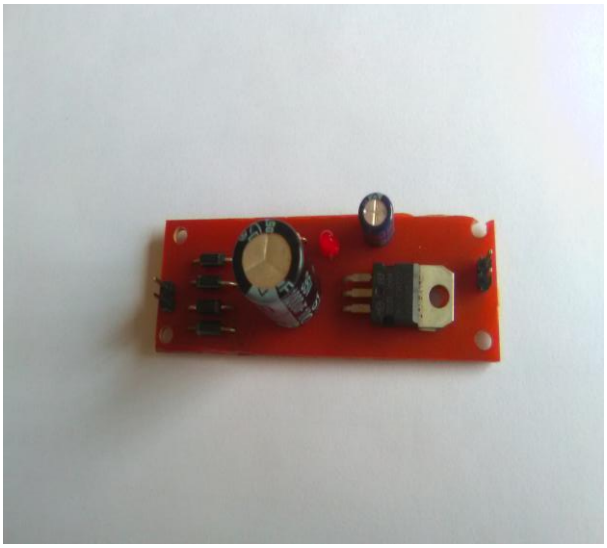
Fig. 1.0: Block diagram

1. POWER SUPPLY

Power supply is an electronic device that supplies electric energy to an electrical load. The primary function of a power supply is to convert one form of electrical energy to another. We have used 12V power supply which is already available in bike. The power supply is connected to voltage regulator and then to the arduino circuit.

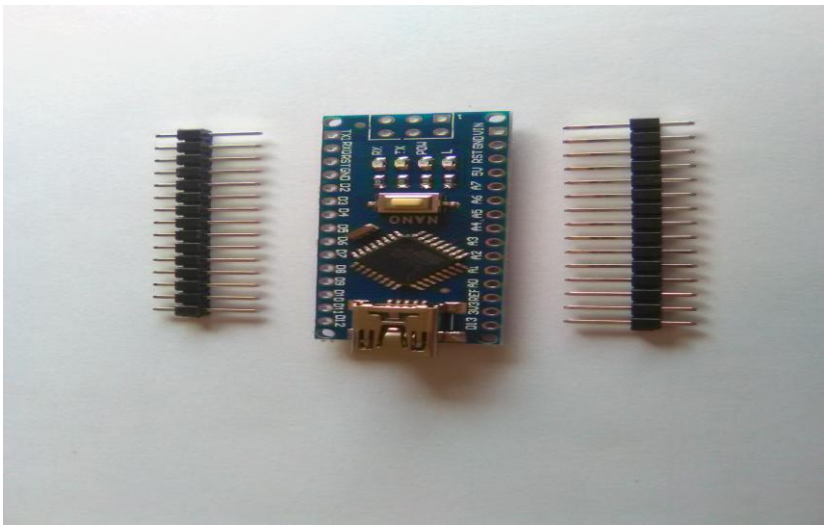
2. REGULATOR





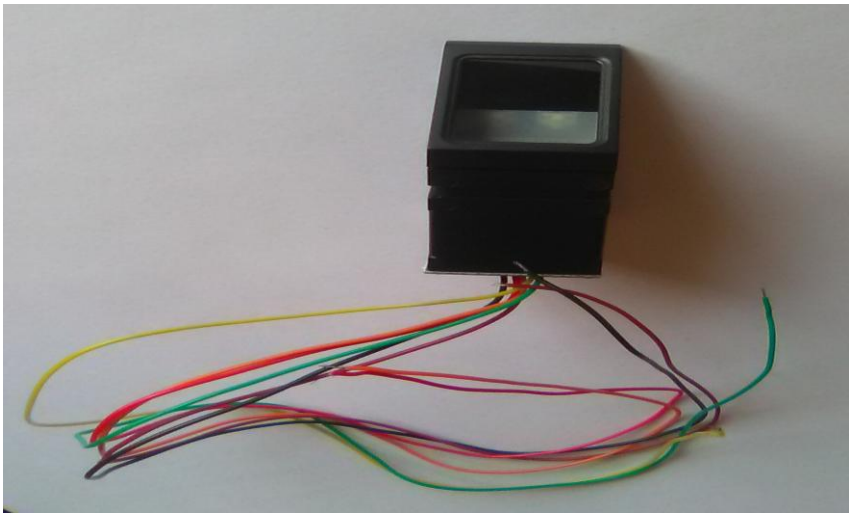
The 12v supply is given to voltage regulator which converts 12v dc supply into 5v dc which is rated voltage of arduino circuit. For our circuit we have used LM7805 voltage regulator with capacitor filter for pure dc supply and give stable 5v supply to the circuit.

3. LCD



LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16*2 LCD display is very basic module and is very commonly used in various devices and circuits. We have used LCD display to show different indication.

4. ARDUINO

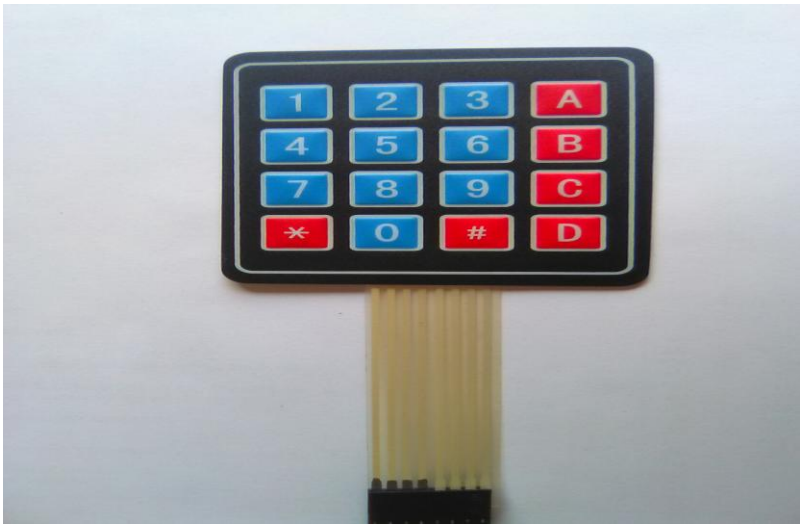


Arduino is an open-source electronics prototyping platform based on flexible, easy-to-use hardware and software. It is intended for artists, designers, hobbyists, and anyone interested in creating interactive objects or environments. Boards are able to read inputs like sensor, and turn it into an output like activating a motor, turning on an LED, publishing something online. There are number of types of arduino boards like Arduino UNO, Arduino Due, and Arduino NANO etc. In our system we have used Arduino NANO. In our system arduino works as minicomputers which have some memory which is used to store the different data like store the fingerprint images. Also arduino will perform different operations like comparing the print images etc.

5. FINGERPRINT MODULE

Everyone has mark on one's fingers. They cannot be removed or changed. These marks have a pattern and this pattern is called the fingerprint. So fingerprints have become an ideal means of identification. There are four types of fingerprint scanners like Optical scanner, capacitive scanner, Ultrasonic scanner and Thermal scanner. The basic function of these three types of scanner is to get an image of a person's fingerprint and find a match for this print in the database. It is a one type of sensor which is connected to input side of arduino. In our system Optical sensor is used which use light to scan the marks on finger these lights are focused on marks and light reflects with different variations after dashing on marks on fingers and make image of the marks and this image is use to match the prints which are in the database.

6. BIKE



A motorcycle often called a bike is a device which minimizes the human efforts to go from one place to another place. We have used our system for moped (Gearless vehicle).

7. KEYPAD

Keypad is an asset of buttons arranged in a block or "pad" which bear digit, symbols. We have used the keypad shown in above image it contains some numbers which is going to be used to enter the pin. We have also provided a keypad for emergency if the authenticated person is not available to use the bike, so he can use the

bike by entering a password provided by owner. Also we have used keypad to add or remove the fingerprints and to enter the menu of the system.

8. ALARM

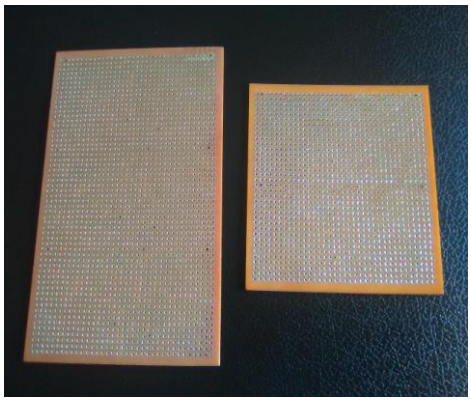
An anti-theft alarm is device or buzzer use to prevent or deter the unauthorized appropriation of items considered valuable the anti-theft alarm will be activated if any person tries to damage the system and if any one tries to access the system by entering wrong password.

III.COMPONENTS USED

1. SWITCH

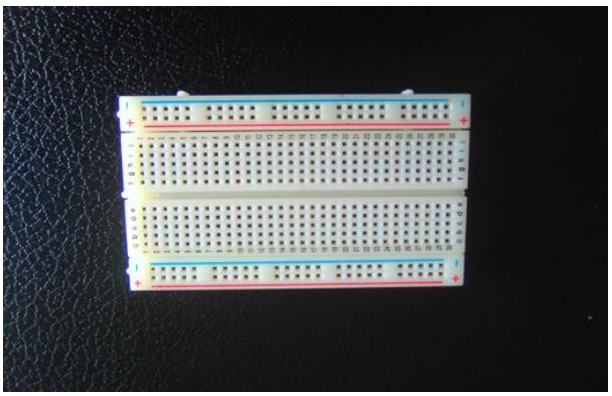
Switch is a device which is used to make or break the electrical circuit from supply according to our convenience, we have used NO-NC contact switch to provide 12v supply to the arduino board & to switch OFF the ignition.

2. ZERO PCB



Zero PCB has copper patches so we can solder our components but it doesn't have any connections so for connecting the components together either solder the components together or connect them by soldering their legs to wire.

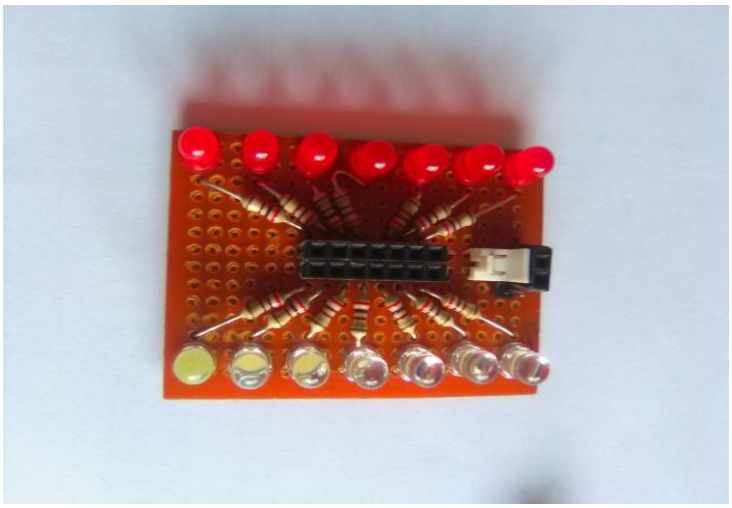
3. BREAD BOARD



Breadboard is a construction base for prototyping of electronics. Because the solderless breadboard does not require soldering, so it is reusable .This makes it easy

to use for creating temporary prototype and experimenting with circuit design.We used breadboard for testing our system before fitting it on bike..

4. LED



Light emmiting diode (LED) is two lead semiconducter light source.It is P-N junction diode that emits light when activated.For testing purpose we have use number of LED lights by considering light as Relay, ignition switch etc. it helps us to test our system before installing it on bike without damaging..

IV.FLOWCHART

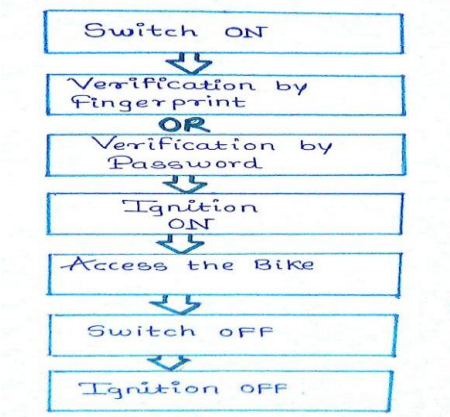


Fig. 1.1: Flowchart

In this flow chart the steps from start to end as shown fig 1.1.

SWITCH ON: We have used switch to power the security system.

VERIFICATION BY FINGERPRINT- If the fingerprint is matched then the supply will be given to whole bike and we can start the bike using kick OR button.

VERIFICATION BY PASSWORD- If the person using bike is not an authenticated person then he can use the bike using password verification, password to use bike will be provided by the owner.

IGNITION ON- If the fingerprint or password matched then the ignition will ON and person can use the bike.

SWITCH OFF- When the switch is OFF the supply will be disconnected and the engine will stop.

CIRCUIT DAIGRAM

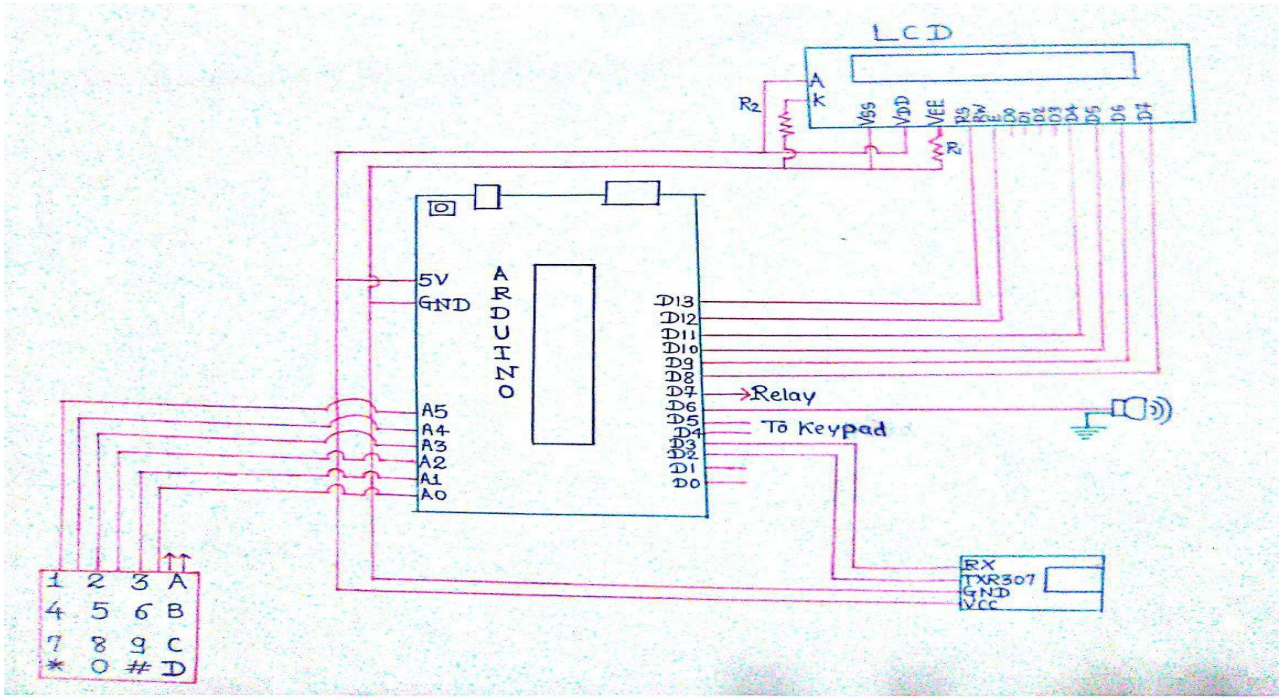


Fig. 1.2: Circuit diagram

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The circuit diagram for the system is as shown in above fig 1.2.

12v supply from step-down 12v DC supply into 5v DC supply which is the operating voltage level of arduino battery is given to LM7805 voltage regulator which as shown in fig 1.3.

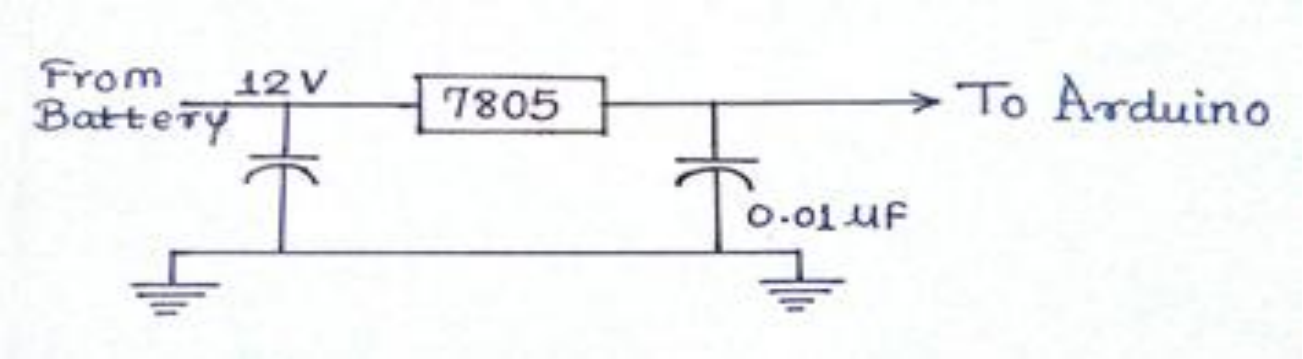

Fig 1.3: Voltage regulator

Then this supply is given to the arduino board & accessories of the system connected to arduino boards which are as follows:

1. Fingerprint sensor
2 .LCD display
3. Keypad
4. Buzzer
5. Relay

Fingerprint sensor is connected to serial communication ports of arduino. Then LCD display is connected to digital ports of arduino which is shown in fig.1.2, To control the ignition system of bike we connected a relay circuit, but the relay cannot be operated directly on arduino pin hence we connected one transistor (2N2222) so the relay can be operated on 12v supply.

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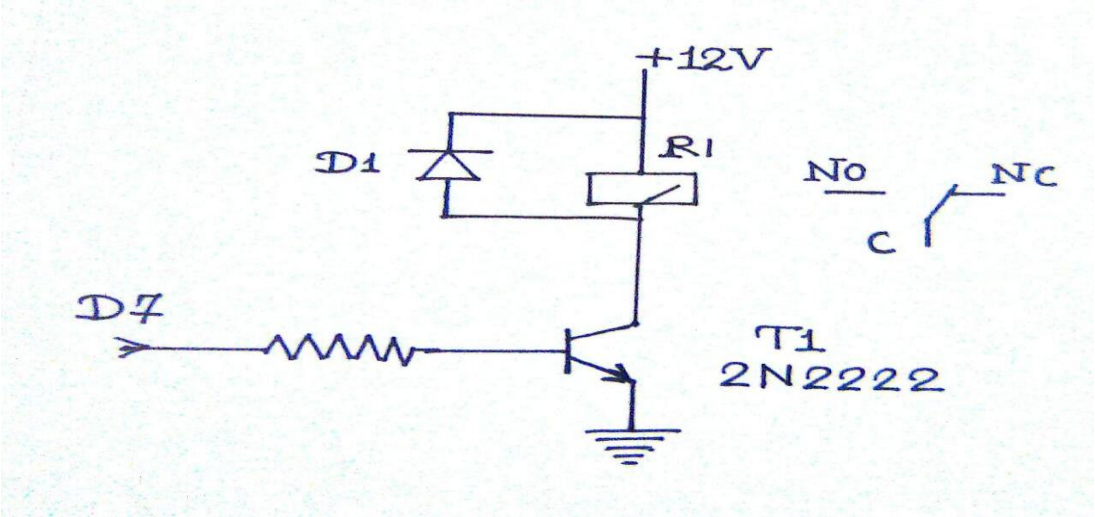

Fig 1.4: Transistor

On the transistor the resistor is connected to base of and the relay is connected to the collector pin, the feedback diode is connected to drop the back EMF which is shown in fig.1.4.

Also we used NO-NC contact switch. The supply from the positive terminal of battery is given to NC contact.

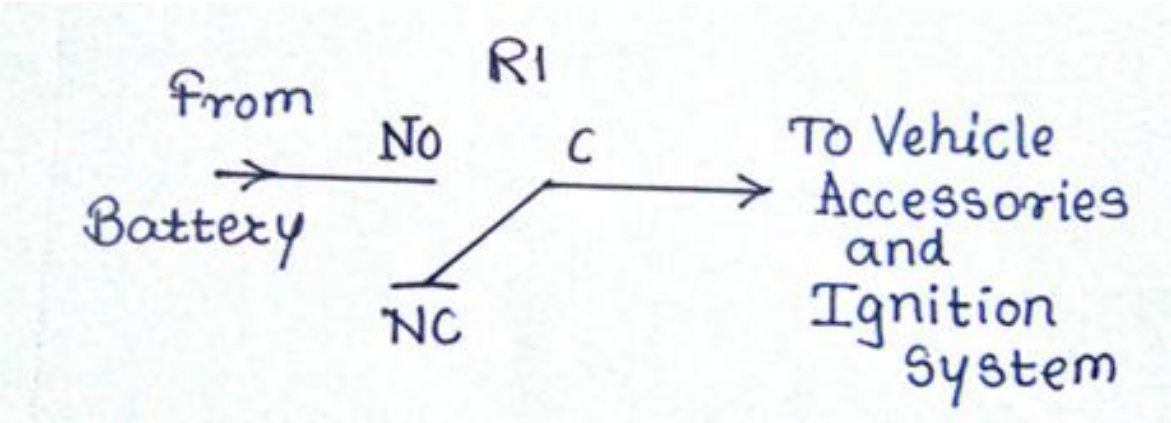

Fig 1.5: Switch

NO (NORMALY OPEN) - There will be no supply in arduino & the accessories.

NC (NORMALLY CLOSED) -When the switch is on NC contact the required supply will be delivered to arduino circuit and the accessories.

Numeric keypad is connected to analog inputs of arduino shown in fig.1.2 also the buzzer is connected to an arduino

V.CONCLUSION

FEATURES OF SYSTEM

1. We can add or remove fingerprint according to our convenience.

2. We can add number of fingerprints.

3. If the person enters wrong password for three times then the antitheft alarm will be activated... (Only for password verification)

4. If anyone tries to break the system or disconnect the system from supply then antitheft alarm will be activated.

ADVANTAGES

- ✓ It is secured.
- ✓ Easy to use.
- ✓ Reliable.

APPLICATION

- ✓ To unlock the ignition of vehicle securely at administrative level.

FUTURE EXPANSION

- ✓ We can provide GPS tracking system with GSM.
- ✓ We can also use remote control to unlock the bike or to start the bike.
- ✓ We can use touch screen for password verification.

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