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RFID Penalty Tracking System with Traffic Control (RFID PTSTC)

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***Abstract*— In this paper, we control the vehicle speed and develop signaling unit to indicate the type of zone to the vehicle. Every zone like school, highway and etc. may have an IR based transmitter tag to transmit the zone information. This signal should be received by the vehicles and accordingly varies the speed limit of the vehicle. The throttle of the vehicle is controlled by an actuator practically. But to show the demo module here we used a DC motor, and varying the speed of it.**

The project is built around LPC 2148 MCU. Here we are using a pair of IR transmitter, receiver pair to track the particular zone and automatically reduce the vehicle speeds. This information will be displayed on 16X2 LCD. At each and every speed limiting zone it is placed with IR transmitter and vehicle consists of a receiver to track and automatically reduce the speed limit in vehicles. Voice announcement will also be given using voice module near the zone when a vehicle approaches. Once it crosses the particular area automatically it gains normal speed. We are using a DC motor for symbolic representation of the vehicle. Here we are implementing penalty to the vehicles which have crossed/skipped the Red signal light near the traffic zone. This is being implemented using RFID cards which can be placed in a vehicle. So, whenever the fault is found by RFID module connected to the controller then the amount will be deducted and the balance amount is displayed on LCD. If there is no balance in the card then the vehicle stops.

***Index Terms*— ARM7 MCU, DC motor, IR sensors, RFID module.**

I. INTRODUCTION

For avoiding rash driving of the drivers we have to provide safety systems within the vehicles mainly for 4-wheelers [1]. This can be done by using sensors and electronic circuits, which costs more. Instead of providing such high-cost equipment, we can achieve the same thing by mechanical means.

It is evident that road accidents are increasing day by day. According to the recent studies, one-third of the number of disastrous accidents are associated with excessive speeds in places where sharp turnings exist, as well as changes in the roadway like the presence of road-work. This is due to having to wait hours together in traffic jams, taking tortuous detours due to on-road works, trying to spot speed breakers, navigating blind turns, one-way and so on. The strange things that one may encounter while driving on the road are forked roads, railway crossings, sudden reverse bends and steep ascents and descents. The road oddities are indicated by road-signs. Cautionary road-signs are installed in hazardous areas to avoid accidents. However, most vehicle drivers miss road signs more often than not. It is difficult to keep an eye out for road signs when one should be focused on driving [2].

Without the interference of the human, the speed of the vehicle can be controlled automatically in highly populated regions by using simple systems. The vehicle will move with low speed even though the driver wants to move the vehicle with high velocity [3].

An Intelligent Transport System is expected to link the vehicle, the infrastructure and thereby make it possible to achieve more mobile and safer traffic conditions [4]. Automated control systems must be incorporated which will not only take care of adjusting sensors and signal conditioner but also be able to take necessary action at the proper time to avoid a collision. A lot of accidents on the highways are due to the carelessness of the driver. We have designed this project to provide a solution for this. Our solution involves using IR sensors we can control the speed of vehicles in different zones.

II. LITERATURE SURVEY

Many Driver Assistance systems for speed control have been developed so as to prevent accidents. One of them is Cruise control system (CC) that is capable of maintaining pre-defined speed and its later evolution version Adaptive Cruise Control (ACC) which keeps the automobile at a predefined safer distance from the preceding vehicle. But

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these systems fail to detect the curved roads where the speeds of the vehicles have to be reduced to avoid the accidents. By using Global Positioning System (GPS) curved roads could be detected where the Curve Warning System (CWS) came into existence and the digital maps accessed from the Geographical Information Systems (GIS) to warn the driver of approaching the curved road. But these maps need to be updated regularly and are not useful if there are unpredictable road diversions or accidents [2].

In the area of accident detection and prevention of traffic rules violation, various applications provided a solution like RF transceiver, Automatic braking systems; Camera-based detection, RFID technology, GPS module [5]. One of the project presented system comprising two major design units i.e. Drivers are warned by sending traffic messages to them as loudspeaker messages. One more project presented a kind of vehicle accident detection system. RF transceiver is also used to send the traffic rule broken information. The RF transmitter module interfaced with the microcontroller will transmit the traffic rule broken information to the nearby RTO controller room [6].

NHTSA, 1992—Beyond the limits a law enforcement guide to speed enforcement. The limitation of this method is that the installment of N number of RFID tags on the road to transmit general area information. The System even detects when GPS satellites lose its satellite communication. The smart display and control unit is made up of two separate units i.e., zone status Transmitter unit and Receiver (speed Display and Control) Unit [7]. According to this system, whenever a person sits in the driver seat of the vehicle, the system checks for various parameters with the driver.

So, we are introducing smart city in that below topics are covered which is zone sign management system, Traffic Rules penalty management system with the help of RFID system, WSN's (wireless sensor network) is made up of spatially distributed autonomous devices using sensors which work corporately to monitor environmental conditions like sound and light at different locations [8].

The aim of our project is to provide a system for continuous monitoring of the vehicles actions and misbehaves using RFID reader and RFID tags. We are also aiming to provide automatic traffic penalty for violation of any of the traffic rules. According to the RTO rules, the driver will be penalized for violation of any of the traffic rules. The charging amount will be automatically deducted from the smart card which will be fixed in the vehicle. Thus in this project, we are compelling people to some extent to follow the traffic rules and zone signs. This will definitely reduce the problems to some extent.

III. METHODOLOGY

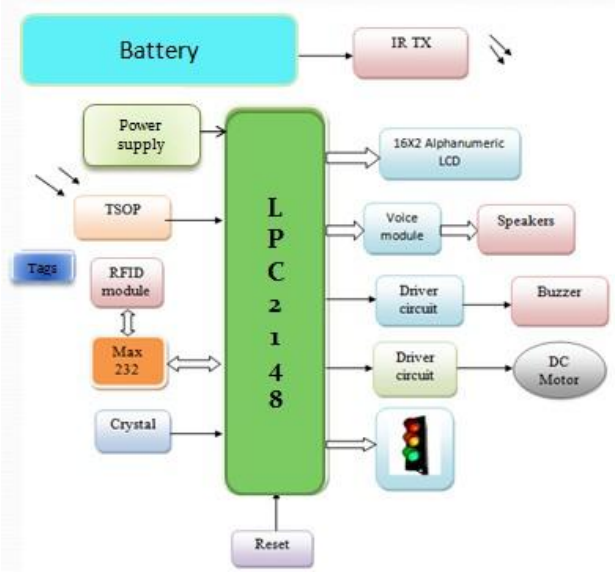

Fig: 3.1(a) Block Diagram of System Model

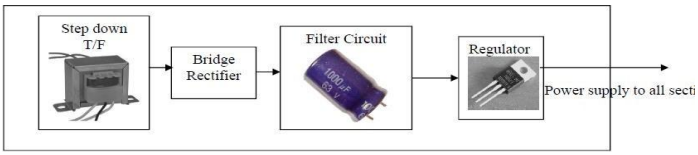

Fig: 3.1(b) Power Supply Model

Microcontroller Module: LPC 2148 microcontroller is based on ARM7 with real-time emulation. ARM7 (LPC 2148) combines microcontroller with wide memory interface, as well as embedded high-speed flash memory. LPC 2148 is ideal for applications where miniaturization is a requirement, such as point-of-sale and access control due to their low power consumption and tiny size. The ARM 7 controller is the heart of operations in this application. For interfacing with various devices, LPC 2148 has 2 ports. It has 512kb of Flash memory and 40kb of RAM and high- speed performance at a speed of 60MHz.

RFID: RFID stands for Radio Frequency Identification. The RFID tags contain electronically stored information. RFID system is used to automatically identify people or objects by using radio waves. Passive tags are energized by collecting energy from a nearby RFID reader's interrogating radio waves. Active tags may operate hundreds of meters from the RFID reader due to its local power source (such as a battery). It is not necessary for the tag to be within the line of sight of the reader like a barcode, so it may be embedded in the tracked object.

DC Motor: The DC motor converts electrical energy into mechanical energy in the form of rotation. The physical behavior of electromagnetism is produced by its movement.. Inside the DC motors, there are inductors which produce the magnetic field used to generate movement.

Astable Multivibrator: Astable multivibrators or free-running multivibrators do not require any additional inputs or external assistance to oscillate. An Astable multivibrator has no stable states. Its output oscillates continuously between its two unstable states without the help of external triggering. Resistor-Capacitor (RC) time constant determines the time period of each state. The name "multivibrator" because its output waveform was rich in harmonics.

Transistor Driver: Generally, transistor driver is used as a current amplifying device. The input is usually from a low current source such as a logic gate or a sensor. Transistor driver usually drives higher current devices such as bulbs and motors.

Step-down Transformer: The step-down transformer "steps down" the voltage applied to it. The Stepdown Transformer is the one whose primary voltage is greater than its secondary voltage. Step-down transformers are designed to reduce the voltage from primary winding to secondary winding. As a step-down unit, the transformer converts high-voltage into low-voltage and low current power into high-current power. The larger gauge wire is used in the secondary winding because it is necessary for the increase in current. The smaller gauge wire is used in the primary winding and it doesn't conduct much current.

Bridge Rectifier: Bridge rectifier converts an alternating current (AC) input into a direct current (DC) output. The arrangement of four or more diodes in a bridge circuit configuration is known as a bridge rectifier. The bridge rectifier provides the same output polarity for either input polarity.

Filter Circuit: The device where the AC components of the rectified output are removed and the DC components are allowed to reach the load is known as a filter circuit. In general, a filter circuit is a combination of the inductor (L) and capacitor (C) called LC filter circuit. The capacitor allows only alternating current (AC) to pass and inductor allows only direct current (DC) to pass.

Voltage Regulator: Any electronic device in which the voltage of a power source can be maintained within acceptable limits is referred to a voltage regulator. The Voltage regulator provides a stable DC voltage independent of the load current, temperature and AC line voltage variations. A voltage regulator uses a simple feed-forward design or may include negative feedback.

IR Transmitter: Infrared (IR) transmitters are called IR LED's since it is a light emitting diode (LED) which emits infrared radiations. The radiation emitted by an IR LED is invisible to the human eye even though it looks like a normal LED.

IR Receiver: To detect the radiation from an IR transmitter, infrared receivers are used. Infrared receivers are generally in the form of photodiodes. Infrared Photodiodes are different from normal photodiodes since only infrared radiations are detected.

SOFTWARE TOOLS: Keil µvision5, Proload, PCB Wizard.

IV. FLOWCHART

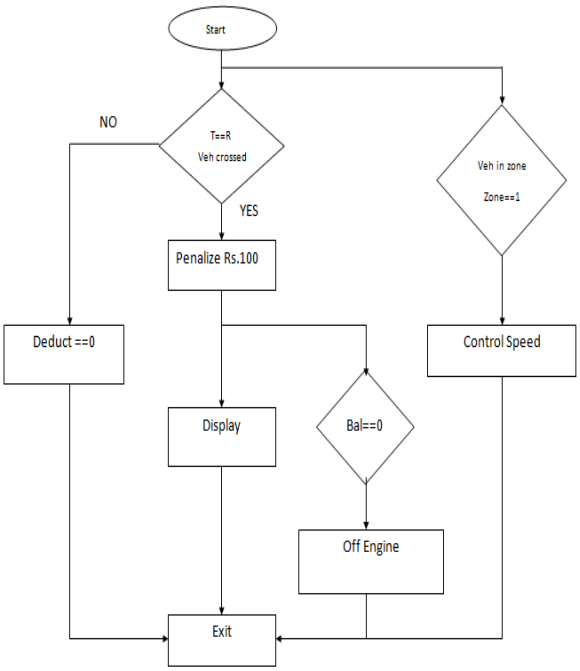

Fig 4. Demonstration of the process through the flowchart

V. ADVANTAGES

1) To control speed in restricted zones
2) Can be used to prevent accidents
3) Not light sensitive
4) Fit & Forget system
5) Wastage of time can be reduced

VI. RESULT

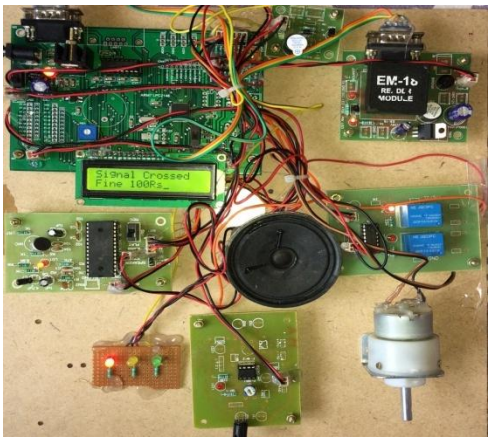

Fig: 6. Result Display

VII. CONCLUSION

This project presents an implementation of RFID penalty tracking system with traffic control. The experimental work has carefully carried out.

In this modern world, everything is fast. So there is a high probability of the occurrence of accidents. The statistical analysis also reveals this fact. So we need some methods to control the accidents. This project is a right solution for the control of accidents in our daily life.

Beware the day is not too far for the people to go only through the vehicles with automatic speed control and alert device. Though it may be costly it is not a factor while considering the life of passengers.

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