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Fleet Management and Driver Supervision using GPS and GSM with Driver Assist

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ABSTRACT

Fleet owners are very particular about the safety of their cars which are maintained by them, they were more bother about the drunk and drive and the theft issues, this made us an idea to make a device which provides the safety to passenger who is travelling in the car by avoiding the drunk and driving cases. Here, we have presented the implementation of management of vehicle and supervision of driver. Blind spot reduction, ignition control, distance measure ment and location finding are the various features which controls the vehicle management and driver super vision. Blind spot reduction enables to reduce accidents by adjusting the mirrors automatically when steering is turned at road turnings. Controlling of ignition enables the drivers to start the car only after giving his breath sample to the alcohol measuring sensor which is placed at the dash board of the car. Ultrasonic sensors are placed on the left, right and back side of the car for the distance measurement of adjacent vehicle. Global positioning system (GPS) and global system for mobile communication (GSM) will be placed in car to send the location of a car to the owner.

Key words: fleet management, ARM7, GPS, GSM, Ultrasonic sensors

INTRODUCTION

The rapid growth in telecommunication, wireless sensor networks, multimedia security and vehicular security system increases the demand in embedded systems due to its wide range applications in providing security to the ownerships from the steeling vehicle, driver supervision and location finding. We are having as many as cab services in metropolitan cities such as Hyderabad, Bangalore, Mumbai and Delhi etc., Everybody needs to provide security to their cars/buses or any other vehicles such that the stolen cars should not move forward without their supervision and need to know the location of a car at that time, so that it is easy to find the theft and car as well. Also these service providers are more bother about the drunk and drive issues, this made us an idea to make a device which provides the safety to passenger who is travelling in the car by avoiding the cases of drunk driving and more over whenever the owner comes to know that car has been theft, then he can just send an SMS to STOP the car, then as a result the car will get stop automatically. And also it has to send the location of a car to the owner to know the exact location of the car without involvement of third party. Here we are also providing the information of vehicles coming behind us. When a car is moving on a highway, generally during tunings we need to look at the side view mirrors, Such that we do not block the car or cause any mishap to happen to the car coming from back, for accurate and comfortable drive either on Highways or on urban roads one need to do this activity or analysis. The rear view mirror has display on it, on which we can see the distance of the car behind us, so by all these data one can easily judge whether the turn could be successful or not.

PROPOSED MODEL

The main aim of this work is categorized into four stages: those are

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1. Blind spot reduction (BSR)
2. Controlling of ignition (IC)
3. Distance measurement (DM)
4. Location finding (LF)

Blind spot reduction enables to reduce accidents by adjusting the mirrors automatically when steering is turned at road turnings. Controlling of ignition enables the drivers to start the car only after giving his breath sample to the alcohol measuring sensor which is placed at the dash board of the car. Ultrasonic sensors are placed on the left, right and back side of the car for the distance measurement of adjacent vehicle. Global positioning system (GPS) and global system for mobile communication (GSM) will be placed in car to send the location of a car to the owner.

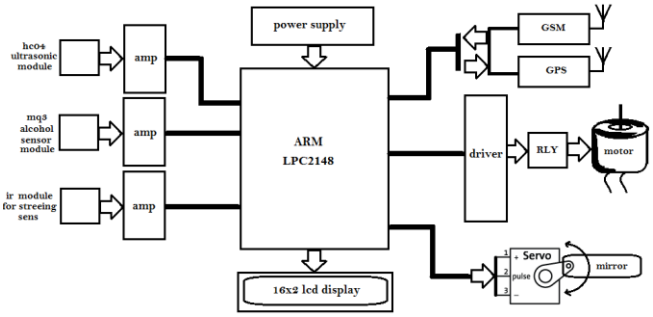

Fig.1 Block diagram of proposed fleet management and driver supervision

I. PROJECT DESCRIPTION

The infrared sensors are kept at the steering wheel of the car, there are both transmitters and receiver sections in the IR pairs, one transmitter section is kept on the steering wheel and four receivers are kept near to the steering wheel such that on rotation of the steering wheel all the four receivers receive the IR light that is coming from the IR transmitter. These four receivers are kept in four different positions around the steering wheel. The receivers to the right are R1.D1 and R2.D2, and to the left are L1.D1 and L2.D2. These R1.D1 are just placed in a position that is immediate right and left positions when the steering wheel is rotated, and the R2.D2, L2.D2 are the next ones to receive the signal. When the first R1 or L1 cuts the side indicator of the car gets on and when the next R2 or L2 receives the light then the side view mirrors are rotated, to the same direction steering wheel is rotated to. This helps to see the vehicles coming from behind during turnings.

The rear view mirror is in collaboration with the steering wheel, depending upon the rotation of the steering wheel the rear view mirror also turns its course. During the parking and reversing we can actually View the vehicles coming from the direction in which the car is heading. And in the case when the steering wheel is in straight position the rear View mirror will be positioned back to its default position. The side indicators turn on themselves when the steering is turned to a particular angle, that is the front wheel movement will be taken into consideration, and if its rotation interrupts the sensor situated there at the front wheel, the indicator turns on.

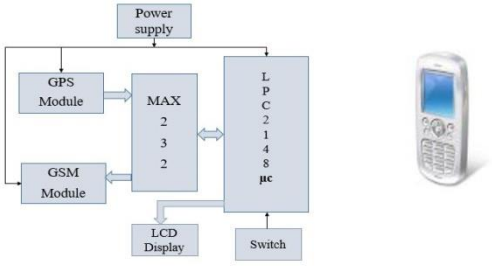

Fig. 2 Block diagram of GPS and GSM interface

Public breath alcohol tester with 3 digit LED display of blood alcohol content (BAC), micro-computer control, automatic test sequence with visual and audio cues have been developed for preventing accidents due to drink-and-drive and for helping decide to drive or not by self-test. In this self-test case if the reading in the meter is noted to be more than the desired ppm level (parts per million) then this level is indicated to the microcontroller which blocks the engine not to get started.

With the help of the ultrasonic sensor we can know whether a car is present or not in the blind spot. For the distance measurement purpose we use the ultrasonic sensors. Ultrasonic is acoustic energy in the form of waves having a frequency above the human hearing range-Ultrasonic can be used to locate objects by means similar to the principle by which radar works. High-frequency acoustic waves reflect from objects, even comparatively small ones, because of the short wavelength. The distance to an object can be

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determined by measuring the delay between the transmission of an ultrasonic pulse and the return of the echo. The ultrasonic sensors are placed on the left, right and back side of the car we can hence we can measure the distance of the car approaching behind us, and in case if the neighbors' car approaches to a certain closer limit to our car the speaker warns us, that a car is approaching towards us from certain direction.

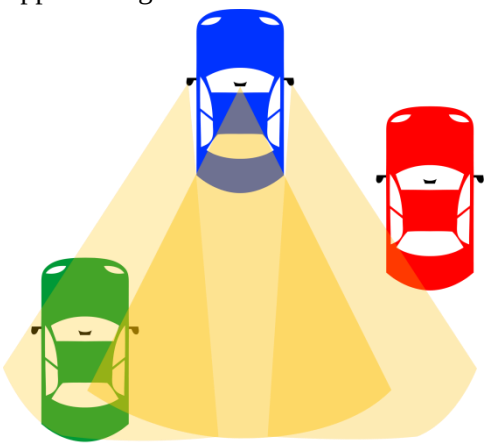

Fig.3 Blind spot

Finally, the location finding of a stolen vehicle will be done by using GPS and the SMS will be sent to the authorized person by using GSM.

II. HARDWARE DESRIPTION

The ARM Processor is used to do the above work. The major components used in its designing are as follows:

1. ARM7
2. Motor Driver
3. LCD
4. Alcoholic Sensor
5. Ultra Sonic Sensor

Motor driver circuit L293D is a quadruple push-pull 4 channel driver capable of delivering 600 milli Amperes (1.2 A peak surge) per channel. The L293D is ideal for controlling the forward/reverse/brake motions of small DC motors controlled by a microcontroller such as a PIC.The L293D is a high voltage, high current four channel driver designed to accept standard TTL logic levels and drive inductive loads (such as relays solenoids, DC and stepping motors) and switching power transistors. The L293D is suitable for use in switching applications at frequencies up to 5 KHz.LCD is used to display the distance of the nearby vehicle which is within the range of ultrasonic sensor. The alcoholic sensor MQ-3 that we are using in our project is suitable for detecting alcohol concentration on your breath, just like your common breathalyzer. It has a high sensitivity and fast response time. Sensor provides an analog resistive output based on alcohol concentration. The drive circuit is very simple; all it needs is one resistor. A simple interface could be a 0-3.3V ADC.Ultrasonic sensors transmit ultrasonic waves from its sensor head and again receive the ultrasonic waves reflected from an object. By measuring the length of time from the transmission to reception of the sonic wave, it detects the position of the object. And we are using this sensor to measure the distance of the vehicle. As one is driving an automobile, blind spots are the areas of the road that cannot be seen while looking forward or through either the rear-view or side mirrors. The most common are the rear quarter blind spots, areas towards the rear of the vehicle on both sides.

Vehicles in the adjacent lanes of the road that fall into these blind spots may not be visible using only the car's mirrors. Other areas that are sometimes called blind spots are those that are too low to see behind, in front, or to the sides of a Vehicle, especially those with a high seating point.

III. EXPERIMENTAL RESULTS

KEIL MicroVision-4 is used to implement the proposed model with hardware set up shown in fig4. The location of the Vehicle is known to the user end by sending a request to the module. The module will respond and send the location to the user. And also blind spot is deducted by using IR sensors and safety of the vehicle is increased by using alcoholic sensor.

Fig.4 Hardware set up for proposed model

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Fig.5Image showing the practical view

The request from the user is accepted by the GSM module and the phone number of the requested user is saved in the controller temporarily. The raw information regarding the location of the object is available in the GPS module. Now this information (the values of Lat,Longs) is read by the controller using serial communication interface. In order to send the information to the user we will transfer the data to the GSM module which uses serial communication, by this the information is known to the user. The outputs include the kit showing the

- Location at different places
- Sending message to the vehicle in-charge in case of breakdown

The working module showing output on the display and reply from the module to the mobile phone of the requested user

- Sending message to the GSM module to stop the vehicle.

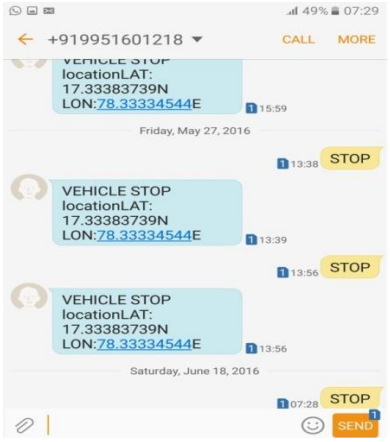

Fig 6 SMS "STOP" from owner end

- Receiving the message from module.

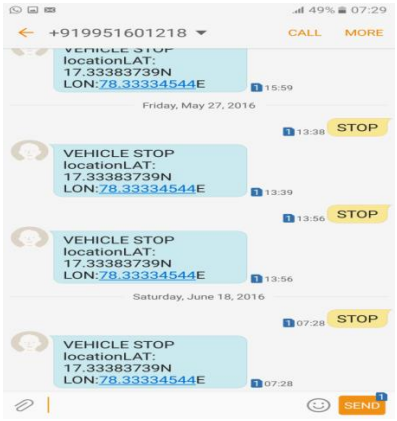

Fig. 7 Location of vehicle sent from GSM Module to the Owner

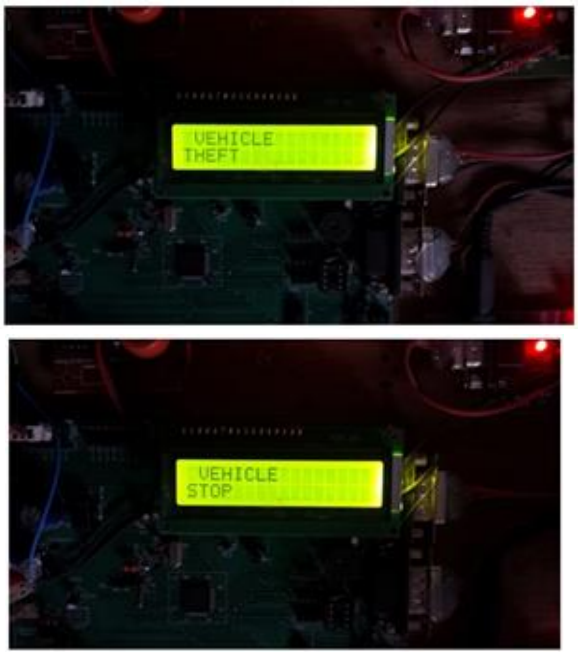

Fig. 8 String displayed on the LCD screen when GSM module receives STOP message

The string is displayed on the LCD screen as "Vehicle Theft and Vehicle Stop" when the message is received from owner mobile. This happens only if the requested user sends a valid string format as 'STOP' which is pre-defined.

- Detection of Alcohol

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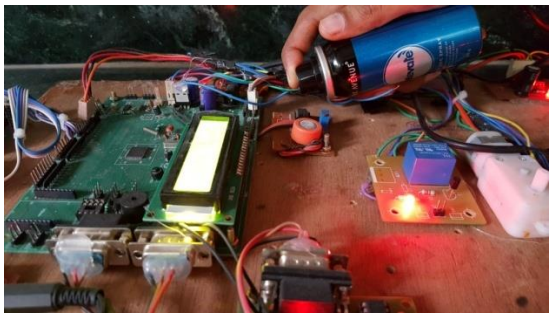

Fig.9 Testing the Alcoholic Sensor

Fig. 10 Detection of Alcohol

- Blind Spot Detection

Fig.11Distance measured by ultra sonic sensors

Fig. 12IR sensors used for blind spot detection

IV. CONLUSION

Here, we presented a novel fleet management and driver supervision with the GSM and GPS. The proposed model has provided the maximum security by blind spot reduction (BSR), controlling of ignition (IC), distance measurement (DM) and location finding (LF). These four stages have given us the accident prevention at the road turning, disable the driving mode in drunk drive case and finding the location of a stolen vehicle through the SMS alert. Finally, we had shown that the proposed model is very efficient and secured system for fleet management.

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