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Dept. of EEE, Mar Baselios Institute of Technology & Science (MBITS), Kothamangalam, Kerala-686693, India

On 17th & 18th March 2016

Zonal Based Cruise Control and Accidential Information System

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ABSTRACT: The main objective is to design a Smart Display controller meant for vehicle's speed control and monitors the zones for a different kind of speed limit, which can run on an embedded system. Smart Display & Control (SDC) can be custom designed to fit into a vehicle's dashboard, and displays information on the vehicle. The project is composed of two separate units: zone status transmitter unit and receiver (speed display and control) unit. Once the information is received from the zones (40kmph, 30kmph, 10kmph) the vehicle's embedded unit is automatically alerts the driver, to reduce the speed according to the zone, it waits for few seconds, and otherwise vehicle's SDC unit automatically reduces the speed. Also when vehicle is collide with each other they send data of each vehicle to other vehicle through RFID technology. According to this project when a vehicle met with an accident, immediately the vehicle number and the collided vehicles unique ID will be transferred to a police control center based on the Global System for Mobile communication. This will help the police to identify the vehicle if any hit and run accident cases occur.

KEYWORDS: Radio frequency identifier (RFID), Smart Display controller, GSM and GPS

I. INTRODUCTION

As the days of manned driving are getting extremely numbered, so are those of traffic jams, dangerous and rough drivers and more importantly, accidents. According to Mr. Willie D. Jones in the IEEE SPECTRUM magazine (September 2001), a person dies in a car crash every second. Government is also implementing new rules and regulations in order to reduce such situation. But people forgetting such laws because of their busy life, unawareness etc… so in order strictly implement the law automation of the driving control is needed .In this proposed project intelligent zone monitoring system monitors whether vehicle keeping the speed limit as per the rules. The government implemented speed restriction each zones for the protection of pedestrians as well as vehicle travelers.eg; school zones are restricted with 25 kmph in our state.

In this project an intelligent embedded system called Smart Display & Control monitors the zones for a different kind of speed limit. Smart Display & Control (SDC) can be custom designed to fit into a vehicle's dashboard, and displays information on the vehicle. The project is composed of two separate units: zone status transmitter unit and receiver (speed display and control) unit. Once the information is received from the zones (40kmph, 30kmph, 10kmph) the vehicle's embedded unit is automatically alerts the driver, to reduce the speed according to the zone, it waits for few seconds, and otherwise vehicle's SDC unit automatically reduces the speed. Automatically the system release the control after the vehicle leaves the zone. The identification of each zone is done with the help of RFID technology.

Another problem facing by vehicle travelers is that traction of accident caused vehicle. That is if any accident happened, there is no need to stay both vehicle on the spot. The common situation is that the person who is really guilty for that accident will escape from the location for not giving compensations. To avoid such difficulties after accident this project also proposing a system which automatically transmit a particular unique vehicle ID to each of the vehicles and to vehicle control station. This ID can be used for further processing and for tracking vehicles responsible for accident. The ID transfer also achieved by the help of RFID technology and alert to control station is send using GSM.

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II. BLOCK DIAGRAM AND DESCRIPTION

REGION SECTION

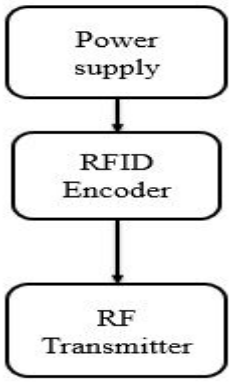

Figure 2.1.Block Diagram of Region Section

VEHICLE SECTION

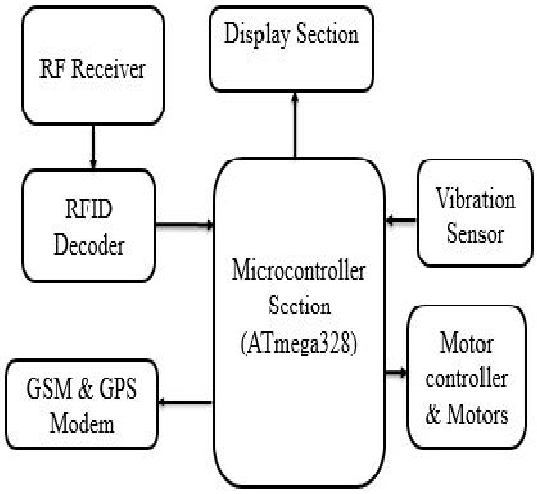

Figure 2.2.Block Diagram of Vehicle Section

BLOCK DESCRIPTION

The region section consists of a dc power unit 5V rechargeable battery. The microcontroller used is ATMEGA328, which makes the system automatic. The microcontroller reads the signals from the RFID reader and card. The Radio Frequency Identification module used to send Zonal data and Vehicle data. The system consist of Reader and Tag. RFID reader is placed in the car. Active read/write RFID tags are used. A GSM modem is a wireless modem that works with a GSM wireless network used to send vehicle information on collision. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio wave. Whenever a structure moves, it experiences acceleration. A piezoelectric shock sensor, in turn, can generate a charge when physically accelerated. Sensors based on the piezoelectric effect can operate from transverse, longitudinal, or shear forces. LCD (Liquid Crystal Display) screen is an electronic display module and find wide range of applications. LCD screen is used to display warning send from the microcontroller.

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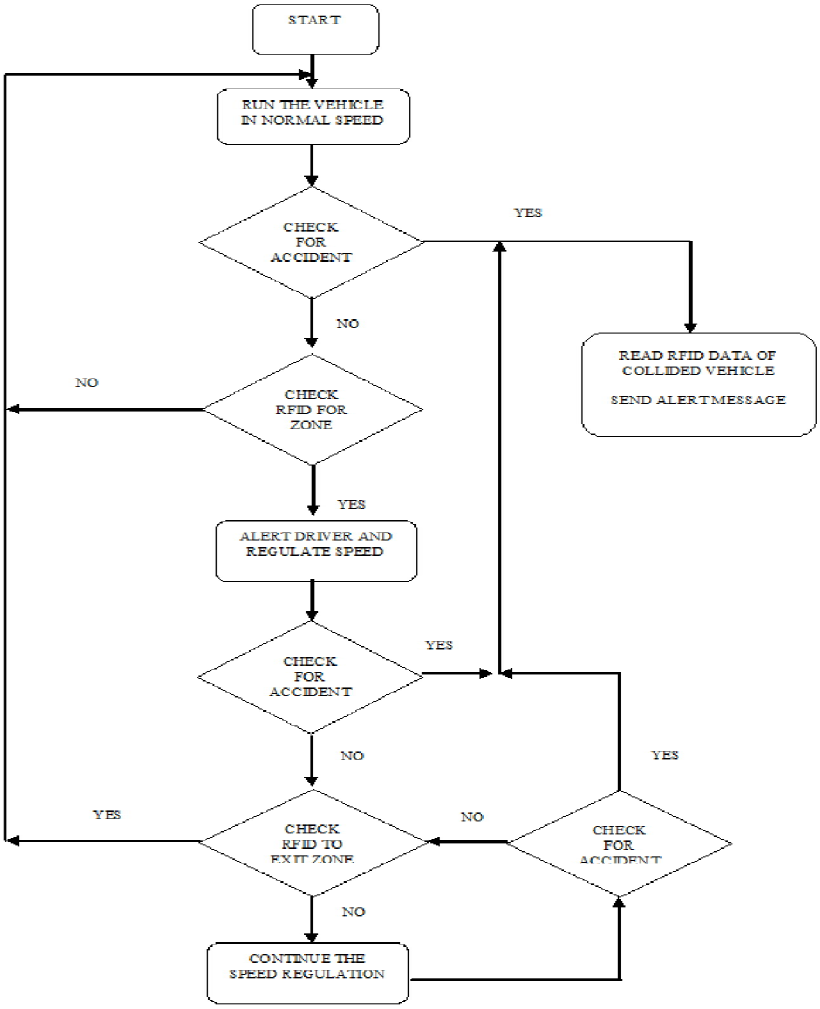
III.FLOWCHART



IV. WORKING

The above flowchart shows the control of vehicle and accident detection. Speed control of the vehicle is demonstrated using the DC motor. At first motor runs in in the full speed, that is PWM signal 100% duty cycle is inputted. The microcontroller checks for accident by comparing the ADC input with a fixed value. If value is greater the fixed value microcontroller will initiate interrupt service routine to send the alert messages and to read the RFID number of the collided vehicle. While running the interrupt service routine other operation are disabled. If value of ADC is less than the fixed value microcontroller will proceeds to next steps. Then RFID reader checks for any zone information. If any zone RFID number is detected the microcontroller will generate speed control information. That is PWM wave is generated for that particular zone, at the same time microcontroller checks for ADC information. If no accident is detected microcontroller checks for next RFID data. That is the RFID data to exit the zone. Until that RFID data is detected microcontroller will regulate the speed and check for collision. After exit from the speed regulation AVR repeat the above procedure.

For each zone we need two RFID tags having the same ID (single tag is used to demonstrate) but practical we could store the unique ID's in the read-write RFID tags. If any vehicle passes through the any of the two tags it will consider as a zone and speed regulation starts. After that if vehicle passed through the same RFID tag or through the

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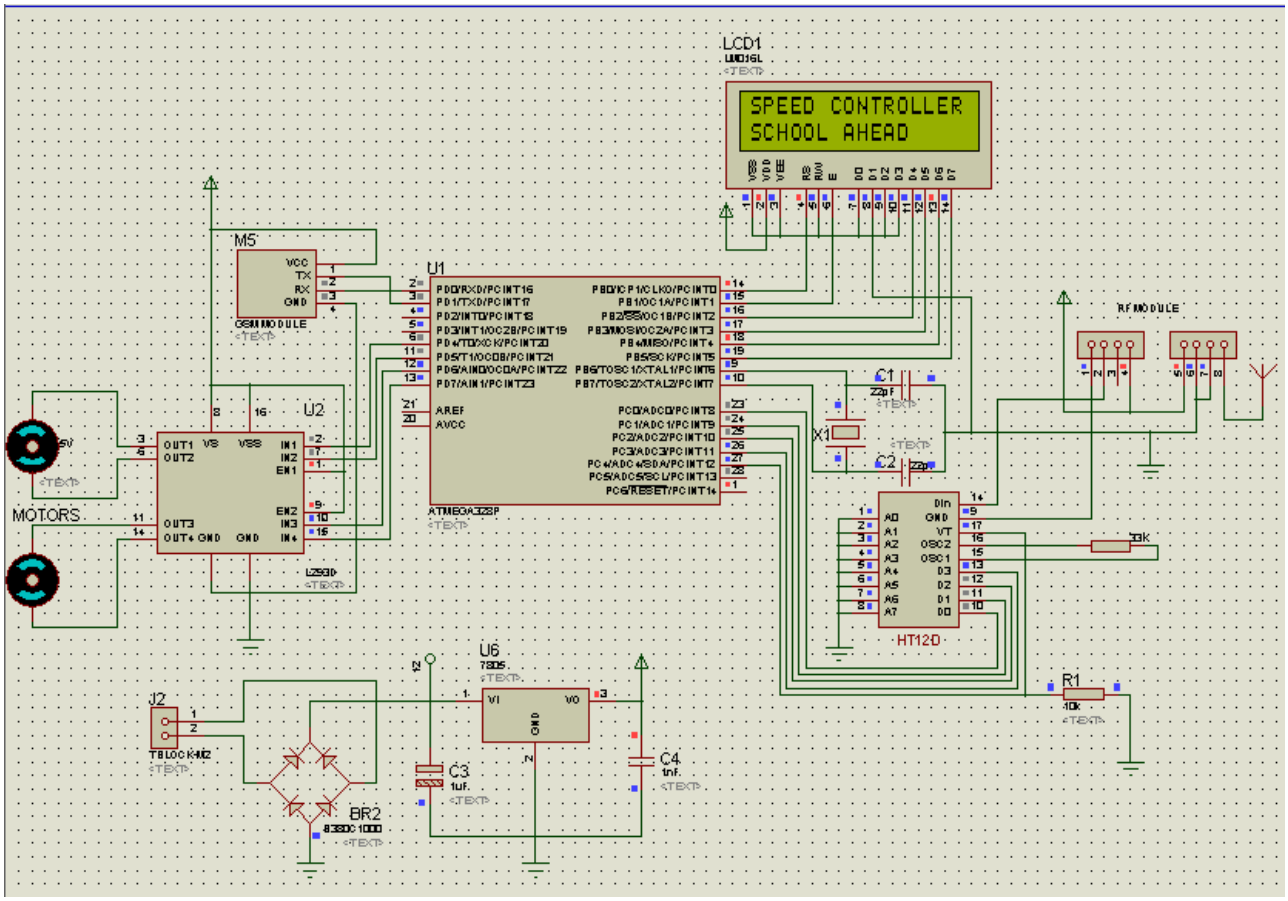
next tag there will be no speed regulation. The battery of the vehicle is providing the backup power to SDC unit or data can be stored to external memory. When vehicle is started the previous data can be recovered .The active RFID tag collided vehicle is enabled when accident occurs so that vehicles can be easily identified.

When accident occurs and ISR is executed. ISR contains instruction to execute the RFID data reading and alert message sending using GSM. The serial numbers of RFID tag to identify the zone and vehicles will be different. It will helps to identify the data for operator at the control station. Alert messages can be send to owner of the vehicle (especially for taxi vehicles) and to police or vehicle control room. The RFID number of the all collided vehicles and the contact number of the driver (for taxi vehicles) will be send in the alert messags. It will help the police to identify the vehicles.

V. SIMULATION AND RESULTS



The schematic circuit diagram which is used for the simulation is shown in figure. The LCD display used is (16 x 2) type LCD display with Alpha numeric displays. The microcontroller unit used is ATMEGA328. It's a 40 pin IC and supply used is 5V. The clock circuit consists of capacitors C1 and C2, a quartz crystal or ceramic resonator Y1. The values of capacitors C1 and C2 is determined by both the clock speed at which you intend to run the AVR microcontroller and by the selection of a quartz crystal or a ceramic resonator as the clock source. Here 22pF capacitors used to avoid damping oscillations.4Mhz crystal is used in the circuitry. A bride rectifier IC used for rectification of AC supply to DC. A bridge rectifier makes use of four Diodes in a bridge arrangement to achieve full wave rectification. The RFID modules at both ends detect the zone and displays the message "**SPEED CONTROLLER SCHOOL AHEAD**" on the lcd display.

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VI. CONCLUSION

A prototype model of controller is built on the speed mixing capability. Signals from the sign board of various zones (school zone, highway zone, "U" turn zone etc.) are intelligently treated individually & generates input signals for driving speed limiters .In prototype model a DC motor is used to demonstrate speed control. This design successfully utilizes a new idea of hybrid vehicle recently immerged in automotive industry. Also this project can only implemented from the government side by making suitable rules and regulation. This project is more helpful public transport vehicle than the private vehicle.

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