

Vehicle to Vehicle Safety Device - An Ease for Safe Driving

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Abstract: An electronic device used at the time of emergency while driving a vehicle. It has embedded the concept of wireless communication i.e. Zigbee and GSM. The overall structure is based on the AT89S52 microcontroller. The key role of DTMF has been implied by the help of which appropriate user can control the security options of vehicle if it is theft. Research content uses the technology of Zigbee for the transmission of message to the other vehicle in the time of need of their help as well as for serving the prospective of safe and sound driving the functions like drivers alcohol detection, vehicle speed slowing and automatic car lock with collision detection is used. The GPS is also being used here for finding the exact car location so that it can be found if lost.

Keywords: Accident, DTMF, GSM, GPS, Speed, Vehicle, Zigbee.

1. INTRODUCTION

The vehicle communication technology has gained the popularity in industrial field. By the use of V2P (vehicle to person) communication and V2V (vehicle to vehicle) communication they can be used for the purpose of serving safety and security. The vehicle communication is in existence due to the accidents caused because of human error or by lack of concentration on road while driving or by applying sudden brake on front vehicle on roads. Using vehicle-to-vehicle (V2V) communication, a vehicle can detect the position and movement of other vehicles up to a quarter of a kilometer away. In a real world where vehicles are equipped with a simple antenna, a computer chip and GPS (Global Positioning System) Technology, your car will know where the other vehicles are, additionally other vehicles will know where you are too whether it is in blind spots, stopped ahead on the highway but hidden from view, around a blind corner or blocked by other vehicles. The vehicles can anticipate and react to changing driving situations and then instantly warn the drivers with emergency warning messages. If the driver doesn't respond to the alerts message, the vehicle can bring itself to a safe stop, avoiding a collision. With the vehicle

Communication onboard the vehicle theft will reduce significantly because owner can reach the vehicle location simply through the help of vehicle communication.

2. LITERATURE SURVEY

There are lots of studies on vehicle to vehicle safety Dr.S.S.Riaz Ahamed proposed the role of

ZigBee technology [1] in future data communication system it provide longer life power usage with small batteries. Soyoung Hwang and

Donghui Yu implement Remote Monitoring and Controlling System Based on ZigBee Networks [2] this system targets the home networks then webservice and smartphones are used for the client system to monitor and controll the home. D. McKinlay propose Wireless Networking Through ZigBee Technology [3] it allow communication between devices to a central computer. Muhammad Ali Mazidi, Janice Gillispie Mazidi implement microprocessor based system design [4]. The 8051 microcontroller and embedded system use high performance microprocessors. Sengupta.R proposed automative wireless communication [5] gives drivers a sixth sense to know whats going on around then help to avoid accidents. Rens van der Heij de implement The Security Architectures in V2V and V2I Communication [6] to solve the current problems in securing communication between vehicles. Capkun.S and Luo.

.J proposed The security and privacy of smart vehicles [7] it evaluate context awareness in the smart vehicle reported of its neighborhood. Enkelmann,W., FleetNet implement The applications for inter-vehicle communication [8] to satisfy the vehicle drivers and passengers need for location dependent information and services. Sengupta.R proposed Vehicle-to-vehicle safety messaging in DSRC [9] develop the smart cars to improve the safety in the road. Miller and Nicastrì implement The next generation automotive electrical power system architecture [10] it provide less expenditure electrical power system with the help of AT89S52 .

3. TECHNOLOGY

3.1 ZigBee

ZigBee technology is standard wireless based technology designed for a specific needs for very low cost. It is very suitable for high level communication protocols. ZigBee is also known as WPAN (wireless personal area network). ZigBee can be used to set small communication network in an area. ZigBee is based on IEEE 802.15 standard technology. ZigBee is like Bluetooth technology whose area of communication is up to 20 meters with line of sight communication with low power consumption. ZigBee communication range can be increased up to 100 meters with high power consumption. ZigBee work on 2.4 GHz radio frequency to transport the reliable and easy to use standard across the world. ZigBee network use mesh network with 128 bit symmetric encryption keys.

The transfer rate of ZigBee is around 250 kbps which is very suitable for intermittent data transmission from input devices like sensor. ZigBee chip include radios and microcontroller that have 60 – 256 kb flash memory. ZigBee has integrated battery with battery life of at least 2 years with certification. The difference between other wireless technologies out there with ZigBee technology:-

The regular uses of ZigBee are stated below

- Home automation control system like smart lighting, temperature controller and security system.
- Home entertainment like music and movies.
 - Industry control system.
- Medical field for collecting data of patient.
- Smoke warning.
- Building automation

Table.1: Table comparing the aspects of Zigbee with others

Brand name	Wi-Fi IEEE 802.15.11b	Bluetooth	ZigBee IEEE 802.15.4
Battery life	Several hours	Several days	Several years
Maximum network capacity	32 nodes	7 nodes	64,000 nodes
Communication distance	100m	10m	>30m
Communication speed	11Mbps	1Mbps	250Kbps
Security method	SSID	64bit 128bit	32,64,12 8bit AES
Applications	Wireless LAN	Wireless speech	Remote control system



Fig.1: Zigbee Applications

There are three types of ZigBee are available out there in global market namely

- ZigBee coordinator(ZC): It is the root of the network tree and might bridge to other network.

- ZigBee router(ZR): ZR acts as intermediate router which supports in passing data from one router to the other its main purpose is to extend the communication range of network which it gives as acting relays. It can acts as ZED.
- ZigBee end devices(ZED): ZED needs very minimum recourse to operate and is cheaper than ZR or ZC. It works by talking to its parent nodes about the condition of network.

3.2 GPS

Global positioning system (GPS) is a network of satellites that transmit data, which can be used to identify precise location on earth by calculating the distance from twenty four satellites. The position of an object is accumulating by four or more satellites line of sight and in order to provide errorless location with the help of GPS satellites which moves around the earth twice a day. GPS are of two type 2D in which only three satellites are required to provide latitude and longitude and other is 3D, for which four or more satellites are require to provide attitude also.



Fig.2:GPS module

The GPS module are using in the research is EM-506 which has superior sensitivity and performance in even urban foliage environment. The GPS module provides the location to GSM which will further transmitted to the user through message.

The features of EM-506 follows below:-

- 48 channel receiver.
- Extremely sensitivity -163dBm.
- 2.5 meter position accuracy.

- Hot start in 1 second.
- 45.55mA at 4.5 – 6.5 volts.

4. FORMING A ZIGBEE NETWORK AND

ARCHITECTURE

The Co-ordinator is responsible for starting a ZigBee network. Network initialization involves the following steps:

1. Search for a Radio Channel- The Co-ordinator first searches for a suitable radio channel (usually the one which has least activity). This search can be limited to those channels that are known to be usable. For example, by avoiding frequencies in which it is known that a wireless LAN is operating.
2. Assign PAN ID- The Co-ordinator starts the network, assigning a PAN ID (Personal Area Network identifier) to the network. The PAN ID can be pre-determined, or can be obtained dynamically by detecting other networks operating in the same frequency channel and choosing a PAN ID that does not conflict with theirs. At this stage, the Co-ordinator also assigns a network (short) address to itself. Usually, this is the address 0x0000.
3. Start the Network- The Co-ordinator then finishes configuring itself and starts itself in Co-ordinator mode. It is then ready to respond to queries from other devices that wish to join the network.

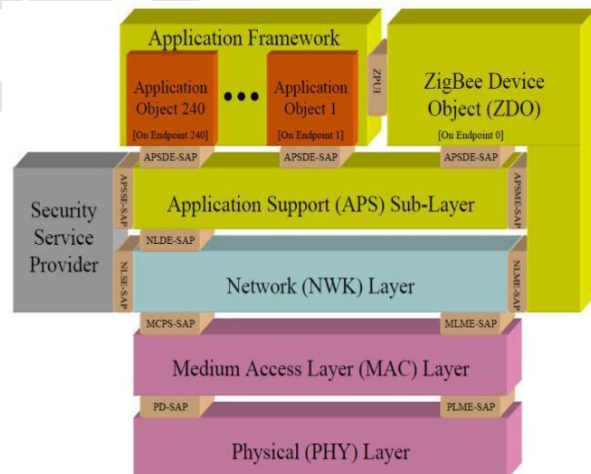


Fig.3: Layer Architecture of Zigbee

5. ALGORITHM

Consider the A user operated a vehicle with this device then it's based on three cycle given by

Step 1: Determine if input of device arrive from GSM, User or External Interrupt.

Step 2: Cycle 1: If input arrives from external interrupts which is combination of three external circuit output then it will perform the operation of interface external circuit which works and slow down the vehicle and turn on the buzzer which is connected to the same output.

Step 3: Cycle 2: If input arrives from GSM/DTMF decoder chip then it will determine that if vehicle is not in motion then will compute the output for additional GSM circuit which generate the location of vehicle else decrease the speed of vehicle and generate the output for GSM Location locater.

Step 4: Cycle 3: If input arrives manually by user then compute the output for GSM Module which give the location of vehicle at 108(ambulance) or 101(police).

Step 5: If no input arrives then again determine the input of device and go to Step 1.

6.APPLICATION

- . Security As the new path for vehicle is opened in field of communication, the security for itself and passenger has been increased. In case of vehicle lost or theft, one can simply send a message to it and ask for its location.
- B. Safety Accident alert to nearest help center, road condition warning etc come under the safety of passenger. The condition of overtaking accident can be overcome through the vehicle to vehicle communication. Warning of car failure can be transmitted throughout the wireless communication area so that the accident can be prevented.
- C. Future Advancement With the advancement in the vehicle to vehicle communication, the application can be increase in our daily life. Some of the advancement is use of radar or sonar sensor instead of pressure sensor. With the use of radar and sonar sensor, the vehicle

can act according to the situation, environment and landscape. The development is going in further advancements so that the vehicle can communicate to as many as possible at the same time.

7. CONCLUSION

Vehicle to Vehicle Safety Device is a device indulge with the recent technology and includes the methodology based on the combination of Zigbee, GSM and many other modules by the help of which immediate support can be provided to anyone in need of it. ZigBee has become one of the most promising technologies for home networks. ZigBee is a specification for a suite of networking, security and application software layers using small, low-power, low data rate communication technology based on IEEE 802.15.4 standard for personal area networks. This project is microcontroller based project. As a part of studying the analysis circuits and programs based on Micro vision 4 Keil, Hardware implementations are done using PCB layouts and EXPRESS PCB.

References

- [1] "The role of ZigBee technology in future data communication system" by Dr.S.S.Riaz Ahamed.
- [2] "Remote Monitoring and Controlling System Based on ZigBee Networks" by Soyoung Hwang and Donghui Yu
- [3] "Wireless Networking Through ZigBee Technology" ISSN: 2277 128X Step-uping ZigBee network communication
- [4] "The 8051 microcontroller and embedded system" by Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay ISBN-13:978-0131194021.
- [5] "V2V COMMUNICATION SURVEY - (WIRELESS TECHNOLOGY)" ISSN:2229-6093.
- [6] "Security Architectures in V2V and V2I Communication" by Rens van der Heijde

- [7]Hubaux, J.-P., Capkun, S. and Luo, J. The security and privacy of smart vehicles. IEEE Security and Privacy Magazine, 2 (3). 49–55.
- [8]Enkelmann, W., FleetNet - applications for inter-vehicle communication. in IEEE Intelligent Vehicles Symposium, (2003), 162–167.
- [9]Xu, Q., Mak, T., Ko, J. and Sengupta, R., Vehicle-to-vehicle safety messaging in DSRC. in Proceedings of the first ACM workshop on Vehicular ad hoc networks, (2004), ACM Press, 19–28.
- [10] Miller, J. M., & Nicastrì, P. R. (1998). The next generation automotive electrical power system architecture: Issues and challenges. Proceedings of the 17th digital avionics systems conference.

