**AUDIO SPOTLIGHTING**

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**ABSTRACT**

Audio spotlighting is a very recent technology that creates focused beams of sound similar to light beams coming out of a flashlight. By shining a sound to one location, specific listeners can be targeted with sound without others nearby hearing it that is to focus sound into a coherent and highly directional beam. It uses a combination of non-linear acoustic and mathematics. But this is real and is fine to knock the socks of any conventional loud speaker. The proposed work can be implemented in two phases.

**( Phase I : in Expert Support with NEST Technologies.)**

**LIFI transmission of AUDIO**

The proposed work concentrates on developing a model which uses Visible Light Communication (VLC) to transfer Audio signals under various interference conditions. The proposed model will work based on the concept of Light Fidelity, which is commonly called as Li-Fi

**Phase II Beam forming using Ultrasonics (in Expert Support with( NPOL)**

In this phase the major aim is to develop an acoustic beam-former; i.e. to exploit the properties of ultrasonic wavelengths to create a tight beam of ultrasonic sound into which an audio signal has been appropriately modulated. This will involve simulation, experimentation, circuit design, testing and measurement. Simulation of beam forming would be carried out in MATLAB

**INTRODUCTION**

**LIFI**

LIFI is the process of transmitting sound through light. The sound signal is our message signal and we use it to modulate the high frequency LED light wave. This helps in directed transmission of sound.

In this present scenario, we use a lot of LED bulbs for lighting our homes and other indoor areas.

The audio input is converted to electric and is given to the modulator IC which modulates the light wave using this message input. So when we switch on that particular LED light, the message signal gets transmitted.

We will be able to receive that audio only if we are in the region under the illumination of that LED. But to restrict the received sound we need to use headphones.

**BLOCK DIAGRAM OF LI-FI**

**Literature Survey**

This technology was originally developed by the US Navy and Soviet Navy for underwater sonar in the mid 1960s. The researchers had not attempted to reproduce audio, also they nonetheless proved that such a device can be possible.

The technology was briefly investigated by Japanese researchers in the early 1980s, but these efforts were abandoned due to extremely poor sound quality (high distortion) and substantial system cost. These problems went unsolved until a paper published by Dr. F. Joseph Pompei of the Massachusetts Institute of Technology in 1998 fully described a working device that reduced audible distortion essentially to that of traditional speakers.

The Audio Spotlight system uses nonlinearly propagating ultrasound to create highly directional beams of sound in mid-air, which can be "shone" and "directed" much like light. Dr. Pompei was the first in the world to develop the mathematics and advanced engineering that allowed sound to be created literally from thin air with sound quality and reliability rivaling traditional loudspeakers. He presented his first paper and demonstration in 1998 to the Audio Engineering Society, and was met with a standing ovation from the world's top audio professionals

The Audio Spotlight sound system, developed and manufactured by Holosonics, is currently used around the world for museums, tradeshows, retail displays, exhibitions, and special effects, and will soon be available for consumer applications. Companies such as Motorola, Time-Warner, DaimlerChrysler, Kraft Foods, Sega, and American Greetings have chosen the Audio Spotlight, and Audio Spotlight systems have been installed in venues such as Boston's Museum of Science, the Matisse Museum, Sega's Joypolis, Bibliotheque National de France, Boston Center for the Arts, the European PGA tour, and the Chicago Cultural Center.

Dirk Olszewski, Fransiskus Prasetyo, Klaus Linhard proposed an idea of steering audible sound beams generated by parametric arrays in air. So-called parametric arrays can be used in air to generate audible sound with high directivity, so that sound can be projected onto a target similar to a light beam emitted from a spotlight. The ultrasound wave is used as a carrier which is modulated by an audio signal, say music or speech. The nonlinearity of air acts as a demodulation device. The air itself then acts as a virtual loudspeaker since it demodulates the emitted sound waves.

To steer the sound beam into a desired direction, a phased array technique is used: ultrasound emitters are arranged in four sub arrays representing four different channels. The paper focus to create a hybrid system for steering an audible sound beam has been built. The paper also shows clearly that steering of audio beams generated by parametric arrays can be done by applying phased array technique. Although emitters have been used that are not matching criterions for phased array purposes from the first sight, the hybrid approach still delivers an appropriate beam steering performance.