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Automatic Vehicle Speed Control With Wireless In-Vehicle Road Sign Delivery System Using ARM 7

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ABSTRACT: Nowadays accidents are occurring frequently, causing demise of many people by making modest mistakes while driving (in school zone, hills area, and highways). But sometimes it may not be possible to view the signboards placed by the Highway Department to alert the drivers in such kind of places and there is a chance for accident. The advancement in the processor technology and microcontrollers has opened a new system designed to prevent the accidents caused due to negligence of drivers in seeing traffic signals alongside the road and other anomalies on the roads. So to intimate the driver about the zones and to automatically maintain the speed is accomplished by means RF technology. The main objective is to design a Electronic Display controller meant for vehicle's speed control and monitors the zones, which runs on an embedded system and can be custom designed to fit into a vehicle's dashboard to display information on the vehicle. This system if adopted by some state can effectively reduce the number of road accidents caused by speeding vehicles losing control of the vehicle at speed breakers or by driver's negligence towards traffic signals. This paper presents a new design to control the speed of the automobiles at remote places for fixed time. The project is composed of two separate units: Zone status transmitter unit and Electronic Display and Control unit. Once the road-sign signal is received from the zones, the vehicle's Electronic Display Controller Unit warns the driver, to reduce the speed according to the zone, it waits for driver's response and reduces the speed of vehicle automatically.

Keywords: Automobile, RF, embedded system.

1 INTRODUCTION

It is evident that road accidents are increasing day by day. Recent studies show that one third of the number of fatal accidents are associated with excessive speeds in places where sharp turnings and junctions exist, as well as changes in the roadway like the presence of road-work or unexpected obstacles. 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-ways and so on. Forked roads, railway crossings, sudden reverse bends and steep ascents and descents are just few of the road oddities that one may encounter on the average drive. Such road oddities are indicated by road-signs. Mandatory road-signs enforce traffic laws; Cautionary road-signs are installed in hazardous areas to avert accidents. Informative road-signs provide directions, locations and other information that is potentially useful to drivers in that locality. 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. 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 pre-defined safer distance from the preceding vehicle. But these systems fail to detect the curved roads where the speed of the vehicles have to be reduced to avoid the accidents. Later Curve Warning Systems (CWS) came into existence to detect the curved roads by using Global Positioning System (GPS) and the digital maps accessed from the Geographical Information Systems (GIS) to warn 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. Here we propose a dynamic model where the system controls the vehicle according to the data frame that is transmitted by the RF transmitter fixed to the nearby road signs. The data frame is received by the microcontroller in automobile which controls the speed of vehicle. This is a RFID-Based Intelligent vehicle speed controller system where passive RF transceivers are arranged in the road close to the position of real traffic signals. This model can also be better utilized to improve the fuel efficiency by imposing the maximum speed limit on the automobiles at which the mileage will be more.

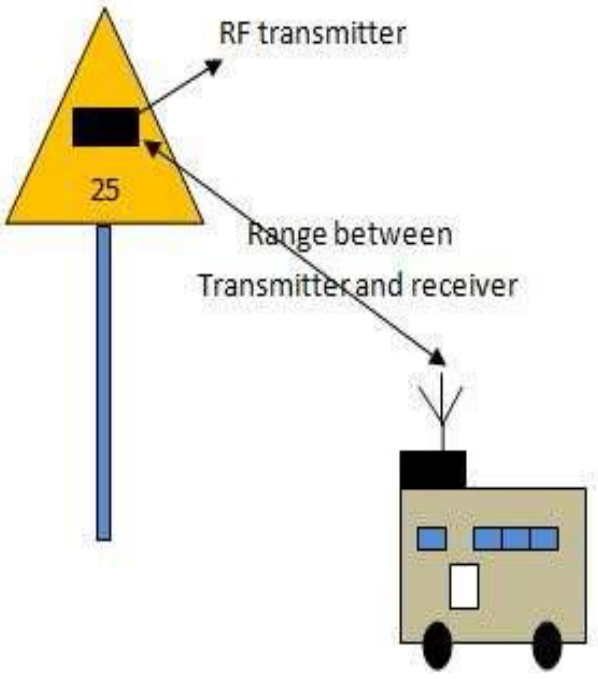

Figure 1: Traffic Signal posts equipped with RF Transmitter (left) Automobile equipped with the RF receiver (right)

2 BLOCK DIAGRAMS

Transmitter RF Tag:

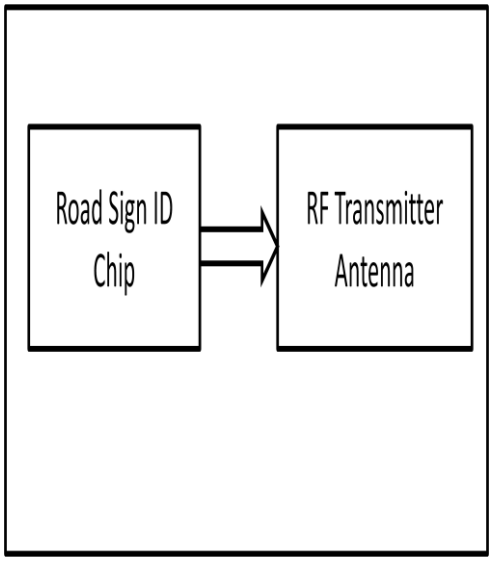

Figure 2.1: Passive RF Tag

Automobile Receiver Unit equipped with Display:

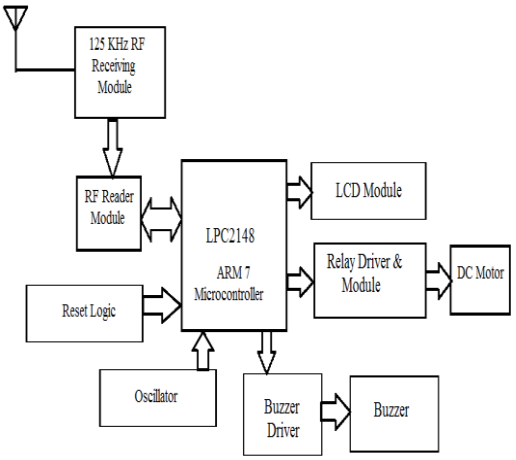

Figure 2.2: Electronic Controller and Display unit embedded in automobile

3 SYSTEM MODEL

The system model for Electronic Controller and Display Unit consists of following Hardware Modules:

3.1 Microcontroller Module:

LPC 2148 microcontroller is based on ARM7TDMI-S CPU with real-time emulation and embedded trace support. It combines microcontroller with embedded high speed flash memory and wide memory interface. Due to their low power consumption and tiny size, LPC 2148 are ideal for applications where miniaturization is a requirement, such as point-of-sale and access control. In this application the ARM 7 controller is the heart of operations of Electronic Controller and Display Unit. It consists of 2 ports for interfacing with various devices and has 40kb of RAM and 512kb of Flash memory and high speed performance at a speed of 60MHz.

3.2 Wireless Module:

3.2.1 RFID Reader: RFID reader connected to a wire antenna which demodulates the Manchester RF 32/64 bit signal and decodes it automatically. The data retrieved from the transponder is ready to be processed inside the device or to be sent over I2C/ UART / SPI or custom protocols. The user can control chip/module with an external device such as microcontroller, PC or handheld device with UART/I2C**.**

3.2.2 RF Tag:
RF identification is the wireless non-contact use of radio-frequency electromagnetic fields to transfer data, for identifying and tracking tags attached to objects. A Passive Clamp shell type tag is used for transmitting the road-sign which consists of memory chip and antenna.

3.3 Speed Control Module:

3.3.1 DC Motor:
DC motor is a mechanically commutated electric motor powered from direct current (DC). DC motors can operate directly from batteries which are rechargeable, providing the motive power for the first electric vehicles.

3.3.2 Relay Module:
Electromechanical relays are devices that join or break a circuit by physically moving electrical contacts into contact with each other.

3.4 Warning Module:

- LCD Module
- Buzzer

4. WORKING AND PROTOTYPE

The main objective is to replace road signs with **RFID** tags, and use in-vehicle RFID Reader-enabled modules to sense them, and provide useful information to the driver and design Electronic Display Controller meant for vehicle's speed control which is an embedded system. The RF tag can be placed on an existing road sign to transmit the information provided by signals placed on the road to adapt the vehicle's speed. Once the information is received from the RF tags, the vehicle's Electronic Display Controller automatically warns the driver, to reduce the speed according to the traffic sign indicated by the tag. It waits for few seconds for the driver's response to the information received, otherwise vehicle's EDC unit automatically reduces the speed. The Zone between two tags where the speed is controlled or reduced is called as Sensitive Zone. This process can be used not only to indicate Sensitive zones but also provide additional information to the drivers. Along with the primary objective of road safety, a plethora of other information can be provided to the commuter. Tags could disseminate additional information such as locations of nearby hospitals, fuel stations and food centres, by serving as Navigator. If there is road work or a construction in progress in a locality, installment of a tag a few km before the distressed area can be used to suggest suitable detours, thereby averting potential traffic jams and blockades. The possibilities are numerous. Care should be taken to provide the alerts on a priority basis. The entire operation of the proto-type is demonstrated in the flow chart given below:

Flow chart for operation:

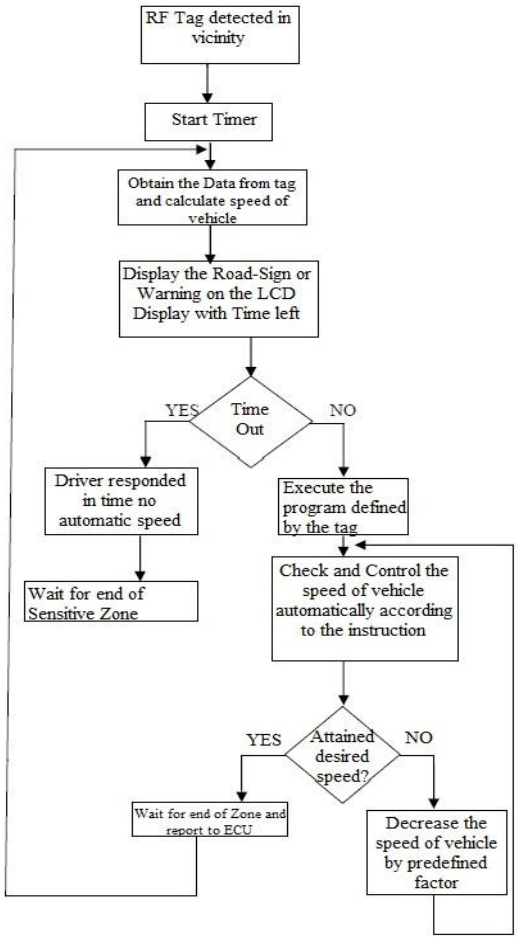

Figure 4.1: Demonstration of process through flow-chart

Different oddities would require notifications at different distances, which must be predetermined beforehand, to ensure that the driver is able to maneuver. Depending on the nature of the oddity, the optimal distance must be fixed at the time of tag placement. So far it has elucidated the concept with one-way traffic only. In the real scenario, however, it is imperative to consider traffic bound in both oncoming and outgoing directions, with respect to the tag. This poses a potential problem. What if the tag meant to be read on one side of the road is read by traffic bound in the opposite direction? For example, a tag meant to be read by a vehicle travelling in the A□ B direction may possibly be read by one travelling from B□ A on the same road. Using of better directional Algorithms in programming of the micro controller and using of Active RF tags solves this problem with this prototype.

5 CONCLUSION

In this paper the prototype design of a system that can deliver road signs to commuters' vehicles and can control the speed of the automobile has been demonstrated. This project is very simple which is durable and is of low cost. This project consumes less power. This system is easy to implement on present system which ensures maximum safety for drivers, passengers and pedestrians. The driver can get the information without any kind of distraction. This proto-type works even in bad weather conditions while the technology of artificial vision-based recognition of traffic signals might fail if visibility is poor and GPS Navigation system may not work due to the sheer distance of satellites or weak signals Radio Frequency signals might still be transmitted reliably through all the conditions. Driving safety will be enhanced and offers a positive cost differential to the government. We are trying to work with the all-pros and cons related to this project. In this proto-type only one vehicle is considered. Practically other vehicles moving nearby can block or attenuate RF signals.This project may be enhanced further by establishing vehicle to vehicle microcontrollers' communication through Radio frequency so as to avoid vehicle collisions and to prevent deaths.

6. REFERENCES

[1]. A design model for Automatic vehicle speed Control, International Journal for Computer Applications, volume-35, No.9, December 2011.

[2]. Design and Prototype of an In-Vehicle Road Sign Delivery System using RFID, 2012 12th International Conference on ITS Telecommunications.

[3]. Design of RF based Speed control system for vehicles, International Journal of Advanced Research in Computer and Communication Engineering Vol. 1, Issue 8, October 2012.

[4]. Vehicle Speed Control using R.F. Technology, 5704017, June 2006, SRM institue of Science and Technology.

[5]. Jerry Banks, David Hanny, Manuel Panchano, Les G. Thompson – RFID Applied – 2007, John Wiley and sons.

[6]. "Follmer, W. C." (1974). "Electronic Speed Control", SAE Tech. Paper # 740022.

[7]. LPC2141/42/44/46/48 Data Sheet, Rev 0.1, 7 September 2005

[8]. http://youthworldcom.blogspot.in/p/automatic-vehicle-over-speed.html

[9]. http://www.engineersgarage.com/electronic-circuits/dc-motor-control-circuit-wireless-rf

[10]. Gangadhar, S.; R N shetty Inst. Of Technol, An intelligent road traffic control system, IEEE conference publication Kharagpur (2010).