**Vehicle navigation and obstacle detection system using ultrasonic sensors**

**Abstract**

This paper describes a system to improve indoor navigation through use of Ultra sonic sensor technology. The terminal unit is an embedded system equipped with an ultrasonic for localization, a mobile robot for navigation, and a combination of ultrasonic sensors for obstacle detection and avoidance during navigation. To increase accuracy of an indoor guidance system, a triangulation method is proposed to accurately detect the location. While the proposed method can be verified by many methods, the accuracy is demonstrated through use of a mobile robot. It navigates to a designated location through continuously monitoring localizing itself, and calculating the path to the destination.

**Existing System**

Global Navigation Satellite Systems (GNSS) include constellations of Earth-orbitingsatellites that broadcast their locations in space and time, of networks of ground control stations, and of receivers that calculate ground positions by trilateration. GNSS are used in all forms of transportation: space stations, aviation, maritime, rail, road and mass transit. Positioning, navigation and timing play a critical role in telecommunications, land surveying, law enforcement, emergency response, precision agriculture, mining, finance, scientific research and so on. They are used to control computer networks, air traffic, power rids and more. Thus the specific objectives of the implementation of the GNSS education curriculum are the demonstration and understanding of GNSS signals, codes, biases and practical applications, and the implications of prospective modernization. While Global Positioning System (GPS) is a widely accepted solution for outdoor operation, its accuracy is very limited when operating indoors due to limited satellite reception. Answering this challenge of indoor object localization and navigation would be of immense help for several applications such as navigational assistance for the blind, tour guide robots, inventory and asset tracking, healthcare, and defense.

**Proposed System**

Answering this challenge, our system presents the research, design, and implementation of an autonomous ultrasonic positioning robot .The ultrasonic positioning robot will provide an accurate indoor navigation algorithm to be implemented for a versatile of applications. This system can assist with navigation through buildings, showcase student work, and also serve as a platform for undergraduate student research and design projects. However, this requires heavy computation and extensive prior knowledge of the environment. The TOA method measures the time it takes for a signal to travel between source and receiver .As the signal might travel on the direct or shortest path, TOA has less impact from multi-path environments. However, accurate time synchronization between the source and receiver needed for accurate time measurement by the micro/nanosecond, thus increasing the hardware cost for accurate localization.

**Advantages**

1. Indoor navigation is possible.
2. Obstacle detection is very high.
3. Cost is less.

**Block Diagram**

Pic 16f877A

L293D

DC Motor

Ultra sonic sensor

LCD Display

**Hardware Specification**

1. Pic 16f877A
2. Ultrasonic sensor
3. L293D
4. DC Motor
5. LCD Display
6. Power Supply Component

**Software Specification**

1. MP Lab
2. Proteus