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KEYLESS IGNITION SYSTEM FOR MOTORCYCLES

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ABSTRACT

In our busy and developing society, there are many diligent people. Whether a distance is too great or too small, everyone is using a vehicle to get from one location to another. There is an issue that they'll forget where they put the motorcycle key or lose it. Keys can shatter occasionally from rough handling, which causes serious issues in an emergency. Even though security is improving every day, there is still a potential that duplicate keys could be used to steal a vehicle.

So, we are developing a keypad security system for bikes with a one-time password to prevent this. When we enter thepassword, the motorcycle unlocks, and we can then start the engine. Because it is a crown prime concern in our regular lives, security. No one can use a key to steal a bike because the vehicle doesn't depend on it, and making a duplicate key for the vehicle is impossible. Using a smartphone, we enter the vehicle's one-time password. It comprises of a wireless Android application running on a mobile device that connects a Bluetooth module to an Arduino system. If the password is correctly entered, the battery gets turned on, allowing us to manually turn on the ignition. A buzzer can be added to a motorcycle's keyless ignition system to provide an audible indication that the system is identified from a parking place with buzzer sound.

KEYWORDS

Keypad, Bluetooth Module, Buzzer, Motor driver, Arduino.

1. INTRODUCTION

More or less in every street part, and road big or tiny, for certain has at least one vehicle. Motorcyclist is simply travelling quickly to avoid a potentially fatal traffic incident. Motorcycles or motorbikes have recently become a popular target for thieves due to their unexpected increase in quantity. Because of its security attributes and one-time password enabled ignition capability, the system will assitance many moped end users to feeling assured and feel pleasant without turning their notice rear to their moped.

Keyless ignition systems with OTP enabled motorcycle does away with the ignition key switch and all the inconveniences that come with utilizing a key. It offers security and comfort.

The purpose of this initiative is to lessen or prevent motor vehicle theft nationwide. With the help of this technology, motorbike owners may be able to protect their vehicles from theft. The motorcycle can be started without a key using the project's one-time password

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module. A Bluetooth that communicates with the end user to interact with the motorcycle using a mobiledevice and which has a mobile app that can kick off the motorcycle.

Using a Bluetooth component, the motorcycle can be connected to the Arduino system.[5] The nearby notion was implemented by Vyas et al. in their study, in which a end user side program was executed on an Android smartphone with Bluetooth connectivity to get entry to and authority over the ignition system. This attribute will stop any robber from pushing or carrying the moped off with them. This improvement increased the security of the project's fingerprint-enabledignition.

One of the main benefits of this system is that it eliminates the need for a physical key, which can be lost or stolen. This provides added security and convenience for the user, as they do not need to carry a key along with them.

Along with this, the ignition system is difficult for unauthorized users to start the vehicle, as they would need to know the correct code. This can help deter theft and unauthorized use of the vehicle.

Buzzers are plain and economical means of supplying communication in the middle of electronic products and the user. Buzzers arranged as indicators, they require only dc voltage to work but they are limited to a single audio frequency of operation, whereas transducers require outermost circuitry, but allow a broad range of audio frequencies.

2. OBJECTIVES

1.

i. Creating a marketable, innovative product.
ii. An improvement over the old-fashioned.
iii. Lock and key method.

Greater certainty is allowed by key-less ignition systems.

3. PROBLEM SOLVING

The latest advancement in motorcycle technology, key-less ignition, offers enhanced security and functionality. This system is completely keyless so that we won't get any issues that arise due to keys.

The main idea behind the system is the Micro-controller setup that is Arduino uno is attached to the moped, through Bluetooth the Arduino is connected to the mobile. Whenever the end user desire to access the moped, then he connects with the Arduino with the help of Bluetooth, as soon as client connects with the Bluetooth the biker gets an OTP from the Micro-controller that is Arduino, the biker require to enter the OTP in mobile using an application interface that is Arduino Bluetooth controller.

If the OTP entered is matched, then only the rider can be able to access the vehicle otherwise rider can't. Thus, this system increases the security when compared with the other traditional key systems.

Along with this, the system has another feature that is tracking auto mobile in huge parking lots. The rider had an option in Arduino Bluetooth controller app to locate vehicle, whenever he clicks on that option the vehicle gives a beep sound, so that the rider able to know where the vehicle is. This how we came up with a solution for increase the security of the vehicle.

4. LITERATURE REVIEW

1.Karthikeyan. A "Fingerprint Based Ignition System" Published in Karthikeyan [8]. The methodology used here is fingerprint based system. The fingerprint sensor is fixed to the vehicle such that onlyauthorized persons able to unlock it. Samples of the fingerprint are prestored in the memory. The drawbacks observed here is there may be a chance of duplicating the

fingerprint and during rainy days it is unable to unlock it with wet hands.

2. Nagaraja, B. G.; Mahesh, M.; Rayappa, R.; Manjunath, T. C.; Patil, C.M., "Design& Development of a GSM Based Vehicle Theft Control System [5]. The system used here is GSM module. GSM stands for Global System for Mobile Communications which used for wireless communication between Arduino and internet using GSM Library.

There are many pros and cons in this system. The pros are it can be able to establish a wireless connection so that we can be able to access from remote location. The cons in this system are it works when the network isavailable in no network places it is notpossible to access the vehicle which is not a good choice.

3. Face recognition for moped engine ignition with message system [11]. The technique used here is face recognition. The idea here is accessing the vehicle using face recognition.

The drawbacks observed her is if impression of the main person kept Infront of face recognition component the vehicle getsunlocked and during light failure times it ishard to capture the picture and one of the major drawbacks is if any injury happens to the face, the face recognition module is unable to recognize the person.

4. B.C. Kavitha, Shanmugaratnam J, "Tracking and Theft Prevention System for Two-Wheeler Using Android", International Journal of Engineering Trends and Technology (IJETT) – Volume 21 Number 7 – March 2015 [3]. The system uses an embedded system built on GPS and the Global System for Mobile Communications (GSM) technologies. The car has this system fitted. The microcontroller is linked to an interface GSM module, which is then linked to the engine.

This system is an attempt to create a tracking device that uses the GPS to pinpoint the specific position automobile of a vehicle towhich it is attached and then uses a GSM modem to relay that information to a user.

5. Automobile Anti-theft System Based on GSM and GPS Module, Intelligent Networks, and Intelligent Systems (ICINIS) [2]. Using micro-controllers and GSM modules, this concept focuses on avert auto theft. With increased accuracy and competence, our system is producing the outcome. For those looking for better and more sophisticated security in their car, it may be useful.

6. Salonie Vyas, Chinmay Nandhini, Umang Chaudhari and Bhushan Thakare "Access Control Application using Android Smartphone, Arduino and Bluetooth ", International Journal of Computer Applications (0975 – 8887) Volume 142 – No.9, May 2016 [15]. The connectivity between the end user and moped in this system is through mobile which is a good mobile, but the drawback we have observed here is we need to carry the mobile every time along with this Bluetooth is also bit slow to interact with Arduino.

7. R.M. Vithlani, Dr. H.N. Pandya, Sagar Shingala, BIOMETRIC AUTOMOBILE IGNITION LOCKING SYSTEM [4]. This system used biometric authentication for automobile ignition locking. In this system the drawback observed is, lot of sensitive data is stored to prevent unauthorized access. So, there is a concern regarding the privacy and security of the information, especially in the event of a data breach.

Along with these biometric systems should be maintained regularly to maintain proper functioning.

8. Omidiora E. O.(2011) "A Prototype of a Fingerprint Based Ignition Systems in Vehicles" [9]. This system used fingerprint technique for ignition, the idea behind using the fingerprint is no two persons can have same prints even though

they are twins, hence it is easy to differentiate.

The drawbacks observed here is sometimes the fingerprint sensors provide false positives or false negatives which means the system may fail to recognize a legitimate user or grant access to an unauthorized user.

Not only this Fingerprint-based systems can only recognize and authenticate the specific set of fingerprints that are enrolled in the system. This means that if someone else needs to use the vehicle, their fingerprints would need to be enrolled in the system before they can gain access.

9. Lacatan, L. L., Austria, Y. D., Funtera, J. G. D., Garcia, S. C., Montenegro, J. H., & Santelices, L. T. (2017) [11]. This system uses facial recognition. The drawback observed here is installation of a face recognition ignition system may require specific hardware and software compatibility with the motorcycle's existing systems. This can add additional costs and complexity to the system.

10. J.S Bhatia, Pankaj Verma, "Design and Development of GPS-GSM Based Tracking System with Google Map Based Monitoring" [16]. One of the drawback GPS and GSM tracking systems rely on cellular network coverage and satellite signals, and may not work in areas with poor reception or no network coverage.

Another drawback GPS and GSM tracking devices require a power source, which may limit the types of assets or vehicles that can be tracked.

5. PROPOSED SYSTEM PROCESS

In this process of proposing the system, first we have gone through the updates required in the motorcycles sector and recognized the need which creates an impact on them. Finally, we selected keyless ignition system for motorcycles.

After recognizing the needs, we have gone through some mechanical design in the existing systems and identifies the drawbacks in them. After that we planned how to overcome these drawbacks and made some research regarding these drawbacks and how to solve them.

As soon as we got some idea on these drawbacks, we identified the components required and created a design which we have decided. After completion of the prototype, we include the software design required for the prototype.

Since we use Arduino uno as our Micro-controller, we used C language as the programming language and for the simulation purpose we used Tinker cad. Finally, we created a model as per requirements.

After this, the code is functionally tested that the code is working as per the functionality or not and finally the code is optimized, evaluated, and integrated.

At last overall testing is done, we got some errors here so, updated the code here and made the prototype working as per needs.

Finally, we used an application to interact with the Arduino to control over all prototypes. This is how we proposed our system in a step-by-step manner.

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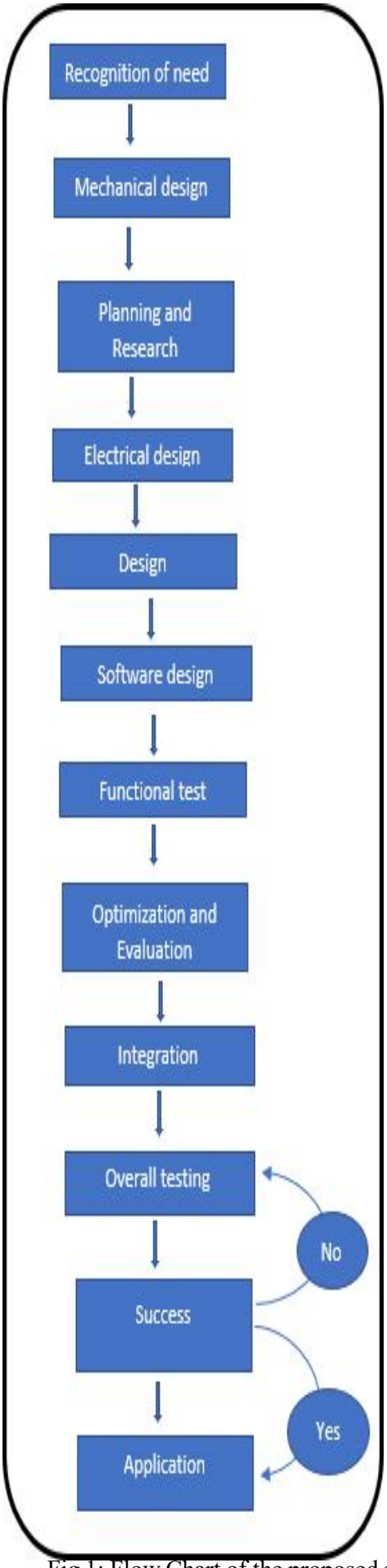

Fig 1: Flow Chart of the proposed system

6. Components used for Designing

These are the different types of electronic components used in this sytem along with its usage.

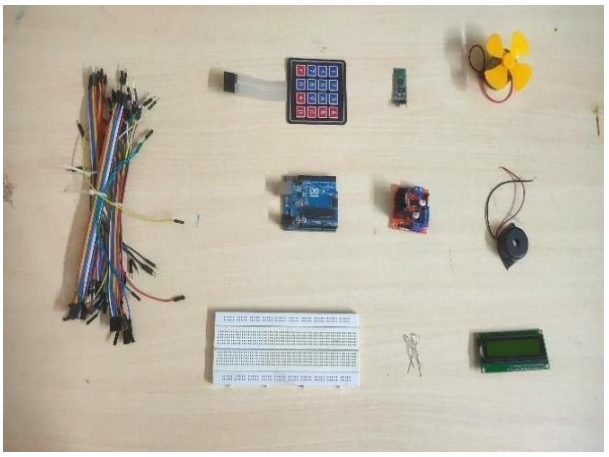

Fig 2: Components

1. Arduino

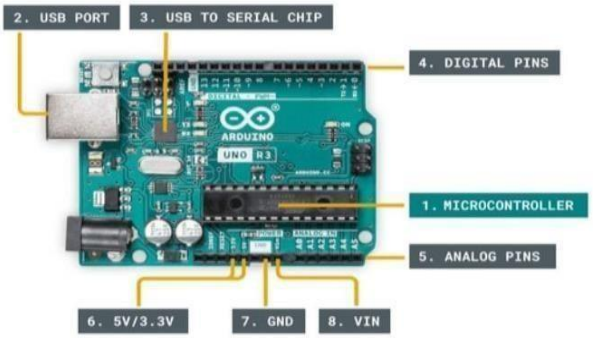

Fig 3: Arduino

Arduino Uno is a Micro-controller with ATmega328P chip. It is a one of the most well liked and widely used boards in the Arduino group of Micro-controllers. Theboard is designed to be easy to use, even forthose with little or no programming experience.

The Arduino platform includes various hardware boards, such as the Uno, Mega, Nano, and others, each with different specifications and capabilities. These boards can be connected to various sensors, actuators, and other electronic components to create interactive projects such as robots, smart homes, and wearable technology.

Arduino has become popular in the maker community due to its accessibility and ease of use.

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1	Arduino Uno	ATmega328P
2	Breadboard	To create electrical connections between electronic components .
3	Bluetooth	Wireless communication technology for exchanging data.
4	Jump wires	Wires which are used to connect components.
5	Buzzer	Signaling device
6	Motor	Sample for the engine
7	Motor Driver	Interface between motors and the control circuits
8	LEDs	Light emitting diode – power efficient lights
9	Battery	Energy storage device.

Table 1: List of Components

2. Breadboard

Fig 4: Breadboard

A breadboard which is also so called as plug block is used to construct sample design. Designers find it beneficial as it enables them to effortlessly remove and replace components. Similarly, individuals who want to construct a circuit for the purpose of showcasing its operation and later reusing the components in another circuit also find it useful.

Breadboards are typically used for creating and testing electronic circuits before soldering them onto a more permanent circuit board. They allow users to quickly and easily connect components such as resistors, capacitors, LEDs, and integrated circuits (ICs) without the need for specialized tools or expertise.

3. Bluetooth

Fig 5: Bluetooth

Bluetooth is a wireless device that allows electronic components to communicate with each other over short distances. It was first introduced in 1994 and has since become a popular way to connect devices such as smartphones, headphones, speakers, and smart watches.

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The HC-05 module is relatively easy to use, as it only requires a few connections to a microcontroller or other device. It typically has six pins: VCC (power), GND (ground), TXD (transmit), RXD (receive), KEY (mode switching), and EN (enable). To use the module, you need to connect the VCC and GND pins to a power source and ground, respectively, and connect the TXD and RXD pins to the microcontroller's UART (universal asynchronous receiver-transmitter) pins. The KEY and EN pins can be used to configure the module or put it in different modes of operation.

4.Jumper Wires

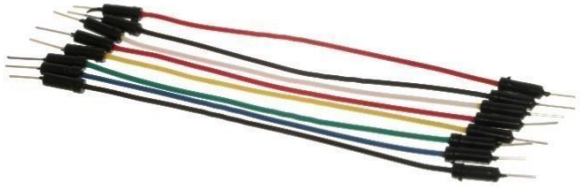

Fig 6: Jumper Wires

Jumper wires are used to connect the devices within the circuit and with the Arduino. Generally, there are 3 kinds of jumper wires.

Jumper wires come in various lengths, colors, and types, including single-core wires, multi-core wires, and ribbon cables. They are used in a variety of electronic projects, from prototyping to more complex circuit designs.

5. Buzzer

Fig 7: Buzzer

Buzzer is used for indication purpose. Buzzer is operated at 3.5 to 5 volts.

A DC buzzer works by converting electrical energy into mechanical energy, which creates a sound wave. The buzzer typically consists of an electromechanical coil, a diaphragm, and a housing. When a DC voltage is applied to the coil, it creates a magnetic field that attracts the diaphragm, causing it to vibrate and produce sound.

6. Motor

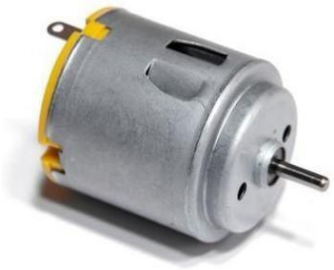

Fig 8: Motor

Motor is used as a reference to the engine. When the motor is on it means that ignition is on and vice versa. It operates using the principle of electromagnetic induction, where a magnetic field is created by passing an electrical current through a wire coil. This magnetic field then interacts with a permanent magnet to produce rotational motion

7. Motor Driver

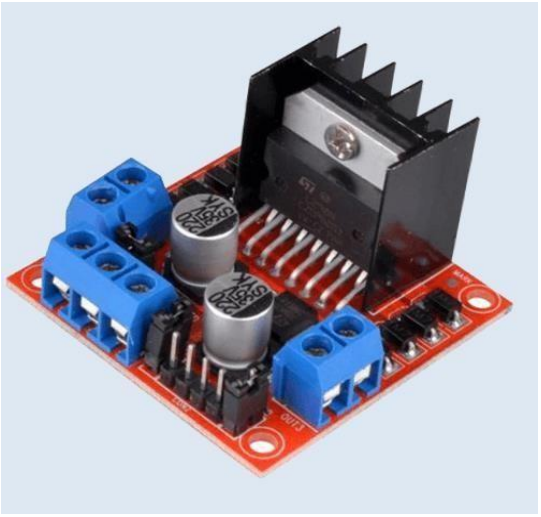

Fig 9: Motor Driver

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Motor Driver behave as a middleman in the middle of motor and Arduino uno. Main reason to make use of motor driver is to connect external power supply to the motor as motor is operated at 9 volts to 12 volts. It typically consists of a microcontroller or other control circuitry and one or more power stages that can deliver current to the motor.

The motor driver receives control signals from a microcontroller or other control circuitry, which can be used to set the desired speed, direction, and torque of the motor. The power stages of the motor driver then amplify the control signals and deliver them to the motor

8. Light Emitting Diode (LED)

Fig 10: Light Emitting Diode

Like buzzers, leds are also used as indicators for different signals different colors of indicators are used.

LEDs, also known as light-emitting diodes, are electronic devices that emit light upon the passage of an electric current through them. These are a category of semiconductor components that transform electrical energy into light energy. The functioning of LEDs relies on the scientific principle of electroluminescence, wherein a material radiates light as a response to the flow of an electrical current across it.

9. Battery

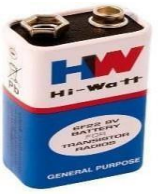

Fig 11: Battery

Battery is used as a power source to Arduino. The operating voltage of Arduino is 9 to 12 volts.

7. Results and Discussions

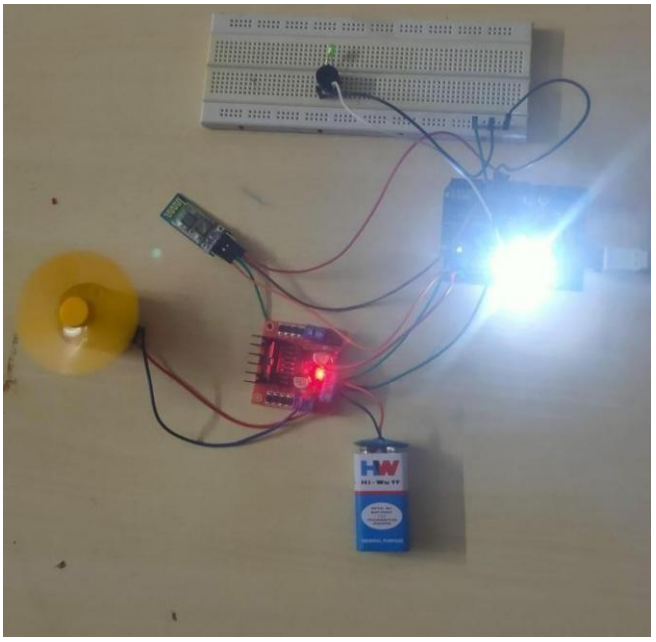

Fig 12: Implementation Diagram

When the rider approaches themotorcycle, the Bluetooth module will scan for available Bluetooth devices**.**

If the rider's smartphone is within range and has Bluetooth enabled, the Bluetooth module will establish a connection with thesmartphone.

The rider's smartphone will then generate a unique OTP and forward it to the Micro-controller via Bluetooth.

The Micro-controller will receive the OTPand verify it with the OTP module. If the OTP is valid, the microcontroller will trigger the relay module to turn on the motorcycle's ignition.

If the OTP is invalid, the Micro-controller will not trigger the relay module, and the motorcycle's ignition will remain off.

Once the rider starts the motorcycle, the system will automatically disconnect theBluetooth connection.

This is the overall result got, the module is handy to use, one of the drawbacks observed in this is the interfacing with Arduino is a bit time taking not as quick than other systems. Overall, the use of keyless ignition systems has become increasingly popular in recent years. However, it is important for drivers to be aware of the potential safety risks and take necessary precautions to ensure their own safety and the safety of others.

8. CONCLUSION

This project has flourishingly constructed a keyless ignition system for moped by using Android components and Bluetooth connection to ignite a moped engine wirelessly. With the mobile application, end users can begin their moped’s engine without a key, and thus furnish many benefits for them. The purpose of the project is twofold - not only does it aim to minimize the chances of moped theft, but it also alleviates the inconvenience of carrying a key that can be lost or damaged. By employing a keyless ignition system, the motorist can easily start the engine without a physical key. Additionally, this system can potentially mitigate fraudulent activities related to the motorcycle, as the user can operate the bike by entering a unique, one-time password. Furthermore, the rider can conveniently locate their bike in a spacious parking lot using this system.

As compared with other keyless ignition system, this system is easy to implement, provide better security and also overcome most of the drawbacks in the previous system.

Though it is bit slow to interact with Arduino, but provide more convenience as compared with GSM system. GSM system is not valid when network is unavailable, whereas no such kind of network required for this system as it is based on Bluetooth.

The drawback in the face recognition and fingerprint ignition system is manipulating them, but in this keyless ignition system for motorcycle no such type of manipulations can be done. This made a difference between the system.

As the system is mainly dependent on the OTP, only authorized user can able to access it. Hence it is more secure.

9. FUTURE SCOPE

For making the system more effective Cloud-based authentication could provide an additional layer of security by validatingthe OTP against a remote server. This would make it more difficult for hackers to gain access to the system.

Another possible development is the integration of the keyless ignition system with mobile apps. The rider could receive the OTP through the app, which could also provide additional information about themotorcycle, such as its location or maintenance.

Remotes access is the major drawback for this system, if the system is made for remote accessing also then leads to advantage to access the vehicle from anywhere.

As more and more devices become connected to the internet of things, keyless ignition systems could be integrated with other smart devices. For example, drivers could use their smartwatch or voice assistant to start their car.

Keyless ignition systems could be further enhanced with safety attributes such as automatic emergency braking, blind spot detection and indication, and lane departure warning systems.

In the future, keyless ignition systems could allow drivers to customize their settings even further. For example, drivers could set their preferred climate control, radio station, and seat temperature.

As temperature also plays a crucial role for maintaining good condition of vehicle it is better to add temperature indicator to the motorcycle, if temperature is high the vehicle should stop and rider must wait until it cool.

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