

## ME 6406 MACHINE VISION

George W. Woodruff School of Mechanical Engineering  
Georgia Institute of Technology  
Fall 2008

### GT Catalog:

3-0-3. Prerequisite: Graduate Standing

Design of algorithms for vision systems for manufacturing, farming, construction, and the service industries. Image processing, optics, illumination, and feature representation.

**Instructor:** Professor Kok-Meng Lee

Office: MARC 474; Office hours: TTh 1:30 – 3:00pm

Tel: (404)-894-7402

email: [kokmeng.lee@me.gatech.edu](mailto:kokmeng.lee@me.gatech.edu)

Class: IC 119, 12:05-1:25pm

### Recommended Texts:

R. Gonzalez, R. Woods, and S. Eddins, *Digital Image Processing using Matlab*, Prentice Hall, 2004.

R. C. Gonzalez and R. E. Woods, *Digital Image Processing*, Prentice Hall, 3<sup>rd</sup> Edition, 2008.

### References:

1. D. H. Ballard and C. M. Brown, *Computer Vision*, Prentice Hall. 1982.
2. B. K. P. Horn, *Robot Vision*, MIT Press. 1986.
3. N. Zuech, *Applying Machine Vision*, Wiley Interscience. 1988.
4. R. M. Haralick and L. G. Shapiro, *Computer and Robot Vision, VI & 2*, Addison Wesley. 1992.
5. F. van der Heijden, *Image Based Measurement Systems*, John Wiley and Sons, 1995.
6. E. R. Davies, *Machine Vision: Theory, Algorithm, & Practicalities*, 2<sup>nd</sup> ed., Acad. Press, 1997.
7. Linda G. Shapiro and George C. Stockman, *Machine Vision*, Prentice Hall, 2001
8. D. A. Forsyth, and J. Ponce, *Computer Vision: A Modern Approach*, Prentice Hall. 2003.

### Topics:

Introduction	Machine Vision Concepts
Image formation	Vision properties and the physics of digital images
Image Processing	Binary image processing, Segmentation, Edge detection, Linear filters
Morphology	Basics and algorithms
Model-based Vision	Hough transformation, Model representation, Matching
Camera Model/Calibration	Intrinsic/extrinsic parameters; Camera and Eye-on-hand Calibration

### Mid-term 1

**October 9, 2008 (Thursday)**

Geometric methods	The geometry of multiple views and geometric reconstruction
Color images	Physics, perception and processing
Neural network classifier	Basics, training algorithms, and applications
Motion	Motion field and optical flow, Visual servoing

### Mid-term 2

**December 4, 2008 (Thursday)**

**Grade:** Four assignments (10% each for A1 and A2 and 15% each for A3 and A4), two Midterms (25% each). All assignments are individual.