



**CALIFORNIA STATE SCIENCE FAIR  
2017 PROJECT SUMMARY**

<b>Name(s)</b> <b>Lauren Ribancos; Nathan Ribancos</b>	<b>Project Number</b> <b>S0317</b>
<b>Project Title</b> <b>Can You Hear It Now? The Comparison Between Dynamic Driver and Bone Conduction Headphones</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective of the project was to differentiate the operation and sound quality of bone conduction and dynamic driver headphones.</p> <p><b>Methods/Materials</b> The following materials were from Adafruit Industries: MAX9806 Class D 3.7w Stereo Amplifier, 8 ohm 1 Watt Bone Conduction transducers, 3.7w 150 man Li-Ion battery. The following materials are from Apple Inc.: audio source, dynamic driver earbud headphones. The materials from Adafruit Industries were used to construct bone conduction headphones, which were compared, in operation, to the dynamic driver earbud headphones from Apple. To test the operation of both headphones, 75 subjects were brought in to listen to each headphones type and answer a survey based on the experience.</p> <p><b>Results</b> After the surveys were collected, the responses were translated onto a statistical graph that represented the results. The bone conduction headphones, according to the data collected from the surveys, had a significant amount of distortion, ambient sound leakage, and lacked frequency responses when compared to the dynamic driver headphones. The dynamic driver headphones were unable to cope with higher frequencies and blocked out more ambient noises.</p> <p><b>Conclusions/Discussion</b> The data received from the surveys did not support the hypothesis. Despite producing stimuli, the bone conduction headphones could not produce "quality" sound compared to the dynamic drivers. It may also be more difficult to hear audio through the bone conduction headphones since the conductors do not directly stimulate the eardrum, since the eardrum is not involved at all. In the end, bone conduction headphones are a less harmful alternative, can help the hearing impaired, and has the capability to prevent hearing loss more so than dynamic driver headphones, but has yet to offer the sound quality the general public is used to.</p>	
<b>Summary Statement</b> We have found that bone conduction headphones cannot match the sound quality of dynamic driver headphones.	
<b>Help Received</b> The construction of the bone conduction headphones and experiment was designed by us, but our anatomy and biology teacher explained the operation of the ear and provided resources for it.	