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Magnoplus Shield Vehicle Security Lock System

Charles J[1], Ambrose Prabhu R[2], Ananthaprakash K[3], Aravindh GB[4]

[1]Charles J, Department of Computer Science, Rajalakshmi Institue of Technology, Chennai-600124, India, [2]Ambrose Prabhu R, Department of Mathematics, Rajalakshmi Institute of Technology, Chennai-600124, India, [3]Ananthaprakash K, Department of Computer Science, Rajalakshmi Institute of Technology, Chennai-600124, India, [4]Aravindh GB, Department of Computer Science, Rajalakshmi Institute of Technology, Chennai-600124, India.

Abstract - *The conventional ignition lock cylinder has served us well for decades, but it's time to get into a new venture with novel idea. Visualize a world where your vehicle key never goes missing, where rust doesn't corrode the lock, and where you can smoothly insert and eradicate the key loss. This article proposes integrating magnets into the ignition lock cylinder to address the collective issues. And also shows how this simple yet effective modification can revolutionize the effect of vehicle user*.

Key Words: **Ignition Lock**, **Magnoplus**, **Magnet**, **Corrode, Integrating Magnets**

1.INTRODUCTION

The ignition lock cylinder is a critical component in any vehicle. It certifies that only authorized users can start the engine. However, traditional lock cylinders have their limitations. Keys get lost, wear out, and sometimes got damaged. Iron collects rust inside the lock in due course of time, leading to stiffness and eventual malfunction. Furthermore, accidental missing of the key while driving can lead to insecure of the vehicle. Author proposed a solution which includes integrating magnets into the lock cylinder, offering several benefits.

1.1 Reducing Rust Formation:

Rust is the antagonist of mechanical components. Ignition lock cylinders, which play a crucial role in starting our enhanced ignition lock cylinders, offer a practical solution to wear and tear issues. Vehicles are not immune to rust-related issues. However, by integrating magnets into the ignition lock cylinder, we can significantly reduce rust formation and enhance the overall durability of the lock key system. Integrating magnets into the ignition lock cylinder addresses rust-related challenges.

- **Barrier Effect:** The magnetic field created by the embedded magnets acts as a barrier against moisture. It repels water molecules, reducing the chances of rust formation.
- **Constant Movement:** As the key interacts with the magnetic field during insertion and removal, any existing rust particles are dislodged. This continuous movement prevents rust from settling and accumulating

1.2 *Avoiding Key Missing while driving with Magnet-Enhanced Ignition Lock Cylinders:*

Losing your vehicle key while driving can be a nerve-wracking experience. Imagine that the rider being stuck on the side of the road, unable to start the vehicle because the key mysteriously missing.

Secure Retention: The magnetic force ensures that the key remains firmly in lock cylinder as long as the vehicle exists. Hence no more panic on the loss of key.

1. **Smooth Transitions**: When you're ready to start the engine, the key effortlessly slides into the lock cylinder, guided by the magnetic attraction. No fumbling or struggling—just seamless insertion.
2. **Emergency Situations**: Imagine being in a hurry or facing an emergency. With magnets holding the key securely, you won't waste precious minutes searching for it. Quick access means peace of mind.
3. **Reduced Distractions**: A securely retained key means fewer distractions while driving. You can focus on the road ahead without worrying about where you left the key.

1.2 *Avoiding Key Damage:*

Traditional vehicle keys are susceptible to wear and tear, often resulting in bending, breaking, or other forms of damage. However, our innovative **Magnet-Enhanced Ignition Lock Cylinders** addresses these issues effectively.

1. **Bend Prevention:** The system's magnetic hold ensures that the key remains aligned within the lock cylinder. Unlike conventional keys that can bend when subjected to pressure, the magnetic retention keeps the key.
2. **Breakage Reduction:** Keys are prone to snapping, especially when excessive force is applied during ignition. With the magnetic system, the key

experiences less stress, minimizing the risk of breakage.

3. **Smooth Insertion and Removal:** The magnets guide the key smoothly into the cylinder, preventing any sudden jolts or jerks that could lead to damage. Likewise, removing the key is effortless, avoiding unnecessary strain.

4. **Durable Materials:** The system incorporates robust materials, including rust-resistant magnets and reinforced key slots. This durability ensures that the key withstands daily use without weakening or breaking.

1.4 *Easy Key Insertion with Magnetic Enhancement*

Traditional ignition locks often require precise alignment and sometimes a bit of jiggling to insert the key smoothly. However, by incorporating magnets into the lock cylinder, we can significantly improve this process.

1. **Gentle Guidance:** The magnetic force subtly guides the key into the correct position, reducing the need for precise alignment. Drivers will notice that the key glides effortlessly into the lock, even in low-light conditions or when in a hurry.

2. **Reduced Friction:** The absence of direct metal-to-metal contact minimizes friction during key insertion. This not only makes it easier to fit the key but also reduces wear on both the key and the lock over time.

3. **User-Friendly Design:** Retrofitting existing locks with magnets is straightforward. The design ensures that the key retains its familiar shape, making the transition seamless for users.

4. **Oil-Free Solution:** In this case, keys do not get stuck, and rust will not form. Therefore, avoid using any oil in the ignition lock.

2. LITERATURE SURVEY

Tanmay kadam etal.,[1] These days, the idea of remote engine locking and vehicle theft detection is essentially employed to locate cars and lock their engines from anywhere with the help of the Blynk app. However, this lock was unable to account for other vehicles, such as scooters and bikes, as they also desired remote engine locks. One of the hardest challenges with the remote engine lock is inserting the controller chip and monitor. It will also function for a limited distance before becoming ruined after a few months. Because the automobile open system relies on the sensor, we are unable to open the lock. Thus, it puts drivers of vehicles in a dangerous scenario. Muthukarpan etal.,[2] Drink and drive issue has become solemnly that needs immediate attention. This is due to driver's ignorance towards road rules and regulations and their selfish attitude that caused loss of innocent lives. Although previously there is a drunk detecting mechanism using breathalyser but it isn't suitable for current fast-paced lifestyle. Therefore, to overcome these issues, this system is proposed. This system is fixed on vehicle's steering to measure alcohol concentration reading using MQ-3 sensor from the driver's exhaled breath. If the driver found to be drunk beyond threshold level of 400ppm, then ignition lock is activated and the car engine does not start till alcohol concentration falls to safe level. Umesh Virkar etal.,[3] Bikes being taken from parking lots is a regular occurrence. Or infrequently we accidentally forget to take the bike's keys off. It is really stimulating to get the bike back in these situations. This creativity is intended to accomplish this goal. The primary idea behind this plan is to use an Android mobile to enter a password to protected a bike. When the password is Incorrectly entered, this project triggers a buzzer. An essential link in a security chain is a bike entrée control. Only anyone with the proper sanction are able to access the bike using the access control system of the microcontroller-based bike locker. In this instance, in addition to any phone issues—such as a low battery or a touch issue—the customer also experiences vehicle lock issues. For this reason, the notion is somewhat challenging.

Shunmathi[4] This concept is provided on how to use value engineering technique to improve the performance of wheel locking system using ignition key and to develop a new design in pro e software. In wheel locking system, when ignition key is in off state then both front and rear brakes are applied. This will prevent the vehicle movement when it is not in use. This could be done for disc brake system. The brake fluid is passing from the caliper to the reservoir. So the brake piston releases the brake pads against the disc. By applying the wheel locking system in two wheelers, we could reduce the number of vehicles stolen per year. Amalia, Andari,Arif[5] Motorcycle theft is a big concern, and using fingerprint sensors for security is much safer than manual methods. This study focuses on how much battery power is needed for a fingerprint security system on motorcycles. The system includes components like the R503 fingerprint sensor, Arduino Uno, buzzer, relay, ignition key, and starter. Testing shows the sensor works well in various conditions. Starting the motorcycle with a fingerprint is faster than manual methods. The system's power consumption was measured, and the battery can power it for 180 hours continuously. Anil Kumar Dubey etal.,[6] According to the National Highway Traffic Safety Administration, drunk driving leads to approximately 10,000 fatalities annually, translating to one death every 50 minutes. Despite its preventable nature, these incidents persist, causing significant harm to drivers, motorcyclists, and pedestrians. There are no justifiable reasons for drunk driving, given its serious repercussions and the endangerment it poses to others on the road. This paper proposes a design model for an ignition interlock system aimed at curbing drunk driving. The system is designed to immobilize the vehicle's engine upon detecting alcohol in the

driver's system. Furthermore, the design includes enhancements such as GPS tracking and a security feature that notifies the owner, offering precise location monitoring and additional security measures.

K. Dinesh Kumar etal.,[7] This project addresses the common issue of bike thefts from parking areas or instances where keys are inadvertently left in the bike. The main objective is to create a bike security system using a keypad-entered password. Upon three consecutive incorrect password attempts, the system activates a buzzer as a warning signal. Users have the flexibility to change the password at any time using the keypad. The system is powered by a microcontroller, serving as the project's CPU. It incorporates GSM technology and a vehicle anti-theft system with ignition control capabilities.

Activation occurs when the bike owner removes the key from the ignition lock. A vibration sensor, akin to a piezoelectric sensor, triggers an SMS to the owner upon detecting vibrations. Upon receiving a response SMS from the owner, the engine is immobilized. A relay and DC motor are utilized to demonstrate the vehicle engine control system in the project. Altaf S etal.,[8] In response to the rising number of accidents caused by drunk driving, we've developed a simple solution. Our project involves a system built with a microcontroller and an MQ3 alcohol sensor. This system detects alcohol consumption by the driver and automatically stops the vehicle's engine if alcohol is detected. We're introducing a setup where the alcohol sensor is placed near the steering wheel, allowing it to detect alcohol from the driver's breath. Additionally, our system includes monitoring capabilities for cars. If alcohol is detected at the start of the ignition, the system immediately shuts off the car's ignition. Furthermore, if alcohol is detected while the car is already in motion, the system reduces fuel supply to address the issue promptly.

Sadhana B etal.,[9] An ignition interlock system to avoid intoxicated drivers which analyses the Blood Alcohol Consumption of the driver and acts according to the results which reduces road accidents. An ignition interlock system to avoid intoxicated drivers which analyses the Blood Alcohol Consumption of the driver and acts according to the results which reduces road accidents. This system consists of a device which is placed on the dashboard of the vehicle on either sides of the steering, detects Blood Alcohol Consumption of the driver when he/she blows in it to start the vehicle which is followed by ignition interlocking if it finds the driver is intoxicated. Shailesh Dhomne etal.,[10] This paper aims to create a biometric system for enhanced security, incorporating an alcohol detector and GPS technology. Fingerprint identification stands out as a reliable method for human identification, given the uniqueness of each individual's fingerprints. The study reviews existing locking systems for both two and four-wheeled vehicles, analysing previous work in this field and identifying areas for potential future development. Rajalashmi K, Vignesh S, Senthilnathan K,[11] The goal of this project is to create an automated system for two-wheelers to engage the side lock feature. In everyday situations, riders often forget to engage the side lock when parking, which can lead to theft or mishandling of the vehicle. To address this issue, we aim to install an automated side locking system in two-wheelers. The system operates simply: when the key is unlocked, a signal is sent to a servo motor located at the base of the handlebar. The servo motor then turns the handlebar to a specific angle, triggering the locking system to engage the side lock automatically.

Fig -1: Ignition Lock parts

Ignition Lock:

An ignition lock, occasionally referred to as an ignition switch, is a part of a car that manages the electrical system and kicks the engine. To operate, it usually needs a key inserted, restricting illegal usage of the car. The electrical system is turned on when the key is inserted into the ignition lock, which starts the engine's starting mechanism.

Ignition Lock Cylinder:

The ignition lock cylinder is a cylindrical tumbler and key mechanism. When you insert the key and turn it, the lock cylinder allows electrical power to flow, enabling the vehicle to start

Focus HU101 Lock Plate:

Particularly the HU101 type commonly found in Ford vehicles. It helps locksmiths align and stabilize the lock during the process, making it easier and more precise to work on. In simpler terms, it's like a helpful gadget that makes working with certain types of locks smoother and more efficient.

Meshing of Lock:

The purpose of the lock protector is to shield the ignition lock cylinder from harm. A cotter pin is used to attach it to the ignition lock cylinder. The material that makes it up is stainless steel.

Connector:

connectors that join all of the ignition lock components in the proper alignment. Used as a connector in ignition lock springs, screws, etc.

4. Solution Method:

4.1 Solenoid Magnetism:

- A Solenoid Magnetism is a type of electromagnet formed by a helical coil of wire whose length is substantially greater than its diameter, which generates a controlled magnetic field. The coil can produce a uniform magnetic field in a volume of space when an electric current is passed through it.
- Solenoid magnet experiments are often used to magnetize metal objects. When an electric current flows through the coil of wire in the solenoid, it creates a magnetic field. By passing the metal object through or around this magnetic field, the metal can become magnetized

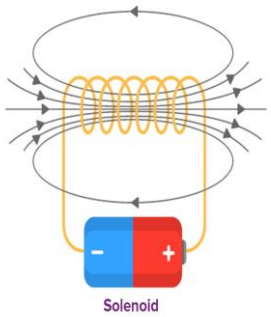

Fig -2: Solenoid Method Magnetic Field Flow

4.2 Implementation:

- In our project we will going to Magnetized Focus HU101 Lock Plate because it is made up of hardened steel which can be magnetized. It is used hold and lock the key in the Ignition Lock System.
- So we insert the Focus HU101 Lock Plate into the Solenoid coil and then give a power supply to the solenoid coil suddenly magnetic field create inside the coil. So our material become magnet.

Fig -3: Focus HU101 Lock Plate

5. Statistical Analysis:

Two set of HU101 Lock Plate were tested using whether HU101 Lock Plate Magnetized is Superior than Without Magnetized Lock Plate (Measured) in mg?

Before	2.01	2.0003	2.002	2.0003	2.01	2	2
After	2.02	2.03	2.003	2.0004	2.02	2.01	2.01

The hypothesis, at the 0.05 level of significance, that the average nicotine contents of the two brands are equal against the alternative that they are equal.

Solution:

$$H_0: \mu_1 = \mu_2$$

$$H_1: \mu_1 \neq \mu_2$$

$$\alpha = 0.05 \text{ l.o.s}$$

Reject H_0 if $Z > 1.645$

Computation using U-statistic:

The observations are arranged in ascending order and ranks from 1 to 18 are assigned.

Before	2.01	2.0003	2.002	2.0003	2.01	2	2
Rank	8.5	3	5	3	8.5	1.5	1.5

After	2.02	2.03	2.003	2.0004	2.02	2.01	2.01
Rank	12	14	6	4	12	8.5	8.5

The ranks of the observation belonging to the Brand A samples are put a bold form.

$R_1 = 8.5+3+5+3+8.5+1.5+1.5 = 31$

$R_2 = 12+14+6+4+12+8.5+8.5 = 65$

Also, n_1=7, n_2=7

$$U = n_1 n_2 + n_1\left(\frac{n_1+1}{2}\right) - R_1 = 46$$

$$\mu_u = \frac{n_1 n_2}{2} = 24.5$$

$$\sigma_u^2 = (n_1 n_2)\left(\frac{n_1+n_2+1}{12}\right) = 61.25$$

$$\therefore \sigma_u = 7.83$$

$$|Z| = \frac{U-\mu_u}{\sigma_u} = 2.746$$

The table value of Z_α at α = 0.05 is 1.645

Conclusion:

Since calculated value is greater than table value, reject H_o

Thus the magnetic key is superior than the regular key.

Chart -1: Line Chart

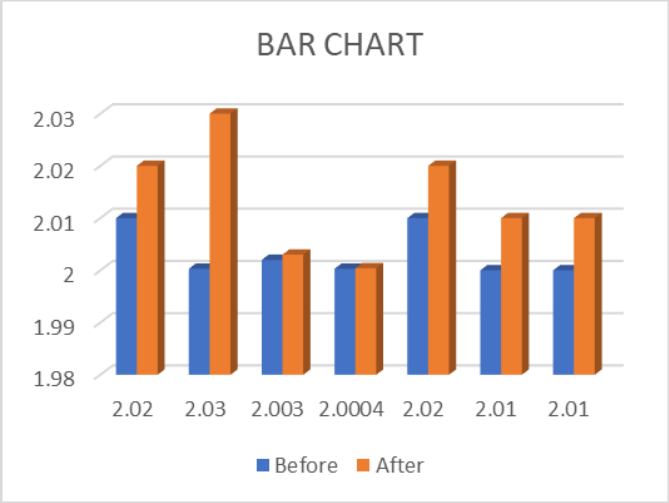

Chart -2: Bar Chart

Chart -1:

Two datasets with the labels "Before" and "After" are shown in the graphic. The range of both lines is roughly 2.01 to 2.03. The "After" data starts lower and rises to intersect with the "Before" line, while the "Before" data starts higher and then drops. Around 2.03, they both peak and then start to decline once-more.

In conclusion, the graph compares two sets of data that exhibit comparable volatility patterns. The "After" data intersects at the peak value after catching up to the original "Before" data.

Chart -2:

Two datasets from seven distinct categories, titled "Before" and "After," are shown in the graphic. The values on the y-axis span 1.98 to 2.04. The salient points are as follows:

Comparing Categories: The "After" values are greater than the "Before" values in the majority of categories (1, 2, 3, 5, ,6). In Category 4, the values for "Before" and "After" are equal. "After" in Category 7 has a lower value than "Before."

General Trend: With the exception of the previously indicated unique situations, the "After" data often performs better in the majority of categories.

In conclusion, the bar chart indicates that the "After" data has generally improved as compared to the "Before" data.

6. CONCLUSIONS

Integrating magnets into ignition lock cylinders is a practical enhancement that addresses common pain points associated with traditional keys. By preventing loss, wear, rust, and damage, this innovation improves both convenience and security for vehicle owners.

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BIOGRAPHIES

Charles J

(UG Student, Department of Computer Science and Engineering, Rajalakshmi Institute of Technology, Chennai-620124)

Ambrose Prabhu R

(Asst Professor, Department of Mathematics, Rajalakshmi Institute of Technology, Chennai-620124)

Ananthaprakash K

(UG Student, Department of Computer Science and Engineering, Rajalakshmi Institute of Technology, Chennai-620124)

Aravindh GB

(UG Student, Department of Computer Science and Engineering, Rajalakshmi Institute of Technology, Chennai-620124)