



**CALIFORNIA STATE SCIENCE FAIR  
2013 PROJECT SUMMARY**

<b>Name(s)</b> <b>Isaac Y. Kim</b>	<b>Project Number</b> <b>J2010</b>
<b>Project Title</b> <b>Stop and Listen: How to Prevent Hearing Damage While Listening to Popular Music on Your Smartphone</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Data showed one in five adolescents in United States have some form of hearing damage. A previous research showed that listening to personal music players at more than one hour per day each week at 85 decibel (dB) or more for at least 5 years can lead to permanent hearing damage. The objective of this project was, in order to avoid hearing damage using earphones, determine safe volume settings for two most popular smartphones while listening to top 10 songs of 2012.</p> <p><b>Methods/Materials</b> Using a digital sound level meter, measurements were taken over 180 second period to determine average sound level and a maximum sound level while playing 10 songs using Apple iPhone 5 and Samsung Galaxy S III with manufacturer supplied earphones at various volume settings.</p> <p><b>Results</b> At 100% of maximum volume setting for both smartphones, not only all 10 songs' average sound levels were above 85 db, but majority of them were above 100 db, which is not only a sound of jackhammer at 1 meter, but also 64-fold above what is already considered dangerous at 85 db. At 75% of maximum volume setting for iPhone 5 and at 80% for Galaxy S III, average sound level for 7 out of 10 songs for iPhone 5 and 10 out of 10 songs for Galaxy S III were above 85 db. None of the songs' average sound levels were above 85 dB at around 50% of maximum volume setting.</p> <p><b>Conclusions/Discussion</b> To avoid hearing damage using earphones, one should never set volume level above 75% of maximum volume of the smartphones. Listening to songs at or below 50% of maximum volume setting is safe. Listening to music above 85 dB is not a mere personal choice, but a health hazard. Without conscious effort by adolescents and adults to control volume of the music, more adolescents are likely to suffer hearing damage in the future.</p>	
<b>Summary Statement</b> To prevent hearing damage using earphones, determine safe volume settings for two most popular smartphones while listening to top 10 songs of 2012.	
<b>Help Received</b> Father helped supplying the materials and designing of the board. Actual research done by the student.	