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Alert on Lane Switching for Smart Transportation Using Zigbee

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ABSTRACT: Indicators for signaling lane shift may cause accidents if the driver fails to notice it, especially when the brightness of the indicator is low. This demands for an effective solution, which could be achieved using V2V communication. In this novel method we have used Zigbee communication to alert the neighboring driver about the lane shift using steering angle.

KEYWORDS: Lane Shifting, V2V communication, Zigbee.

I.INTRODUCTION

Road Safety is an important area of concern for well-designed vehicular system. UC Berkeley study analyzed nearly 6,000 California collisions involving motorcycles in 2012 and 2013.17% percent of all accidents involved lane splitting .This calls for a novel method to alert the driver when the adjacent vehicle is going to shift the lane or the vehicle is in close encounter .Vehicle to Vehicle Communication also known as V2V communication , is that technology which comes to the rescue.V2V communication is a technology in which vehicles transfer data through wireless communication. Wireless communication may be Zigbee, Bluetoothetc. In this paper we have used V2Vcommunication, using Zigbee, where an alert is sent to the vehicle on lane shift of the adjacent vehicle. V2V communication is still fledgling and its application in developing smart vehicles would mean zenith in the field of automotive industry.

II. RELATED WORK

At present, the world's car manufacturers and research institutions are conducting some researches on lane change assistant system. Volvo, Ford, Audi carried out lane changing decision supporting system to detect vehicles lane switching and send alert to other nearby vehicles. ClaasRodemerk et al. used the relative movement between ego-vehicle and front vehicle in original lane as well as faster traffic flow in target lane to make an assessment on risk during lane changing. Godbole et al.and Shiller analyzed the obstacle avoidance problem. They considered the problem of collision between a moving vehicle and an existing static obstacle, such as a disabled vehicle or a large object. For avoiding the obstacle, two approaches were considered: stopping in the same lane, or performing a lane changing maneuver

In this approach, the lane changing system is based on V2V communication using Zigbee protocol and distance sensor. The car feature of steering angle is exploited and it is used to decide the minimum angle for lane switching by gyroscope which gives the tilting pitch angle. The warning signals is sent to all nearby vehicles within Zigbee network thus providing safe driving.

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III. PROPOSED METHODOLOGY AND DISCUSSION

The System Module consists of Vehicle 1 employed with Arduino UNO interfaced with Zigbee, Ultrasonic Sensor and Gyroscope. Vehicle 2 is employed with Arduino interfaced with Zigbee.

- When the Vehicles are within the range of distance sensor and close to each other, then an alert is sent to its Vehicle through a buzzer indicating danger.
- When the Vehicles are far apart –If Vehicle 1 wants to shift his lane and reaches the threshold gyroscope angle, then Zigbee is triggered and an alert is sent to Vehicle 2 indicating Vehicle 1 is switching lane.

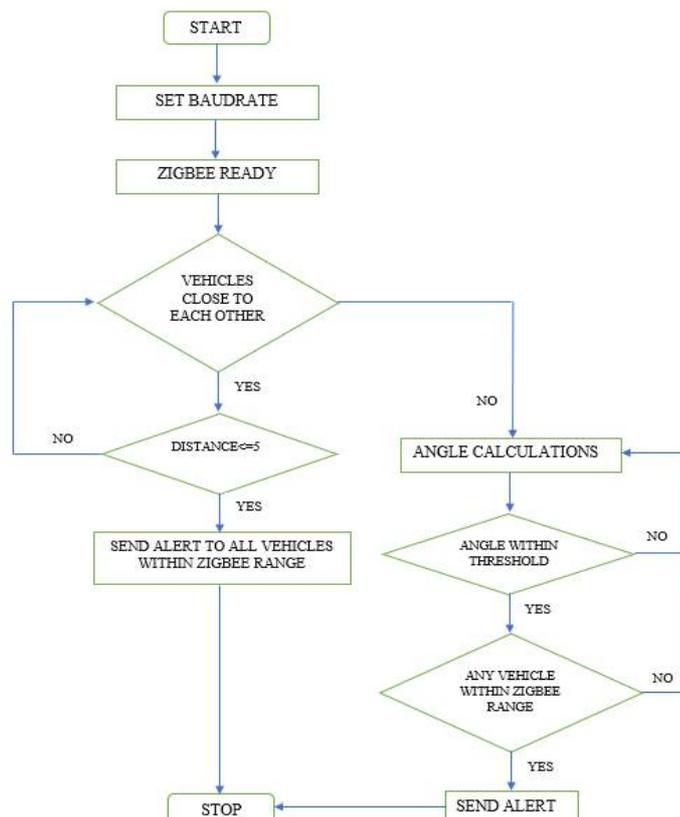


Fig 1: FlowChart

IV. PROBLEM STATEMENT

It's not safe for the vehicles to switch lanes on a highway which usually have vehicles travelling at higher speeds using manual indications like hand signals or by using the indicators provided in the vehicles as these may not be successful most of the times and thus leads to collision.

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V.SOLUTION

To the above stated problem, an effective solution can be got by making the vehicles to communicate amongst each other automatically. This is achieved by the using gyroscope whose tilting threshold indicating the lane switching, is sent as an automatic indication to other vehicles through ZigBee communication. Thus, avoiding collision.

VI. EXPERIMENTATION RESULTS

- Alert during lane switching in provide in two steps:
 - First, using a distance sensor to sense its distance from another vehicle
 - Second, through ZigBee protocol alerting all the vehicles in the range about lane switching.
- Every vehicle is equipped with a microcontroller, ZigBee module, distance sensor, gyroscope and actuators (like buzzer, LCD, audio module or LED).
- ZigBee modules are configured using XCTU software in such a way that, at a time only one module acts as a transmitter and the rest act as receiver.
- The purpose of using a distance sensor is to alert the vehicle through a buzzer about the safe distance that has to be maintained between two vehicles where ZigBee module is not necessary.
- Gyroscope measures the angle of tilt. We utilize this functionality of gyroscope to set a threshold angle for right and left turns of a vehicle.
- When the gyroscope which is placed on the staring attains the set range of angle for right or left turns, all the vehicles in the ZigBee range receives an alert message regarding the turns taken by the transmitting vehicle.
- This system prevents accidents due to human errors during lane switching and also more reliable.
- Why ZigBee? is because its range can be manipulated according to our requirement so that vehicles that are far away do not receive the message.

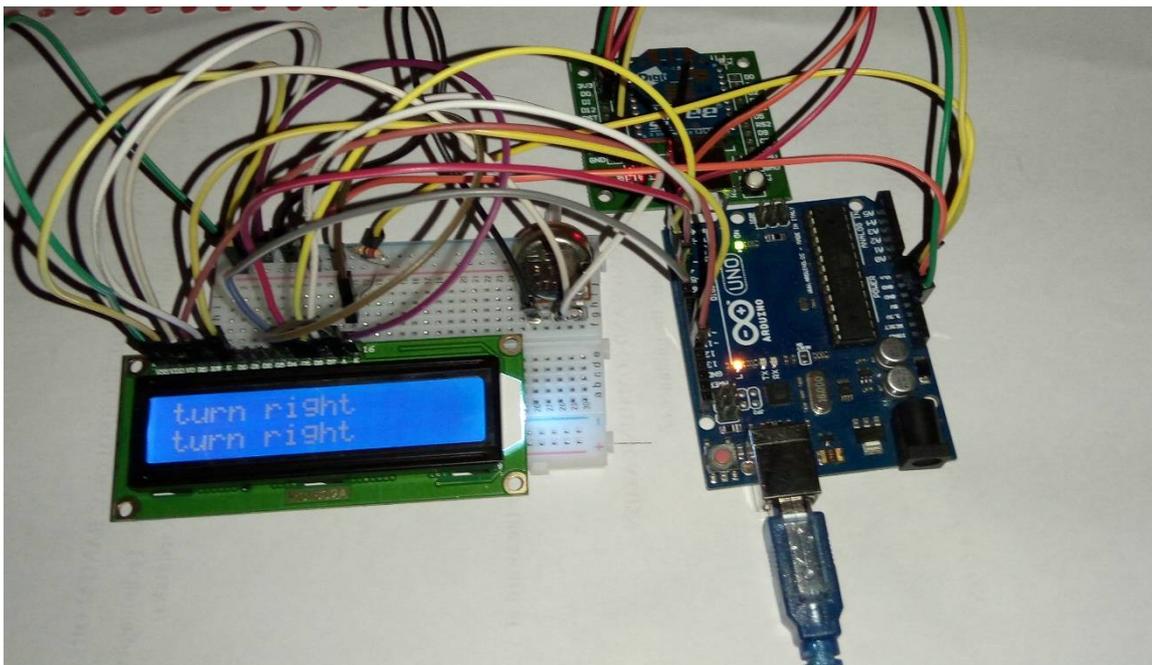


Fig 2.Alert displayed on LCD when the neighbouring vehicle shifts its lane towards right.

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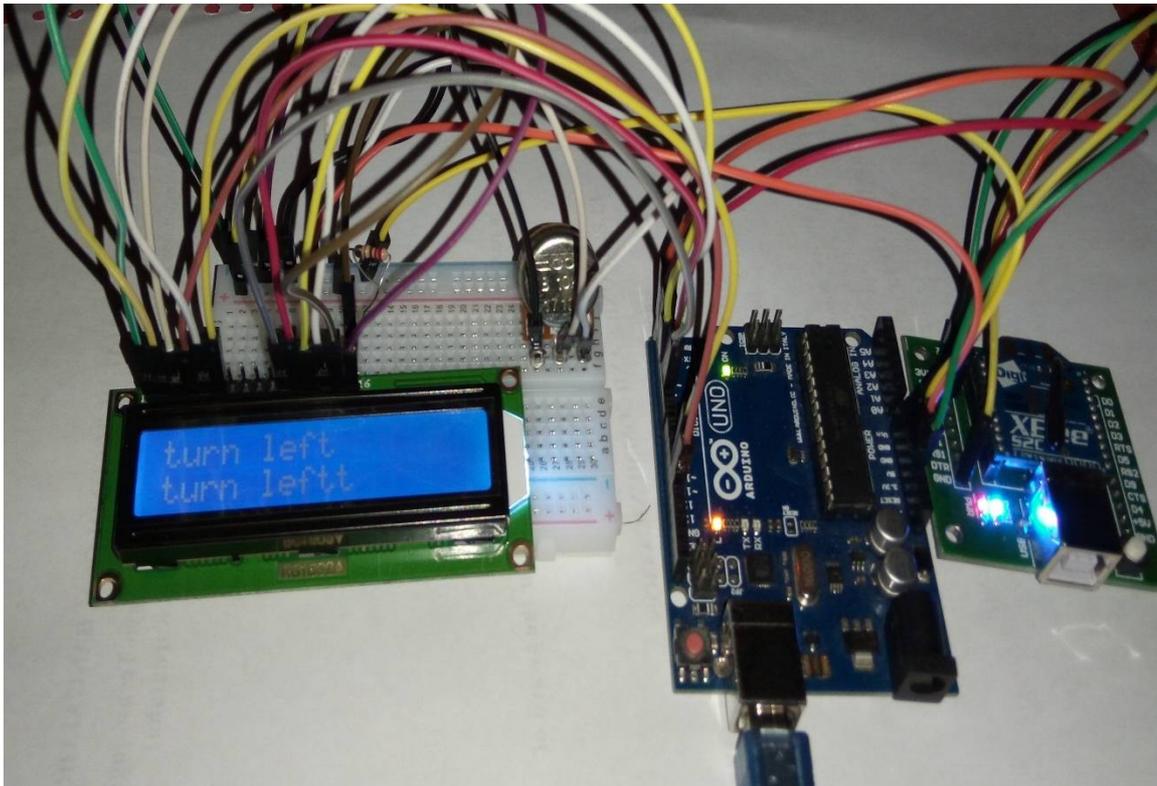


Fig 3.Alert displayed on LCD when the neighbouring vehicle shifts its lane towards left.

V. CONCLUSION

Alerts and warning using Vehicle-to-Vehicle (V2V) communication provides warning of collision, distance, abnormal movement in neighborhood, accident on road sharp curve, dangerous road surface. Assistance services like voice and instant messages can be provided. Alerting through Zigbee protocol is successful and instant. Gyroscope reading is accurate and constant. Accidents due to human errors could be overcome and can provide safe traveling assistance.

VI. ACKNOWLEDGEMENT

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REFERENCES

1. Rodemerck, C.; Habenicht, S.; Weitzel, A.; Winner, H.; Schmitt, T.. Development of a general minimality criterion for the risk estimation of driving situations and its application to a maneuver-based lane change assistance system. Intelligent Vehicles Symposium (IV), 2012 IEEE, pp.264-269.
2. Meng Lu, Kees Wevers, Rob Van Der Heijden. Technical Feasibility of Advanced Driver Assistance Systems (ADAS) for Road Traffic Safety. Transportation Planning and Technology, 2005, vol. 28, no.5, pp. 167-187.
- 3.Anand Santhosh Kumar, J. Mrudula, "Advanced Accident Avoidance System for Automobiles" in International Journal of Computer Trends and Technology (IJCTT), volume 6 no 2– Dec 2013.



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- 4.S.Ramesh, Ravi Ranjan, Ranjeet Mukherjee, Swarnali Chaudhuri, "Vehicle Collision Avoidance System Using Wireless Sensor Networks" in International Journal of Soft Computing and Engineering (IJSCE), Volume-2, Issue-5, November 2012.
5. Nesreen Alsbou, Nicholas Martinek, Brian Beckrest and Nathan Pax, "Vehicle Collision Avoidance System" ASEE North Central Section Conference, 2012.
6. Nesreen Section, Eric Biedenham and Donald Bartlett, "Vehicle Collision Avoidance Application" in American Society for Engineering Education, 2012.
- 7.S.SivajothiKavitha, M. Bharathi and S. Senthil Kumar, "PCS Based Vehicle Collision Avoidance and Communication System" in International Journal of Advanced Research inElectrical, Electronics and Instrumentation Engineering, Vol. 4, Issue 7, July 2015.
8. Md. Maminul Islam, Md. Rabiul Hasan, Imran Chowdhury and Md. TowhidChowdhury,"Internet of Car: Accident Sensing, Indication and Safety with Alert system" in American Journal of Engineering Research (AJER), Volume-02, Issue-10, pp-92-99.
- 9.Intelligent Traffic Control System For Emergency Vehicle Minal Patil#1, Abhishek Madankar #2, VivekPise #3
- 10.K. Mittal and D. Bhandari, "A novel approach to implement green wave system and detection of stolen vehicles," in Proc. IEEE 3rd Int. Adv. Comput., Feb.2013, pp. 1055–1059.
- 11.Chunyu Yang and Jie Zhou, "Design of intelligent traffic light controller using embedded system" 2nd conf. 2012, ICETET.
12. Anand Gupta, Sajal Chaudhary and Shachi Paul, "DTC:A Framework to Detect Traffic Congestion by miningversatile GPS data", 2013, ICETACS