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System for Vehicle safety and Traffic Co-ordination

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----------**ABSTRACT**----------
These days, mass-produced vehicles benefit from research on Intelligent Transportation System (ITS). One prime example of ITS is vehicle Cruise Control (CC), which allows it to maintain a pre-defined reference speed, to economize on fuel or energy consumption, to avoid speeding fines, or to focus all of the driver's attention on the steering of the vehicle. However, achieving efficient Cruise Control is not easy in roads or urban streets where sudden changes of the speed limit can happen, due to the presence of unexpected obstacles or maintenance work, causing, in inattentive drivers, traffic accidents. In this communication, we present a new system for vehicle and traffic co-ordination that identifies a problem driver/vehicle to take action against them on violation of speed limit, along with traffic management.

Keywords *– Automatic Braking, Accident control system, High speed driving, Rule violation, Data analysis*

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I. INTRODUCTION

Problem of traffic controlling has become more intense with increased number of vehicles on roads. High speed driving followed by exceeding speed limits has become very common. The objective of this research is to focus on many systems that attempt to regulate the traffic on roads. There are traffic control systems that monitor speed of vehicles and that identify vehicles that exceed the speed limits. Such systems only check if the vehicles follow the traffic rules or not [2][3]. The monitoring is done with the help of few sensors and one or more cameras. The sensors used by the systems are easily affected by the environment and are prone to damages. They require lot of maintenance. The systems use a number of sensors that make the system more complicated in addition to high maintenance. The traffic controlling systems are limited to monitoring, and they do not contribute in any penalizing action against the offenders.

The traffic regulating systems does not have any control over the identity of the driver of vehicles. Hence, they can only monitor position of the vehicle but fail to identify the driver without external assistance. Such systems are limited to informing the controlling units or cops that a particular vehicle has crossed the speed limit or not followed a traffic signal. Therefore, there is a need of traffic control system that monitors vehicles along with the drivers, and penalizes those who violate traffic rules. A system is also needed that monitors and stores history of each vehicle /driver for future reference

In this paper work, we propose a system and methods for automatic monitoring and/or controlling the actual speed of a vehicle relative to the legal speed limit of the geographic area the vehicle is located in. A wireless transmission containing location or legal speed limit information is received from the transmission source. If the location information is obtained, database is queried to obtain legal speed limit information for the physical location of the vehicle. The legal speed limit is stored into a memory space. Alternatively, the legal speed limit is used to control the actual speed of the vehicle to the legal speed limit with the help of an access control device. The transmission source may be a GPS-compatible satellite network.

This paper in organized as follows. A description of the access control device (ACD) installed in vehicle and infrastructure is provided in Section 2. This include customizable features, storing driver information, route maps, pre approved driver detail. Section 3 discusses the working of control system decision and control stages. Section 4 discusses the working automatic braking system (ABS). The paper ends with a discussion of the results in Section 5.

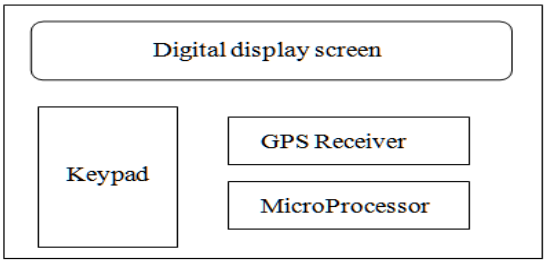

Fig.1: schematic diagram of the access control device

II. ACCESS CONTROL DEVICE

In this section, we describe the access control device that can be installed in a vehicle in order to achieve intelligent speed control. Referring to Figure 1. The access control device (ACD) includes a microprocessor, touch screen digital display, GPS receiver. The microprocessor controls the keyboard and display, deals with commands and control signalling with the control unit, and coordinates the rest of the functions on the board.

The RAM and flash memory chips provide storage for an operating system and customizable features, storing driver information, route maps, and pre approved driver detail. The access control device has capability to store certain information, such as the driver ID, License number, and vehicle codes etc, in internal Flash memory.

The microprocessor includes application programs that checks authorizations of each driver who request for authorization to the system, a server receive signals from the access control device. After processing the signals, the server sends appropriate signals to the respective access control device. In this process the driving license, validity, record of accomplishment etc. is checked.

III. CONTROL UNIT

The proposed architecture for control unit is shown in Figure 2 Control unit consist of a server, a front layer of programs, a master database, a plurality of GPS receiver unit. The access control devices communicate with Control unit preferably through wireless connectivity. The access control devices access control device is positioned in plurality of vehicles that are to be monitored in accordance with the present system. Each of such vehicles includes one access control device; communication is done between GPS receiver and radio station through satellite signal transmission. The network is accessible by the access control device on authorization.
The Control unit includes a master control module, a speed control module. The master database includes details of license holders and the driver, a plurality of maps, destinations, landmarks, and registered vehicles. For example, a license holder's information includes fields such as (name, date of birth, address, state, date of issue, date of expiry, name of license issuing officer etc.)

The Control unit receives signals from vehicles access control device such that the access control device receives from the GPS receiver in the respective vehicle, and the information is transmitted from access control device to Control unit. Decoders in Control unit receive the information that is interpreted and processed as per the nature of the information. The front layer includes a plurality of computer programs that forms a front end of the system. The GPS tracking system monitors the speed, direction, time of travel, and location of the vehicle. The GPS tracking system sends the monitored data to the control unit through the front layer where the data is received by master control module. The master control module sends the data to speed control module for analyzing and interpreting it. Master control module identifies any violation of rules or any emergency to take appropriate action with the help of relevant modules. The master control module, analyses the data obtain from GPS tracking unit and depending on the data obtain further action are taken. The speed control module receives information from master control module, which the master control module receives from GPS tracking unit about the relative movement of the respective vehicle. The speed control module decides whether the vehicle has violated the speed limits by checking the desired speed limit by which one should drive. On speed violation, the speed control module sends corresponding signals to master control module. The speed control module has rules according to which on first speed violation the master control module informs the speed control module to display a warning message to the access control device for a predefine period. If the speed violation persists, the speed control module instructs the access control device to enable the automatic braking system due to which the vehicle brakes are applied and as the vehicle, again approaches to the desired speed the control unit disable the automatic braking unit, which in result releases the brakes.

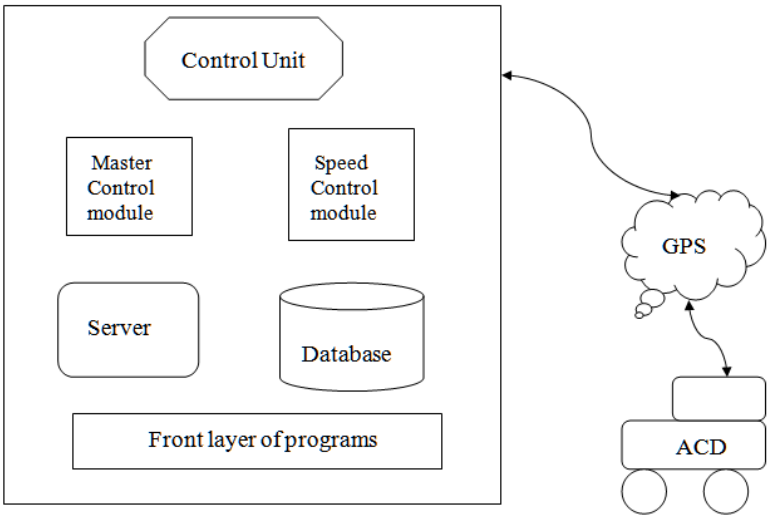

Fig.2: schematic diagram of the control unit

IV. AUTOMATIC BRAKING UNIT

In this section, we describe the automatic braking unit; a automatic braking unit consist of a master cylinder, a modulator, a hydraulic control unit and a electronic control unit as shown in Figure 3. The electronic control unit continuously keep on checking for the signal from the access control device, when the electronic control unit receive the signal from the access control device it sends the instruction to the modulator when the instruction reaches the modulator it began to increases the hydraulic pressure being feed to the wheels this result in increase of the braking force and when the vehicle reached to desired speed limit electronic control unit instruct the modulator to release the hydraulic pressure which reduces the braking force.

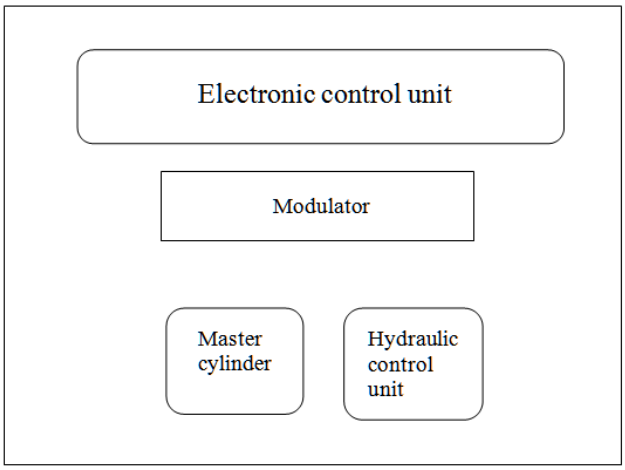

Fig.3: schematic diagram of the automatic braking unit

V. CONCLUSION

This paper presents an architecture for automatic adaptation of the longitudinal speed control of a vehicle to the circumstances of the road which can help to decrease one of the major causes of fatalities: the excessive or inadequate vehicle speed In the empirical trials in our installations, the vehicle's speed was successfully changed as a result of the detection of the signals, increasing the driver's safety. The technology developed can assist human drivers in difficult road circumstances. The proposed on-board architecture is portable and easily adaptable to any commercial car with minimal modifications

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