



CALIFORNIA STATE SCIENCE FAIR 2004 PROJECT SUMMARY

Name(s) Michael Faryna; Jared Shuman	Project Number S0705
Project Title Applications of Omni-Directional Antennas	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Omni-directional antennas have a tremendous application in everyday life. They allow firms to effectively and efficiently transmit data over a high speed connection that only requires a minimal initial investment. We believe that we can further increase in the gain and decrease the probability of encountering a dead zone. Through research of different designs of antennas, we found that a collinear based design would be best for application in a IEEE 802.11b environments.</p> <p>We believe that through alternating $\frac{1}{2}$-wavelength elements we can achieve omni-directional coverage in the x-y plane and reach Rx sites in all directions from a single Tx location. We believe that this can be accomplished through a coaxial collinear antenna design with a foam dielectric from LMR-400.</p> <p>Methods/Materials 2 meters LMR-400; 2 12" length of 5/16 K&S brass tubing; 1 12" length of 11/32 K&S brass tubing; 1 block of wood of at least 1m long; 4 1" x 2" scrap wood blocks; 1 1/64th thick piece of scrap metal; 1 2# length of 1# brass tubing; 1 brass disk with 1# diameter; Non-acid core plumbing solder; Flux paste; Utility knife; Hacksaw; 300 watt soldering gun; Metal ruler (Metric/English); Metal sandpaper; Metal file; Hand-held pipe cutter; Rotary coax cutter; Vise; Micrometer; Dremel tool with metal cutting head; 1 14 dbm directional antenna; 1 802.11b Access Point; 2 Lucent 802.11b wireless network interface cards; 1 Laptop.</p> <p>Conclusions/Discussion We found our experiment to be successful and are very proud of the results. Although we did not achieve true omni-directional coverage, the project forced us think analytically and helped us to come up with possible solutions to this dilemma. One major and unforeseen problem with the omni-directional antenna is the beamwidth. We found that the more elements stacked on the antenna, the harder and more complex it becomes to align the Rx antenna with the Tx antenna. In our 16-element antenna we found that if we did not have our antennas on the same horizontal plane () they would not connect. Overall, the project was a huge success because we learned so much about electromagnetic waves and how they relate to the computer industry.</p>	
Summary Statement Developing an effective omni directional antenna for small business application	
Help Received	