**School of Engineering and Applied Science (SEAS),
Ahmedabad University**

**ECE501: Digital Image Processing**

**Group Name: Humans.exe**

**Project 2: Person Retrieval**

**Date:** $20^{th}$ **September, 2025**

**Team Members:**

- Chaudhari Isha Rajeshkumar - AU2340147

- Chaklasiya Shrey Pareshbhai - AU2340106

- Mangukiya Ramkrishna Anantray - AU2340052

- Vachhani Hitarth Miralbhai - AU2340096

# I. Introduction

- **Goal:** Person Retrieval – finding all images of the same person in a given photo database.

- **Common Method:** Normally achieved using Machine Learning or Deep Learning.

- **Our Approach:** Use only Classical Digital Image Processing (DIP) Techniques.

- **Our Database:** 20 photos → 4 persons × 5 photos each.

# II. Objectives

The project focuses on developing a classical Digital Image Processing-based system to retrieve all images of the same person from a given image database without involving machine learning or deep learning algorithms. The approach relies on using feature extraction and matching techniques such as histogram-based similarity, Local Binary Pattern (LBP), Discrete Cosine Transform (DCT), and Principal Component Analysis (PCA). The objective remains to demonstrate that classical methods are interpretable, computationally efficient, and capable of achieving accurate retrieval performance.

## III. What has been done so far (Progress)

This week, the team worked on formulating a combined method using LBP, DCT, and PCA to improve retrieval accuracy. LBP was chosen for capturing fine local texture patterns of the face, DCT for extracting global frequency-based information, and PCA for reducing feature redundancy and dimensionality. We developed a conceptual framework on how these three methods can complement each other when used together — LBP providing local texture details, DCT adding frequency representation, and PCA optimizing the feature set for better comparison. This theoretical combination is expected to enhance robustness against variations in lighting, pose, and expression. The team also reviewed several research papers to support this approach and discussed potential normalization and fusion strategies for the upcoming implementation phase.

## IV. What is planned for next week

- Begin the initial coding phase of the project by implementing the preprocessing pipeline.

- Work on simple tasks first — converting images to grayscale, resizing, and equalizing histograms.

- Start writing basic code for feature extraction using LBP, DCT, and PCA based on the theoretical plan.

- Perform initial trials on the existing 20-image database to verify the correctness of preprocessing and feature extraction.

## References

[1] Yogalakshmi S., Megalan, L. L., & Simla, J. A. (2020). Review on Digital Image Processing Techniques for Face Recognition. *International Conference on Communication and Signal Processing (ICCSP)*.

[2] Singh, G., & Goel, A. K. (2020). Face Detection and Recognition System using Digital Image Processing. *International Conference on Innovative Mechanisms for Industry Applications (ICIMIA)*.

[3] Shtam, R., & Singh, Y. N. (2015). Automatic Face Recognition in Digital World (Vol. 2). *Advances in Computer Science and Information Technology (ACSIT)*.

[4] Alhayani, B. S. A., & Rane, M. (2014). Face Recognition System by Image Processing (Vol. 5). *International Journal of Electronics and Communication Engineering & Technology (IJECET)*.