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Unidirectional Speaker to Eliminate Noise Pollution

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ABSTRACT- A loudspeaker that people only hear when directly in front of it. Used for marketing or instructional purposes when someone walks by, parametric speakers use ultrasonic frequencies, which are extremely directional but are beyond human hearing. Whereas a typical loudspeaker pushes air, parametric speakers generate an audible signal by modulating the air outside of the speaker cabinet, which confines itself to the narrow geography of the ultrasonic beam. The higher the ultrasonic frequencies used, the narrower the beam. Uses in Public Safety, Commercial Advertising, Security Alarm Systems.

I.INTRODUCTION

Unidirectional speakers work in an entirely different way from conventionalloudspeakers. The biggest difference is that they don't produce ordinary, audiblesound waves with a single, moving electromagnetic coil and cone. Instead, theygenerate ultrasound (high-frequency sound) waves that are too high pitched for ourears to hear using an array of electrical devices called piezoelectric transducers. Ultrasound is used because its higher-frequency waves have a correspondingly shorterwavelength and diffract (spread out) less as they travel, which means they staytogether in a beam for longer than ordinary sound would. Also, having an array ofmany, small transducers make sound diffract less than it would do from a single,large transducer. Most speakers are designed to throw sound as far and loud aspossible. Parametric speakers are more like a laser beam with the sound focused athigh intensity into a relatively small area. The result is that two people can bestanding only a few feet apart from each other yet only one of them will hear thedirectional audio waves emanating from the parametric audio source.

II. PROBLEM STATEMENT

Due to increase in population, there is increase in noise pollution also. And because of increase in noise pollution there are some negative effects on human health. And today's modern digital world audio/musicexperience is essential part of human civilization, but while experiencing the isolated music can cause several effects on multiple areas of human body like ear, brain, eyes and etc.

III. LITERATURE SURVEY

A.The Audio Spotlight in Electroacoustic Performance Spatialization by Darren Copeland
At the Toronto Electroacoustic Symposium in 2011, Darren Copeland demonstrated his research up to that date with the Holosonic Audio Spotlight directional loudspeaker. The following article, prepared for this issue of eContact!, provides a summary of his research with the Audio Spotlight up to the present date as how this company is providing best quality unidirectional speaker for personal and commercial usage.

B.Directional loudspeakers by Chris Woodford

Instead of pumping air out randomly over a wide area, directional speakers can target sound like a stage spotlight to a precise place where only certain people can hear it. Directional loudspeakers have all kinds of uses, from high-tech megaphones on naval warships to billboards that catch your ear as well as your eye.

C.An application of parametric speaker technology to bus-pedestrian collision warning By Alexander Burka,AlaricQin,Danirl D. Lee

The purpose of this research is to address the problem of frequent bus-pedestrian accidents in dense urban areas through the creation of an intelligent pedestrian warning system. Our proposed system uses visual detection and parametric speaker technologies to provide a concise, focused beam of sound that reaches only the detected target while minimizing the amount of disruption and disturbance to neighboring areas. We believe that this solution will provide a minimally invasive, cost-effective method for avoiding bus-pedestrian collisions and substantially reducing the loss of life and property. In this paper, we first present a review and analysis of the

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relevant technologies and current implementations. Then, we provide a detailed overview of the system that we have developed, and discuss our tests and data collected. Finally, we conclude with a brief discussion of future engineering and cost considerations for implementation of this system in a practical setting.

D.Parametric loudspeaker for speech signal based on the combination of amplitude and frequency modulationsBy Takanobu Nishiura,MasatoNakayama,DaisukeIkefuji

A parametric loudspeaker has been used for audio guidance to a specific area because it has a sharper directivity compared with the conventional electrodynamic loudspeakers. The parametric loudspeaker emits an ultrasound as a carrier wave, which is modulated with an audio signal and has large-amplitude.

IV.BLOCK DIAGRAM

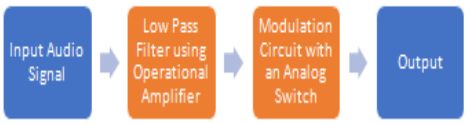

Fig.1 Block Diagram of Ultrasonic Transducer

E. Low Pass Filter using Operational Amplifier

Low pass filter from operational amplifier helps to get desired signal which is to be modulated according to selected cut-off frequency from the designed circuit.

F. Modulated Circuit with an analog switch

Modulated circuit is used to superimpose low-frequency input signal onto a high-frequency carrier signal.

G. Output.

Ultrasonic Transducer in parallel connection is used to get desired output signal.

V. WORKING

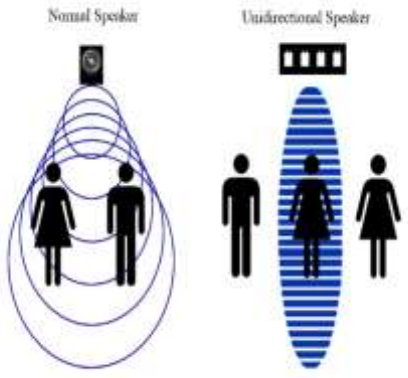

Fig.2 Difference between Normal and Unidirectional Speaker.

H. Difference between Normal and Unidirectional Speaker

Unidirectional speakers work in an entirely different way from conventional loudspeakers.

The biggest difference is that they don't produce ordinary, audible sound waves with a single, moving electromagnetic coil and cone. Instead, they generate ultrasound (high-frequency sound) waves that are too high pitched for our ears to hear using an array of electrical devices called piezoelectric transducers. Ultrasound is used because its higher-frequency waves have a correspondingly shorter wavelength and diffract (spread out) less as they travel, which means they stay together in a beam for longer than ordinary sound would. Also, having an array of many, small transducers make sound diffract less than it would do from a single, large transducer.

VI. ADVANTAGES

-Directional sound for specific displays - and quiet elsewhere.
-Several directional audio soundtracks in one room - without disturbing others or interfering with one another.
-Attract and excite shoppers with directional sound, without adding noise.
-Maintain peace and quiet, while still providing sound.
-Target specific display areas or audiences with directional sound.
-Use focused sound to avoid filling entire store with unpleasant noise.
-Audio Spotlight provide private listening for every patient.
-Eliminate messy, dangerous headphones.

-Directional sound spares the hospital staff from being subjected to noise.
-Assisted directional sound listening for the hard of hearing.
-Bedtime TV viewing without disturbing partner.
-Eliminate sound bleed and jumbled noise in open command center layouts.
-Focused, headphones-free sound for each specific recipient.

REFERENCE

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