

# Advanced Ignition Control and Surveillance Module for Automobiles

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**Abstract-** The mechanism of working of the motor vehicle is the same from past many years which has let the security of the vehicle down and thieves to improve themselves to break the locks and start the vehicle easily, to eradicate this problem to a great extent, this project have been built, in which the owner would have the complete control and can track over owner's vehicle even being miles apart from it. The user can control the power supply, ignition, and location tracking operations of the vehicle through an application installed on the owner's phone, which is connected to the cloud. When the vehicle has been stolen, it can control the ignition, and every motion will be captured through the application, from wherever in the globe (as this device is not distance-limited). The proposed idea is a one step ahead in the revolution and innovation of the two-wheeler vehicle. The purpose of working on this project is to develop a safety device for motor vehicles in an era where vehicle theft is a common occurrence that happens almost every day.

**Keywords**—Anti-theft system, Location tracking, cloud, GSM, GPRS, Arduino.

## 1. INTRODUCTION

Two-wheeler theft is a growing concern due to the high usage of motorcycles and scooters and the limited security features in conventional vehicles. Traditional locking mechanisms such as mechanical keys and handle locks can be easily bypassed. With the advancement of the Internet of Things (IoT), smart, connected, and automated security solutions can be developed to significantly enhance vehicle protection. An IoT-based anti-theft system integrates sensors, communication modules, cloud platforms, and mobile applications to monitor, control, and secure two-wheelers in real time [1]. To address this problem, various solutions have been proposed and implemented in India, including the use of GPS-based tracking systems, remote immobilization. GPS-based tracking systems are becoming increasingly popular in India, and they enable vehicle owners to track the location of their vehicles in real-time, thereby increasing the chances of recovering stolen vehicles. In this paper, we are presenting Smart Ignition and Surveillance Device for Motor Vehicles based on Internet of Things (IoT), one step ahead in the evolution of anti-theft devices.

It allows users/owners to control the ignition operations and track the location of their vehicle from anywhere. It also saves the user from the hassle of turning the engine on and off using the key and provides the functionality of starting the ignition system of the vehicle using the mobile application.

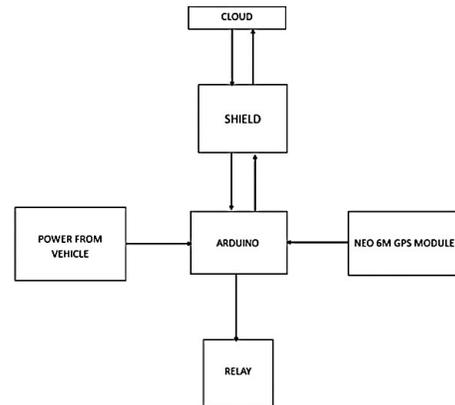


Figure1: Block Diagram

The purpose of this project is to develop a safety device for motor vehicles in an era where vehicle theft has become a common occurrence. The proposed system prevents the vehicle from being started without authorization signals from a mobile application. In addition, it enables the user to track the vehicle's location in real time, allowing recovery even if the vehicle is stolen and moved to a distant location [2]. IoT devices and cloud technologies together enable seamless connectivity and make intelligent, automated systems possible across the world [3]. Therefore, we propose a system that automates the vehicle ignition process through a mobile application, eliminating the need for a physical key while also providing an integrated anti-theft feature. The chances of getting vehicle stolen are nearly impossible after this device is installed in the system as the thief won't be able to start the vehicle without the mobile application installed on the owner's smart phone.

## 2. OBJECTIVES

- To eliminate motor vehicle theft in both existing and new vehicles by integrating IoT devices with cloud-based monitoring and control systems.
- Location tracking of the motor vehicle from anyplace,
- To provide wireless ignition system in the vehicle,
- To allow the user to on/off the ignition system of the vehicle without receiving the signals by user interface.
- To provide an anti- theft, location tracking& wireless ignition device (all 3-in-1) at a reasonable cost.



Figure 2:Arduino Uno

## 3. FACTORS OF SMART IGNITION AND SURVEILLANCE DEVICE FOR MOTOR VEHICLES

A smart ignition and surveillance device for motor vehicles is an IoT-enabled security system designed to prevent theft and enable continuous monitoring of vehicle status. The system integrates anti-theft mechanisms, remote ignition control, GPS-based location tracking, and cloud connectivity to provide real-time vehicle surveillance and management. By allowing users to remotely enable or disable the ignition system and track vehicle location through a cloud platform, the device ensures enhanced vehicle security, rapid theft detection, and efficient recovery. The block diagram is shown in figure 1. Its cost-effective and scalable design makes it suitable for both existing and new motor vehicles [4].



Figure 3: GSM Shield

### 3.1 Security

The rate of motor vehicle theft is increasing exponentially and very few of them are detected. The newspaper report proves the problem of vehicle theft in

our country, and the number of vehicles that have been detected.

Our system prevents the motor vehicle from being stolen and locates the motor vehicle in case it is lost or stolen. It will reduce the count of stolen motor vehicles to a great extent and increase the number of vehicles detected if they are stolen. If the owner is anywhere in the world and the device is activated then the application will send a notification to the user about the vehicle. It makes the work of police officials easy and makes the owner feels safe about the motor vehicle [5].

### 3.2 Smart Ignition System

This system makes working the ignition system way too smooth and easy to operate. The signals sent from the application and cloud will help the ignition system to get start, stop, and be turned off. It will save power and increase the life of the vehicle. It will save power and increase the life of the vehicle.

### 3.3. Location Tracking

The motor vehicle owner can view the vehicle's live location by accessing the mobile application. The system provides real-time coordinates, which assist in locating the vehicle in case of theft or loss. The user can access the vehicle from anywhere in the world to ensure its security [6].

### 3.4 Data Security

The system ensures the safety and security of user data across the mobile application and cloud storage. Login authentication is protected by an OTP sent to the registered phone number. Access to cloud data is restricted to the administrator, making the system highly secure.



Figure 4 : Channel Relay

## 3. COMPONENTS REQUIRED

The Components required for this project are as follows:

### 4.1 Arduino UNO (Microcontroller ATmega328P)

The ATmega328P microcontroller, as shown in figure 2, provides 14 digital input/output pins, 6 analog inputs, and various other features such as timers, interrupts, and serial communication capabilities, which make it suitable for a wide range of applications [6]. Additionally, the board can be programmed using the Arduino Integrated Development Environment (IDE), which is a simple and user-friendly

programming environment that is accessible even to those with little to no experience in programming. The Arduino Uno plays an imperative role in this system, as it controls the Relay operations, GSM Shield and manages the working operations of motor vehicle.

#### 4.2 GSM Shield

GSM (Global System for Mobile Communication), as presented in figure 3, is a digital cellular technology widely used for mobile voice and data communication services [8]. It operates over different frequency bands depending on regional regulations. GSM employs a Time Division Multiple Access (TDMA) technique, in which each frequency band is divided into multiple time slots, enabling several users to share the same frequency simultaneously. Each user is allocated a unique time slot within a specific frequency band, ensuring efficient spectrum utilization. In this system, the GSM SIM800C module is used due to its compatibility with the Arduino UNO platform and its relatively faster receiving and transmitting capabilities compared to other GSM shields.

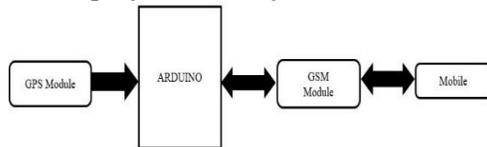


Figure 5: GPS Module

#### 4.3 Relay

A relay is an electrical switch that is operated by an electrical signal, rather than a mechanical action. Relays typically have two sets of terminals: input terminals for the control signal, and output terminals for the operating contacts as shown in figure 4. The input terminals are connected to a control circuit, such as a microcontroller or other electronic device, which provides the electrical signal that causes the relay to switch. The output terminals are connected to the load or circuit that is being controlled by the relay, such as a motor, light, or other electrical device. In this project, 1 channel relay 5V module has been used. The module's power and relay operation instructions make it easy to use and troubleshoot, and its screw terminals allow for easy wiring and connection of the relay's C(common),NC(normally closed), and NO (normally open) terminals. In addition, the inputs of the module are isolated, providing protection for any delicate control circuitry that may be connected to it. The module is compatible with a wide range of microcontrollers, including popular platforms such as Arduino, AVR, PIC, and ARM, making it a versatile and widely applicable solution for controlling electrical loads in a variety of settings.

#### 4.4 Neo-6M GPS Module

The Global Positioning System (GPS), shown in figure 5, is a satellite-based radio-navigation system that provides users with location, time, and velocity information [9]. The system is made up of a

constellation of at least 24 satellites or orbiting the Earth, as well as a network of ground-based control stations and user receivers. GPS receivers have indeed become much smaller and more affordable in recent years, and can be found in a wide variety of devices such as smart phones, cars, and drones. The GPS chipset is the main integrated circuit (IC) in a GPS receiver, and is responsible for receiving and decoding the signals transmitted by the GPS satellites [4].



Figure 6 : DC-DC XY-3606PowerConverter

#### 4.5 DC-DCXY-3606Power Converter

DC-to-DC converters are devices that convert a DC input voltage to a different DC output voltage level, as shown in figure 6. They operate by switching the input voltage on and off at a high frequency, and then filtering and regulating the resulting output voltage [9]. They can be used for a variety of purposes, including voltage level shifting, voltage regulation, and isolation. For the connection between the device and the motor vehicle's battery, DC-DC XY-3606 power converter has been used for converting 12V of motor vehicle's battery to 5V for the proper working of the device.

### 5. WORKING PRINCIPLE

The proposed system provides 3 features that are- an anti-theft, location tracking & automated ignition device. Prerequisites:

- i. A Subscriber Identity Module (SIM) to be inserted in GSM Shield,
- ii. A mobile application (Smart Ignition) to be installed in owner's/user's mobile phone.

The motor vehicle battery supplies power to the Arduino Uno through a buck converter, and the Arduino Uno in turn provides power to the GSM shield, GPS module, and relay.

An account has been created on cloud, registered the SIM, the cloud provides with an auth code, and at this instant, system got access to the cloud. The working principle of the project is illustrated in Figure 7. The shield gets connected to the network providers' network through the SIM. Now, by the help of internet, the shield gets connected to the cloud.

Relay, an electrical switching device, used here for tripping/breaking the circuit. It works on Boolean logic 0-1. Relay gets commands from Arduino, which gets commands from GSM Shield (through cloud & mobile application). When relay is at 0 or no signal

has been provided, user can turn on the vehicle manually using key; now when the signal has been given to change it into 1, relay is tripped, it breaks the circuit, and vehicle is turned off.

To track the location of the vehicle, GPS module has been installed in the system [11]. It provides the exact coordinates (longitude & latitude) of the vehicle every 5 minutes, with 97% accuracy.

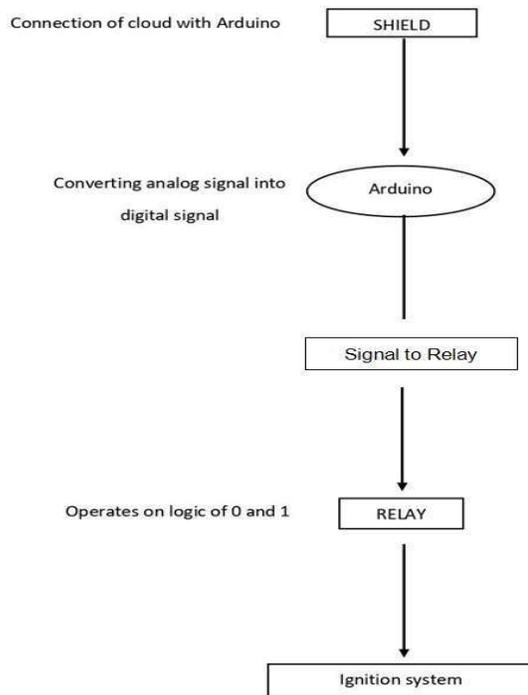


Figure 7: Working of project

## 6. CONCLUSION

A cloud-based smart ignition and surveillance device for motor vehicles is an advanced security solution designed to prevent theft and continuously monitor vehicle activity. The system integrates multiple security features that enhance its effectiveness in deterring unauthorized access and safeguarding vehicles. In this work, the authors propose a Smart Ignition and Surveillance Device for Motor Vehicles that offers anti-theft protection, real-time location tracking, and automated ignition control at a cost-effective price. By leveraging cloud technology, the

proposed system enables real-time monitoring, data storage, and remote management of vehicle security. This approach ensures continuous protection and prevents unauthorized vehicle operation, thereby improving overall vehicle safety and reliability. Another key feature of the proposed device is GPS-based tracking, which enables vehicle owners to monitor the real-time location of their vehicle. This functionality is particularly valuable in the event of theft, as it allows accurate tracking of the stolen vehicle and assists law enforcement agencies in its rapid recovery.

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