

# HIT137

## Group Assignment 3 (30% Mark)

**You are required to create a GitHub repository and add all your group mates to it (make sure to keep it public, not private). You should do this before you start the assignment.**

**All the answers and contributions should be recorded in GitHub till you submit the assignment.**

### **Submission Guidelines:**

- **Include your GitHub Repository link in a text file “github\_link.txt”.**
- **Zip all the programming files, outputs, and “github\_link.txt”. Upload them to Learline.**

## Overview

You will develop a desktop application that demonstrates your understanding of Object-Oriented Programming principles, GUI development using Tkinter, and image processing using OpenCV.

## Functional Requirements

### 1. Object-Oriented Programming

Your application must be structured using at least three classes, and demonstrate the following OOP concepts: Encapsulation, Constructor, Methods, Class Interaction.

### 2. Image Processing with OpenCV

Implement the following image processing features using the OpenCV:

- Grayscale Conversion – Convert image to black and white
- Blur Effect – Apply Gaussian blur with adjustable intensity
- Edge Detection – Use Canny edge detection algorithm
- Brightness Adjustment – Allow users to increase/decrease brightness
- Contrast Adjustment – Allow users to adjust image contrast
- Image Rotation – Rotate image by 90°, 180°, or 270°
- Image Flip – Flip image horizontally or vertically
- Resize/Scale – Allow users to resize the image

### 3. Tkinter GUI

You have the flexibility to design any user interface, provided it effectively supports all required functionality.

#### Required GUI Elements:

- Main Window – A properly sized window with an appropriate title
- Menu Bar – Include File menu (Open, Save, Save As, Exit) and Edit menu (Undo, Redo)
- Image Display Area – A canvas or label to display the current image
- Control Panel – Buttons or a sidebar for filter/effect options
- Status Bar – Display current image information (filename, dimensions, etc.)

#### Required Functionality:

- File dialogs for opening and saving images
- Support for common image formats (JPG, PNG, BMP)
- At least one slider for adjustable effects
- Message boxes for confirmations and errors