

## E9 241 Digital Image Processing Final Project

**Project Proposal:** You are required to come up with a topic for the project by Oct 15, 2025. Please upload the proposal as a pdf with the following details:

1. Project topic and problem
2. Team members (upto two in each team)
3. What you wish to learn from the project
4. What you plan to do to achieve your objectives

**Proposal Expectation:** You need to be very specific in what you wish to explore in your project: eg. specify exact algorithms, what analysis you plan to perform, etc.

**Topic Suggestions:** A few topic suggestions are provided below. You are welcome to choose any other topics. You may choose topics that are not covered in the syllabus of this course.

A few topic suggestions (but not limited to):

1. Binarization of color images
2. Segmentation of digits as binary images from an image of a credit/debit card
3. Segmentation of characters as binary images from images of printed text
4. Retinex and improved methods for contrast or low light enhancement, use of bilateral filters in retinex methods for contrast enhancement
5. Image dehazing/defogging
6. Denoising - implementation of BM3D algorithm and analysis of parameters, K-SVD based denoising
7. Image deconvolution/deblurring/restoration, blind deconvolution, motion deblurring methods
8. Image super resolution, eg.  
[http://www.cs.huji.ac.il/~raananf/projects/lss\\_upscale/paper.pdf](http://www.cs.huji.ac.il/~raananf/projects/lss_upscale/paper.pdf) and comparisons with other methods
9. Auto white balance, color balancing, color constancy, color correction methods
10. High dynamic range imaging, tone mapping methods, multi-exposure fusion
11. Watershed algorithm for image segmentation and analysis of parameters
12. Motion segmentation
13. Image matting
14. Object detection (face, pedestrians, or generic) (Viola-Jones will be covered in class, so you cannot take up vanilla Viola-Jones)
15. Lane detection for understanding the driving area for automotive driving assistance systems
16. Vehicle detection
17. Analysis Problems: How much does image pre-processing (like contrast enhancement, denoising, deblurring, etc) help in downstream tasks like face/vehicle detection of poor-quality images.

**Project Modalities:** The project can be done in groups of up to **two** students. We encourage you to find a project partner and work in teams of two. For a team of two, it is sufficient if one of the team members uploads the proposal on Teams.

### **Project Deliverables**

1. a demo/code upload
2. 10 slide project presentation slides containing brief problem description, algorithm, results towards achievement of project goals.
3. 15 min viva on the project based on the slides and the project

**Project Evaluation:** The project evaluation will be based on the deliverables above and your accomplishment in the project. A rough distribution of the 20% allocated for the project is as follows:

- a. 10% - viva to test understanding of topic, correctness of algorithms studied, etc.
- b. 10% - accomplishment, demo/results, experiments.

**Code usage:** If you use existing code that is publicly available, you will be expected to conduct more experiments in trying to understand why the algorithm works, where it fails, parameter sensitivities etc. On the other hand, if you code the algorithm yourself, you could be asked to explain your implementation, how you verified that your implementation is correct, any benchmarking experiments to validate your implementation etc.

### **Good publication venues for you to choose papers from to work on for your project:**

1. Conferences: CVPR, ICCV, ECCV, ICIP, ICASSP, WACV, BMVC, ACM Multimedia, SIGGRAPH, SIGGRAPH Asia, Neurips, ICML, ICLR, AAAI
2. Journals: IEEE Transactions on Image Processing, IEEE Transactions on Multimedia, IEEE Transactions on Pattern Analysis and Machine Intelligence, IEEE Transactions on Circuits and Systems for Video Technology, Internal Journal of Computer Vision, IEEE Signal Processing Letters, International Journal of Computer Vision.