# Project Abstract: Face Recognition Attendance System with Anti-Spoofing

## Project Title

Face Recognition-Based Login and Attendance System with Anti-Spoofing Detection

## Objective

To develop a real-time face recognition login system that securely authenticates users using their facial features while incorporating anti-spoofing measures to prevent fraudulent logins using photos or videos.

## Functional Requirements

* User Authentication: Login and Logout using face recognition with anti-spoofing detection.
* User Registration: Capture and store face embeddings with a username.
* Webcam Integration: Live feed using OpenCV and Tkinter.
* GUI Interface: Simple UI for Login, Logout, and Register.
* Face Recognition: Matching captured face with stored embeddings.
* Activity Logging: Store login/logout timestamps in a log file.

## Non-Functional Requirements

* Performance: Real-time processing with minimal lag.
* Security: Anti-spoofing layer to block unauthorized attempts.
* Scalability: Extendable for multiple users.
* Usability: User-friendly interface.
* Reliability: High recognition accuracy under good conditions.

## Architecture

* Presentation Layer (UI): Tkinter-based GUI components.
* Application Logic Layer: Authentication and registration logic, anti-spoofing check.
* Data Layer: Pickle-based storage for embeddings and log file for events.

## Technologies Used

* GUI Framework: Tkinter
* Face Recognition: face\_recognition (Dlib-based)
* Anti-Spoofing Logic: Placeholder, can be upgraded
* Image Processing: OpenCV, Pillow
* Serialization: Pickle
* Programming Language: Python 3.x

## Anti-Spoofing

Prevents spoofing using printed photos or digital images. Currently implemented as a placeholder with potential for CNN model integration.

## Log Format

username,datetime,action  
Example: JohnDoe,2025-05-16 10:25:14.552947,in

## Directory Structure

project/  
├── app.py # Main GUI logic  
├── util.py # Helper functions (recognition, GUI elements)  
├── test.py # Anti-spoofing (mock function)  
├── db/ # User face encodings  
├── log.txt # Login/logout logs  
├── anti\_spoof\_models/ # Placeholder for anti-spoofing models

## Future Enhancements

* Integrate real anti-spoofing CNN model.
* Add face detection feedback (bounding boxes).
* Export logs to CSV or a real database.
* Replace local storage with cloud-based solution.
* Add audio/voice feedback for accessibility.