



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Austin Ha; Alan Yoon	Project Number S1807
Project Title Waves of Sound to Wash Out the Flames	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this experiment was to find what frequency of sound best extinguishes fire at two different volume levels of -15 dB and 6 dB, both at 25% speaker output from a subwoofer. Our hypothesis was that a frequency of 20 Hz would best extinguish a small, half inch flame from a distance of six inches away from the subwoofer. Accordingly, higher frequencies would not be as effective. Also, the louder volume will be more effective than the quieter volume.</p> <p>Methods/Materials 165 candles were used in this experiment. One candle at a time was lit and placed six inches away from the center of the subwoofer. The subwoofer played a single frequency, which was set by the laptop on Logic Pro, for three seconds at -15 dB. Using the video camera, the point at which the flame was deflected the furthest was recorded. Then, the frequency was replayed at 6 dB and the process repeated. This process was repeated for each frequency from 20 Hz to 120 Hz in intervals of 10 Hz.</p> <p>Results In the resulting averages, the frequencies around the middle of the tested spectrum (around 90 Hz) were the most effective. The general effectiveness of the sound exponentially decreased around the low and high range of frequencies tested. All frequencies performed better at the higher volume.</p> <p>Conclusions/Discussion The main hypothesis was that lower frequencies and higher volumes would be able to extinguish flames more effectively than higher frequencies and lower volumes. The middle frequencies performed the best, refuting part of the hypothesis, but the higher volumes were more effective than lower volumes, supporting part of the hypothesis. Our experiment presents an alternative method of fire-extinguishing that can be used especially in micro-gravity situations where water and chemicals would not effectively douse flames.</p>	
Summary Statement This project tests the ability of different frequencies of sound from a subwoofer to extinguish a fire.	
Help Received Mr. Yoon helped finalize the project name; Mrs. Ha provided tape and food during work.	