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Accidence avoidance system for connected cars using Zigbee Communication Technology

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ABSTRACT

Every year, the number of traffic accidents in the world increase as the number of vehicles. These were caused by improper use of vehicles such as the location awareness of road users to obey traffic signs or a lack of tolerance or mutual respect fellow road users. Wireless communication between vehicles is expected to help reduce the number of accidents. In the near future the vehicle can be used as a means of communication and transportation. CoMoSeF is a method that use a sensor controller area network (CAN) BUS instilled in every vehicle where the sensor is functioning as communication between vehicles. This is considered as a new approach for car to car communication in VANET. The sensors connected to a mobile device that serves riders by giving information when there is a vehicle which may experience a collision with him. This study presents a simulation designed for inter-vehicle communication system using the system of 802.15.4. The results of this study are expected to provide benefits to the smart-city of transportation in reducing the accident rate.

KEYWORDS: Zigbee, car to car communication, VANET, controller area network, location awareness.

1. INTRODUCTION

Transportation can be divided into three parts, namely land, sea and air. In the development of current transportation, road transportation is the transportation of the most widely used by people. Ground transportation can be done on the highway or railroad. While the means used to using private vehicles, public transport and rail. The use of private vehicles, particularly in urban areas is the most widely used today. Location search technology has experienced a remarkable improvement in recent years. It is characterized by ever increasing internet users who use smart phones as a tool in the search for the location where the phenomenon bring indirect benefits to the transportation industry in Indonesia. In line with the needs of the community against the traditional mode of transportation in Indonesia, especially in Jakarta is very crucial.

Indonesian society is now highly dependent on the existence of the internet, including in search of information related to congestion and traffic accidents. Factors affecting traffic accidents are extremely diverse, ranging from driver factors, vehicle factors and environmental factors. Of these three factors, the biggest cause of the accident was due to human negligence. Today many vehicles that operate on the road sometimes are not followed by the awareness of road users to obey traffic signs or a lack of olerance mutual respect fellow road users. Indiscipline of road users certainly can endanger other road users. Much research has been done to solve these problems, one by utilizing existing sensors such as GPRS/3G and Wi-Fi. The wireless network itself is important in supporting the development of location awareness. Celtic-Plus is one company that stands in Germany and focuses on network capacity, optics, satellite, mobile, security, energy efficiency,5G, smart city, smart home, digital enterprise, E-health, big data, security, identity and public safety. Project Co-operative Mobility Services of the Future (CoMoSeF) is one of the projects being developed by Celtic-Plus. This project builds upon the incorporation of previous projects that Carlink -Wireless Traffic Service Platform for Linking Cars, WiSafeCar- Wireless Safety Network between Cars, where CoMoSeF built with the aim of increasing the safety, smoothness, and reduce the number of traffic accidents by defining the use of mobility in a more modern based on user requirements Road safety improvement is one of the objectives of the inter-vehicle communication using wireless networks and telecommunications. This is due to the fast growing number of road users which somehow support the occurrence of road accidents. Security devices on vehicles and road infrastructure can be developed to further improve road safety, but it is costly. More infrastructure build to support wireless communication between vehicles is expected to help in reducing the number of accidents in order to achieve the level of road safety and higher operating.

2. LITERATURE REVIEW

[1] "UAV-assisted supporting services connectivity in urban VANETs" Omar Sami Oubbati, Member, IEEE, NoureddineChaib, Senior Member, IEEE, AbderrahmaneLakas, Member, IEEE, Pascal Lorenz, Senior Member, IEEE, IEEE TRANSACTIONS ON VEHICULAR TECHNOLOGY, VOL. XX, NO. XX, XXX 2019.[1]
To keep the services and applications of Intelligent Transportation System (ITS) stable and active, Vehicular Ad hoc Networks (VANETs) are considered as an essential building block to maintain and manage its features. In this paper, an efficient routing solution based on a flooding technique is conceived to make the data delivery more reliable and to guarantee robust paths.

"On Detection of Sybil Attack in Large-Scale VANETs using Spider-Monkey Technique", C. O. Iwendi1, M. Uddin2, J.A. Ansere3, P. Nkurunziza3, J.H. Anajemba3, and A. K. Bashir 2169-3536 (c) july 2018 IEEE.[2] Sybil security threat in vehicular ad hoc networks (VANETs) has attracted much attention in recent times. The attacker introduces malicious nodes with multiple identities. As the roadside unit fails to synchronize its clock with legitimate vehicles, unintended vehicles are identified, and therefore erroneous messages will be sent to them. This paper proposes a novel biologically inspired spider-monkey time synchronization technique for large-scale VANETs to boost packet delivery time synchronization at minimized energy consumption. From Channel Selection to Strategy Selection: "Enhancing VANETs using Socially Inspired Foraging and Deference Strategies" Mohammad Abu Shattal, Member, IEEE, Anna Wisniewska, Student Member, IEEE, Bilal Khan, Member, IEEE, Ala Al-Fuqaha, Senior Member, IEEE, Kirk Dombrowski IEEE TRANSACTIONSON VEHICULAR TECHNOLOGY,JUNE 2018.[3]

Dynamic spectrum access (DSA) has been hailed as a possible panacea for the "spectrum crunch," drawing significant attention from researchers and industry alike. In our system, nodes continuously and independently choose one of three strategies for channel selection. Within our system, a specialized road side unit (RSU) continuously computes the game-theoretically optimal evolutionarily stable strategy and broadcasts this recommendation to all VANET nodes.

"A Novel Adaptive TDMA-Based MAC Protocol for VANETs" Shengbin Cao and Victor C. S. Lee, Member, IEEE IEEE COMMUNICATIONS LETTERS, VOL. 22, NO. 3, MARCH 2018.[4]The medium access control (MAC) protocol plays an important role in vehicular ad-hoc networks (VANETs) to provide efficient broadcast service for safety applications. In this letter, we propose a novel adaptive Time Division Multiple Access-based MAC (VAT- MAC) protocol for VANETs.
[2] CAOVA: "A Car Accident Ontology for VANETs" , Javier Barrachina, PiedadGarrido, Manuel Fogue, Juan- Carlos Cano, Carlos T. Calafate, Pietro Manzoni, 2012 IEEE Wireless Communications and Networking Conference.[5]

In a near future, vehicles will be provided with a variety of new sensors capable of gathering information from their surroundings. These vehicles will also be capable of sharing the harvested information via Vehicular Ad hoc NETworks (VANETs) with nearby vehicles, or with the emergency services in case of an accident. it is necessary to create a standard structure which enables data interoperability among all the different entities involved in transportation systems.

3. PROBLEM IDENTIFIED

This project is focused on the inter-vehicular communication (IVC). The main target of inter- vehicular communication is to increase devices on- board (like sensor ,GPS) and, to extend the boundary of the drivers. The cooperative assistance systems target on coordinating the vehicles in pivotal points like crossroads with no traffic lights. This project is based on long control which tries to accomplish the look-through competence of inter-vehicular communication to reduce accidents and platooning vehicles to increase the capacity of the road, while information and warning functions backs with actual-time alarm messages to avoid collisions. The target here is that the human driving the car in front of the accident then he/she can inform the person driving behind them about the accident by sending the information, which is repeated exactly the same the driver-pattern conduct of the leading car. This is called 'platooning' of vehicles. It does not only make a improved use of the roadway capacity, but it also saves power as the group become modernized.

4. PROPOSED SYSTEM

This system is useful to avoid the collision detection and avoid traffic on road. The wireless system to be formed by using microcontroller and zigbee protocol. Multiple sensor networks are used in system basically we use line follower robot .these two robots are connected by using zigbee protocol. Keys are use to move the path of robot. Ultrasonic sensor used to detect the obstacle in path. L293D is motor driver used to move the motors used in system.

5. WORKING OF PROPOSED SYSTEM

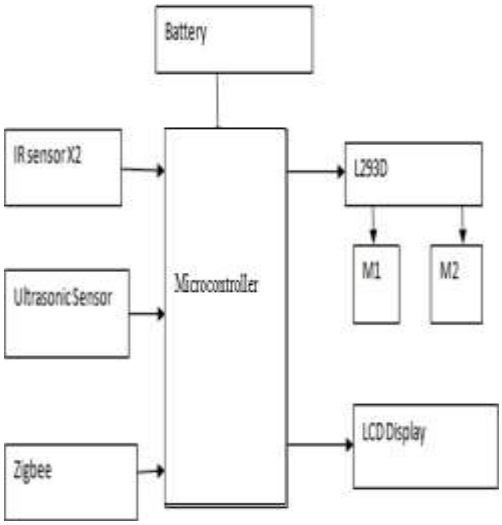

Fig. 1 Proposed Block Diagram

Can work on both 8bit and 4bit mode. Each character is build by a 5x8 pixel box.

5.1 ZIGBEE S2C

Fig. 2.Zigbee S2C

ZigBee S2C is a RF module designed for wireless communication or data exchange and it works on ZigBee mesh communication protocols. The module provides wireless connectivity to end-point devices in any ZigBee mesh networks including devices from other vendors. The transceiver is integrated with a highly configurable baseband modem. It provides extensive hardware support packet handling, data buffering, burst transmission, clear channel assessment and link quality.

- Specification : Supply Voltage – 2.1-3.6V Frequency – 2.4GHz Transmit Current – 33mA Receive Current – 28mA RF Data Rate – 250Kbps

5.2 LCD(16*2)

Fig. 3.LCD(16*2)

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of application. A 16*2 LCD display is very basic module and is very commonly used in various devices and circuits.

- Specification : Operating Voltage - 4.7V to 5.3V Current consumption – 1m

5.3 Motor Driver (L293D)

Motor driver ICs act as an interface between microprocessors in robots and the motors in the robot. The most commonly used motor driver ICs are from the L293D.

Specification:Voltage – Upto 14V Current – Upto 2A Type – Speed Controller Interface – Micro-controller such as Arduino

Fig. 4 Motor Driver(L293D)

5.4 Ultrasonic Sensor

This is the HC-SR04 ultrasonic ranging sensor. This economical sensor provide 2cm to 400cm of non-contact measurement functionality with a ranging accuracy.

Specification : Working Voltage – DC5V Working Current - 15mA Working Frequency – 40kHz

Fig. 5UltraSonic Sensor

6. RESULT AND DISCUSSION

In this project we have successfully built two vehicle model using zigbee. So whenever the accident occurs in front of the first vehicle , this first vehicle presses the button of accident and that message is passed to the vehicle approaching behinds him and that message is displayed on the lcd display of the other vehicle . And the second vehicle passes to the other vehicle. Through this we can help in reducing the traffic jam and the other vehicle can take their own call by changing their route.

Fig. 5(a)

Fig. 5(b)

Fig 5: Two Vehicle Model Using Zigbee

7. CONCLUSION

Cooperative Mobility Services of the Future - CoMoSeF. The implementation of CoMoSeF between vehicles are using wireless smart phones can help avoid accident by adding sensors; controller area network (CAN) BUS. In this study, the simulation was implemented using 802.11p system on a vehicle where the sensors worked well during the communication between vehicles. The sensor was connected to a mobile device that serves riders by giving information when there is a vehicle which may experience a collision with him.

8. REFERENCES

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