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SMART CAR FEATURES USING EMBEDDED SYSTEMS AND IOT

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ABSTRACT

Automobile and self-driving vehicle advancements have accelerated dramatically in the last decade. The increased use of automobiles has resulted in an increase in the number of safety concerns. The number of accidents and life-threatening injuries has increased dramatically. Adequate vehicle safety features have become a legal requirement. When a vehicle crashes and its location is detected, the system notifies the police and the user's family members, and a panic button is provided for the passenger's safety. We also show a cabin monitoring system and an interactive interface between a user and a car, in which the user can send a text message to the car's GSM module to inquire about temperature, humidity, and other factors within the vehicle. The GSM module communicates with the Arduino, which retrieves sensor data and sends it to the user via text message. We also show a mechanism for cabin monitoring and an interactive interface between a user and a car, where the user can remotely inquire about the temperature, humidity, and other variables inside the car by sending a text message to the car's GSM module. The GSM module communicates with the Arduino, which retrieves sensor readings and sends them to the user via text message.

Keywords: *Smart Car; Embedded System; IoT; GSM module; automobiles; motor driver; Arduino.*

INTRODUCTION

Because of the growing use of IoT in automotive Embedded Systems, the Smart Car application has received a lot of attention. When the owner is not present, it is extremely difficult to locate lost vehicles in large cities or to track down any thefts that may have occurred. The Internet of Things (IoT) refers to smart gadgets and sensors that are distributed and connected in the environment to gather, share, and integrate data. Many new Internet-of-things (IoT) devices are designed to help people gain a better understanding of how humans interact with their surroundings. [1] Wireless sensing is expected to become a dominant solution for IoT applications due to the expansion of wireless radio equipment, pervasive wireless signals, and the wealth of information brought into wireless signals by human activities.

Embedded systems are found in everything from automobiles and bridges to hospitals and industries. These systems can be found in a variety of devices, including mobile phones and virtual reality headsets, as well as clothing and even our homes. It's only a matter of time before embedded systems become more prevalent in equipment. In the ITS sector, emerging embedded systems technology can be seen. [2] When it comes to ITS, embedded systems play a role in lowering pollution, fuel

consumption, and road fatalities in automobiles and public infrastructure. In the background of active safety systems, vehicle-to-vehicle or vehicle-to-road infrastructure communication necessitates interconnection with various devices.

Monitoring device with speech is a lot more convenient because it manages things and has produced a golem automotive functioned through speech that can go in any direction together with a hard distance expressed by the operator as per given instruction. If someone must be forced to manage this golem for a specific path? We usually use a customised equation where there is a lot of distance management going on. At first, the system must be forced to determine the rate (RPM) of the motor connected at intervals to the golem automotive. Then we usually measure the radius of the wheel and calculate its circumference. We've created an equation that's provided within the system description half. To demonstrate our system, we typically use only one language: English. [3]

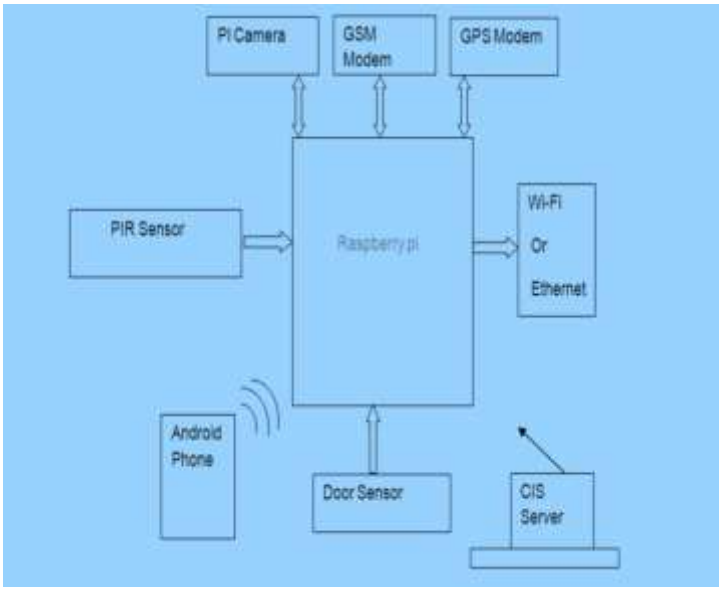

Figure 1: Block Diagram of a Smart Automobile

Figure 1 depicts the project's block diagram as well as the components needed. This project was designed using the Raspberry PI single-board computer for embedded applications. Sensors such as door sensors, proximity sensors, and Wi-Fi dongles are used as interfacing components. The CPU Core can be used with the Raspberry Pi's 32-bit ARM controller. If a car is stolen or mishandled, the driver is notified via the APP and has the option to activate the Tracking system, which activates the camera and begins tracking the GPS location. [4] Users can specify whether the gadget should save the internal or external image. Simply rotate the camera attached to the CAR's rear-view mirror to accomplish this.

REVIEW OF LITERATURE:

According to Weber [5,] a private company using IoT should incorporate data authentication, access control, resilience to attacks, and client privacy into their business activities as an added benefit. According to Weber, when defining global security and privacy issues, IoT developers must consider the geographical boundaries of different countries. Weber. A standard framework must be developed in order to address privacy and security concerns on a global scale. The investigation of privacy and security concerns should be the first step in preparing for the full-fledged operational IoT framework. Later, Heer et al. [6] discovered a security flaw in IP-based IoT systems. They claimed that the internet is the backbone of an IoT system's device connectivity. As a result, IP-based IoT security is a major concern. Furthermore, the security architecture of an IoT system should be designed with the life cycle and capabilities of each object in mind. Security protocols and a trusted third party are also involved. A flexible IoT security architecture that can scale from small to large-scale devices is required. According to the study's findings, traditional end-to-end internet protocols are unable to handle IoT's new form of communication among various things on the network.

Ahmed S. Salama et al. (2010) [7] propose an integrated intelligent traffic light system for roads using photoelectric sensors dispersed over long distances before and after traffic lights. In the event of an emergency, such as when the president's car passes or an ambulance arrives, traffic signals must be opened immediately. The system can handle emergencies that require a complete path to the destination; however, this system does not work well when multiple emergencies occur at the same time. Vehicles enter the signal from both sides.

ManojKantaMainali et al. (2010) [8] proposed using a genetic algorithm to predict traffic volume in road segments in the absence of segment-specific traffic data. Using only existing data, it is possible to predict the unknown traffic volume. As a result, the proposed ITSC system makes use of the AVR-32 and genetic algorithm combination to create a highly efficient system.

According to the Department of Roads and Highways Transport's Statistical Report (ind, 2016) [9] on Vehicle Mishaps in the Country in 2016, the country recorded 4,60,852 accidents in the year, resulting in 1,45,685 deaths. Every day, approximately 423 people were killed in 1,227 vehicle accidents. According to the data, at least 16 deaths occurred in vehicle mishaps out of 55 accidents per hour during a specific period, primarily due to victims' inability to receive appropriate treatment in a timely manner.

Derwinet al [10] predicted Tidal Speech recognition in areas where the term capability has not yet been developed. There is no restriction on word capability in our scheme because we use BT speech recognizer, which has unrestricted word capability. Luis Fernando D et al. [11] are given additional speech recognition primarily based on an approach that can only recognise six completely different idioms.

The ATmega162 microcontroller touches another speech recognition primarily based on a work that is [12] projected in a popular method. They use an ADC (Analogue to digital converter) for speech recognition, which can solely grasp fundamental processes like forwarding, backward, left, and right.

In our proposed scheme, all popular methods are not only happening in the cloud, but it can also perform a wide range of commands.

Sajkowski et al. [13-16] given a golem that can only perceive four commands and has no other options other than corporal punishment for those four commands. Similarly, [17] the authors' given systems and people systems will only accept basic 2-3 instructions. However, in our system, the golem will execute the basic five commands, left, right, stop, back, forward, and observe, in addition to capturing image, moving with the operator, measuring remoteness, and apprizing the user only in the event of any sudden state. It is shown an Arduino Uno organiser that is primarily based on speech recognition methodology. The scheme includes all of the fundamental dominant options, but the interval is slow due to Arduino's comparatively weak process piece. The system can be tested by identifying the defect management system.

OBJECTIVES

1. Eye-blink sensors are installed in automobiles to verify that the driver is not drowsy.
2. In order to avoid a collision, a proximity sensor is used to locate the obstruction ahead of the vehicle.
3. The location of the wrecked car is determined using a GPS system, and an alert is issued to a responsible and authorised party to assure post-crash safety. A vibration sensor picks up the accident's vibrations.
4. To ensure that the motorist is not drunk, use a gas senor. Only when the driver is sober will the engine start.

RESEARCH METHODOLOGY

It is the systematic, theoretical examination of the methods used in a specific field of study. A theoretical analysis of the methodologies and principles of a field of knowledge is included. This type of research typically includes parameters such as paradigm, theoretical model, and phases. In order to apply analytical and descriptive methodologies to the research, secondary sources must be thoroughly reviewed and analysed.

RESULT AND DISCUSSION:

The self-directed scheme advocated (Fig. 2) employs an Arduino Uno as the primary device, with an electro-acoustic transducer connected to a Bluetooth device used to capture speech. We use several supersonic devices to avoid obstacles. The four motors were measured and linked to the motor driver. For speech recognition, the Arduino Uno comes with a 12v battery, and we typically use BT speech identifier. This segment enables the extraction of text from speech with greater precision than the standard acknowledgment method's technique.

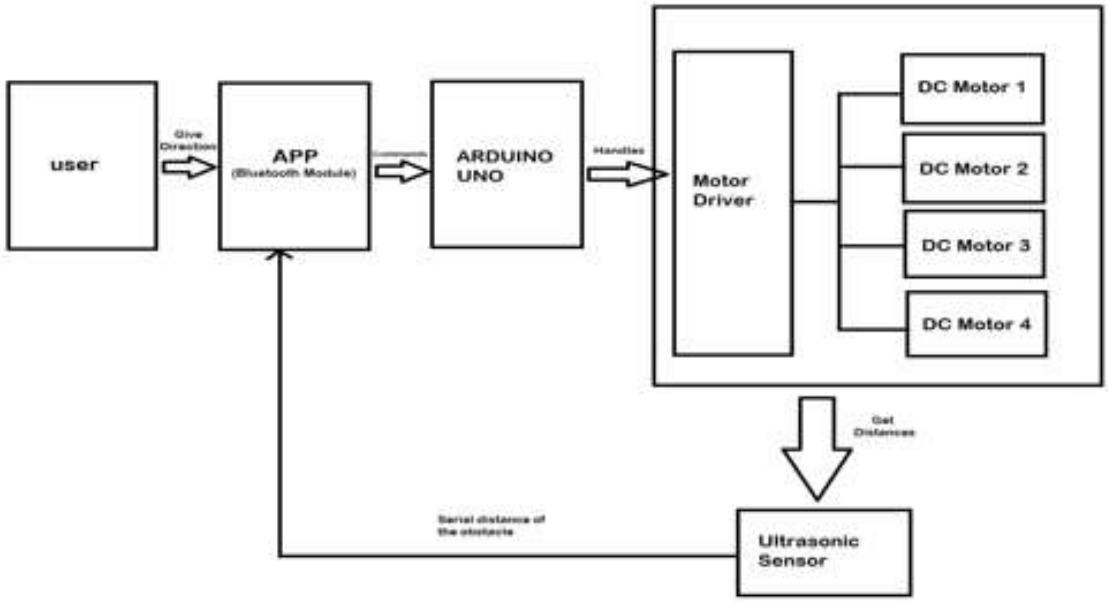

Figure 2: System Architecture

A laptop or portable computer must go through many advanced stages in order to convert voice or speech instructions to on-screen text or a laptop facility. When someone speaks, vibrations are generated in the air. The comprehensiveness is achieved by taking precise scopes of the wave at regular intervals. The system shifts the digitised wide-ranging to reject irritating sound and typically to dissimilar it into total different frequency bands. People detect frequency as changes in any field because it is the wavelength of the comprehensive breakers. It also normalises or controls the comprehensive to a continuing capacity or comprehensive level. It will even have to be related temporarily. [18]

SOFTWARE ARRANGEMENT

1) Package Arrangement: Because we have a tendency to square measure utilising Arduino Uno for implementing the proposed system. The flow chart for the proposed system is shown in Figure 2.
2) Package Setup and Configuration System: After successfully accessing Arduino Uno, we have a bent to design our Arduino Uno for implementing any steps. We intend to develop a Bluetooth to recognise speech commands.
3) Cause of difficult avoidance speech: We have a tendency to square measure unindustrialized speech. We have a tendency to need to ensure that our scheme is pleasing contribution from our chosen expedient by avoidance, golem.

4) Repairing Elements: The primary elements for which we intend to use Speech Recognition. To acknowledge speech recognition, we enforced speech command directions at code intervals to limit unwanted speech or sounds.

HARDWARE ARRANGEMENT

1) Getting Ready Frames, Motorised, and Controls: To carry out the scheme, we used machine pouring (4WD) automotive frames. We usually sew the motorised frames and controls together. We used one hundred eighty revolutions per minute on the motorised and a half dozen wheels. The length is 6 cm. In our scheme, we typically use these options to develop the gap activity method. We tend to position every half by regulating heaviness and length, however the scheme won't work properly with an unsuitable modification.
2) Motorised chauffeur, Engines, and Arduino Uno: The broadcasting that connects the engines and the Arduino Uno is known as the motorised chauffeur. We typically use the L293D motor driver when implementing the scheme. We typically place it at the 2d level of the frames in order to maintain restrained detachment between engines and thus the regulator. We used to connect the Arduino Uno and motor driver to shorten the length of the wiring issue. Currently, the wheel motor connections are connected to the motor driver.
3) Distribute over Detachment activity formula: We would have liked to do roughly intention for creating the scheme accomplished of success actual detachment. We usually decide to change our controls for a specific amount in order to close the gap in accordance with our expertise. Here, we must compute the time required to reach a metre. We tend to planned time per metre by developing the following equation:

$$TPM=100/((RPM/60) *2\pi r) + 5\% err$$
$$Or$$
$$TPM=100/((RPM/60) *2\pi r) - 5\% err$$

where 'RPM' is the engine's rotation per minute and 'r' is the radius of the controls. Fivehitter is the fault frequency that has been augmented for extra mass. Our revolutions per minute are one hundred eighty, and the radius of the controls is three.3 cm, so the TPM for our scheme was one.6 sec. When the fault frequency was added, the value was one.6 seconds. We tend to supplement the value in our programme and proceed.

Figure 3 and 4 shows the device. A few people confirm the speech instructions. Individually, it was verified to the machine 10 to 15 times, and we arrived at the results, which are based on real-time testing. [19-20]

Figure 3: GSM SIM 900A module

Figure 4: Neo 6m GPS module

CONCLUSION:

Modern wireless technology and radio analytics advances enable several cutting-edge Internet of Things (IoT) applications that will fundamentally alter our way of life and help us better understand what, when, where, and how the world around us works. Automobiles are multiplying in number and becoming increasingly automated; therefore, in this age of increased automation, it is critical that they be intelligent and provide driving assistance and safety assurances. Multipath propagation interacts with the driver and passengers inside the vehicle and records their characteristics, which can be thought of as a subset of rich scattering interior environments. A pair of commercial Wi-Fi devices installed in a vehicle to provide a Wi-Fi connection enable automated identification, monitoring, counting, and detection of an unattended/left child. Because the Arduino Uno is the most recent technology, it makes use of English commands. During this broadside, we've organised all of the required application stages and created an equation to conceal any detachment exploitation speech expertise. We tested our scheme in a variety of scenarios and obtained extremely accurate results. This mechanism is frequently used in any product selling as well as commission-related work because it will execute command as well as the path slightly on its method. In the future, we intend to combine laptop vision technology to create a call by imagining the surroundings.

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