University of Denver Department of Electrical and Computer Engineering

Course: Computer Vision (4 QH), ENCE 4800, Winter 2009.

Schedule:	
Lecture: MW 5:00pm-6:20pm	CMK-205
Laboratory: Tuesday 5:00pm-7:50	CMK-100

Instructor:	Dr. Mohammad H. Mahoor
Office:	CMK 306, Phone: (303) 871-3745
E-Mail:	mmahoor@du.edu

Office Hours: MW 10:00am-12:00p.m., and by appointment

Prerequisites: Signals and Systems (ENEE 3311).

Useful Courses: Introduction to DSP (ENEE3670) and Linear Algebra.

Course Description

This course is an introduction to the basic concepts in image processing and computer vision. First, an introduction to low-level image analysis methods, including radiometry and geometric image formation, edge detection, feature detection, and image segmentation will be presented. Then, geometric based image transformations (e.g., image warping and morphing) for image synthesis will be presented in the course. Furthermore, methods for reconstructing three-dimensional scenes including, camera calibration, Epipolar geometry, and stereo feature matching will be introduced. Other important topics include optical flow, shape from shading, and three-dimensional object recognition. In conclusion, students will learn and practice image processing and computer vision techniques that can be used in other areas such as robotics, pattern recognition, and sensor networks.

Laboratory

The purpose of the laboratory for this course is to become familiar with technical aspects of the computer vision including hardware and software. In the lab, students will learn how to develop codes using computer vision libraries such as OpenCV (an open source C/C++ lib.), Direct Show and Matlab toolboxes for image processing, camera calibration, and so on. Several types of cameras are available in the robotics lab and image processing/computer vision lab. Students will use these cameras to capture still images and videos for their projects.

Grading

This course is a project-based course and students will be evaluated based on their performance on doing assignments and projects. Approximately, five bi-weekly projects will be assigned to students. Projects will be done by each individual student (there is no group project in this course, unless approved by the instructor). Each student is responsible for completing the assigned project, capturing required data for the project

(e.g., video or image using the cameras available in the lab.), developing and implementing necessary computer programs (C/C++ or Matlab codes), submitting a final report documenting his/her activities on the project, and presenting a short oral presentation (15 minutes).

Recommended Textbooks

[1] Computer Vision: A Modern Approach by D. A. Forsyth and J. Ponce, Prentice Hall, Upper Saddle River, N.J., 2003.

[2] Multiple View Geometry in Computer Vision, Richard Hartley and Andrew Zisserman, Cambridge University Press, Second Edition, March 2004.

[3] Digital Image Processing, by Rafael C. Gonzalez (Author), Richard E. Woods. Prentice Hall, (2nd Edition) 2008.

[4] Introductory Techniques for 3-D computer Vision, by Emanuele Trucco and Alessandro Verri, Prentice Hall, 1998