



CALIFORNIA STATE SCIENCE FAIR 2004 PROJECT SUMMARY

Name(s) Matthew L. Ward	Project Number S1523
Project Title The Focalization of Sound	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Scientists have been able to focus sound waves by transmitting an ultrasonic wave in a straight line that can give off audible sound in its path. The only disadvantage to this is the high cost. This project was designed to develop a low-cost process of focusing sound using a parabolic dish and sound-absorbent material.</p> <p>Methods/Materials The project began with the building of a sound box to test different materials in. The box (20.75 in. x 15 in. x 16 in.), made of particleboard, had one open end and served as a confined space to test the sound characteristics in. A speaker was suspended in a cradle and was capable of moving inward and outward 1 in. A constant sound frequency was transmitted at a level of 105 dB through the speaker. The project consisted of 3 small tests and 1 final test. The 1st test was to determine if the material of the parabolic dish affected its sound focusing capabilities. Measurements were taken from many locations around each parabolic dish (inside the box) using a decibel meter. The 2nd test determined if the position of the speaker affected how sound was focused. Measurements were taken with the decibel meter at many different locations to determine if the speaker directed sound best from 2, 3, or 4 in. from the back of each dish. The 3rd test was to determine whether sheet rock, styrofoam, or fiberglass insulation absorbed the most sound. These materials were cut to line the walls of the sound box. For each material, sound measurements were taken 1 ft. from the outside of the box. The final test combined the results of the previous 3 tests to determine if it is possible to focus sound.</p> <p>Results The 1st test indicated that the glass dish was the most capable of focusing sound. The 2nd test yielded that sound waves were more focused when the speaker was placed 2 in. from the rear of the dish. The 3rd test showed that fiberglass insulation was the most capable of absorbing sound. Thus, the final test consisted of a measuring of the sound with the speaker 2 in. from the back of the glass dish that was situated inside the fiberglass insulation-coated walls of the box. The sound was able to be focused 3-5 ft. in front of the dish, while the spread of sound was limited in other directions.</p> <p>Conclusions/Discussion The data collected supported the hypothesis that sound could be focused using a parabolic dish and sound-absorbent material. Also, this process of focusing sound is very cost-effective.</p>	
Summary Statement My project utilizes a parabolic dish and sound-absorbent material to focus sound, generated from a speaker, in a certain direction without the spread of audible sound waves in all directions.	
Help Received	