

RACING SPEED LOCKING SYSTEM FOR ELECTRIC VEHICLE

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Abstract: The main objective of proposed project is to make a system for vehicle that can control maximum speed using a remote and GSM/Bluetooth module. The goal of developing the proposed system is to control the speed of vehicles to avoid accidents. It is useful for the parents whose children do rash riding. By using their mobile phone they can set up the speed controlling modes of the vehicle. The proposed system uses GSM/Bluetooth as way of wireless communication. After setting the mode, the children will only be able to ride the vehicle up to the speed set by their parents. That will result in reduction of the accidents caused due to overspeeding.

Keywords: GSM, UART (Universal Asynchronous Receiver Transmitter), LCD (Liquid crystal display), MCU (Microcontroller unit), Embedded C, EEPROM (Electrically Erasable Programmable Read Only Memory), PWM (Pulse Width Modulation), ADC (Analog to digital convertor), LED (light emitting diodes).

I. INTRODUCTION

Now a day, road facilities are a major concern in the developed world. Recent studies show that one third of the numbers of fatal or serious accidents are associated with excessive or inappropriate speed, as well as changes in the roadway (like the places where sharp turnings and junctions exist [1]. Reduction of the number of accidents and mitigation of their consequences are a big concern for traffic authorities, the automotive industry and transport research groups [2].

Many systems have been developed to prevent these road accidents. One of them is Cruise control system (CC) that is capable of maintaining speed defined by the driver [3]. In Rubini.R, et al [4] proposed a system has an alerting, recording and reporting system for over speed violation management. The Zigbee transmitter sends the speed limit of the particular lane entered by the vehicle and also gives alerts like "road works", "steep slopes", "school zone" in the form of acoustical messages and also in LCD. The receiver unit placed in the vehicle receives the messages and sends to the microcontroller. When speed of the vehicle nears the speed limit it displays the warning and if exceeds the limit, the microcontroller records the violated speed and time. The LCD displays the lane speed limit and shows the number of times, speed was violated. A GSM module sends message to the nearest traffic personnel immediately after a violation occurs. An authenticated device is also provided, which can be operated only by the traffic police in whom he can retrieve the data stored at any time. Increase in the count of violation

increases the penalty amount which can be collected in toll gates located nearby.

80% of road accidents are caused by human error say senior police officials, according to a news report. Incidentally, the number of accidents for 1000 vehicles in India is as high as 35 while the figure ranges from 4 to 10 in developed countries. The seriousness of passing a red light traffic signal and speed violation on highways are very often now a day [5].

This project has immense application in day to day life. The proposed system uses an AVR microcontroller. A GSM device is interfaced to the microcontroller using UART (Universal Asynchronous Receiver Transmitter) Communication protocol. An alphanumeric LCD display is connected to the microcontroller to display the mode set by the user. Once the user connects the android device to the system using GSM, signal will be sent to system and mode will be displayed on the LCD.

II. THEORY

Pulse-width modulation (PWM) is a modulation technique used to encode a message into a pulsing signal. Although this modulation technique can be used to encode information for transmission but now a days it is also been used to allow the control of the power supplied to electrical devices, especially to inertial loads such as motors. In addition, PWM is one of the two principal algorithms used in photovoltaic solar battery chargers, the other being maximum power point tracking.

The main advantage of PWM is that power loss in the switching devices is very low. When a switch is off there is practically no current, and when it is on and power is being transferred to the load, there is almost no voltage drop across the switch[6]. PWM also works well with digital controls, which because of their on/off nature can easily set the needed duty cycle.

A universal asynchronous receiver/transmitter (UART), is a computer hardware device for asynchronous serial communication in which the data format and transmission speeds are configurable [7]. The electric signaling levels and methods (such as differential signaling, etc.) are handled by a driver circuit external to the UART.

The universal asynchronous receiver/transmitter (UART) takes bytes of data and transmits the individual bits in a sequential fashion. At the destination, a second UART re-assembles the bits into complete bytes. Each UART contains a shift register, which is the fundamental method of conversion between serial and parallel forms. Serial transmission of digital information (bits) through a single wire or other medium is less costly than parallel transmission through multiple wires.

In electronics, an analog-to-digital converter (ADC, A/D, A-D, or A-to-D) is a system that converts an analog signal, such as a sound picked up by a microphone or light entering a digital camera, into a digital signal. An ADC may also provide an isolated measurement such as an electronic device that converts an input analog voltage or current to a digital number proportional to the magnitude of the voltage or current.

III. HARDWARE DISCRPTION

ATmega16 (AVR Microcontroller) is the main controlling device of the whole system. It is an 8-bit high performance microcontroller of Atmel's Mega AVR family with low power consumption. ATmega16 is a 40 pin microcontroller (32 I/O pins divided into four 8-bit ports designated as PORTA, PORTB, PORTC and PORTD). ATmega16 has various in-built peripherals like UART, ADC, and Analog comparator. All AVR microcontrollers have inbuilt EEPROM. The advantage of EEPROM is that even when the microcontroller is turned off, data stored in EEPROM will remain. In short, EEPROM can maintain its content when electrical power is removed. It can only be accessed the same way an external peripheral devices is, using special pointer registers.

LCD is used in a project to visualize the output of the application. 16x2 LCD has 16 columns and 2 rows. So, we can write 16 characters in each line. So total of 32 characters can be displayed on 16x2 LCD. LCD can also be used in a project to check the output of different modules interfaced with the microcontroller. Thus LCD plays a vital role in a project to

see the output and to debug the system module wise in case of system failure in order to rectify the problem.

The basic step in the designing of any system is to design the power supply required for that system. The steps involved in the designing of the power supply are as follows. First determine the total current that the system sinks FROM the supply. Second determine the voltage rating required for the different components and third Concept of vehicle speed control system.

A photo-resistor (or light-dependent resistor, LDR, or photocell) is a light-control LED variable resistor. The resistance of a photo-resistor decreases with increasing incident light intensity; in other words, it exhibits photoconductivity. A photo-resistor can be applied in light-sensitive detector circuits, and light- and dark-activated switching circuits.

IV. SOFTWARE DISCRPTION

Embedded C compiler based software is used to create a hex file using Code Vision AVR(CVAVR) using C language. Then simulation software (PROTEUS) is used to test the prepared codeas shown in fig.1.

CVAVR-Code vision AVR is a C cross-compiler, integrated development and automatic program generator designed for the Atmel AVR family of microcontrollers. The program is designed to run under the windows 98/Me/NT 4/2000/XP/vista 32 bit operating systems. The C cross-compiler implements nearly all the elements of the ANSI C language, as allowed by AVR architecture, with some features added to take advantage of specificity of the AVR architecture and the embedded system's needs [8].

Khazama-It is software used to burn the hex file into the controller.

Extreme Burner-It is software used to check the connections of the controller.

Bluetooth Module CIA-This android application is used to send the command to the microcontroller.

V. WORKING

In our proposed design, a GSM/Bluetooth module is used as communication. A message is sent to the receiver end using an android app. The system works on three modes: child mode, normal mode, racing mode. Alphabet C, N&R are sent for child mode, normal mode, racing mode respectively. The message is then transferred to receiver through the GSM device.

The receiver receives the message through GSM/Bluetooth. The GSM transfer the message to the MCU.

MCU analyze and write the message in EEPROM. MCU read message from EEPROM. The message is then processed and the corresponding mode is switched on. Initially there is no message written in EEPROM. If there is already message written in EEPROM, the corresponding mode will be automatically switched.

As the accelerator pedal is moved to increase or decreased the speed, its corresponding PWM is generated and hence the speed is increased or decreased. Then any one of the three different available modes can be set.

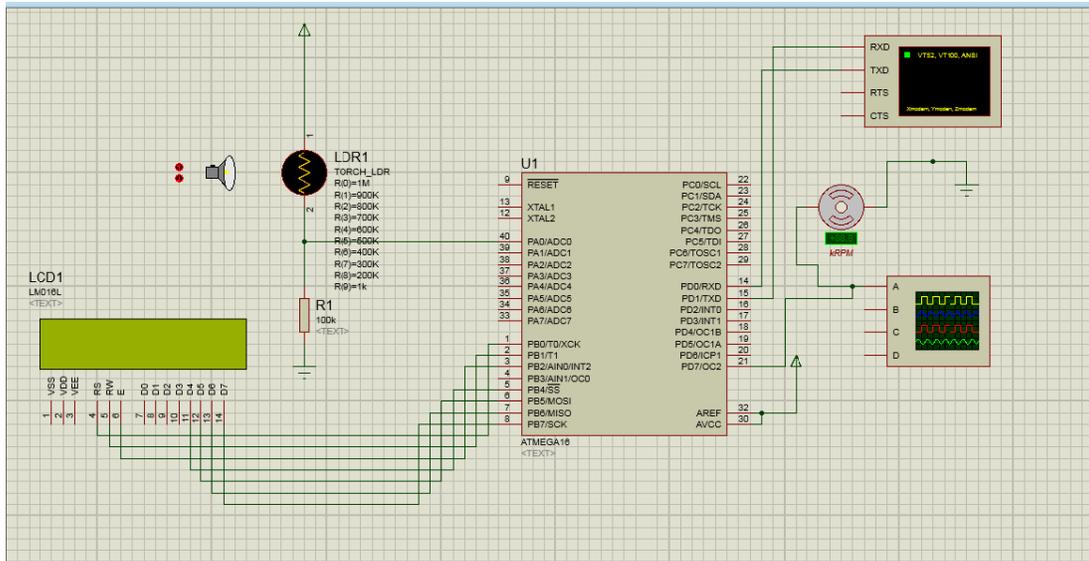


Fig.1. PROTEUS SIMULATION

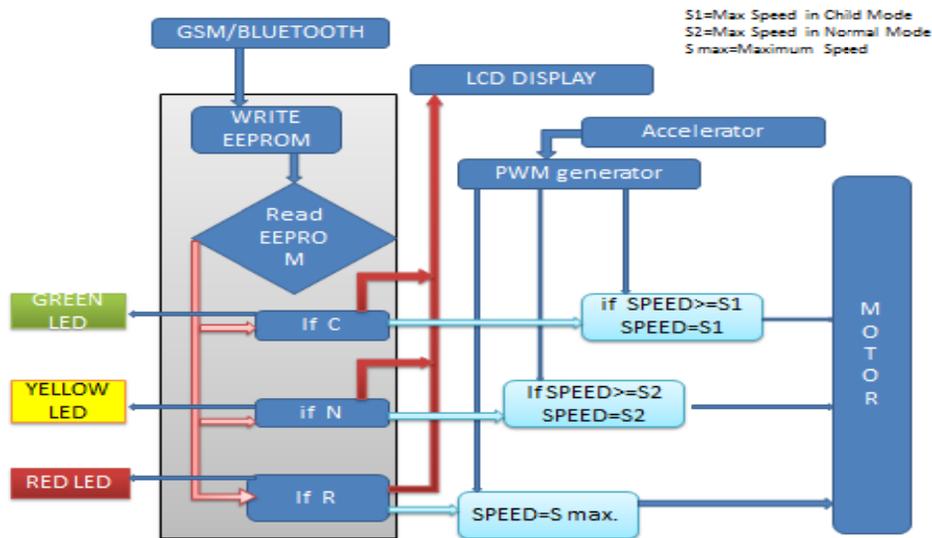


Fig.3. Flowchart of receiver section of the proposed system

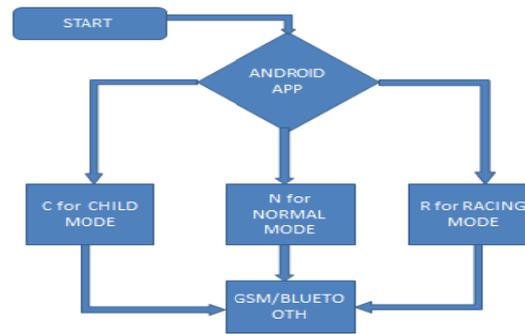


Fig.2.Flowchart of transmitter section of proposed system

First is CHILD MODE, In this mode, the maximum speed will be S_1 (assumed as half of the total speed). Even if the accelerator is increased the duty cycle of PWM will not increase to the specified value (say 50%) and thus the speed.

Second is NORMAL MODE, in this mode, the duty cycle is not increased to a value $> S_1$ (say 75%) even if the pedal is increased. And hence its maximum speed is fixed to S_2 .

Third is RACING MODE, in this mode, there is no limit to the maximum speed.

So after receiving the signal or message the MCU will check for the above modes and selected mode will be displayed on the LCD and their respective LEDs will glow as shown in fig. 3.

PWM will generate a pulse according to Accelerator (LDR) and user can increase or decrease the speed of the motor by pressing or releasing the accelerator.

VI. CONCLUSION

In this paper we presented a design to control the speed of vehicles. A real time system is built using ATmega16 microcontroller. The microcontroller is interfaced with various peripherals (like UART, PWM, LCD) to impose restriction on speed. Also the GSM modem is used for communication purpose i.e. to send message on mobile phones. The proposed system can impose the restriction on speed, due to which safe driving is possible and in this way; rate of accidents can be minimized.

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