

AUTOMATED PATROLLING SYSTEM

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Abstract- The traffic enforcement system provides a real-time data detection and notification mechanism to detect traffic rule violations, also to notify the police and the car owner of the committed violation in order to take the right procedure at the right time. The speed of vehicle is measured and checked, if the vehicle is in over speed then a warning message is send to the vehicle. Following to this action the vehicle will be slowdown and will stopped. There are some mechanisms to check the vehicle parameters and document details (Vehicle Licence number, Seat belt status, insurance, tax and pollution details).If anything found incorrect then the car will be stopped. The RFID technology which has a vital role in the implementation of this system.

Keywords- ATMEGA328 microcontroller, RFID.

I. INTRODUCTION

The purpose of this project is to provide an efficient method to prevent traffic rule violations and replace the manual system. At present, traffic police faces many difficulties to detect the vehicle that violates the traffic rules. Also more than one officer is required for patrolling. Still many of the law breakers are easily escaped from the police. Therefore we intend to develop a system that focuses on enforcing traffic regulations by replacing the manual system. The key for this automation is the use of a reliable data reading technique using the radio frequency technology. The system provides a real-time data detection and notification mechanism to detect various law violations. The system notifies the police and the vehicle owner of the committed violation and then further legal procedures will be followed. The system comprise of a Police unit and a Vehicle unit. Whenever a Vehicle unit approaches the range of the Police unit, the data regarding the document details of the Vehicle unit is send to the Police unit through a RF data modem. The data, generally, would be a sequence of dates (which are the expire dates of insurance, tax and pollution test) followed by other parameters involved in the Vehicle unit,

such as the vehicle registration ID, present speed and the seat belt status. Also, the driver can insert a personal RFID tag containing his/her license details to the system as one of the parameter. The data modem initializes a wireless link between the Police unit and the Vehicle unit. The received data from the Vehicle unit to the Police unit is processed in the Microcontroller and displayed in a LCD display. This received sequence of data is checked, which also includes the comparison of the dates with a real-time clock present in the Police unit. If the received data is vague or dubious, a stop message is sent to the Vehicle unit. This system can reduce the traffic caused by the manual patrolling systems. For this system there should be a unique identification of vehicles. For this RFID tags can be used. RFID (Radio Frequency Identification) enables identification from a distance, and it does so without requiring a line of sight. So using RFID technology, identification of the vehicle can be uniquely done. By introducing this project, we can reduce the number of officers required for checking. A Windows based computer program enters the data in to the Vehicle unit. A single police officer can ensure that there are no violations in traffic. And also using this system, the inconvenience caused due to the traffic block can be avoided. The system requires a certified authority to update the data into the vehicles.

II. MOTIVATION AND TECHNICAL RELAVANCE

The technology being developed each day are replacing the manual methods as they are more efficient and accurate. This makes the life of an average individual easier. The primary motivation for this project is the desire to reduce the prolonged queues caused due to existing manual patrolling

system. The existing system is very cumbersome and leads to unnecessary waiting at the checkpoints.

III. RELATED WORKS

In Paper [1] The research, 'Automatic Penalty Charging for Traffic Regulation', is an attempt to design a system which will automatically incur penalty to the car driver and owner for violation of traffic rules. There are 3 units. One will be a system attached to the ignition mechanism of the car. The other will be a system which will be attached to the traffic signal points and the third is the RTO unit. For car ignition the driver has to place his RFID driving license card near to the reader. The design aims to reduce bribery, corruption, pollution, congestion in a city. [2] The paper proposes a single integrated traffic enforcement system that is able to recognize and report various traffic violations. It consists of a Wi-Fi infrastructure that enables communication between the moving vehicles and a central node. The proposed model should encompass several issues like entering a no entry street, car theft, congestion and tolling. In paper [3] To intimate the driver about the zones and to maintain the speed is accomplished by the RF technology. The main objective is to design a Electronic Display controller used for vehicle's speed control. It monitors the zones, which runs on an embedded system and can be custom designed to fit into a vehicle's dashboard. In Paper [4] This paper describes a method to perfectly solve the problem of invisibility of traffic signal caused by huge vehicles, prevent traffic congestion at toll gates and give advanced collision warning to the drivers. In Paper [5] The police unit must be mobile and the car unit doesn't need to be in line of sight. By using the RF technology we can communicate the car unit and police unit. And the main feature is Real-time notification by the RF technology. The proposed system aids an average driver by saving his precious time. This is due to the hassle-free patrolling approach brought out by our system.

IV. PROPOSED SYSTEM

The system comprises of a method to implement automated patrolling system. Automated patrolling system is an Embedded system. The system proposes an effective method for detection of traffic law violations. The system includes a Vehicle unit, Enforcer unit and A PC software to update the details. The system checks the various dates of relevant papers like tax, pollution, insurance and also checks the seat belt status and speed violations. If the checked dates are expired and the other prescribed laws are violated, the system stops the vehicle and further actions are taken.

The different modules associated within are

1. Vehicle unit : The vehicle unit updates the document details and sends to the Enforcer unit using the RFID technology.

2. Enforcer unit : The received data from the Vehicle unit to the Police unit is displayed in a LCD display and checked. If any violations found further actions to be taken.

3. A PC software : It is used to update the details to the vehicle unit.

Advantages of proposed system:

The following are the advantages of Automated patrolling system

- It replaces the manual form of patrolling system.
- Reduces prolonged queue at the check points.
- Reduces the fuel loss during the waiting time.
- Time saving.
- The enforcer (Police unit) can be mobile.
- Real-time notification to the offender.
- The car unit doesn't need to be in line of sight.
- Wireless communication.

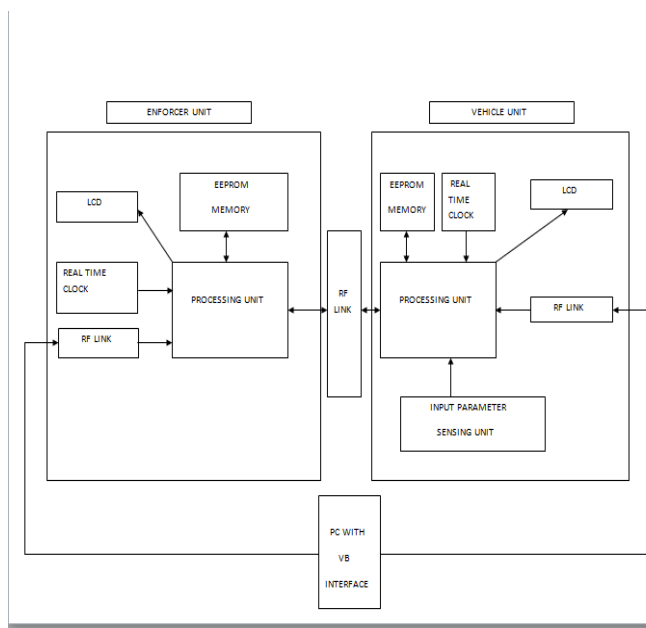


Fig: Architectural Diagram of Automated Patrolling System.

The figure shows the architectural diagram of Automated Patrolling System. We have 2 units such as enforcer unit and vehicle unit. In the enforcer unit it consist of LCD, EEPROM System, Processing unit, Real-time clock, and RF link. A 16x4 LCD display is very basic module and is very commonly used in various devices and circuits. The command instructions given to the LCD from the EEPROM. From processing unit the signal is given to the LCD. And there is a connection between EEPROM and processing memory. Real-Time clock is used to transfer the address and data serially. The end of the month date is automatically adjusted for months with fewer than 31 days, including corrections for leap year. RF data modem working at 2.4 Ghz frequency in half duplex mode with automatic switching of receive/transmit mode with LED indication. RF link is attached to the 2 units simultaneously. According to the vehicle unit, the PC is connected with visual basic interface. Here also we used the RF link. The data from the VB INTERFACE connected to RF link directly. And this output will connected to the processing unit. And that output is given to the LCD and Real-time clock is also included in the vehicle unit .So transmission can send in serial way. In this unit we used the 16X2 LCD display. Here also we used the

RF link. The LCD and EEPROM are worked simultaneously.

V. SYSTEM REQUIREMENTS & SPECIFICATION

Here we are including the software's and hardware's used for developing the project and implementing the project.

A. SOFTWARE REQUIREMENTS

1. Microsoft Visual Basic
2. Arduino Software
3. Proteus Design Suite

B. HARDWARE REQUIREMENTS

- ATmega328 microcontroller
- Dot Matrix LCD
- RF Modem
- Real Time Clock
- RFID

C. TECHNOLOGIES UTILIZED

In this section we are including the technologies and software used for our project development phase.

1. ATmega328 microcontroller

ATmega328 microcontrollers is used in vehicle and enforcer units. The ATmega328 is a single-chip microcontroller created by Atmel in the mega AVR family. The Atmel 8-bit AVR RISC-based microcontroller combines ISP flash memory with read-while-write capabilities, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, the 2-wire byte-oriented serial interface, SPI serial port, 6-channel 10-bit A/D converter, programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The microcontroller can operate between 1.8-5.5 volts. The device achieves throughput approaching 1 MIPS per MHz. The ATmega328 is commonly used in many projects and autonomous systems where a simple, low-powered, low-cost micro-controller is required. Perhaps the most common implementation of this chip is on the popular Arduino development

platform, namely the Arduino Uno and Arduino Nano models. This system uses the Arduino Uno model.

2. Real time clock DS1307

The serial real-time clock (RTC) DS1307 is a low power and binary-coded decimal (BCD) clock plus 56 bytes of NV SRAM. Address and data are transferred serially through I²C, bidirectional bus. The clock provides seconds, minutes, hours, day, date, month, and year information. The end of the month date is automatically adjusted for months with fewer than 31 days. The clock operates in either the 24-hour or 12-hour format with AM/PM. The DS1307 has a power-sense circuit that detects power failures which automatically switches to the backup supply.

3. RF Modem

RF modem can be used for applications that need wireless data communication. It features adjustable data rate and reliable transmission distance. The communication protocol is self controlled which is also transparent to user interface. The module can be embedded to your current design so that wireless communication can be set up easily. This module works in half-duplex mode, it can transmit or receive but not both at same time. After each transmission, module will be switched to receiver mode automatically. In the case of LED, the TX and RX indicates IC is currently receiving or transmitting the data. The data sent is checked for CRC error if any. If chip is transmitting and any data is input to transmit, it will be kept in buffer for next transmission cycle. The internal 64 bytes of buffer is for the incoming data. When you power on the unit, the TX LED will briefly blink indicating that initialization is complete and it is ready to use.

4. RFID

RFID is a growing technology. It is used to identify and authenticate tags that are applied to any product. Radio frequency Identification and Detection is used for technologies that make use of radio frequency waves to identify objects and people. Purpose of Radio frequency Identification

and Detection system is to facilitate data transmission through tag that is read with the help of RFID reader. Information transmitted with the help of tag. RFID tag includes a microchip with radio antenna, mounted on a substrate. The RFID tags are configured to receive and respond signals from an RFID transceiver. This allows tags to be read from a distance. The Basic RFID consists of an antenna, transceiver and transponder. Antenna emits the radio signals to activate tag and to read/write information to it. Reader emits the radio waves, ranging to 100 inches. While passing through electronic magnetic zone, RFID tag detects activation signals of readers. After being Powered the tag sends radio waves back to the reader. Reader receives these waves. After which it identifies the frequency to generate a unique ID. Reader then decodes data which is encoded in the integrated circuit of tags and transmits it to the computers for use.

5. ARDUINO

Arduino is an open-source project that can create microcontroller-based kits for building the digital devices and interactive objects that can sense and control physical devices. The project is based on microcontroller board designs, produced by several vendors, by using the various microcontrollers. These systems provide sets of analog and digital input/output (I/O) pins. That pins can interface to various expansion boards (termed shields) and other circuits. The boards feature serial communication interfaces, including Universal Serial Bus (USB) on some particular models, for loading programs from personal computers. For programming the microcontrollers, the Arduino project provides an integrated development environment (IDE) based on a programming language, which also supports the languages C and C++.

6. PROTEUS DESIGN SUITE

The Proteus Design Suite is an Electronic Design Automation (EDA) tool. It includes schematic capture, simulation and PCB Layout modules. It is developed in Yorkshire, England by Labcenter Electronics Ltd. The software runs on the

Windows operating system. The Proteus Design Suite is a Windows application for schematic capture, simulation, and PCB layout design. All PCB Design products include an autorouter and basic mixed mode SPICE simulation capabilities.

7. SCHEMATIC CAPTURE

Schematic capture in the Proteus Design Suite is used for the simulation of designs. And it is also used as the design phase of a PCB layout project. It is therefore a core component and is included with all product configurations.

8. MICROCONTROLLER SIMULATION

The micro-controller simulation in Proteus works by applying a hex file or a debug file to the microcontroller part on the schematic. It is then co-simulated with any analog and digital electronics connected to it. Since no hardware is required, is convenient to use as a training or teaching tool.

9. PCB DESIGN

The PCB Layout module is automatically given connectivity information from the schematic capture module. It applies this information, together with the user specified design rules and various design automation tools, to assist with error freedesign of board. Design Rule Checking does not include high speed design constraints. PCB's of up to 16 copper layers can be produced with design size limited by product configuration.

VI. SYSTEM IMPLEMENTATION

The system is implemented in three phases. The first phase of implementation includes the development of vehicle unit. Whenever a Vehicle unit approaches the range of the Police unit, the data regarding the document details of the Vehicle unit is send to the Police unit. For this purpose a RF data modem is used. The data is in the form of sequence of dates (which are the expire dates of insurance, tax and pollution test) followed by other parameters involved in the Vehicle unit, such as the vehicle registration ID, present speed and the seat belt status. The data is sent as below:

*vehicle_number#insurance_date\$tax_date&polluti
on_date%

The '*' and '%' symbols denotes the starting and ending of the string respectively. Also, the driver can insert a personal RFID tag containing his/her licensedetails to the system as one of the parameter. The data modeminitializes a wireless link between the Police unit and the Vehicle unit. The program is wrote in the microcontroller in embedded C.

The second phase of implementation includes the Enforcer Unit .The received data from the Vehicle unit to the Police unit is processed in the Microcontroller and displayed in a LCD display. This received sequence of data is checked, which also includes the comparison of the dates with a real-time clock present in the Police unit. If the received data is vague or dubious, a stop message is sent to the Vehicleunit. And the vehicle will be automatically off.

The third phase of implementation includes A PC softwareto update the details to the vehicle unit. For demonstration, an application is created in visual basic. The real implementation comes when details are updated from the RTO office.

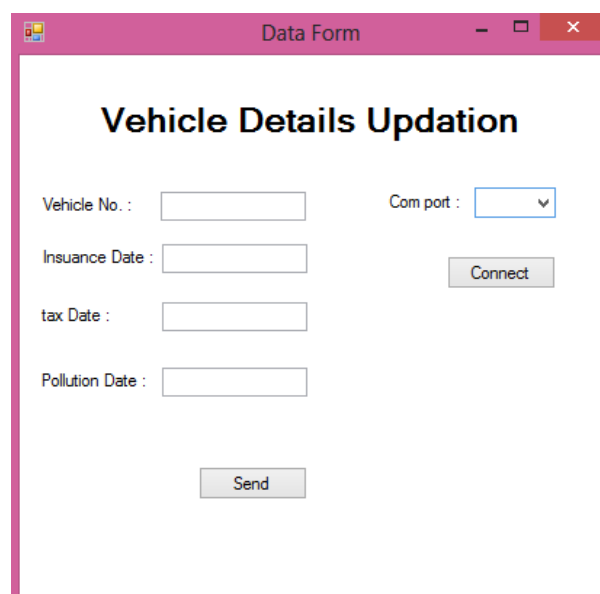


Fig. Vehicle details updation

VII. CONCLUSION

Safety and comfort of road users is becoming a matter of grave concern in our world. It is essential to build a safer and much more reliable system for traffic control and management. Our project describes a method to solve the problem of traffic block caused by the manual patrolling system. The overall idea is to share the information of one system to the other and verify its authenticity. Our project is based on embedded system. The objective of this project is to introduce a system which detects traffic rule violations including license ,pollution paper, speed ect that are checked during a manual police patrolling and thereby we can trace each and every individual vehicle by fitting a device in each vehicle and also with the police unit which uses the RF technology. The advantages of our project are saves time by replacing manual traffic patrolling system. The police unit must be mobile and the car unit doesn't need to be in line of sight. By using the RF technology we can communicate the car unit and police unit. And the Real-time notification by the RF technology is the main feature.

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