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VEHICLE STARTER BY VOICE RECOGINITION USING ARDUINO

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Abstract: Nowadays the vehicle theft is increasing rapidly by increasing the number of vehicles. Handling keys in automobiles is another issue. Keys must be carried, and loosing or misplacing them will be a serious problem. Using a fingerprint-authenticated vehicle starter system, this issue can be solved in the existing method. The proposed method gives accurate result for voice system. Any users can sign up to be authorized by the system. Arduino's versatility and accessibility make it an ideal platform for implementing voice recognition, ensuring reliable performance and easy integration.

The system checks the user's authorization before starting the vehicle for only authorized users during voice recognition. Here Arduino Microcontroller is made use of the microcontroller is connected to the voice module, push buttons, a motor driver, Buzzer, LCD display are used. The motor servers as the vehicle's starter in the demonstration. Using a voice module system automates vehicle security in addition to doing so.

Keywords: Arduino UNO, Voice module, LCD, Microcontroller, Push buttons, Buzzer, Automobiles.

I. INTRODUCTION

In the age of advancing technology, innovation is not just a luxury, but a necessity. One such innovation poised to redefine the conventional vehicle starting system is the integration of voice recognition technology with Arduino microcontrollers. This revolutionary approach not only enhances convenience but also augments the safety and security standards of vehicle operation. Traditionally, starting a vehicle involves manual manipulation of keys or buttons, a process susceptible to theft and prone to human error.

However, with the implementation of voice recognition technology, the process becomes seamless and secure. By simply uttering a predetermined command, drivers can initiate the ignition process, eliminating the need for physical keys and minimizing the risk of unauthorized access. At the heart of this innovation lies the Arduino microcontroller, a versatile and accessible platform known for its compatibility with various sensors and actuators. By interfacing a voice recognition module with Arduino, we create a dynamic system capable of accurately interpreting vocal commands and translating them into actionable signals for the vehicle's ignition system.

This paper delves into the intricacies of designing and implementing such a system, detailing the hardware components, software algorithms, and integration processes involved. Furthermore, it explores the potential applications and benefits of voice-controlled vehicle starters, ranging from enhanced user experience to heightened security measures. In a world driven by technological evolution, it is imperative to embrace innovations that not only simplify tasks but also elevate standards of efficiency and safety.

The fusion of voice recognition technology with Arduino for vehicle starters represents a significant stride towards achieving these objectives, promising a future where convenience and security converge seamlessly on the roadways.

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II. BLOCK DIAGRAM

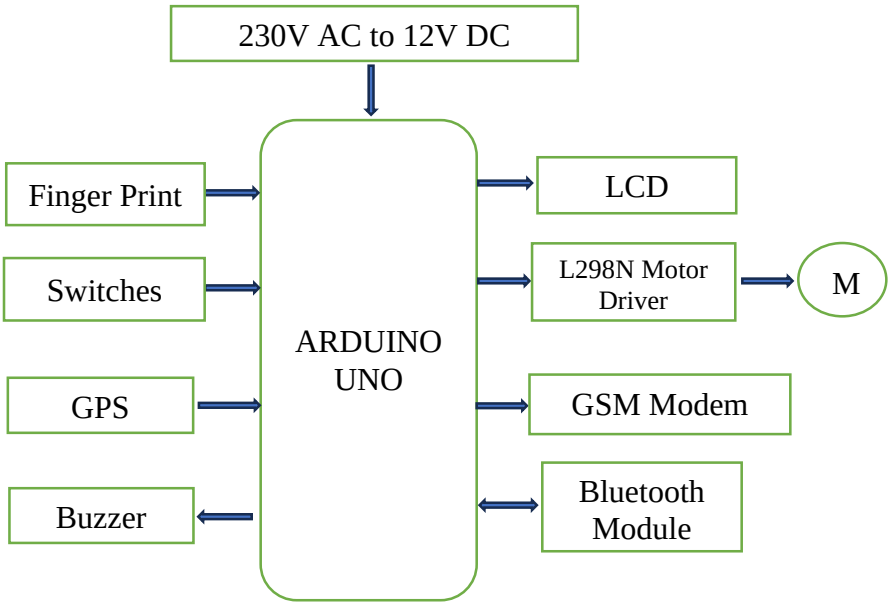

FIG 1: Block Diagram

III. COMPONENTS

Regulated power supply:

An embedded circuit known as a regulated power supply transforms unregulated AC into a consistent DC. It transforms the AC supply into DC with the aid of a rectifier. Its job is to provide a circuit or device that must work within specific power supply parameters with a stable voltage (or, less frequently, current). The output of the regulated power supply is almost always DC but may also be alternating or unidirectional.

Arduino UNO:

A serial communicator is necessary in order to programme the ATmega328P microcontroller. The most common interface between a microcontroller and a computer is serial communication. UART is one of the most used serial interfaces. A piece of computer hardware called a Universal Asynchronous Receiver/Transmitter (UART) converts data between parallel and serial formats. Traditionally, the majority of serial interfaces between microcontrollers and computers use serial port (DB9). However, a level shifter is required between these interfaces because the microcontroller used TTL UART and the computer serial connection used the RS232 protocol. The market offers a variety of level shifters, some of which feature USB plug and play. Most of the times the level shifter is unstable to use due to its design and more than one software is required to convert the programming on C to hex or machine language and maybe another software to interface between the Microcontroller and computer. An alternative to this technique is the Arduino UNO, whose inside board has all the integrated circuits (ICs) required for communication. Additionally, it is compactly designed into a PCB with connectors for quick and simple prototyping.

FIG 2: Arduino UNO

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R305 Fingerprint module:

High-precision, high-performance matching algorithms and a high-capacity flash chip make up the R305 biometric fingerprint module. It processes fingerprint image data, compares data, looks up data in memory, and performs predetermined tasks. Serial communication is used to exchange data between the R305 and the microcontroller. It has a TTL UART interface and is a fingerprint sensor module. When recognizing a person, the user can configure the module in 1:1 or 1: N mode and save the finger print data there. A 3V3 or 5V microcontroller can directly connect with the finger print module. For PC interface, a level converter (like MAX232) is needed.

FIG 3: Fingerprint Module

Bluetooth Module:

A Bluetooth module facilitates wireless communication between the Arduino board and a mobile device. This allows users to remotely start their vehicles using voice commands. The Bluetooth module connects to the Arduino board, which interprets voice commands received from the mobile device and triggers the necessary actions, such as engaging the starter motor. This setup offers a convenient and hands-free way to start vehicles while ensuring security and ease of use.

FIG 4: Bluetooth

16*2 LCD display:

The LCD is a type of electronic display that shows information and messages. The 16×2 LCD, as its name implies, has 16 Columns and 2 Rows, allowing it to display 32 characters (16×2=32), each of which is made up of 5×8 (40) Pixel Dots. The total number of pixels in this LCD can therefore be computed as 32 x 40, or 1280 pixels. The majority of 16X2 displays rely on multi-segment LEDs. There are many alternative display kinds and configurations on the market, including 8×2, 8×1, 16×1, and 10×2. However, the LCD 16×2 is widely utilized in gadgets, DIY circuits, and electronic projects due to its lower cost, programmability, and ease of access.

FIG 5: 16x2 LCD Display

GSM MODEM:

Text messaging and phone calls can be used for remote control and communication with a GSM modem. The modem connects to the Arduino board, allowing users to start the vehicle by sending predefined voice commands via SMS or making a call. This setup offers an alternative method for initiating vehicle ignition remotely, enhancing convenience and security. Additionally, it provides a reliable means of controlling the vehicle starter system even when outside the Bluetooth range.

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FIG 6: GSM Modem

GPS MODULE:

A GPS module provides location data for added security and functionality. The module interfaces with the Arduino board, allowing users to specify geographic restrictions for starting the vehicle via voice commands. This setup enhances vehicle security by enabling features like geofencing and remote vehicle tracking. Additionally, it enables advanced functionalities such as automatic engine immobilization based on predefined geographic boundaries.

FIG 7: GPS Module

L298N Motor Driver:

An L298N motor driver facilitates the control of starter motors. The motor driver interfaces with the Arduino board, enabling precise control over motor speed and direction based on voice commands. This setup ensures smooth and reliable operation of the vehicle starter mechanism. Additionally, the L298N motor driver offers protection features such as overcurrent and overtemperature protection, enhancing the safety and longevity of the system.

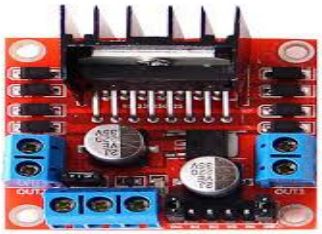

FIG 8: L298N Motor Driver

BUZZER:

A buzzer provides audible feedback for user interactions. The buzzer connects to the Arduino board, emitting sound signals to confirm successful recognition of voice commands or system status. This setup enhances user experience by providing real-time feedback during operation. Additionally, the buzzer can alert users to potential errors or malfunctions in the system, ensuring prompt attention and troubleshooting.

FIG 9: Buzzer

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SWITCHES:

Switches act as manual override controls. These switches connect to the Arduino board, allowing users to manually trigger the starter mechanism if voice recognition fails or in emergencies. This setup ensures redundancy and enhances safety by providing a backup method for starting the vehicle.

IV. WORKING

In a vehicle starter system employing voice recognition with Arduino, the process commences with the initialization of all system components, including the Arduino board, Bluetooth/GSM module, GPS module, and L298N motor driver. Once activated, the system awaits voice commands from the user, captured either through a connected microphone or a mobile device interfaced with the Arduino.

The Arduino's speech recognition module interprets the voice commands to discern the user's intention accurately. Subsequently, the Arduino may engage in communication with a paired mobile device via Bluetooth or GSM to validate the commands or receive further instructions. If a GPS module is integrated, the system may cross-check the vehicle's location to ensure compliance with predefined parameters or geofencing rules. Upon meeting all necessary conditions, the Arduino triggers the L298N motor driver to initiate the vehicle's engine. Throughout the process, the system offers feedback to the user, confirming successful command execution while incorporating safety measures such as manual overrides for added reliability.

V. RESULTS

A vehicle starter system with voice recognition using Arduino simplifies the process of starting your vehicle by responding to spoken commands. Here's how it works: You speak a specific command, like "Start engine," into a microphone.

The Arduino, a small computer-like device, listens to your command and recognizes the words using software. Once it identifies the correct command, the Arduino sends a signal to the vehicle's starter system, instructing it to start the engine. Essentially, it eliminates the need for physical interaction with keys or buttons, allowing you to start your vehicle conveniently and potentially hands-free. It's a user-friendly way to initiate your vehicle's engine with just your voice.

FIG 10(a): Bluetooth using Voice Command

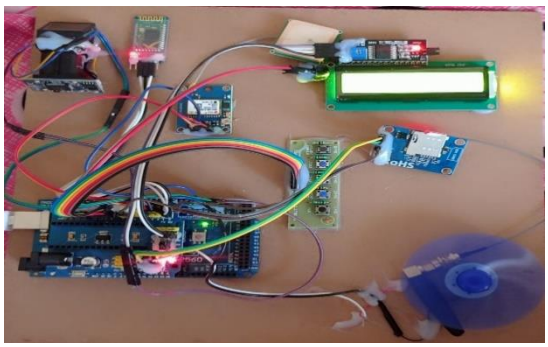

FIG 10(b): Experimental Output

VI. CONCLUSION

In conclusion, the integration of voice recognition technology with Arduino-based vehicle starter systems offers a sophisticated and convenient approach to vehicle ignition. By leveraging voice commands, users can initiate the engine remotely with ease, enhancing both comfort and security. The utilization of Arduino facilitates seamless communication between various components, including Bluetooth/GSM modules, GPS systems, and motor drivers, ensuring efficient operation.

Furthermore, the incorporation of safety features such as manual overrides and fail-safes enhances reliability and mitigates potential risks. Overall, this innovative solution represents a significant advancement in automotive technology, providing users with a seamless and intuitive experience while ensuring the safety and security of their vehicles.

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