International Journal of Advance Research in Science and Engineering
Vol. No.4, Issue 07, July 2015
www.ijarse.com
IJARSE
ISSN 2319 - 8354

SELF-DRIVING ROAD TRAINS USING RF COMMUNICATION

N Sai Satya Kiran[1], B Santosh Kumar[2]

[1]Pursuing M.Tech ES, Visvesvaraya College of Engineering and Technology (VCET), M.P.Patelguda, Ibrahimpatnam, RangaReddy, Telangana, (India)

[2]Working as Assistant Professor & HOD, ECE Department,
Visvesvaraya College of Engineering and Technology (VCET), M.P.Patelguda, Ibrahimpatnam , RangaReddy, Telangana, (India)

ABSTRACT

This project gives information about the Self-Driving Road Trains system, in which the first vehicle with its own intelligence will control the remaining vehicles .To perform that operation we are going to use RF communication. So initially we have 3 vehicles, the first vehicle consists of RF-TX, RF-RX. The second and third vehicles consist of only RF RX.The first vehicle will consist of ultrasonic sensor to identify the obstacles, if there is an obstacle then automatically the vehicle is going to take the other direction. Accordingly sensors are placed to the remaining two vehicles to follow. If the first vehicle takes a turn the automatically a coded information will be transmitted to the remaining two vehicles that it has taken a turn. Then accordingly the remaining two vehicles will also take a turn. So automatically synchronization is maintained between all the three vehicles to maintain the flow.Another application is that when the user wants to disconnect any of the vehicles or wants to deselect any vehicle from the flow, then the user consists of remote control with RF TX. The user will send the information based on the vehicle number he wants to deselect from the flow. That information will be passed on to the first vehicle with RF RX, that first vehicle will pass that coded information to the respective vehicle, the user wants to deselect. If the second vehicle is deselected it takes left turn and will stop near the footpath. The third vehicle will occupy the position of the second vehicle. We can also monitor and control through zigbee module.

Keywords: ARM LPC2148 MicroController,AT89S52 Micro Controller, Zigbee,Motors, RF Modules, Ultra Sonic Sensor.

I. INTRODUCTION

Vehicle-to-Vehicle communication system will facilitate to extend safety and luxury "On The Road". As associate emergency happens anyplace at any location, at any time, and in varied ways that can create one in danger. These things need a speedy response, Safety and luxury. So, it's terribly crucial and necessary to ascertain direct, quick and economical code immediately. With the increasing range of population within the metropolitan areas already existing drawback of accidents occurring's attributable to driving congestion and luxury on road aspect has adult .This drawback needs to be properly analysed and also the acceptable measures need to be taken. usually rural and concrete square measures are void of the accidents attributable to driving effectiveness in vehicles. Recovery action ought to be taken instantly with none pause by exploitation vehicle-to-vehicle communication technology.

Conventional technologies use perception of the lead car's braking was measured on-road once subjects of assorted levels of driving expertise were watching a alphanumeric display settled at the lower a part of the screen, at the meter level, or within the mid-console. The brake lights of the lead automotive were either operating unremarkable or shifted. The results indicated that the detection of the lead car's brake lights, in daylight, is well impaired once a following driver is watching the meter space and brake lights don't contribute to detection the least bit once he/she is watching a target within the mid-console. Driving expertise failed to influence performance in detective work a closing headway in vision, in distinction to improvement in lane-keeping with lead vehicle. Such differential ability in exploitation vision for lane and distance-keeping could mislead experienced drivers after they follow another vehicle and perform sure in-car tasks.We have developed a system that is employed to produce clearance to any emergency vehicle, Comfort driving, preventive Safety driving on road aspect exploitation oftenness Transmitter and Receiver signals that's exploitation direct wireless communication will expeditiously warn and inform drivers via wireless inter-vehicle communication. The vary of a wireless transceiver extended from current line of sight to the radio vary of wireless transceiver. With multiple usages of RF Rx and Lone-Star State communication, every vehicle will enjoy the regionally detected knowledge from lead vehicle or main vehicle to following vehicles. Clearly sensing, distributive and retrieving data on the present following vehicle shows a possible for up transport potency and luxury on roads.

II. HARDWARE DESIGN

In this project using ultra sonic sensor, RF Transmitter, RF Receiver , Motor Driver hardware is designed.

2.1 Ultrasonic Sensor

Ultrasonic sensor is used in real time applications. By using ultrasonic sensor we are not only detecting the obstacle but also the range for different types to alerts. The basic principle of ultrasonic sensor is transmitting a high frequency of ultrasonic range which is above than 4 MHz frequency. After transmitting the signal sensor waits for the reflection signal of same frequency. Whenever Transmitted sound signal is interrupted with the obstacle an echo signal is reflected from object. We are having another sensor for detecting a received sound signal. Depending on the time taken for the reflection of the signal an echo signal is generated in electrical pulses. The generated pulse is directly proportional range of object. After receiving the signal we have to calculate the range. The calculated range is stored for the corresponding sensor. The figure represent the ultrasonic sensor which consists of 4 pins such as Vcc, Trigger ,Echo and GND By using Trigger and echo we used to control the sensor based on our application depending upon requirements.

Fig.1: Ultra Sonic Sensor

The trigger pulse is active high. Pulse must be given more than 10ms. After receiving the 10ms trigger pulse ultrasonic sensor generates 8 sonic burst signals and transmits them to air. If there is any object in front of the sensor sound signal is reflected. It does not depend on color of the object. If sound signal is interrupted with the

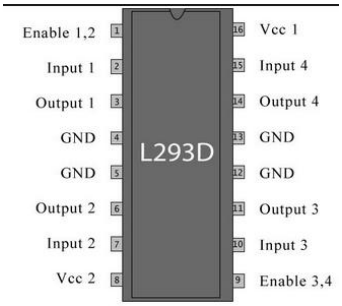
black surface there is a chance to observe the sound signal instead of reflection. Since our sensor output does not depends on how much sound signal is reflected but it depends on how much time it taken. So we don't have errors in calculation of range regarding the color of the object. But we have some kind of errors in the shape of the object. If the objects have round shape then it can effect calculation of range. In case of round objects less amount of sound signal received at sensors because reflected sound signal distributes in all direction not only in the direction of sensor. But at short ranges like less 4 m we can have accurate range values. Since we don't have any problems while detecting the range below 4 m we can use ultrasonic sensor in our project because 4 m is very long range than we require.

2.2 RF Module

Radio frequency (**RF**) is a frequency or rate of oscillation within the range of about 3 Hz to 300 GHz. This range corresponds to frequency of alternating current electrical signals used to produce and detect radio waves. Since most of this range is beyond the vibration rate that most mechanical systems can respond to, RF usually refers to oscillations in electrical circuits or electromagnetic radiation.

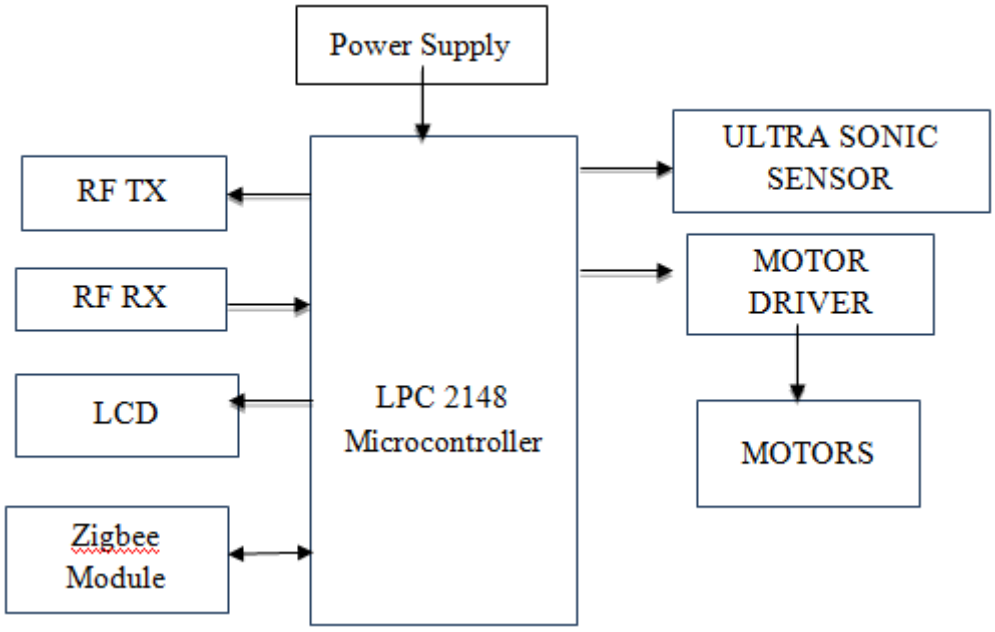
2.3 Motor Driver

The L293D motor driver are quadruple high-current half-H drivers. The L293D is meant to supply duplex drive currents of up to 1 A at voltages from four 5 V to thirty six Voltages. The L293D is meant to supply duplex drive currents of up to 600-mA at voltages from four. 5 V to thirty six V. each devices are designed to drive inductive masses like relays, solenoids, dc and bipolar stepping motors, likewise as alternative high current high-voltage masses in positive-supply applications.

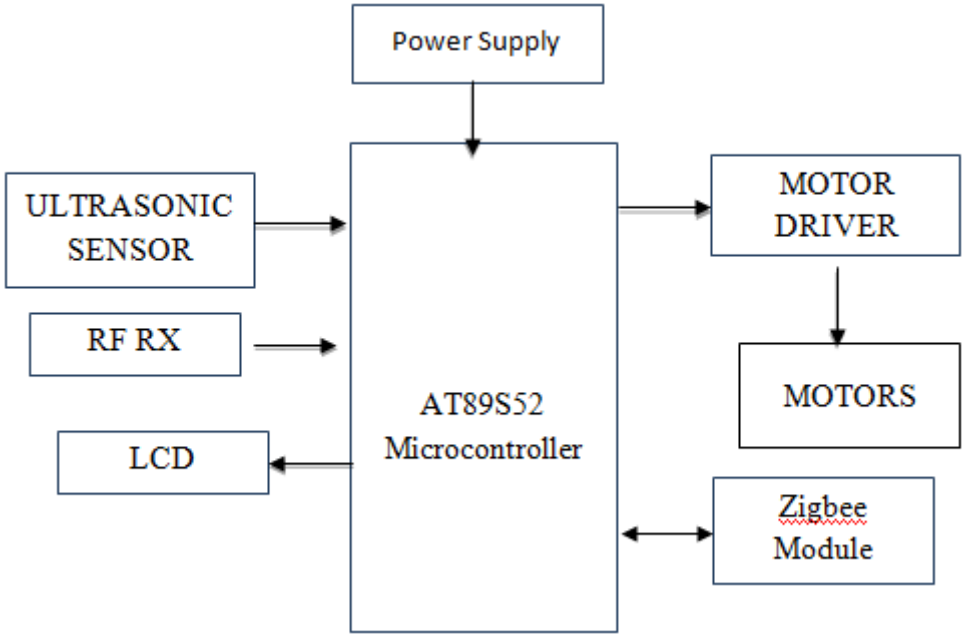


Transmitting section: The below shown sending diagramindicates the sending section or main section in this section ARM LPC2148 Micro controller interfaces with Ultra sonic sensor,RF Transmitter and RF Receiver,Motors.Here,the vehicle moves in a straight direction unless it detects any obstacles,when it detects the obstacles turns left side on road and moves straight direction and the relevant information is sends to second and third vehicles from RF Transmitter to RF Receiver Sections. Also it has RF Receiver Module to receive the data or signal from remote control,when it receives the signal from remote control immediately it send that information to second vehicle to move aside on road and stop.

2.4 Main Vehicle



Receiving Sections of Second and Third Vehicles: The below shown diagram indicates the receiver sectionof the transmitted knowledge by the main section vehicle i.e. whenever the signal is received from main vehicle to second and third vehicle of RF Receiver module, by the received instructions both vehicle moves in the directions of main vehicle .When second vehicle receives the RF signal from main vehicle to stop then immediately second vehicle turns left and stops.



III. SOFTWARE DESIGN

In this proposed system, as we used ARM LPC2148, AT89S52 Micro controller we need to use following software tools to program for it.

1. MDK Keil µVision 4
2. UC Flash
3. Flash Magic

The Keil µVision4 is an Integrated Development Environment for Embedded C language. In this IDE, we need to import the utilities and libraries according to the controller we are using. This IDE tool is very simpleto use and easy. This IDE consists of C/C++. Simply it simplifies the process of embedded simulation and testing tool along with Hex file generation.

The flash magic and UC flash are a programming utility and the C/C++ program codes are written in IDE areprocessed into the Hex filesformat .So, It is necessary to dump the hex files on to the microcontroller.

It would be tedious to have to set these options up every time the application is being built; therefore they are stored in a project file. Load the project files into KEIL and informs to KEIL for requirement of the source files where the files are and how to configure the tools in the correct way. The user of KEIL points on a projects and a project consist list of all the files required to build a only one application and all other tools option which are specify is exactly how to build the applications, and if required can view how the application simulation are done and this projects are used to save and maintain the required settings are made.

This project is reloads and starts the debugging process and all the required windows files are opened andthe KEIL projects has extension of the sourcefiles.

IV. RESULTS

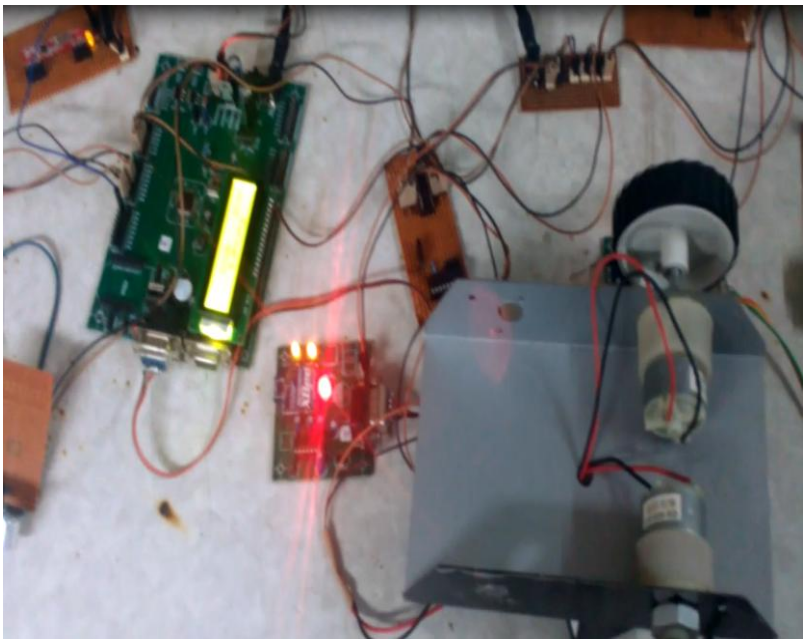


Fig 1: Vehicle to Vehicle Communication at Master Section

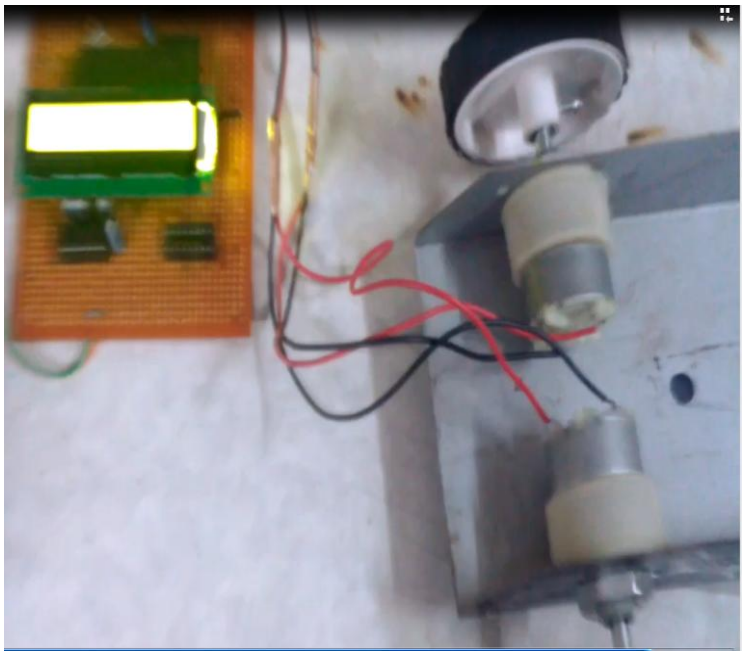


Fig 2: Vehicle to Vehicle Communication at Slave Section

V. CONCLUSION

After the code is programmed into the controller and powered up then the lead/main controller section starts moving forward whenever it detects obstacles from ultra-sonic sensor turns left , then quickly it transmits the information to second and third vehicle from RF Tx to RF Rx .After receiving the signal both vehicles moves in the directions of main vehicle ,Also for stopping the second vehicle on the foot path in that case by using RF Rx in main section it remotely controlled by RF Tx using buttons ,through this remote access sending information to main vehicle to stop the second vehicle on the road side, it is also displayed on the LCD regarding the category of the vehicles. Here we are developing a conventional system for the efficient usage of the vehicle-to-vehicle communication protocol for co-operative collision warning conditions.

REFERENCES

[1] GPS-based message broadcast for adaptive inter-vehicle communications,Min-Te Sun Dept. of Computer. & Inf. Sci.Wu-chi Feng , Lai, Ten-Hwang ,Yamada, K., Okada, H. ,Published in Vehicular Technology Conference, 2000. IEEE-VTS Fall VTC 2000. 52nd (Volume:6).

[2] Multichip R-ALOHA for intervehicle communications at millimeter waves Verdone, R. Published in Vehicular Technology, IEEE Transactions on (Volume:46 , Issue: 4).

[3] A frequency agile air-interface for inter-vehicle communication, Lott, M. Siemens AG, Halfmann, R. , Meincke, M. published in Telecommunications, 2003. ICT 2003. 10th International Conference on (Volume:1).

[4] Wireless LAN performance under varied stress conditions in vehicular traffic scenario. Singh, J.P. Dept. of Electr. Eng.,Bambos, N. ; Srinivasan, B. ; Clawin, D. published in Vehicular Technology Conference, 2002. Proceedings. VTC 2002-Fall. 2002 IEEE 56th (Volume:2).

[5] L. Briesemeister. Group Membership and Communication in Highly Mobile Ad Hoc Networks. PhD thesis, Technical University of Berlin, Germany, Nov 2001.

[6] M. Green. "How Long Does It Take to Stop?" Methodological Analysis of Driver Perception-Brake Times. Transportation Human Factors, 2(3): 195-216, 2000.

[7] H. Hartenstein, B. Bochow, A. Ebner, M. Lott, M. Radimirsch, and D. Vollmer. Position-Aware Ad Hoc Wireless Networks for Inter-Vehicle Communications: the Fleetnet Project. In Proc. ACM Mobihoc'01, 2001. .

[8] M. Lott, R. Halfmann, E. Schulz, and M. Radimirsch. Medium access and radio resource management for ad hoc networks based on UTRA TDD. In Proc. ACM Mobi-HOC'01, 2001.[9] J. P. Singh, N. Bambos, B. Srinivasan, and D. Clawin. Wireless LAN Performance under Varied Stress Conditions in Vehicular Traffic Scenarios. In IEEE VTC 2002 Fall, volume 2, pages 743-747, 2002.

[10] C. D. Wang and J. P. Thompson. Apparatus and method for motion detection and tracking of objects in a region for collision avoidance utilizing a real-time adaptive probabilistic neural network, 1997. US. Patent No. 5,613,039.

AUTHOR DETAILS

	**N SAI SATYA KIRAN**, Pursuing Mtech (ES) from Visvesvaraya College of Engineering and Technology (VCET), M.P.Patelguda, Ibrahimpatnam, RangaReddy, Telangana, INDIA.His area of interest includes embedded systems interrelated with different types of microcontrollers.
	**B.SANTHOSHKUMAR**,working as Assistant Professor & HOD (ECE Department) from Visvesvaraya College of Engineering and Technology (VCET), M.P.Patelguda,Ibrahimpatna m, RangaReddy. He is pursuing Ph.D in Wireless Communications .He has morethan nine years of Experience in Teaching Field