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# Speed Control for Motor Vehicles Using Global Positioning System

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**ABSTRACT**: The main objective of this project is reducing the speed when the vehicle is in a highly populated areas for avoiding the accident. A novel approach for creating an advisory/regulatory environment to limit the maximum running speed of the vehicle is presented. This paper deals with creating an onboard speed regulation module for vehicles which can monitor as well as control their instantaneous speed in comparison with the maximum permissible speed of that location. The location is obtained using position tracking technology of GPS and GSM system. The work discusses the unique position matching developed and design details of the proposed on-board module for limiting vehicle's speed. It developed tracks the vehicle position using data acquired from both GPS and GSM receivers which lead to increased efficiency, reduced complexity and processing time in contrast to the conventional methods.

**KEYWORDS** : GPS, GSM, Speed control. Zigbee transceiver

## I INTRODUCTION

In an attempt to bring down the number of road accidents caused due to intentional or unintentional over speeding of vehicles in urban areas, proposed here is a design of an on-board speed regulation device that first matches the location data obtained from GPS and GSM with the geographical zone already defined in the database and then compares the vehicle speed with speed limit of the matched zone.

The uniquely developed algorithm for position matching is used by the module to detect user location on the road and select the corresponding speed limit. The novelty of the algorithm is its ability to match the vehicle position directly to a defined speedzone thus avoiding complexities involved in any of the presently used position matching algorithms.

To avoid a total loss of positioning, in our system GPS is coupled with a GSM receiver because of the following considerations. Firstly, the position accuracy which is required for the kind of an application mentioned is provided with a complexities as compared to using only GPS. combination of GPS and GSM with far less the same speed zone**.** Although, GSM alone is also not
sufficient enough due to a large number of speed zones falling inside a cell due to its large span. Secondly, GPS unit performance highly depends on the positions of the satellites in the sky and their visibility from the vehicle location. GPS accuracy is expressed in a few attributes available from GPS receiver. If any of these parameters exceeds a certain threshold value, the probability of correct position matching is very low. In urban areas, the GPS signal can be blocked by tall buildings, in that case the location obtained from GSM can be utilized as in no scenario can a GSM signal be blocked.

## II SYSTEM ARCHITECTURE

The system is composed of two parts, which are vehicle section which includes GPS and GSM receiver,speed control motor,LCD module and the pedestrian zone section which includes Zigbee transceiver and switch.

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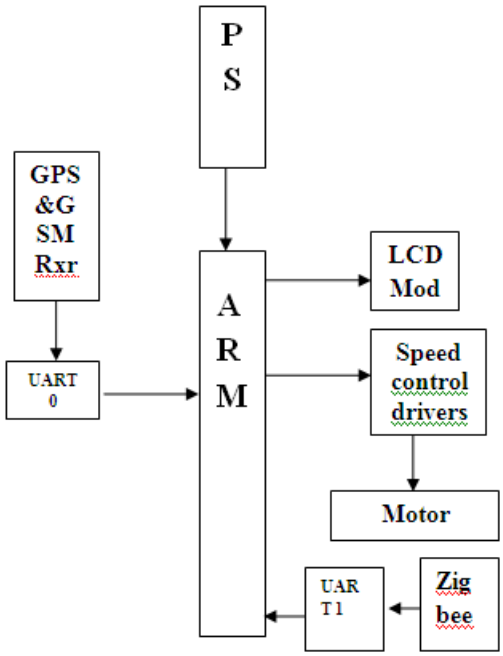
WORKING MODULES

In this vehicle section we get a GPS value from satellite continuously and display in LCD Modules if vehicle meet the Pedestrian zone having a fixed GPS modem and transmit the value to the vehicle help of zigbee wireless and we compared and check its same zone means microcontroller automatically reduce the speed of vehicle By referring this GPS values the condition of the vehicles can be send through as a sms by GSM and display in LCD. Because of we are avoiding the accident in zonal limits Even if the vehicle has passed Pedestrian zone means that should be increase previous speed limit.

The Global Positioning System (GPS) is a satellite-based navigation system made up of a network of 24 satellites placed into orbit by the U.S. Department of Defense. GPS was originally intended for military applications, but in the 1980s, the government made the system available for civilian use. GPS works in any weather conditions, anywhere in the world, 24 hours a day. There are no subscription fees or setup charges to use GPS. The 24 satellites that make up the GPS space segment are orbiting the earth about 12,000 miles above us. They are constantly moving, making two complete orbits in less than 24 hours. These satellites are travelling at speeds of roughly 7,000 miles an hour. GPS satellites are powered by solar energy. They have backup batteries onboard to keep them running in the event of a solar eclipse, when there's no solar power. Small rocket boosters on each satellite keep them flying in the correct path. GPS satellites transmit two low power radio signals, designated L1 and L2. Civilian GPS uses the L1 frequency of 1575.42 MHz in the UHF band. The signals travel by line of sight, meaning they will pass through clouds, glass and plastic but will not go through most solid objects such as buildings and mountains.

BLOCK DIAGRAM

VEHICLE SECTION



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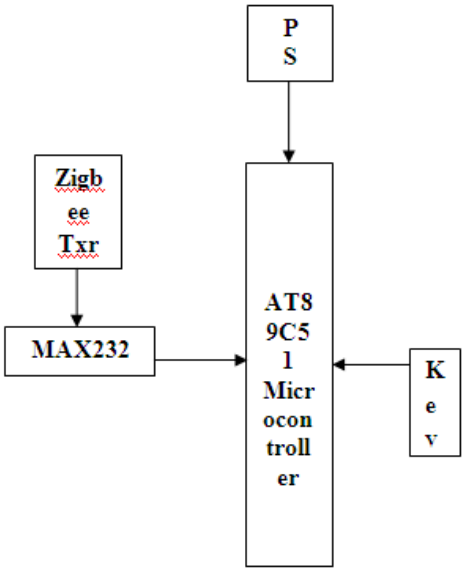
PEDESTRIAN LIMIT




GSM provides recommendations, not requirements. The GSM specifications define the functions and interface requirements in detail but do not address the hardware. The reason for this is to limit the designers as little as possible but still to make it possible for the operators tobuy equipment from different suppliers. Cellular is one of the fastest growing and most demanding Tele communications applications. Throughout the evolution of cellular telecommunications, various systems have been developed without the benefit of standardized specifications. This presented many problems directly related to compatibility, especially with the development of digital radio technology. The GSM standard is intended to address these problems. The primary goal of GSM was to provide a mobile phone system that allows roaming of users through Europe and provides voice services compatible to ISDN and others PSTN systems.GSM is a typical 2nd generation system replacing the 1st generation analog system but nor offering worldwide high data rates as 3rd generation systems.

## III CENTRAL PROCESSING UNIT (CPU)

The proposed module is a real time system, meaning that the CPU has to match the vehicle position to a speed zone every time it receives location data either from a GPS or GSM receiver. Thus, processing capabilities of the CPU have to be in accordance with the application requirement supported with the Real time operating system.The CPU takes input from the following sources:

1) GPS and GSM receiver: by using the appropriate communication protocols, the CPU obtains the LAC and CELL ID from the GSM receiver and the GPS co-ordinates from the GPS receiver.

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2) Flash disc: It stores the database which is used by the CPU for a) matching the acquired values of LAC,CELL ID and GPS co-ordinates from the GSM and GPS receivers b)obtaining the speed limit value (v) corresponding to thematched speed zone.
3) Speed measuring device: CPU obtains the instantaneous vehicle speed (u) from devices like speedometers or OBD (on board diagnostics) mounted on the vehicle.

The instantaneous speed (u) of the vehicle is then compared with speed limit (v) obtained and output is generated accordingly:
i)If {0< (u-v) <5} Km/hr: warning system in the form of display device is activated.
ii)If {(u-v) >5}Km/hr: an electronic feedback signal proportional to the difference (u-v) is fed into the ECU(electronic control unit) of the vehicle which in turn automatically brings the vehicle speed down to the permissible limits. In vehicles which don't possess an ECU, a mechanical design can be incorporated inside the vehicle to regulate the speed according to the feedback signal.

ARM/ LPC2129

The ARM7TDMI-S is a general purpose 32-bit microprocessor, which offers high performance and very low power consumption. The ARM architecture is based on Reduced Instruction Set Computer (RISC) principles, and the instruction set and related decode mechanism are much simpler than those of microprogrammed Complex Instruction Set Computers. This simplicity results in a high instruction throughput and impressive real-time interrupt response from a small and cost-effective processor core. Pipeline techniques are employed so that all parts of the processing and memory systems can operate continuously. Typically, while one instruction is being executed, its successor is being decoded, and a third instruction is being fetched from memory.
The ARM7TDMI-S processor also employs a unique architectural strategy known as THUMB, which makes it ideally suited to high-volume applications with memory restrictions, or applications where code density is an issue.The key idea behind THUMB is that of a super-reduced instruction set. Essentially, the ARM7TDMI-S processor has two instruction sets:

- The standard 32-bit ARM instruction set.
- A 16-bit THUMB instruction set.

The ARM architecture is the most widely used 32-bit ISA in terms of numbers produced They were originally conceived as a processor for desktop personal computers by Acorn Computers, a market now dominated by the x86 family used by IBM PC compatible computers. The relative simplicity of ARM processors made them suitable for low power applications. This has made them dominant in the mobile and embedded electronics market as relatively low cost and small microprocessors and microcontrollers.

The LPC2129 are based on a 16/32 bit ARM7TDMI-STM CPU with real-time emulation and embedded trace support, together with 128/256 kilobytes (kB) of embedded high speed flash memory. A 128-bit wide internal memory interface and a unique accelerator architecture enable 32-bit code execution at maximum clock rate. For critical code size applications, the alternative 16-bit Thumb Mode reduces code by more than 30% with minimal performance penalty.

With their compact 64 and 144 pin packages, low power consumption, various 32-bit timers, combination of 4-channel 10-bit ADC and 2/4 advanced CAN channels or 8-channel 10-bit ADC and 2/4 advanced CAN channels (64 and 144 pin packages respectively), and up to 9 external interrupt pins these microcontrollers are particularly suitable for industrial control, medical systems, access control and point-of-sale.

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## IV POSITION MATCHING

If GPS data is found to be reliable then we proceed by matching obtained LAC(x), CELL ID(y) with corresponding values stored in database (x1, y1), in order to narrow down to a particular cell as per the database. Further, distances (di , i=1 to 6 ) of obtained GPS coordinate (z) from all zone tags (zi ,i=1 to 6) of the corresponding cell are calculated. Zone tag (zo) corresponding to minimum value of di (dmin) is selected and the speed limit (v) associated with zo is obtained.

```
N= number of location IDs
M=number of cell ID in a given Location ID
Pos_matching_func(x, y)
{
Loop ( i=1 to N) % loop to locate location ID
        {
        If (x=xi)
        {
          loop( i=1 to M) % loop to locate cell ID
          {
           if(y=yi)
            {
            Loop (i=1 to 6)
                  {
                  di = abs (z-zi)
                  }
            dmin = min(di)
            zo = z(dmin);
         if (CV=0)
                  goto (data acquire);
           else
                  v= V (zo);
                  }
             }
            }
            }
          }
```

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## V. CONCLUSION

India is the worst hit country . annually and mostly they are caused due to over speeding of vehicles. There is an urgent need to put a system in place which can automatically restrict the top vehicle speed according to the speed limit regulation of a
particular speed zone, thereby minimizing accidents due to over speeding. The system proposed in the paper is a fully functional automatic speed regulation system which is a step ahead of presently available speed controllers in terms of efficiency accuracy and simplicity. The algorithm used for position matching and subsequent speed limit extraction is the first of its kind relying on both GSM and GPS input signals, complementing each other and thus avoiding limitations of using them individually for position tracking. The algorithm also takes special steps to validate the inputs before actually using them and also makes sure that it does not halt its output in case of inputs not being reliable. A self assessment check is also done by the algorithm and in case of dispute, restricts itself from proceeding and starts processing with new inputs. It also has a special provision for limiting the speed in sensitive areas without affecting the speed limits of the complete speed zone in which the place of concern lies. If this system is made compulsory for all vehicles, a noticeable decrease in the number of road accidents would be seen and thus reducing a heavy loss of life and property in the country.

## REFERENCES

[1] Bernstein, D., Kornhauser, A. (1996). An introduction to map matching for personal navigation assistants. Technical report, New Jersey TIDE Center, Princeton University, USA.
[2] Greenfeld, J.S. (2002). Matching GPS observations to locations on a digital map. In Proceedings of the 81th Annual Meeting of Transportation Research Board,Washington .
[3] Kim, J.S., Lee, J.H., Kang, T.H., Lee, W.Y., and Y.G. Kim (1996). Node based map matching algorithm for can navigation system, Proceeding of the 29th ISATA Symposium, Florence, Vol. 10, pp 121-126.
[4] Scott, C.A., Drane, C.R. (1994). Increased accuracy of motor vehicle position estimation by utilizing map data, vehicle dynamics and other information sources. Proceedings of the Vehicle Navigation and Information Systems Conferences, pp. 585-590.
[5] White, C.E., Bernstein, D., and A.L. Kornhauser (2000). Some map matching algorithms for personal navigation assistants. Transportation Research Part C 8, 91-108.
[6] Jun Zhang Electronic Dept. Tianjin University of Technology and Education(2009 IEEE )The Traffic-Flow Detection Based on Pseudo-Random Coded Radar
[7] J. Pawelec, K. Kosmowski and Z. Krawczyk (2007 IEEE journal) ICT Anticollision radar for road traffic
[8] Youwen Liu Department of Geographic Science Minjiang University Fuzhou, P.R.China(2010 IEEE Conference) Forecast Map Matching Model for Vehicle-borne Navigation Based on Roadway Characteristic.
[9] Hui Fang, Ming Yang, Ruqing Yang, and Chunxiang Wang(2009 IEEE conference) Ground-Texture-Based Localization for Intelligent Vehicles