

Smart Dashboard: An Advancement in Vehicle Technology and its Impact

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Abstract- This paper presents the work pertaining to project which aims at developing a high security system in vehicles so that the problems such as theft of vehicle being faced by the vehicles owner, documents, checking by policeman like (RC, insurance and DL) etc. can be solved. In this paper, the keyless starting system is being introduced with the use of programming also in which driving license and registration certificate comes into the picture as a replacement of key. This device automatically checks and verify documents after only it start the vehicle. In today's fast and optimized world, these problems waste much time of public and government process while checking of documents, finding the lost vehicle. The device has been made to eliminate such problems is based on sensors, RFID (Radio Frequency Identification) cards and also on programming software which read data from documents and matches it with the prefilled details. In this device, two slots are provided where one can insert RC, DL and also the snap of document captured on camera with date and time and stored. Thus one can also access the information of the vehicle that who is driving the vehicle at any time.

Keywords – Smart Dashboard, vehicle security, Documents checking and verification, RFID.

I. INTRODUCTION

In the fast growing and optimized world where maximum no. of peoples having their own vehicle, but don't have time to maintain it for a long time and they pay attention when they have been needed not when a vehicle needed. But there are lots of unavoidable problems are arising such as pollution, crowd of vehicles on the road, less place for parking etc. which are commonly being ignored by the user. For an example, in trucks it needs periodic maintenance such as after every job which is assigned needs to be checked that 'everything is alright' and if not, then it may create the problems like reduction in efficiency which will indirectly lead to increase pollution. Even, if a minor part is damaged, it may turn to a bad accident etc.

For many people, internet and telecommunications have redefined the ability to track the vehicle [1]. Thomas F. Golob and Amelia C. Regan [2] studied the various histories and development in the field of transportation. Hensher and Golob [3] [4] examined the problems being faced in travel patterns and telecommunications. Ng et al. (1995) [5] performed a nationwide survey in two countries pertaining to dispatchers and commercial vehicle operators to determine characteristics that would determine the likely acceptance of advanced traveler information systems (ATIS) technologies, including route guidance, navigation, road and traffic information, roadside services and personal communication. Athanasios [6] et al. used the Internet-based geographic information system (GIS) technique to bring together spatio-temporal data, models and users for a wide range of transportation applications-planning, engineering and operations. G. M. Giaglis et al. [7] investigated avenues for building upon recent trends in Vehicle routing (VR) related research towards an integrated approach to real-time distribution management. Patricia Lyon Mokhtarian [8] presented the relationship between telecommunications and transportation by identifying additional tools such as how transportation affects the cost of demand or supply, and by putting these relationships into a robust conceptual framework. Thus the problem also arises that what if the vehicle was stolen, or while accident who was driving the vehicle.

In this paper, the keyless starting system is being introduced with the use of programming also in which driving license and registration certificate comes into the picture as a replacement of key. Thus, it is mandatory to carry a registration certificate of vehicle and driving license of the driver. Since the vehicle registration certificate is a unique ID for a vehicle and will be used as MasterCard and another is a user interface card which is driving license of the user (which is supposed to drive the vehicle at that time of driving) is made to come in contact to the circuit and resulted (binary, 0 or 1) as according to the circuit requirement.

In the experiment, RFID cards have been used as a replica (model) of driving license and RC of a vehicle. A circuitry system has been used with software which triggers the ON/OFF functions, which requires a master card (RC) and user interface cards (DL) when comes in contact with the RFID card reader module one after another, it reads a value which is assigned to it. After comparing the values for MasterCard and user interface card one by one, if both are matched, then only output will occur in the form a pulse which will trigger a switch which is connected to the starter motor.

II. CONSTRUCTIONAL COMPONENTS AND THEIR TECHNICAL DESCRIPTION

The rationale behind the project is to develop a smart logic to identify the person and allow the one to use it only. To employ this technology in use, RFID cards have been used here because of its unique number. This unique number is stored in the silicon chip inside the RFID card and can't be changed by anyone.

Since RFID card is equipped with the unique code which is already stored in the database on checking point. Thus, when RFID reader module senses an RFID card, it generates 125 kHz frequency for decoding RFID Card. If the database is OK, then the Indicator LED on its circuitry will glow and will indirectly indicate that the card is accepted and it is waiting for the next card. Similarly, if the system accept the second card, then it results '1' and if not, it will trigger the buzzer automatically.

2.1 Power Supply –

In the power supply section, one step-down transformer is used to reduce the voltage from 220 Volt AC to 9 Volt DC. The output of the transformer is further connected to the two diode circuit. Here, two diode work as a full wave rectifier circuit. The output of the full wave rectifier is now filtered by the capacitor. Capacitor converts the pulsating DC into smooth DC with the help of charging and discharging effect. The output of the capacitor is now regulated by the IC 7805 regulator.

IC 7805 provides a 5 volt regulated to the circuit and provides a regulated 5 volt power supply. The output of the regulator is now again filtered by the capacitor. In the output of the capacitor one resistor and one LED were used in series to provide a visual indication to the circuit.

2.2 Voltage Regulator –

In A regulated power supply is essential for several electronic devices due to the semiconductor material employed in them have a fixed rate of current as well as voltage. The device may get damaged if there is any deviation from the fixed rate. The AC power supply gets converted into constant DC by this circuit. By the help of a voltage regulator DC, unregulated output will be fixed to a constant voltage. The circuit is made up of linear voltage regulator 7805 along with capacitors and resistors with bridge rectifier made up from diodes. By giving unchanging voltage supply such that output reaches uninterrupted to the appliance, the diodes along with capacitors handle elevated efficient signal convey.

2.3 Rectifier and Transformer Circuit–

A rectifier was used to convert alternating current which periodically reverses direction, to direct current that flows in only one direction. The process known as rectification. Transformers were used to increase or decrease the voltages of alternating current in electric power applications. A varying current in the transformer's primary winding creates a varying magnetic flux which indirectly induces a varying Electromotive (EMF) or voltage in the secondary winding due to electromagnetic induction. Using together it will result a circuit whose output is in favor of an electronic circuit which is required in the circuit.

2.4 Microcontrollers (AT89S52 and MAX232) –

A microcontroller is a small, inexpensive computer, usually used for sensing input from the real world and controlling devices based on that input. Microcontrollers are easy to use with simple sensors and output devices, and they can communicate with desktop computers fairly simple as well. For building some form of customized sensor or output device, using a microcontroller is an excellent way to separate the customized part of the project from the part that's best done on a desktop computer.

2.4.1 Features of Microcontroller (AT89S52) -

- Compatible with MCS-51® Products
- 8K Bytes of In-System Programmable (ISP) Flash Memory
- Endurance: 1000 Write/Erase Cycles
- 4.0V to 5.5V Operating Range
- Fully Static Operation: 0 Hz to 33 MHz
- Three-level Program Memory Lock
- 256 x 8-bit Internal RAM
- 32 Programmable I/O Lines
- Three 16-bit Timer/Counters
- Eight Interrupt Sources
- Full Duplex UART Serial Channel
- Low-power Idle and Power-down Modes
- Interrupt Recovery from Power-down Mode
- Watchdog Timer
- Dual Data Pointer
- Power-off Flag

2.4.2 Features of micro controller (MAX232)

- Meets or Exceeds TIA/EIA-232-F and ITU
- Recommendation V.28
- Operates From a Single 5-V Power Supply
- With 1.0-mF Charge-Pump Capacitors
- Operates Up To 120 Kbit/s
- Two Drivers and Two Receivers
- ± 30 -V Input Levels
- Low Supply Current . . . 8 mA Typical
- ESD Protection Exceeds JESD 22
- – 2000-V Human-Body Model (A114-A)
- Upgrade With Improved ESD (15-kV HBM)

Applications

- – TIA/EIA-232-F, Battery-Powered Systems
- Terminals, Modems, and Computers

2.5 RFID Reader Modules and card –

RFID reader module is a device which reads the value or recognizes the RFID cards by its unique number. It is connected to the pin no 10 of the controller (Fig. 1). Thus an output results from the RF module by showing the card to the RF module then Reader.

- Voltage: DC 5V
- Current: < 50mA
- Operating Frequency(READ): 125 KHz
- Read Distance: 10 CM
- Out Put: TTL (RS 232) & WEIGAND- Selectable
- Indication: BEEP & LED Connect pin out
- Connectivity: Berg Strip (male)

- Enclosure: ABS
- Antenna: Built in.

Data from the card reader is connected to the pin no 10 (Fig. 1) of the controller. Pin no 10 of the controller is Rx pin. RFID Systems consist of a transponder, also known as a tag, which is basically a microchip connected to an antenna. The tag is mounted to an item, such as a pallet of goods in a warehouse, and a device called a reader communicates with the tag via radio waves. Depending on the type of tag that is used, the reader can receive detailed information or it can receive data as simple as an identification number.

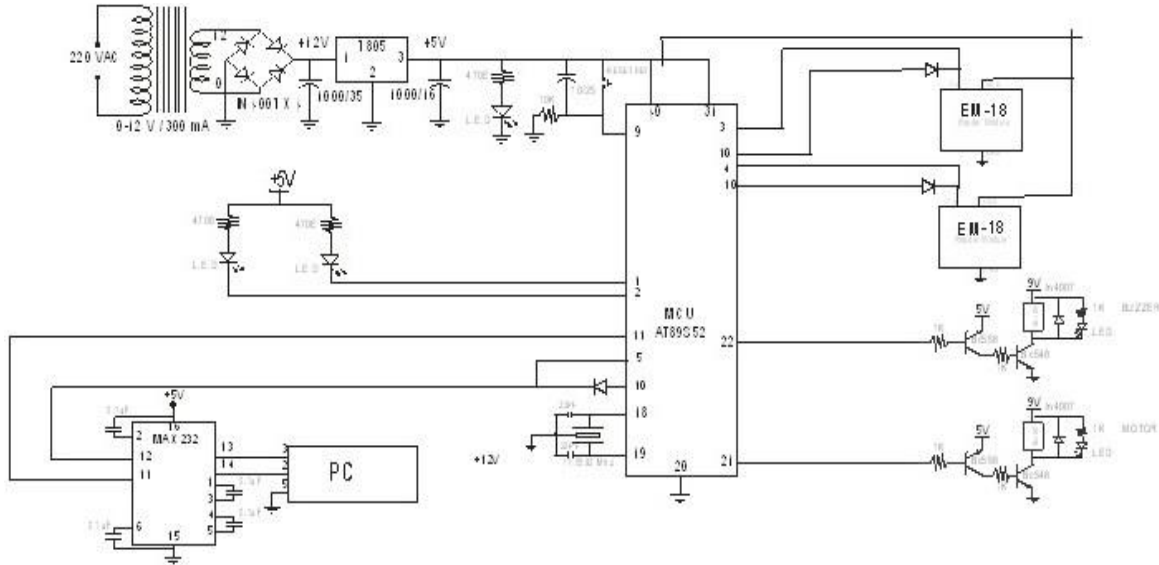


Figure 1. Assembled circuit board of Smart Dashboard.

2.6 Transistor, Resistors and LED-

The transistor is used to amplify or switch electronic signals and electrical power. Resistors act to reduce current flow, and, at the same time, act to lower voltage levels within circuits. The color of the light from the LED is a function of the ingredients (materials) and recipes (processes) that make up the chip.

2.7 Digital Camera, Diodes and Buzzer-

A webcam was used for feed or stream the image in real time. When "captured" by the computer, the video stream may be saved, viewed or sent on to other networks via systems such as the internet, and email as an attachment.

A diode is a specialized electronic component with two electrodes called the anode and the cathode. Most diodes are made with semiconductor materials such as silicon, germanium, or selenium. An electrical device called buzzer that makes a buzzing noise and is used for signaling.



Figure 2. Assembled circuit board of Smart Dashboard.

III. EXPERIMENT AND RESULT

The condition is such that when the value matches to the given value for master card, then it accepts and turn the first red led on and waiting for another card which is a user interface card and when the second card is inserted in second slot after removing master card from the first slot which makes it easier to read second card and compares the value. If found true, then it captures a still image of the user interface card and store it into a database with date and time after it the second confirmation red LED turns on. Here both card and the circuit combine to form AND gate in which it executes when both the output is true.

Table -1 Combination of true and false values for AND gate.

S. No.	Master Card Value (RC)	User Interface Card Value (DL)	Output (AND Gate)
1.	0	0	0
2.	1	0	0
3.	0	1	0
4.	1	1	1

Table 1 show that it is acting like a gate i.e. when the conditions will be true then only it will respond.

IV. CONCLUSION AND FUTURE SCOPE

This work can be modified to store data online, or it may be connected to modem for online storing of data. Not only driver's detail, but vehicle's details can also be stored which can be done by installing the second camera in circuit and/or in software also. By doing this a still image of the driver can be captured. In the result, not only thefting can be prevented, but all the details can be provided to the traffic department and user as well by which the total flow of vehicle can be controlled and other activities e.g., fake registrations, terroristic activities by using of a vehicle etc. can be stopped. And also these details may help to reduce the traffic on road, pollution control, document verifications etc.

Since one is able to check the details of registered vehicles at any time, also in case of accidents there is a storage is provided for a scanned image of driver and RC of the vehicle. If its implementation become successful then it may be modified for pollution control which is a great issue now days. By which, one will be able to control the pollution level since it is very well known that pollution under control (PUC) certificate is provided to all the vehicles, but there are a lot of vehicles running on road having pollutants more than its limits and in general, nobody identify that vehicle easily, but by making very minor modification, such as modifying the sensors and its circuit arrangement of the system, this problem may be eliminated by which the vehicle can be identified and banned.

Another modification such as details of a vehicle which is provided by the dealer with the date and time of registration, will be stored (e-birth of running car) and say fifteen years would be its ending time. Since a vehicle is only allowed to run on road for a finite number of years after that it falls in red listed vehicles and asked for recycling). List of online information which will provide after the execution of these implementations:-

- Vehicle’s manufacturing date and time
- Vehicle’s owner details
- Vehicle’s registration date and time
- Vehicle’s insurance details
- Your vehicle has remained life of _____
- Your vehicle has _____% of pollutants.



Figure 3. Representation of life of a vehicle.



Figure 4. Representation of current status of pollution emitting by a vehicle.

Such kind of details which will help traffic police in maintaining the traffic as well pollution and other illegal activities which can't be preceded further.

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