



# CALIFORNIA STATE SCIENCE FAIR 2003 PROJECT SUMMARY

<b>Name(s)</b> <b>Connie H. Leung</b>	<b>Project Number</b> <b>S1216</b>
<b>Project Title</b> <b>A Robust Web-Based Face Recognition System Based on Gabor Wavelets Matching</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> This study aims to develop a robust, Web-based face recognition system simulating human perception of objects and faces. After the September 11 terrorist attacks, the need for homeland security has considerably increased. An accurate face recognition system could greatly aid the identification of possible terrorists and other threats to security. The purpose of this study is to demonstrate that it is technically and economically feasible to employ Web-cams in public places, including airports, stadiums, and theme parks, to scan pictures of human faces and compare them with mug shots and ID photos hosted in a centralized database. In real time, the resulting system will identify potential suspects and alert law enforcement officials.</p> <p><b>Methods/Materials</b> We collected frontal ID photos from individuals and stored them in a centralized database. Next, we set up a Web site to capture images of those same individuals with Web-cams. The Web images were taken with heads and faces in different sizes, poses, expressions, and alterations. Then these Web photos were automatically processed through the algorithms. Finally, using these Web images, we tried to find out how well our algorithms could identify each person from the database of 300 people.</p> <p><b>Results</b> Our Gabor wavelets, Web-based system has demonstrated robustness in recognizing faces under four different conditions: poses, alterations, sizes, and expressions. Experimental data showed that low-resolution images captured by inexpensive Web-cams resulted in few penalties in recognition performance. In addition to the robustness, the proposed system possesses ease of implementation at a fraction of the costs of the existing commercial systems.</p> <p><b>Conclusions/Discussion</b> This study has demonstrated the robustness of the Web-based face recognition system employing Gabor wavelet techniques. The performance of our system was found to be superior at a fraction of the costs compared with existing commercial systems using Principal Component Analysis (PCA) technologies. Future work with our system may include the optimization of speed and performance. A study of the tradeoff between recognition rates and time would yield a more cost-effective system. Moreover, our system has yet to be tested under a larger scale database with thousands of mug shots and ID photos.</p>	
<b>Summary Statement</b> This Web-based face recognition system using Gabor wavelets improves on current commercial systems and can be implemented for commercial use to identify possible suspects.	
<b>Help Received</b> Used lab equipment at USC	