# Smart Ambulance and smart traffic system for traffic management using ARM Processor

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## ABSTRACT

In recent years, spurred on by the growing aftermarket use of dash kits, many automakers have taken the initiative to add more stylistic elements to their dashboards. One prominent example of this is the Chevrolet Sonic which offers both exterior (e.g., a custom graphics package) and interior cosmetic upgrades. Manufacturers such as Honda, Toyota and Mercedes-Benz have included fuel economy gauges in some instrument clusters, showing fuel mileage in real time. The ammeter was the gauge of choice for monitoring the state of the charging system until the 1970s. Later it was replaced by the voltmeter. Today most family vehicles have warning lights instead of voltmeters or oil pressure gauges in their dashboard instrument clusters, though sports cars often have proper gauges for performance purposes and driver appeasement The instrument cluster contains traffic control system position, seat belt warning light, parking-brake engagement warning light and. There may also be indicators. Heating and ventilation controls and vents, lighting controls,. A glove compartment is commonly located on the passenger's side. There may also be an ashtray and a cigarette lighter which can provide a power outlet for other low-voltage appliances.

***Keywords:*** ARM-LPC2148, LCD Display, LED"S, Meters, buzzer, IEE 802.15.4 Standard, Ultrasonic sensor.

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## INTRODUCTION

This new technology, popularly called vehicle Tracking Systems which created many wonders in the security of the vehicle. This hardware is fitted on to the vehicle in such a manner that it is not visible to anyone who is inside or outside of the vehicle. Thus it is used as a covert unit which continuously or by any interrupt to the system, sends the location data to the monitoring unit. When the vehicle is stolen, the location data from tracking system can be used to find the location and can be informed to police for further action. Some Vehicle tracking System can even detect unauthorized movements of the vehicle and then alert the owner. This gives an edge over other pieces of technology for the same purpose. This accident alert system in it detects the accident and the location of the accident occurred and sends GPS coordinates to the specified mobile, computer etc. With the coming of the LED in consumer electronics, some manufacturers used instruments with digital readouts to make their cars appear more up to date, but this has faded from practice. Some cars use a head-up display to project the speed of the car onto the windscreen in imitation of fighter aircraft, but in a far less complex display.

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The ZigBee network layer natively supports both star and tree networks, and generic Mesh networking. Every network must have one coordinator device, tasked with its creation, the control of its parameters and basic maintenance. Within star networks, the coordinator must be the central node. Both trees and meshes allow the use of ZigBee routers to extend communication at the network level. ZigBee builds on the physical layer and media access control defined in IEEE standard 802.15.4 for lowrate.

The specification includes four additional key components: network layer, application layer, ZigBee device objects (ZDOs) and manufacturer-defined application objects which allow for customization and favor total integration. ZDOs are responsible for a number of tasks, including keeping Track of device roles, managing requests to join a network, as well as device discovery and security. The MAC sublayer is capable of single-hop reliable communications. As a rule, the security level it is to use is specified by the upper layers. The network layer manages routing, processing received messages and being capable of broadcasting requests. Outgoing frames will use the adequate link key according to the routing, if it is available; otherwise, the network key will be used to protect the payload from external devices.

## LITERATURE REVIEW

In Md. Abdus Samad Kamalet al[1] this paper presents a vehicle driving system in a model predictive control framework that effectively improves traffic flow. The vehicle driving system regulates safe intervehicle distance under the bounded driving torque condition by predicting the preceding traffic. It also focuses on alleviating the effect of breaking on the vehicles that follow, which helps jamming waves attenuate to in the traffic.It is observed that the system alleviates congestion-forming phenomena from the traffic and improves the traffic flow by only controlling a single vehicle. Since the smart vehicle significantly attenuates the jamming waves, the flow of vehicles in the following traffic becomes smooth, so need some string stability.

In Rubini.R, et al [2] proposed a system has an alerting,recording and reporting system for over speed violation management. The Zigbee transmitter sends the speed limitedof the particular lane entered by the vehicle and also givesalerts like "road works", "steep slopes", "school zone" inthe form of acoustical messages and also in LCD. Thereceiver unit placed in the vehicle receives the messagesand sends to the microcontroller. When speed of the vehiclenears the speed limit it displays the warning and if exceedsthe limit, the microcontroller records the violated speed andtime. The LCD displays the lane speed limit and shows thenumber of times, speed was violated. A GSM module sendsmessage to the nearest traffic personnel immediately after aviolation occurs. An authenticated device is also provided,which can be operated only by the traffic police in whom hecan retrieve the data stored at any time. Increase in thecount of violation increases the penalty amount which canbe collected in toll gates located nearby.

In F.Parvez Ahmed et al [3] this paper focus on unifying the Global Positioning system with embedded wireless system is the new approaches in intelligent vehicle control for critical remote location application using ARM. In conventional system they are designed to control the speed of vehicles in all days. The main objective of the proposed system is to operate the vehicle in safe speed at critical zones. The base station having the transmitter which is designed for Frequency Modulation (FM), the receiver part is implemented in Vehicle. The ARM processor is implemented at receiver side, which receives the critical frequency,and then it is activated in critical mode. Speed Control Driver (SCD) can be custom designed to fit into a vehicle"s dashboard, and displays information on the vehicle. Once the information is received, it automatically alerts the driver, to reduce the speed according to the time and zone. The novel system is implemented with the support of embedded processor and the simulation is achieved through Keil C software and results are discussed.

In Gummarekula Sattibabu [3] et al this paper describes the advancement in the processor technology and microcontrollers has opened a new system designed to prevent the accidents caused due to negligence of drivers in seeing traffic signals alongside the road and other anomalies on the roads. So to intimate the driver about the zones and to automatically maintain the speed is accomplished by means RF technology. The main objective is to design an Electronic Display controller meant for vehicle"s speed control and monitors the zones, which runs on an embedded system and can be custom designed to fit into a vehicle"s dashboard to display information on the vehicle. This system if adopted by some state can effectively reduce the number of road accidents caused by speeding vehicles losing control of the vehicle at speed breakers or by driver"s negligence towards traffic signals. This paper presents a new design to control the speed of the automobiles at remote places for fixed time.

In Sunil R. Kewate et al [5]Road accidents can be prevented by adopting measures such as Traffic management, improving quality of road infrastructure and safer vehicles. The existing techniques still doesn"t able to reduce the number of accidents. Hence there is a need to implement Intelligent Speed Adaptation (ISA) in which vehicles speed can be automatically controlled by various limit techniques which are based on zones, highway, traffic density etc. In this research work, it proposes automatic speed control system based on color strips for highway road and the roads where the speed control within limit is required. Many color sensors are able to detect more than one color for multiple color sorting applications. Depending on the sophistication of the sensor, it can be programmed to recognize only one color, or multiple color types or shades for sorting operations. The methodology explains that a various color strips are marked on highway road or the roads where the speed control within limit is required and vehicle will have a colorsensor attached which will recognize the color marked on the highway road and accordingly maintain the vehicles speed in that particular limit. In this developed system, the color detecting sensor of specific intensity is used to activate/deactivate the system of speed control within the color strips marked on the road. In actual practice, the system works that when vehicle enter in speed limiting roads like express–high way, high way and any other roads where the speed limit is required etc., the vehicle sensor detect the color to activate the system and send the signals to programmable ECU/MCU and the programmable ECU /MCU controls the position of throttle valve/fuel pump/motor which result in controlling the speed of engine at given limit. When the system activated then our vehicle is controlled at given limited speed or below that limiting speed and cannot exceed beyond that limit till the next color strip crossed. This reduces the road accidents and gets driving comfort for the driver, after implementation of this automatic speed control system.

## PROPOSED SYSTEM

Wireless communication is transfer the data between two or more points that are not connected by an electrical conductor. Wireless communication will play a major role in efficient vehicle control systems, different type of wireless communication method are given below that are vehicle to vehicle communication, vehicle to infrastructure communication, intravehicle communication For transmitting a data between the vehicle with the help of different protocol for controlling the data loss. In my proposed system provide the design of wireless instrument cluster; IEEE 802.15.4 standard is used for data transmission, Frames are the basic unit of data transport, of which there are four fundamental types (data, acknowledgment, beacon and MAC command frames), which provide a reasonable tradeoff between simplicity and robustness. Additionally, a superframe structure, defined by the coordinator, may be used, in which case two beacons act as its limits and provide synchronization to other devices as well as configuration information. A superframe consists of sixteen equal-length slots, which can be further divided into an active part and an inactive part, during which the coordinator may enter power saving mode, not needing to control its network. Within superframes contention occurs between their limits, and is resolved by CSMA/CA. Every transmission must end before the arrival of the second beacon.

**Block Diagram:**

The block diagram of the proposed system has two important units that are vehicle body unit, Instrument cluster unit these are the two units involve in the wireless communication. Instrument cluster unit has following block for speed indication:Zigbee unit: for transmitting the data between the pc and instrument cluster unit,Power supply: provide the power supply to the controller for process control,LCD Display: Display the transmitted data by the PC unit, Motors, Speedometer, RPM meter: speed variation shown in the meter.Personal Computer unit has following blocks:Zigbee unit: for transmitting the data from the vehicle body unit transmitting the data. The instrument cluster unit is a receiving unit , that the receiving unit arehas controller for process controlling, lcd display for display the receiving data from the transmitter, motors are running with the desire receiving data speed and the speedometer and odometer are used to provide the variation in the speed and RPM rate. The proposed system will provide the wireless instrument cluster .Each block of the instrument cluster unit are given below sections.As mentioned before, applications with well-defined bandwidth needs can use up to seven domains of one or more contention less guaranteed time slots, trailing at the end of the superframe.

**LPC2148 Controller:**

LPC 2148 microcontrollers are based on a 16-bit/32 bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combine the microcontroller with embedded high-speed flash memory ranging from 32 kb to 512 kb. A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at the maximum clock rate. For critical code size applications, the alternative 16-bit Thumb mode reduces code by more than 30 percentageswith minimal performance penalty.In- System Programming/In-Application Programming via on-chip boot Loader software. Single flash sector or full chip erase in 400 ms and programming of 256 B in 1 ms. Embedded Trace interfaces offer real-time debugging with the on-chip Real Monitor software and high-speed tracing of instruction execution.USB 2.0 Full-speed compliant device controller with 2 kb of endpoint RAM.

In addition, the LPC2148 provides 8 kb of on-chip Random Access Memory accessible to USB by Direct Memory Access.One or two 10-bit ADCs provide a total of 6/14Analog inputs, with conversion times as low as 2.44 ms per channel. Single 10-bit DAC provides variable analog output.Two 32-bit timers/external event counters (with four capture and four compareChannels each), Pulse Width Modulation unit (six outputs) and watchdog.Low power Real-Time Clock with the Independent power and 32 kHz clock input.The LPC 2148 incorporate a 32 kb, 64 kb, 128 kb, 256 kb and 512 kb flash memory system respectively. This memory may be used for both code and data storage. Programming of the flash memory may be accomplished in several ways. It may be programmed In System via the serial port. The application program may also erase and/or program the flash while the application is running, allowing a great degree of flexibility for data storage field firmware upgrades, etc. Due to the architectural solution chosen for an on-chip boot loader, flash memory available for user‟s code on LPC 2148 is 32 kb, 64 kb, 128 kb, 256 kb and 500 Interfacing Pulse Width Modulation with LPC2148 Generate a Pulse width modulation in LPC2148 Primer Board at a particular frequency. Pulse Width Modulation is a technique for getting analog results with digital means. Digital control is used to create a square wave, a signal switched between on and off. This on-off pattern can simulate voltages in between full on (5 Volts) and off (0 Volts) by changing the portion of the time the signal spends on versus the time that the signal spends off. The duration of "on time" is called the pulse width. To get varying analog values, you change, or modulate, that pulse width.

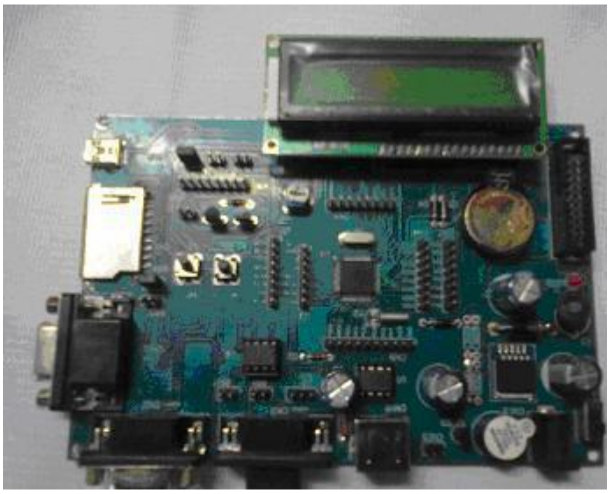

Figure 1: LPC 2148Board

## IMPLEMENTATION AND RESULT

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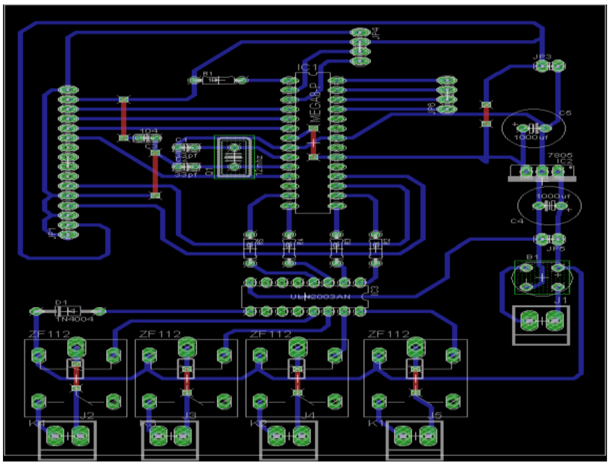

Figure 2: PCB Layout at Hospital/Traffic Light Side

**Description of the Project:** Above figure shows the Board layout at the receiver end which will log all the date recived and will display it on lcd the data which above module will receive is bing send from the vehicle unit which contains LPC2148 board and some patient monitoring sensors named as smart sensors mounted in the vehicle itself at remote end the data is being monitored and stored in the buffer of the microcontroller unit then it is being transmitted through RF module having frequency of 2.4 GHZ.

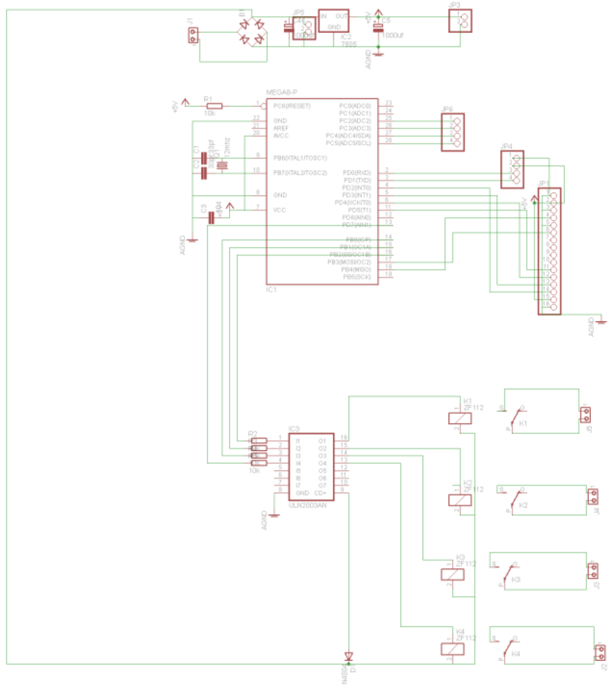

Figure 3: Schematic Layout at Hospital/Traffic Light Side

**Schematic Description:** Our receiver end which is also responsible for automation of traffic light system consist of various electronic components and ics like ATMEGA328,ULN2003,SPDT Relay,LCD,Rectifier,7805,Transformer and many more basic components. the overall working of the receiver end is loke it receives data from the remote end through rf receiver and then display on LCD.A Relay arrangement is also provided in to the circuit causing the smart traffic light control mechanism, which work like following steps given below:

**Step1:** Receive Data from the remote side.

**Step2:** Store the data in a variable and display the received data on LCD.

**Step3:** Monitor the condition of the switch pressed at the remote end.

**Step4:** There are 4 conditions given at remote side which is a kind of indicator.

**Step5:** The controller at the receiver end reads the data and initiates the traffic management system as per the direction from which vehicle is coming.

## CONCLUSION

This project explored the design of a prototype model for wireless driving controls of instrument cluster in a vehicle. Wireless communication is transfer the data between two or more points that are not connected by an electrical conductor. Wireless communication will play a major role in efficient vehicle control systems; this project explores the wireless communication between transmitter and receiver unit. The transmitter unit is personal computer build with c Programs written for „c‟ Framework execute in a software environment, receiver unit designed with controller unit with keil-c. This project has an advantageous nature of cutting down the present cost of the vehicle. It also helps in the reduction of the vehicle weight.

If this project idea is implemented in present vehicular system then the detection of mechanical problems in vehicles will also become easy. Since in present system if there is a problem with broken wire then it's considered somewhat difficult for the mechanic man to find the correct wire and fix.

## REFERENCES

[1]. Abdus Samad Kamal, Akira Ohata, Jun-ichi Imura, Kazuyuki Aihara and Tomohisa Hayakawa, (2014), „Smart Driving of a Vehicle Using Model PredictiveControl for Improving Traffic Flow‟ IEEE Transactions On Intelligent Transportation Systems, Vol. 15, No. 2, April.

[2]. M. Ames, C. U. Saraydar, T. Elbatt, and T. Talty, (2014) "Intravehicular wireless networks," IEEE Globecom, November, pp. 1–9.

[3]. BI Yuanguo, Xuemin (Sherman) Shen, Zhao Hai1 (2014), „Explicit Rate Based Transmission Control Scheme in Vehicle-to- Infrastructure Communication Networks‟IEEE/CIC ICCC2013 China Communications January 2014.

[4]. Eui Jung, Gahun Jung, Seong Kim, Sung Kim, Sungjoon Park(2010), „Effects of Design Factors of the Instrument Cluster Panel on Consumers‟ Affection‟ IMES 2010 March.

[5]. Govindaraju, Jagadeeshraja, Parvez Ahmed, Thulasi Ram, (2014), „Embedded Based Vehicle Speed Control System Using Wireless Technology‟ International Journal Of Innovative Research In Electrical, Electronics, Instrumentation And Control Engineering Volume 2, Issue 8, August.

[6]. Gummarekula Sattibabu, Satyanarayan Kona , (2014), „ Automatic Vehicle Speed Control With Wireless In-Vehicle Road Sign Delivery System Using ARM 7‟ International Journal Of Technology Enhancements And Emerging Engineering Research, Volume 2, Issue 8 ISSN 2347-4289.

[7]. Henk Nijmeijer, Jeroen Ploeg, Nathan van de Wouw, and Sinan oncu, (2014),‟ „Cooperative Adaptive Cruise Control: Network - Aware Analysis of String Stability‟ IEEE Transactions on Intelligent Transportation Systems, Vol. 15, No. 4, August.

[8]. S.V. Karmare , R. Kewate, Nehal Sayankar ,Sunil, and Siddharth Gavhale (2014) , „Automatic Speed Control System by the Color Sensor for Automobiles -An Innovative Model Based Approach‟ International Journal of Advanced Mechanical Engineering.ISSN 2250-3234 Volume 4, Number 2, pp. 223-230.

[9]. W. Levine and M. Athans, "On the optimal error regulation of a string of Moving vehicles," (2010) IEEE Transaction Automation Control, volume 11, no. 3, pp. 355– 361, July.

[10]. X. Liu, A. Goldsmith, S. S. Mahal, and J. K. Hedrick, "Effects of communication delay on string stability in vehicle platoons," (2010) IEEE. Intelligent Transport System, pp. 625–630.

[11]. N. Navet, Y. Song, F. Simonot-Lion, and C. Wilwert, (2010) "Trends in automotive communication systems," IEEE Transaction, volume 93, no. 6, pp. 1204–1223, June. D. Prashanth, K. Poornima Naga Jyothi, J. Vamsikrishna (2014), „An Intelligent Transport Navigation and Vehicle Speed Monitoring System Using Arm9"International Journal Of Engineering And Computer Science ISSN: 2319-7242 Volume 3 Issue 11 November.

[12]. A. Sangiovanni-Vincentelli and M. Di Natale, "Embedded system design for automotive applications," (2010) IEEE Transaction, volume 40, no. 10, pp. 42–51, Oct.