

# NFC VEHICLE LOCKING SYSTEM USING IOT

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## Abstract

The technology has been recognized as one of the most integral part in our daily basis. Without technology, the humans cannot effort to challenge the problems that are occurring every day. Everyone in this world needs a particular requirement by using technology at an cost which is security. Security is the main requirement as many countries making their own strategies for the development of this technology. The main aim of this project is to provide security to the vehicles using internet of things. This vehicle locking system uses Arduino IDE and NODE MCU microcontroller and consists of an interface with LCD display, DC motor, relay and other hardware equipment. To perform the operations like rotating motor, switching relays ON and OFF, the software code is dumped into the Arduino microcontroller. Now a days, thieves are increasing as the missing cases of the vehicles is increasing rapidly day by day. NFC is used to authorized that owner's vehicle and anyone can access the motor with the NFC tag by the permission of that vehicle's owner. Not only by using NFC, but also with mobile of the vehicle's owner which it can be operated.

**Index Terms – Near Field Communication(NFC), Node MCU, Arduino, DC motor, Relay.**

## 1.INTRODUCTION

As in this present world where the technology is growing day by day, a lot of research is going on enhance the existing technology in which one of the main application is security. The protection of vehicles is important as if its stolen no alternative methods will be available to help the owner of the vehicle to find it back. Instead of using biometric system to the vehicles, a non-biometric security system is used as the biometric system is easily hacked and decoded by the thieves. The main aim of this project is to provide high security to the vehicle and it will allow only to authenticated users.

NFC is a non-biometric system short range communication system which provide high security to the vehicles. It consists of a tag or card as when they placed on the NFC module, the vehicle's ignition will ON and OFF. NFC vehicle locking provides two advantages than the biometric security system is that it is more cheaper than the biometric security system based on cost and it is simple and efficient than the biometric security system. NFC is more accurate as it takes milliseconds to work the entire system. If the tag is lost or someone will want to take the vehicle with the permission of the vehicle's owner, a mobile app is used to control the vehicle ignition system. This mobile application is called Blynk and it works with the help of micro controller which is connected through WIFI to it. With the help of this Blynk application, any authentication person can access the vehicle security by using correct username and password.

## 2.OBJECTIVE

The main objective of this project is to provide high security to the vehicles. Biometric recognition security system is more reliable and easy but the security code present in biometric security is easily hacked and the code can be easily decoded by the hackers and thieves. The main disadvantage is that it requires more battery power supply and it is more costlier than the others. Instead of using biometric system to the vehicles, a non-biometric security system is used as the biometric system is easily hacked and decoded by the thieves. NFC is a good option for the non-biometric security system. In NFC, we use external hardware component like tag which is impossible to make duplicate of distinctive characteristics. NFC is more simple, less costlier than the Biometric security system and the more important thing is that it does not require more power supply than the Biometric security system.

## 3.PROPOSED METHOD

To rectify the problem that occurs in the Biometric recognition security system, we use non-biometric recognition security system like tags, cards etc. Biometric recognition security system is more reliable and easy but the security code present in biometric security is easily hacked and the code will be easily decoded. It also requires more battery power supply than the other security components. When the security code of a system in a vehicle is hacked by the thief, the owner of the vehicle will have to face the consequences. So, instead of using biometric security system, we use non-biometric security system. NFC is a favourable choice for the non-biometric security system. In NFC, we use external hardware component like tag which is impossible to make duplicate of distinctive characteristics.

Firstly, it requires far less energy. Second, because NFC can be one-way or two-way, both components doesn't always need a power supply. NFC can further transmit data quicker than Bluetooth, making it fitting for mobile payments. In particular, the NFC coherence is well-suited for such purpose due to its short simple communication range (of a few centimetres) providing basic security of the user's physical juxtaposition. The main focus is on smartphone-based NFC-enabled vehicle lock systems. A vehicle locking system is an anti-theft device that prevents an unknown person from using the vehicle unless the corresponding access token is (physically) present and authenticated. Smart Locks have active NFC chips inside of them, understanding that

they will need a source of power. However, since NFC uses such little energy, it's sufficient to just have a couple of batteries in there, and we can think no more of for months or years at a time.

On the flipside, though, since the NFC locks are the active devices, the tokens that we'll use to access them don't have to be active: They can be passive NFC devices, explanation that they literally don't need a power source.

#### 4.BLOCK DIAGRAM

The block diagram of NFC vehicle locking system represent the components that are used and the connections are made accordingly as shown in the figure given below. The below block diagram consists of the components like NFC module, LCD display, Node MCU, Arduino IDE, relay and DC motor. The power supply is used to supply the necessary power to the board function.

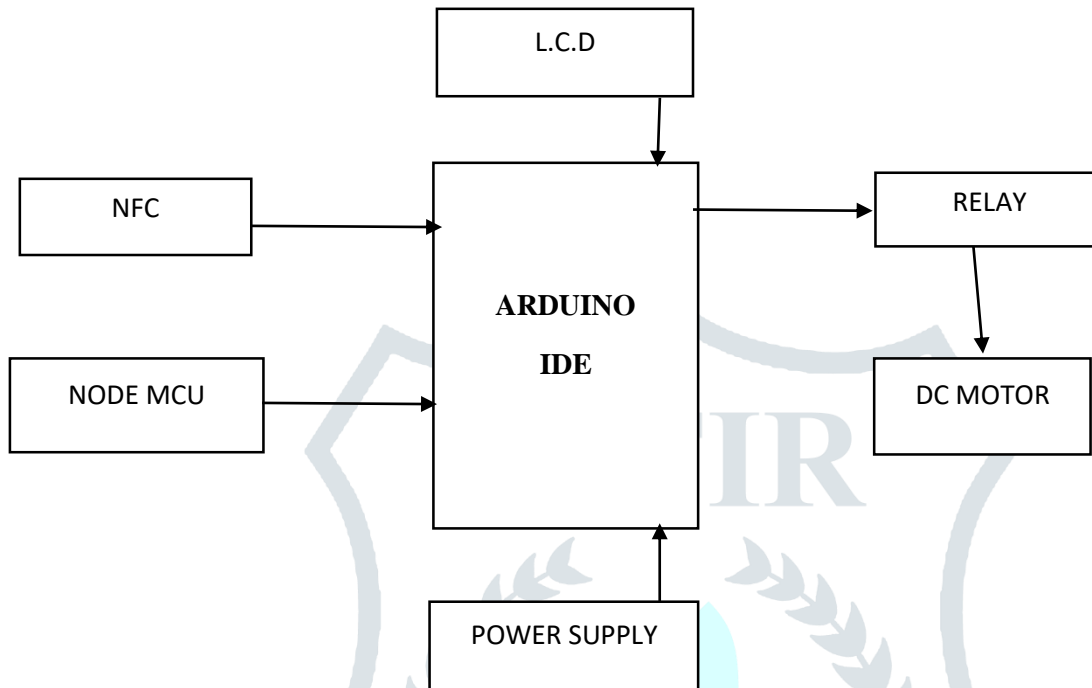


Figure.1:BlockDiagram

#### 4.1 Near Field Communication

NFC which may be abbreviated as Near Field Communication is a wireless connectivity technology which works at a short range that creates life simpler and more fitting for users around the world by making it easier to make transactions, connect electronics devices with a single touch. Many immeasurable contactless cards and readers are adaptable with NFC have already positioned round the world.

#### 4.2 LCD display

Liquid Crystal Display (LCD) is employed for the aim of displaying the words which are given within the program code. This code will be carried out on microcontroller chip.

The Liquid Crystal Display (LCD) has the specific advantage of having a low power device. In LCD, the power requirement can be calculated in of microwatts .Low cost and good contrast are the central advantages of the LCD. The lifetime of LCD s is fixedly increasing above 10,000+hours limit.

#### 4.3 Relay

A relay is primarily a switch which requires a small voltage to get triggered which we will give from the Arduino as once it's triggered, it'll drag the connection to make the high voltage circuit as we can control devices inaccessible over a network or the internet.

A relay may additionally use more current than an Arduino pin can safely supply. Relay should not require more than 40mA absolute maximum, at 5V to operate.

#### Specification and Features :-

- 1 channel relay board
- Operating Voltage 5V
- Max Current : 20mA

- Relay Contact Current Capacity at AC250V: 10A
- Relay Contact Current Capacity at DC5V: 10A
- Triode drive, increasing relay coil
- High impedance controller pin

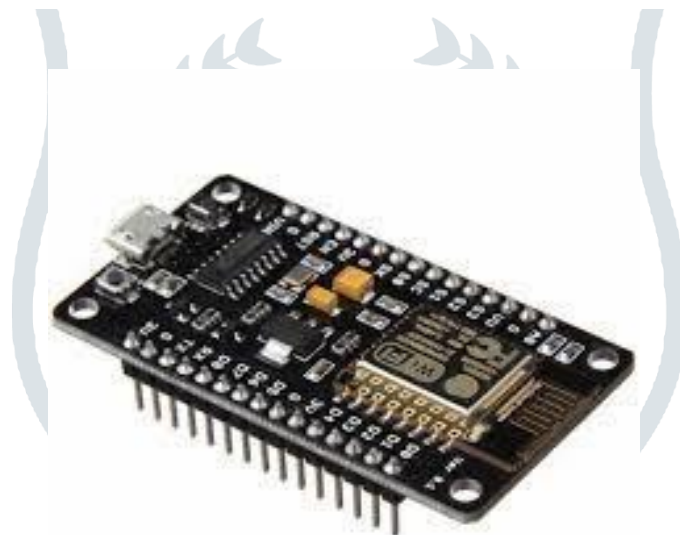
#### 4.4 DC motor

This DC Motor – 300RPM – 12Volts is termed Centre shaft DC Geared Motors as these are simple DC motors in which their shaft elongate through the middle of their gear box assemblage. For DC motors, they may be a 3mm string drill hole in the central of the shaft as it makes easy to connect it to the wheels or any other mechanical assemblage .500 RPM 12V DC geared motors widely used for robotics applications. It is effortless and very simple to use and available in typical size. For example, one of the most common items that motor is used in droids to fly in the air. A droid is such an example of an electronic device that contains a DC motor.

#### 4.5 Node MCU

Node MCU is basically a SOC (system on chip) is an integrated circuit that consolidate all components of a computer or any other electronic modules .

Node MCU (Node Microcontroller Unit) is a open-source, interactive, programmable, low cost, Simple, smart, Wi-Fi enabled software and hardware development environment that is built around a very inexpensive System-on-a-Chip (SOC) called the ESP8266. The ESP8266, designed and manufactured by Espressif Systems, contains all crucial elements of the modern computer: CPU, RAM, networking (WI-FI), and even a modern operating system and SDK. The ESP8266 chip costs only \$2 USD a piece when we purchased at vastness which makes it an exceptional choice for IOT projects of all other kinds. The main advantage of the Node MCU is that it greatly accelerates the process of developing IoT applications and it's a lower cost WI-FI.



**Figure.2:** Node MCU ESP8266 Module

#### 4.6 ARDUINO

Arduino is an open-source exemplar tribune used for fabricating electronics projects. It includes twain physical programmable circuit board and a software, or IDE (Integrated Development Environment) that sprints on your computer, where you can write and transmit the computer code to the corporeal board. Arduino can be used to develop stand-alone interactive objects or can be connected to software on your computer as examples like Flash, Processing, MaxMSP. The open-source IDE can be downloaded for free as currently working for Mac OS X, Windows, and Linux.

Arduino board designs use a variety of microprocessors and controllers. The boards are fortified with multiple connections of Digital and Analog input/output (I/O) pins that are integrated to distinct expansion of boards ('shields') or breadboards (For prototyping) and various other circuits. The boards feature serial communications interfaces, which includes Universal Serial Bus (USB) on some images, which are also helpful for loading programs from computers. The microcontrollers can be programmed using C and C++ programming languages. In addition to putting into action traditional compiler tool chains, the Arduino project provides an integrated advancement environment (IDE) based on the refining language project. Arduino and Arduino-sociable boards use printed circuit expansion boards called shields, which plug into the normally supplied Arduino pin headers.

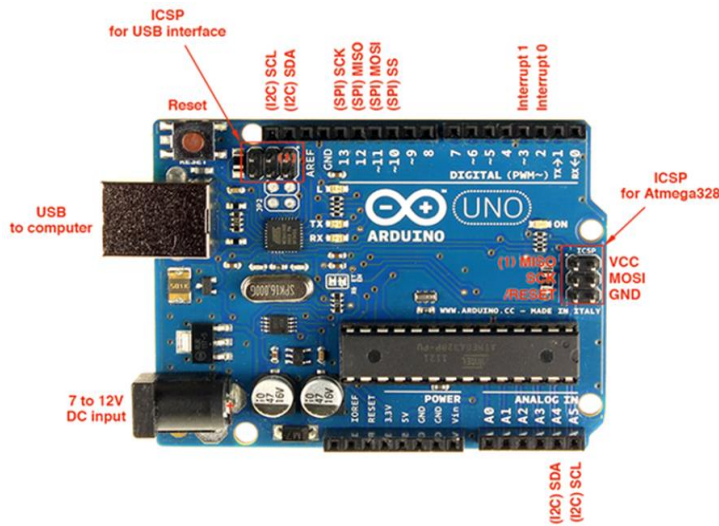


Figure.3: Arduino UNO

In this experiment, we use Digital I/O pins, Analog I/O pins, Ground pin, Power Supply pin as the Digital I/O pin is connected to LCD Display, Relay and the Analog I/O pin A5 which is (I2C)SCL is connected to the Node MCU Wi-Fi module. A charging cable is to 7 to 12V DC input for the working of the Arduino and the code is dumped in the compiler which is connected through Universal Serial Bus (USB) to computer.

Features:

- ATmega328 microcontroller
- Input voltage-7-12V
- 14 Digital I/O pins
- 6 Analog Inputs
- 32k Flash Memory
- 16Mhz Clock Speed

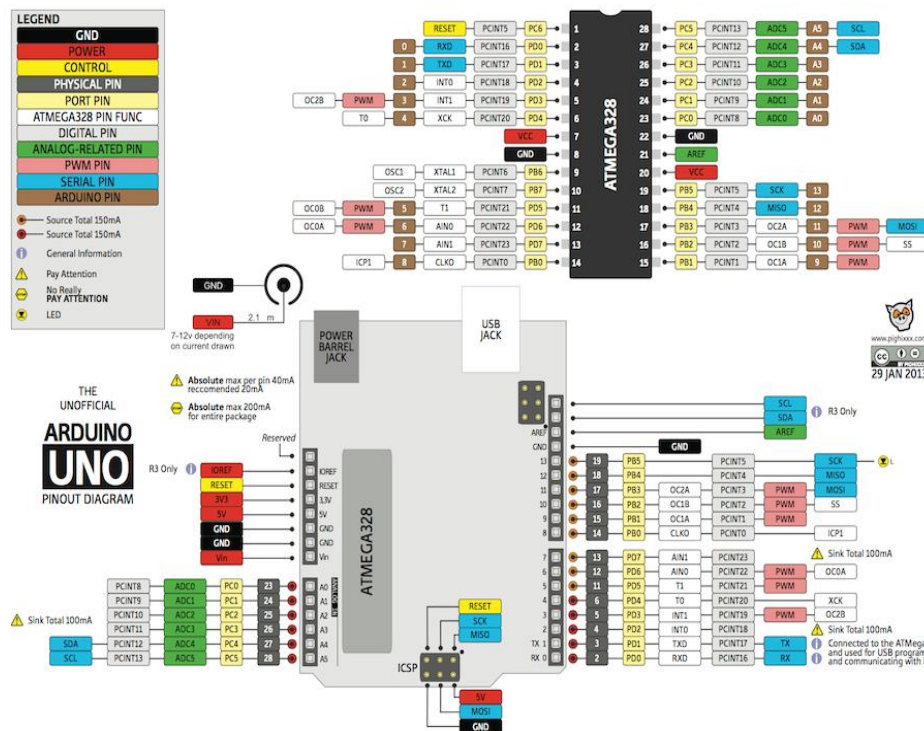


Figure.4: Arduino UNO Pinout Diagram

### 5.BLYNK APPLICATION

Blynk is a podium with IOS and Android apps to guide Arduino, Raspberry Pi and various types over the Internet. It's a digital instrument panel where you can throw up a graphic interface for your project by simply wriggling and released widgets. Blynk application come out with both in AppStore and Google Play.

Firstly download the app, create a account and login. Secondly, create a Blynk project and we need to select a hardware model which is NodeMCU and connection type is Wi-Fi. After adding hardware model and connection type, we need to add Widget to the project which is a Slider which have output pins D2 and D1. Next for the connection of NodeMCU ESP8266 with Blynk



application, we upload the Firmware which have username and password as the hotspot application in the mobile is changed respective with the given username and password. When slider moves from starting to ending, the ignition of the vehicle will ON and as if the slider moves opposite then the ignition of the vehicle will OFF.



Figure.5: Blynk Application

## 6.RESULT

When power is supplied to the board, the initial display on the LCD displays when we insert the tag on the NFC module as shown in the below figure 7. After inserting the tag on the module at a range the ignition i.e. vehicle engine will be started without any problem as if the tag is matched. As the tag is mismatched with the module then the ignition i.e. vehicle's engine doesn't start.

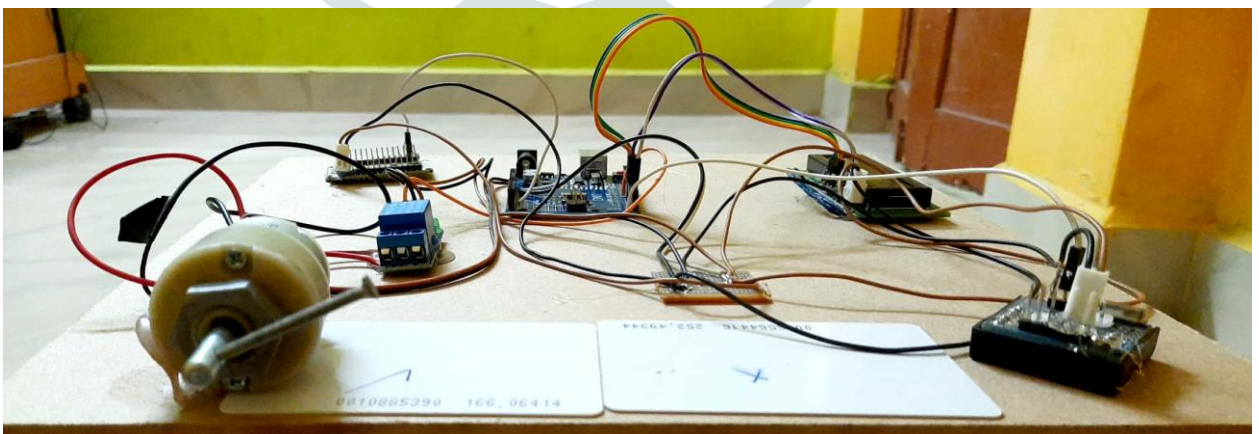
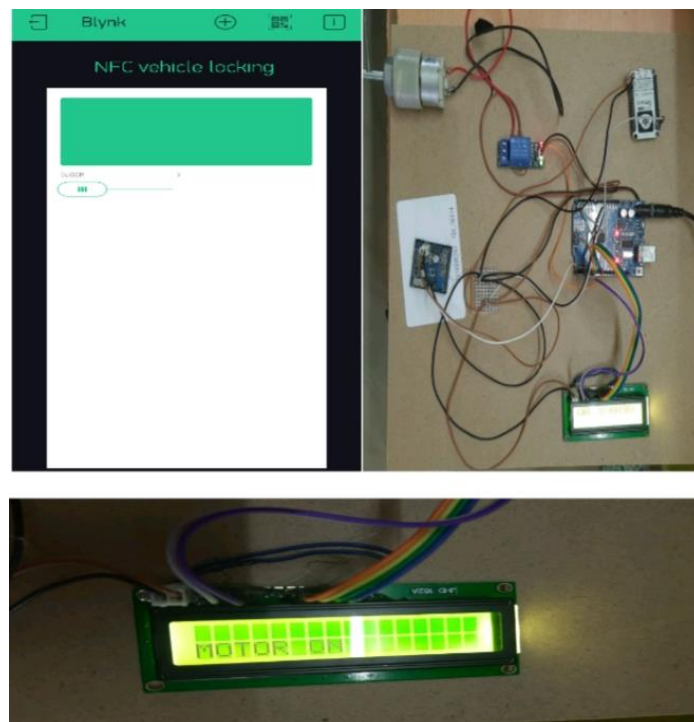


Figure.6: Total Experimental kit



**Figure.7:**Experiment using Blynk application

As the vehicle is used by someone with the permission of the vehicle's owner, a mobile app named Blynk application is used to control the ignition of the vehicle with correct username and password. As the username and password of the mobile is matched then we can control the vehicles ignition system which can be displayed on the LCD display as Motor ON. The control of the ignition of the vehicle through Blynk Application can be done by using a slider as shown in the figure 7.

## 7.CONCLUSION

NFC technology display in lots of operations in present tech era. From now onwards big tech companies like Apple, google, Samsung etc. Combining this technology in their achievements. At present it's mostly being used for payment but no one should wonder if it will be taking to more and more number of services for occurrence automobile.

NFC stub will charge imminent role in afterward smart devices for their vast incorporate functions, modern transportation, aviation, shipping, manufacturing industry for automation of particular errand. Merging NFC technology with our smart data communication and arrangement process avails convenience, time saving, energy effective and high priority improved security.

Mobile handsets are the original goal for NFC and soon NFC will be contrasted in high handheld devices. No matter NFC have the smallest range among radio frequency technologies, incorporating them with present technologies like Bluetooth or Infrared can expand its span of applications.

In hasty, NFC surely going to comfort many difficult and unsafe operation to be done with repose and promptly in this prototype coffee world.

## 8.FUTURE SCOPE

Near Field Communication system can be used for connecting more Devices as which it has provision to store Several Mobile Numbers. NFC will be required in IoT and 5G enabled networks for easier implementation and efficiency as it is used to configure with smartphone applications like entry to a restricted area.

In the future, we can expect that the locking system will be takeover by complete NFC Enabled devices and NFC tags as door locks. Thus NFC will act as a more distant step towards the creation of automatic devices. The switches for using household appliances like tube lights, fans etc will be takeover by remote controls that serve can be achieved using NFC-enabled devices that results in complete express of the devices.

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