



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Garrett L. Gwinn	Project Number J0908
Project Title Practical Application of Parabolic Antenna to Improve iPad Performance	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this project was to determine if a homemade parabolic antenna, incorporated into an iPad case, could improve the performance of an iPad. Additionally, varying levels of surface finish were tested with increasing degrees of roughness, to determine its impact on performance.</p> <p>Methods/Materials An iPad was placed in a specific corner of the house at a specific orientation and then the iPad's download speed was measured with and without the antenna. Three different antennas, differing only in the roughness of the finish, were tested. Each antenna design was tested 3 times. For each test, download speed was measured 30 times with and without the antenna. All electronic devices in the house were turned off while testing to minimize interference. Each pair of with/without antenna tests was run on the same day. Surface finish was quantified by counting the number of imperfections present within a 1 cm circle placed at three locations across the width of the antenna. A baseline antenna was tested against an antenna with 6 times and 18 times the number of imperfections.</p> <p>Results The iPad baseline antenna had a range of download speed improvement from 14-28% over the no antenna test with an average of 22%. Standard deviation of the download speed with the antenna was also reduced by a factor of 2. t-Tests showed a high level of confidence in the difference of the means. The 6 times level of imperfections antenna produced an average 6% improvement in download speed, however t-Tests suggest the level of confidence in the difference in the means to be low to unacceptable. The 18 times level of imperfections antenna produced only a .8% improvement. Again, however, confidence is very low with this data set.</p> <p>Conclusions/Discussion The homemade parabolic antenna, designed to fit into an iPad case, did improve the iPad's performance. Download speed and download speed standard deviation were greatly reduced with the baseline antenna. However, the number of imperfections present in the surface finish of the antenna severely degraded its performance.</p>	
Summary Statement My project was about the use of a parabolic antenna to improve the wifi performance of an iPad. Additionally, variations in antenna surface finish were also tested to determine the impact of the finish on antenna performance.	
Help Received I had some help from my dad by buying the materials for the antenna.	