CS4365/5354 – Computer Vision for Video Games
Summer 2011

Instructor:
Olac Fuentes
ofuentes@utep.edu
www.cs.utep.edu/ofuentes
(915) 747-6956

Meeting Times:
M-F 2:30-3:35 CSB 308

Course Contents:
1) Introduction
   a) Computer vision
   b) 3D Computer vision
   c) Real-time computer vision
   d) Computer vision and video games
2) Basic Computer Vision Algorithms and Implementation
   a) Matlab
   b) The Image Processing Toolbox
      i) Reading and writing images
      ii) Image enhancement
      iii) Filtering
      iv) Color manipulation
      v) Texture analysis
   c) Classification and Detection: The Neural Networks Toolbox
      i) Network architectures
      ii) Training
   d) Features
      i) Histograms of Gradients
      ii) Scale-invariant Feature Transform
      iii) Haar features
      iv) Census transform
   e) Cascade-based detection algorithms
3) 3D Computer Vision
   a) Stereo vision
      i) Geometry
      ii) Matching
   b) 3D Computer Vision with active illumination
      i) Devices
         (1) Microsoft Kinect
      ii) Algorithms
4) Real-time computer vision
   a) Tracking
i) The Kalman filter
ii) Particle filters

b) Applications
   i) Object detection
   ii) Object recognition
   iii) Tracking

5) Putting it all together: Real-time 3D Computer Vision for Video Games
   a) Case studies
   b) Project development

Pre-requisites:
There are no formal prerequisites, but knowledge of programming, elementary calculus, linear algebra, probability, and statistics is useful.

Grading:
2 Midterm exams 10% each
Homework and Programs 30%
Final exam 20%
Course Project 30% (3 presentations, final report)

Tools:
- Matlab
- OpenCV
- Microsoft Kinect