MEPCO SCHLENK ENGG COLLEGE
SIVAKASI

VEHICLE MONITORING USING ZIGBEE

PRESENTED BY

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ABSTRACT:

Wireless technologies, enable one or more devices to communicate without the physical connections, without requiring network or peripheral cabling. In the current scenario, the world is plagued by accidents which are primarily due to human errors in judgment and hence thousands of lives are lost. These accidents can be avoided if only if there was a mechanism to alert the drivers of approaching danger.

This can be done by monitoring the distance between nearby cars and alerting the driver whenever the distance becomes too short. This is prime aim of our paper. In this paper, we propose the use of ZIGBEE Technology by which we can check the speed of the car whenever it comes dangerously close to any other vehicle up front, thereby saving many lives. ZigBee is one of the most potential standardized technologies for wireless sensor networks (WSNs).
INTRODUCTION

WHAT IS ZIGBEE?

ZIGBEE DEVICES

ROAD ACCIDENT STATISTICS

AUTOMATIC BRAKING SYSTEM

APPLICATIONS

CONCLUSION

REFERENCES
ZIGBEE devices are capable of communicating with eight other devices simultaneously. We can monitor and check the speeds of eight neighboring cars simultaneously, thus preventing accidents. Thus if we have two ZIGBEE enabled devices in two cars, the devices automatically communicate with each other when they come in the range of up to 100 meters. The range is dependent on the power class of the product. Power transmission rates vary in many ZIGBEE devices depending upon the power saving features available in a particular unit, bandwidth requirements, transmission distance. The statistics of road accidents is tremendous and highlights the need for such a system.
WHAT IS ZIGBEE ?

- Zigbee is the high level communication protocols using small, low-power digital radios for wireless personal area networks (WPAN).

- ZigBee is targeted at radio-frequency (RF) applications that require a low data rate, long battery life, and secure networking.

- Technological Standard Created for Control and Sensor Networks

ZIGBEE DEVICES:-

- **ZigBee coordinator (ZC):** The most capable device, the coordinator forms the root of the network tree and might bridge to other networks. It is able to store information about the network, including acting as the Trust Centre & repository for security keys.

- **ZigBee Router (ZR):** As well as running an application function a router can act as an intermediate router, passing data from other devices.

- **ZigBee End Device (ZED):** Contains just enough functionality to talk to the parent node (either the coordinator or a router); it cannot relay data from other devices.
### ROAD ACCIDENT STATISTICS

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<th>Total No. of Road Accidents (in numbers)</th>
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<th>Total number of Registered Motor Vehicles (in thousands)</th>
<th>No. of Accidents per ten thousand Vehicles</th>
<th>No. of Persons Killed per ten thousand Vehicles</th>
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OPERATION:

The ZIGBEE radio is a short distance, low power radio operating in the unlicensed spectrum of 2.4 GHz and using a nominal antenna power of 20 dB. The modulation used in ZIGBEE is Gaussian frequency shift keying, in which zeros are represented by low frequency and ones are represented by high frequency.

![Diagram showing data, carrier, and frequency shifted signal]

Radio communication is subjected to noise and interference, as the 2.4 GHz frequency is shared between all devices in piconet. The ZIGBEE specification has solved this problem by employing what is called as
spectrum spreading, in which the ZIGBEE radio hops among different frequencies very quickly. There are 79 hops starting at 2.402 GHz and stopping at 2.480 GHz, each of which is displaced by 1 MHz. The ZIGBEE avoids interference by hoping around these 79 frequencies 1600 times per second. So in order to avoid it we use ZIGBEE equipped car, in which each car have ZIGBEE transmitter and receiver. And every car should have mini computer to monitor the relative position of the car with the other car.

At the 10 dB level, the range is 100 meters, meaning the equipment must be within 100 meters to each other (about 328 feet) to communicate using the ZIGBEE standard. With the help of this technology, we can send data to seven devices(cars). The group of eight devices is known as Piconet. Figure 4 shows the screen of the computer inside our car. Our car will monitor seven other cars which are closest to us. Based on the distance the tabulation is plotted.
AUTOMATIC BRAKE SYSTEM:

- The automatic brake system is the next generation braking system for controlling the speed of the car. On receiving the control signal from the traveling car, the computer inside the car manipulates the signal and gives control signal to the braking system.

There are four main components of an automatic braking system:
- speed sensors
- Controller
- pump
- valves

The computer constantly monitors the distance between each of these cars and when it senses that the car is getting too close it moves the hydraulic valves to increase the pressure on the braking circuit, effectively increasing the braking force on the wheels. If the distance between two vehicles is within the 100m the ZIGBEE devices get enabled and if the distance come closer within 10m the automatic braking system takes the control. After the speed of the car is reduced, the hydraulic valves decreases the pressure on the braking circuit, thus effectively decrease the braking force on the wheels. The following steps show the various functions of the hydraulic valve:

- In position one, the valve is open; pressure from the master cylinder is passed right through to the brake.

- In position two, the valve blocks the line, isolating that brake from the master cylinder. This prevents the pressure from rising further and the driver’s effort in pushing the brake pedal harder.

- In position three, the valve releases some of the pressure from the brake.
• The processed signal from the computer is given to the electromagnet and it gets magnetised and moves the spring downwards, the other end of the spring is attached to the steel plate.

• The movement of steel plate is nothing but a force and it will add with the force applied by the driver. The signal is then given to the anti-lock braking system and it takes the control

APPLICATIONS :-

Home Entertainment and Control — Smart lighting, advanced temperature control, safety and security, movies and music

Home Awareness — Water sensors, power sensors, smoke and fire detectors, smart appliances and access sensors

Mobile Services — m-payment, m-monitoring and control, m-security and access control, m-healthcare and tele-assist

Commercial Building — Energy monitoring, HVAC, lighting, access control

Industrial Plant — Process control, asset management, environmental management, energy management, industrial device control
CONCLUSION :-

The ZIGBEE technology is being widely adopted by the Industry leaders. The possibility for new applications is very exciting with this versatile technology. It provides a simple logical answer to all the problem, which built a single common radio into every mobile computer. Then companies have to worry about neither WAN nor building external cables. The ZIGBEE communication device will thus be a small, low powered radio in a chip that will talk to other ZIGBEE enabled products. ZIGBEE has been designed to solve a number of connectivity problems experienced by the mobile workers & consumers. Thus, this technology is user friendly and helps address to various other problems like accidents.

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