



# CALIFORNIA STATE SCIENCE FAIR 2008 PROJECT SUMMARY

<b>Name(s)</b> Shaleena Jeeawoody	<b>Project Number</b> <b>J1307</b>
<b>Project Title</b> <b>Voice Analysis and Recognition as a Car Theft Deterrent</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> According to the National Insurance Crime Bureau, a car is stolen every 26 seconds in the United States. In this project, I wanted to find out whether I could develop a more efficient car security system using the technology voice recognition. The function of this voice recognition car security system is to unlock only when it recognizes a password spoken by the password holder.</p> <p><b>Methods/Materials</b> In my project, I used a mathematical technique, the Fourier Transform. The Fourier Transform breaks down time signals into frequencies, which can then be analyzed. The code I have written in Matlab converts the word spoken in the microphone from the time domain into frequency, overlaps the frequency spectra of the same word spoken by two people, and calculates the area under the curve. The difference between two voices is expressed as an area under the curve, which ranges from a low value to a high value depending on the participants' voice characteristics. When this value is small, this means that the two voices analyzed are somewhat close to each other and so the word is not a good password. The bigger the value is, the less correlation exists between the two voices and so a better choice for a password.</p> <p><b>Results</b> My results show that among the fifteen words tested, no two voices overlapped. For a given word, the voice spectrum differs from one person to another. The highest value of area is observed with the words #godzilla# and the least value is observed with the word #weather#.</p> <p><b>Conclusions/Discussion</b> For each word spoken by two different people, the security code is able to differentiate between them and thus, can be used for voice analysis and recognition. I also find that calculating the area under the curve is not the best mathematical method to use, as a time lag exists between the voice recordings and many unwanted frequencies interfere in the calculations. More research needs to be done, but voice recognition technology can definitely be used as a car security system.</p>	
<b>Summary Statement</b> The purpose of my project was to find out if voice recognition technology can be used as a more efficient car security system.	
<b>Help Received</b> Mr. Amar Gill helped me with the software Matlab. My 14 participants helped me by providing their voices. My parents helped me with support and advice.	