**Image Processing Lab**

**1. Introduction to Image Processing**

* **What is Image Processing?**
  + Definition and importance
  + Applications (medical imaging, autonomous driving, facial recognition)
* **Digital Image Basics**
  + Pixel, image representation (grayscale, RGB)
  + Image resolution and bit depth
* **Types of Images**
  + Binary, grayscale, color images
* **Image Formats**
  + PNG, JPEG, TIFF, BMP
* **Basic Operations**
  + Loading, saving, and displaying images using OpenCV.

**2. Key Techniques**

* **Image Transformation**
  + Resizing, cropping, rotating, flipping
* **Image Filtering**
  + Blurring, sharpening, edge detection (Canny, Sobel)
  + Noise reduction
* **Histogram Equalization**
  + Contrast enhancement
* **Color Spaces**
  + Converting between RGB, HSV, and grayscale

**Hands-On**: Apply resizing, blurring, and edge detection.

**3. Advanced Concepts & Applications**

* **Thresholding**
  + Binary, adaptive, Otsu's method
* **Morphological Operations**
  + Erosion, dilation, opening, closing
* **Contours & Object Detection**
  + Detecting shapes and objects
* **Introduction to Segmentation**
  + Thresholding, watershed, region-based

**Hands-On**: Contour detection, basic segmentation tasks (e.g., background removal).