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Smart E-vehicle and Smart Road System using RFID Technology

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Abstract: Public places are often characterized with incessant traffic congestion, especially during special occasions and events, as large number of automobiles attempt to use the same parking lot concurrently. This usually results in confusion and dispute, auto crashes, waste of time and resources, and release of more carbon into the ecosystem. Radio Frequency Identification (RFID) technology offers effective solution for distant object identification without requiring a line of sight. In this paper, the authors developed an intelligent, cost-effective, and eco-friendly park management system for scalable traffic control using RFID. In this communication we present a new control system for intelligent speed control, which is based upon Radio Frequency Identification (RFID) technology for identification of traffic signals on the road, and high accuracy vehicle speed measurement with a Hall effect-based sensor. Moreover, these car will be more users friendly help the users in many ways, such as these cars will helps user to follow RTO rules such as managing the traffic in better way which further results in improvement of performance of the cars, speed control, direction control, automatic car parking light turn on/off etc. This will lead in improvement such as handling of emergency conditions like accident, theft etc

Keywords: Intelligent cars, RFID, Radio frequency Transponders.

I. INTRODUCTION

Road fatalities are a major concern in the developed world. Recent studies show that a third of the number of fatal or serious accidents are associated with excessive or inappropriate speed, as well as changes in the roadway (like the urban streets). Reduction of the number of accidents and mitigation of their consequences are a big concern for traffic authorities, the automotive industry and transport research groups. We in this have come up with solution for same. Using Radio frequency identification (rfid) tag we have tried to automate the control of cars for identification of traffic signals on the road, and high accuracy vehicle speed measurement with a Hall effect-based sensor. Moreover, these car will be more users friendly help the users in many ways, such as these cars will helps user to follow RTO rules such as managing the traffic in better way which further results in improvement of performance of the cars, speed control, direction control, automatic car parking light turn on/off etc. This will lead in improvement such as handling of emergency conditions like accident, theft etc

II. PROBLEM IDENTIFICATION

1. Over Speeding:

Most of the fatal accidents occur due to over speeding. Higher the speed, greater the risk. A vehicle moving on high speed will have greater impact during the crash and hence will cause more injuries. The ability to judge the forthcoming events also gets reduced while driving at faster speed which causes error in judgment and finally a crash.

2. Drunk and driving:

Alcohol reduces concentration. It decreases reaction time of a human body. Limbs take more to react to the instructions of brain. It hampers vision due to dizziness. Alcohol dampens fear and incite humans to take risks. All these factors while driving cause accidents and many a times it proves fatal. For every increase of 0.05 blood alcohol concentration, the risk of accident doubles.

3. Distraction to driver:

Though distraction while driving could be minor but it can cause major accidents. Distractions could be outside or inside the vehicle. The major distraction now a days is talking on mobile phone while driving. Act of talking on phone occupies

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major portion of brain and the smaller part handles the driving skills. This division of brain hampers reaction time and ability of judgement. This becomes one of the reasons of crashes.

4. Red light jumping:

It is a common sight at road intersections that vehicles cross without caring for the light. The main motive behind Red light jumping is saving time. A red light jumper not only jeopardizes his life but also the safety of other road users. It has also been seen that the red light jumper crosses the intersection with greater speed to avoid crash and challan but it hampers his ability to judge the ongoing traffic and quite often crashes.

III. DESIGN PROCEDURE

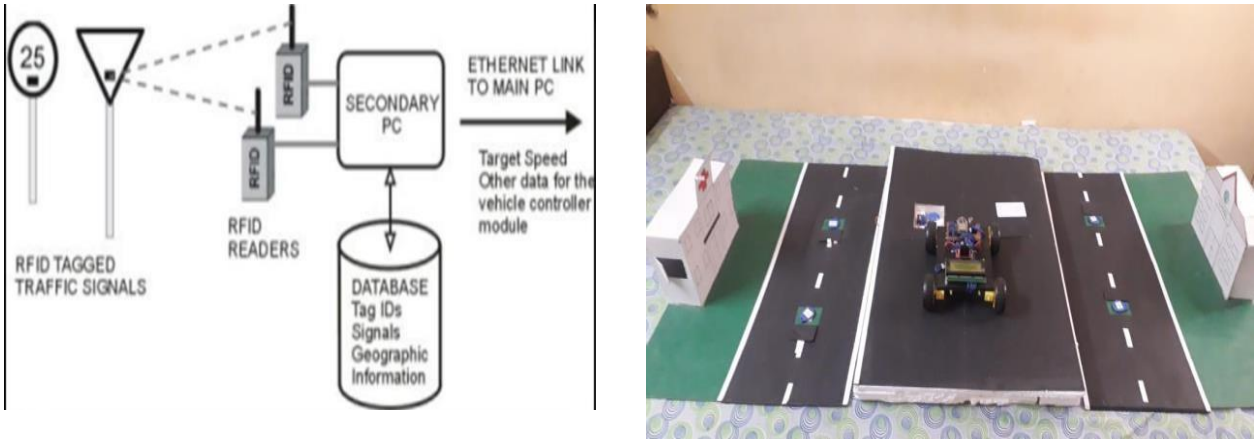

Fig. 1 block diagram, Actual picture of project

RFID is an automatic identification technique which relies on data storage and transreceiving of data using devices known as RFID tags or transponders. The power which is required to initiate the tag is transferred with the help of a contactless technology which is known as RFID reader. The mode of communication between the reader and the tag of an RFID system is based on radio frequency (RF) technology. A simplified RFID system is shown in Fig. 1.the tag includes the antenna within itself, which is responsible for providing communication while the reader is usually having one or two antennas. The reader which contains a transceiver generates a pulse of electromagnetic waves. The transponder receives the transmission which is further, rectified to get the dc power supply for the IC memory. The processed signal transmitted by the transponder is then received by the reader again to obtain the tag's ID number. As the RFID technology is simple, more flexible and relatively cheaper it is nowadays gaining attention in a large number of applications, such as personal identification, food production control, security guard monitoring, and inventory management etc.

RFID TECHNOLOGY IN CARS:

There are many applications of RFID which are being used in cars. Now-a-days, for toll collection, RFID technology is being used. This is done with the help of a RFID tag and a RFID reader as shown in fig 4. The RFID tags are installed on the cars and there is a server having a RFID reader that gathers information from these tags. As the cars passes the gateway, the readers reads the RFID tags placed on cars. In this way the system is able to identify the car and the charges are made. Many cities, e.g. London and Seoul, are using automatic toll collection (ATC) systems. Edinburgh Council has adopted a bus track light priority system which is helpful in reducing track congestion and as a resultant, road accidents are also avoided. When a bus or a car having a RFID tag reaches the intersection, a RFID reader which is placed on the road gathers the information about the car or bus and sends it back to the track signaling system in order to control track light.

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Fig. 2 : RFID Toll Road Payment systems

As a main controller we have used esp32 controller .which has provided Bluetooth and WIFI connectivity also lots of GPIO pins this controller is connected to the RFID sensor which is used to read the RFID tags which are placed on the road. L298n motor controller which control motor directions and power / speed. This driver has powered by 12v battery LCD display with i2c which shows the speed and other data .Buzzer as a horn to power all the circuit except motor driver all the component are connected to 5v power supply. The Reduction of the number of accidents and mitigation can be achieved by this system we have designed , Using Radio frequency identification (RFID) tag we have tried to automate the control of cars for identification of traffic signals on the road, and high accuracy vehicle speed measurement with a Hall effect-based sensor. Moreover, these car will be more users friendly help the users in many ways, such as these cars will helps user to follow RTO rules such as managing the traffic in better way which further results in improvement of performance of the cars, speed control, direction control, automatic car parking light turn on/off etc. This will lead in improvement such as handling of emergency conditions like accident, theft etc

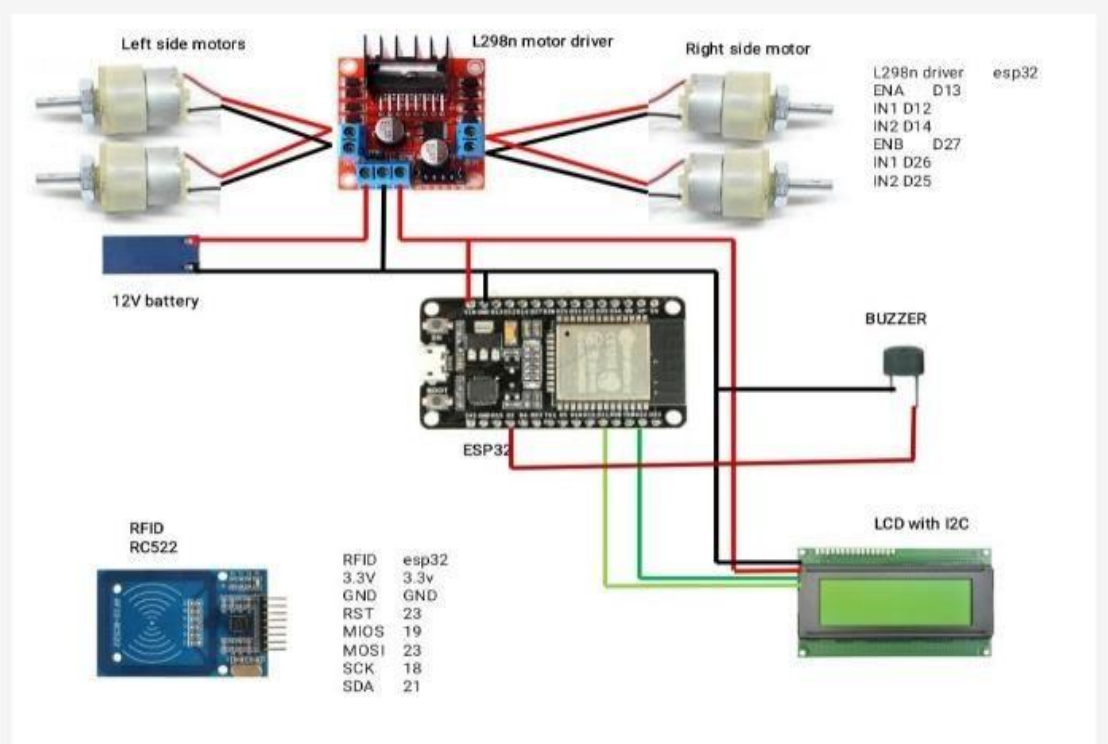

Fig. 2 : Circuit diagram of project

RFID module with tag: A reader consists of radio frequency module and an antenna which generates high frequency electromagnetic filed. On the other hand, the tag is usually a passive device, meaning it doesn't content battery. Its low power, low cost, pretty rugged, easy to interface with the insanely popular among hobbyists.

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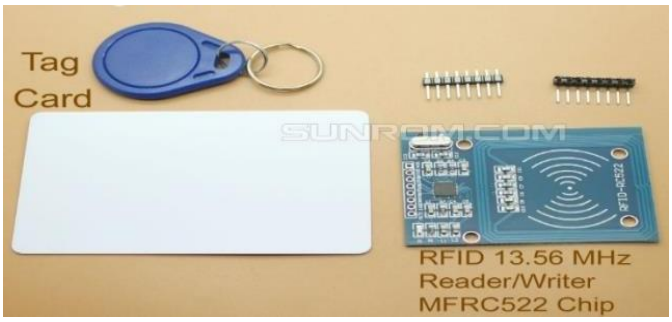

Fig. 4: RFID module with RFID tags and cards

- Working frequency: 13.56 MHz
- EEPROM Siz:256 byte (2048 bit)
- Memory Organization:64 blocks, 4 bytes per block
- Read/Write Range :3.5" / 8.9 cm
- Data Retention (years):10
- RF Interface:ISO 15693-3
- Write Endurance (cycles) :100,000

Radio-frequency identification (RFID) uses electromagnetic fields to automatically identify and track tags attached to objects. An RFID system consists of a tiny radio transponder, a radio receiver and transmitter. When triggered by an electromagnetic interrogation pulse from a nearby RFID reader device, the tag transmits digital data, usually an identifying inventory number, back to the reader. This number can be used to track inventory goods.

Passive tags are powered by energy from the RFID reader's interrogating radio waves. Active tags are powered by a battery and thus can be read at a greater range from the RFID reader, up to hundreds of meters. Unlike a barcode, the tag does not need to be within the line of sight of the reader, so it may be embedded in the tracked object. RFID is one method of automatic identification and data capture (AIDC).

ESP32 Controller module:

The integration of Wi-Fi, Bluetooth and Bluetooth LE ensures that a wide range of applications can be targeted, and that our modules are truly versatile. Using Wi-Fi ensures connectivity within a large radius, while using Bluetooth allows the user to easily detect (with low-energy beacons) a module and connect it to a smartphone. With in-built antenna switches, RF balun, power amplifier, low-noise receive amplifier, filters, and power management modules, our chips add priceless functionality and versatility to your applications with minimal PCB requirements.

Fig. 5: ESP32 Controller Module

- Single or Dual-Core 32-bit LX6 Microprocessor with clock frequency up to 240 MHz.
- 520 KB of SRAM, 448 KB of ROM and 16 KB of RTC SRAM.
- Supports 802.11 b/g/n Wi-Fi connectivity with speeds up to 150 Mbps.
- Support for both Classic Bluetooth v4.2 and BLE specifications.

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- 34 Programmable GPIOs.
- Secure Boot and Flash Encryption.
- Cryptographic Hardware Acceleration for AES, Hash (SHA-2), RSA, ECC and RNG.

Arduino Nano:

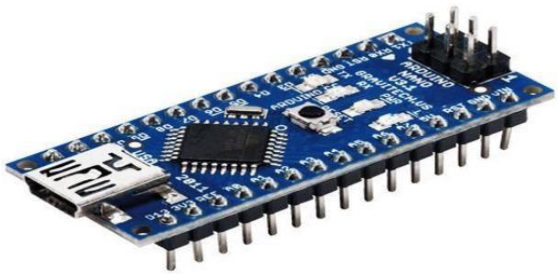


Fig. 6: Arduino Nano

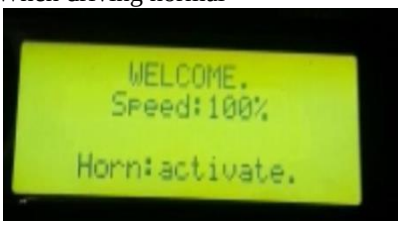
- Operating voltage: 5 volts
- Input voltage: 6 to 20 volts
- Digital I/O pins: 14 (6 optional PWM outputs)
- Analog input pins: 8
- DC per I/O pin: 40 mA
- DC for 3.3 V pin: 50 mA

The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328P released in 2008. It offers the same connectivity and specs of the Arduino Uno board in a smaller form factor. The Arduino Nano is equipped with 30 male I/O headers, in a DIP-30-like configuration, which can be programmed using the Arduino Software integrated development environment (IDE), which is common to all Arduino boards and running both online and offline. The board can be powered through a type-B mini-USB cable or from a 9 V battery. In 2019, Arduino released the Arduino Nano Every, a pin-equivalent evolution of the Nano. It features a more powerful ATmega4809 processor and twice the RAM.

IV. RESULT AND CONCLUSION

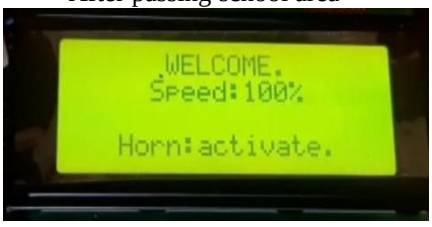
The following figures show the result of the project:

When driving normal



Before school area

After passing school area



A Smart e-vehicle with smart road system using rfid technology has successfully been designed and developed. This interface is synchronized with the whole process of accident control on the road. In this of prototype can be easily be implemented in real life situations. With the help of RFID technology we can control accident on road and use this sensor in car . It will read the card and work accordingly rules assigned to the card. Today it is very useful for Global Road Safety. This system provides a remarkable change in the road system for protection purposes with affordable cost.

V. REFERENCES

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[1] A.N. Nambiar, "RFID Technology: A Review of Its Applications", Proceedings of the World Congress on Engineering and Computer Science, WCECS 2009, San Francisco, USA, Vol II, October 20-22, 2009. [2] S. Mohammadi, and S. G. Mesgarha, "Autonomous Movement in Car with The Base of RFID", World Academy of Science, Engineering and Technology, Vol. 58, pp. 580-583, 2011.

[3] W. Gueaieb, and M.S. Miah, "An Intelligent Mobile Robot Navigation Technique Using RFID Technology". IEEE Transactions on Instrumentation and Measurement, Vol. 57, Issue. 9, September 2008. [4] P.V. Nikitin, and K.V.S. Rao, "Antennas and Propagation in UHF RFID Systems", IEEE International Conference on RFID, Las Vegas, pp. 277 – 288, 2008.

[5] A. Amanna, A. Agrawal and M. Manteghi, "Active RFID For enhanced Railway Operations", Proceedings of the ASME 2010 Rail Transport Division Fall Conference, RTDF2010, Roanoke, USA,October,2010.

[6] Smart Vehicular Traffic Management System using RFID Technology Victor O. Matthews, Adebayo O. Ajala, Segun I. Popoola, and Aderemi A. Atayero, Members, IAENG

