Research Seminar - Fall 2009

Report: In fall 2009 Dr. Wei-Tai Hsu, a Lamar alumnus, presented a talk about the “Application of modern optics in engineering.” The seminar covered multiple methods of the facial recognition in a dynamic tracking system of individuals within a controlled domain. The domain consisted of a high-resolution color camera with remote controlled positioning, rooftop mounted at 20 meters above the ground observing an area of pedestrian traffic and a parking lot in our campus. The system described is based on the facial detection using Haar-like features.

The presenter has shown the results of the collaboration with Dr. Cristian Bahrim on measurements of indices of reflection for dielectrics using the polarization of light reflected by surfaces. We propose a simple and accurate experimental method for finding the curve of dispersion for solid and liquid dielectrics using the polarization of reflected light on the dielectric surface near Brewster angle. The method allows improving by 100 times the precision in measuring the Brewster angle as known until now. An angular resolution of 0.01° can be easily achieved with a technique based on the parabolic fit of the parallel component of the reflectance normalized to the total reflectance in a region close to the Brewster angle. This procedure allows measurements of the indices of refraction for solid and liquid dielectrics with a precision of 10^-4.
Comments: Here are the two comments from the STAIRSTEP Physics students:

• "This seminar covered many methods of facial recognition where a computer program recognizes a face from an ordinary video camera feed and then searches through files of pictures of faces to find a match. Dynamic systems can make matches with accuracy in the ninety plus percentile even in situations of bad lighting and camera position."

• "I had some knowledge of imaging software and photography, so I thought I would be able to follow the seminar with reasonable understanding. I was not able to follow the presentation nearly as well as I had hoped. This was also the first research seminar that I had attended in several years. Some aspects were simply beyond my comprehension on the subject. The most informative aspect of the presentation happened once the professors began to ask questions. Seeing people of higher learning in that setting was akin to watching a samurai battle."