



**CALIFORNIA STATE SCIENCE FAIR  
2008 PROJECT SUMMARY**

<b>Name(s)</b> <b>Caroline Chan; Sierra Tobin</b>	<b>Project Number</b> <b>J0807</b>
<b>Project Title</b> <b>Radio Hide and Seek: The Effect of Obstacles on Radio Waves</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The objective is to make an electronic pet finder that would be small enough to hang on a pet collar. Our project will test the effectiveness of the pet finder by measuring the effect of obstacles on radio waves. <b>Methods/Materials</b> We built an FM Radio Transmitter from a kit (Ramsey Electronics Model Kit FM10C FM Radio Transmitter), and transmitted a signal to a radio receiver with and without obstacles (sponge pad, nylon screen, poster board, and particleboard) obstructing the transmitting antenna. We measured the distance at which the radio receiver lost the signal, which played a distinct audio tone, with the help of an indicator light. In addition to testing different obstacles, we tested different frequencies (87.50 MHz, 94.30 MHz, 98.40, and 108.00 MHz) to verify the Friis Transmission Equation. <b>Results</b> Our results showed that the 108.00 MHz waves traveled the farthest, followed by 94.30 MHz, 98.40 MHz, and 87.50 MHz. We also found that at most frequencies the screen was the most obstructive and the foam poster board was the least obstructive. <b>Conclusions/Discussion</b> Our hypothesis was partially correct; the distances traveled by the higher frequencies were farther than the distances traveled by lower frequencies for the most part. We were wrong about how obstructive the obstacles were; we predicted that screen would be the least obstructive, but it was the most. The overall order of obstruction is the nylon screen, the sponge pad, the particleboard, the foam poster board, and the unobstructed test. For the tests at 98.40 MHz, we believe there was interference from an outside broadcast, so that test may be invalid. Our conclusion is that our pet finder will work best at the highest frequency, but that its effectiveness will vary depending on the type of obstructions.	
<b>Summary Statement</b> We transmitted radio waves of different frequencies to a radio receiver through different obstacles to test how well an electronic pet finder would work.	
<b>Help Received</b> Pak Chan helped hold the soldering iron when soldering the Printed-circuit board and explained some scientific concepts.	