Advanced Digital Image Processing
Course Code: EE-836

Course Description

This course emphasizes on the application of processing and analysis of digital images. There are practically unlimited applications of this course in real life. Some of these include the Image Restoration, Satellite Image Analysis for Planning and remote sensing, Security and Surveillance Applications by detecting, tracking and recognizing certain objects, Medical Applications, Forensic Applications as well as Robotic Vision etc. The techniques and the algorithms used for such applications will be discussed in this course.

Text Book:

1. Digital Image Processing by Rafael Gonzalez and Richard E Woods.

Reference Book:

1. Fundamentals of Digital Image Processing by Anil K. Jain, Prentice Hall..
2. Digital Image Processing using MATLAB by Rafael Gonzalez and Richard E Woods.

Prerequisites

ASSESSMENT SYSTEM

Quizzes	10%
Assignments	5%
Project	10%
Mid Terms	30%
ESE	45%

Teaching Plan

Week No	Topics	Learning Outcomes
1	Introduction	Course Outline, objectives, teaching plan, assessment method, concepts review
2	Fundamentals of Digital Image processing	Fundamental Steps in Digital Image Processing Components of Image Processing System Elements of Visual Perception Image Sampling & Quantization

Week	Topic	Contents
3-4	Image Enhancements	Neighborhood, Connectivity, Regions & Boundaries Distance Measures Image Operations on Pixel Image negatives, log transformations, power law Transformations, Piecewise linear & other transformations. Introduction to histograms
5	Image Transformation	Rotation, Translation, scaling, affine transformation, perspective transformation, transformation in homogeneous coordinates system
6	Morphological Operations	Erosion, Dilation, opening, Closing, Boundary extraction, Connected Components
7	Steganography	Bit-plane processing, data hiding
8	Filtering	Histogram based techniques, Spatial Filters & Sharpening Filters
9	**MID TERM IN WEEK 9**	
10-11	Segmentation	Thresholding, Region Growing, Split and Merge, Clustering, Watersheds, Mean Shift
12-13	Compression	Different Compression Techniques: Error-Free, lossy & Image Compression Standards, Compression Algorithms
14	Image Analysis and Computer Vision	Feature Extraction, Classification Techniques, Scene matching
15	Color Spaces	RGB, HSV, YUV
16-17	Project	Presentations and Demonstrations
18	**End Semester Exams**	