PROJECT REPORT

DEPARTMENT: COMPUTER SCIENCE AND ENGINEERING

PROGRAMM: BACHELOR PROGRAM

SEMESTER NAME: SPRING-2024

COURSE TITLE: SOFTWARE DEVELOPMENT-1

COURSE CODE: CSE-2340

SUBMITTED BY

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SEMESTER: 3rd

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Computer Science and Engineering

Project: Face Recognition-Based Student Attendance System

INTRODUCTION

With every passing day, we are becoming increasingly dependent on technology for carrying out even the most basic tasks. Facial detection and recognition technologies offer numerous benefits, from sorting photos in our mobile phone galleries to unlocking phones with a mere glance and integrating facial images into national biometric ID databases for verification purposes.

This project aims to implement Face Detection and Face Recognition using Intel's Computer Vision library, OpenCV. It provides a practical implementation of these technologies using Python on both Windows and macOS platforms. The project's goal is to enable Facial Recognition for faces that the script can be trained to recognize. The input is taken from a webcam, and the recognized faces are displayed along with their names in real time.

On a larger scale, this project can be developed into a biometric attendance system, significantly reducing the time-consuming process of manual attendance systems.

PROJECT OVERVIEW

The project consists of an admin panel and a student panel, both of which interface with a MySQL database for data storage and retrieval. The project uses Tkinter for both frontend and backend development. The system's primary function is to save student data and take attendance based on facial recognition.

Given my limited knowledge of machine learning, I initially used pre-set photos for students to recognize their faces. The system components and their functionalities are detailed below.

TECHNOLOGIES USED

Frontend and Backend Development:

Tkinter: Used for creating the graphical user interface (GUI) for both the admin and student panels.

PIL (Python Imaging Library): Used for image processing and handling image-related tasks within Tkinter.

Database(MySQL): Used for storing and retrieving student data and attendance records.

Face Recognition:

OpenCV: Intel's Computer Vision library used for implementing face detection and recognition.

Additional Libraries: face_recognition: A library built on top of dlib's facial recognition functionality.

SYSTEM ARCHITECTURE

1. Admin Panel:

Functionality:

- Login and Registration system for secure access.
- Interface to add, update, and delete student records.
- Viewing and managing attendance records.

Modules:

Admin: Handles the admin functionalities.

Train: Trains the face recognition model with the student dataset(which has been rest for developing in future).

Developer: Provides information about the developer and project.

Help: Offers help and documentation for using the system.

2. Student Panel:

Functionality:

- Student login and registration.
- Viewing personal attendance records.

Modules:

Student: Manages the student functionalities and interactions.

TAKEATTENDANCE: Captures attendance by recognizing student faces via webcam.

3. Face Recognition System:

Functionality:

- Captures video input from the webcam.
- Detects and recognizes faces in real-time.
- Displays recognized faces with their corresponding id.

Modules:

FaceRecognition: Core module for face detection and recognition.

IMPLEMENTATION DETAILS

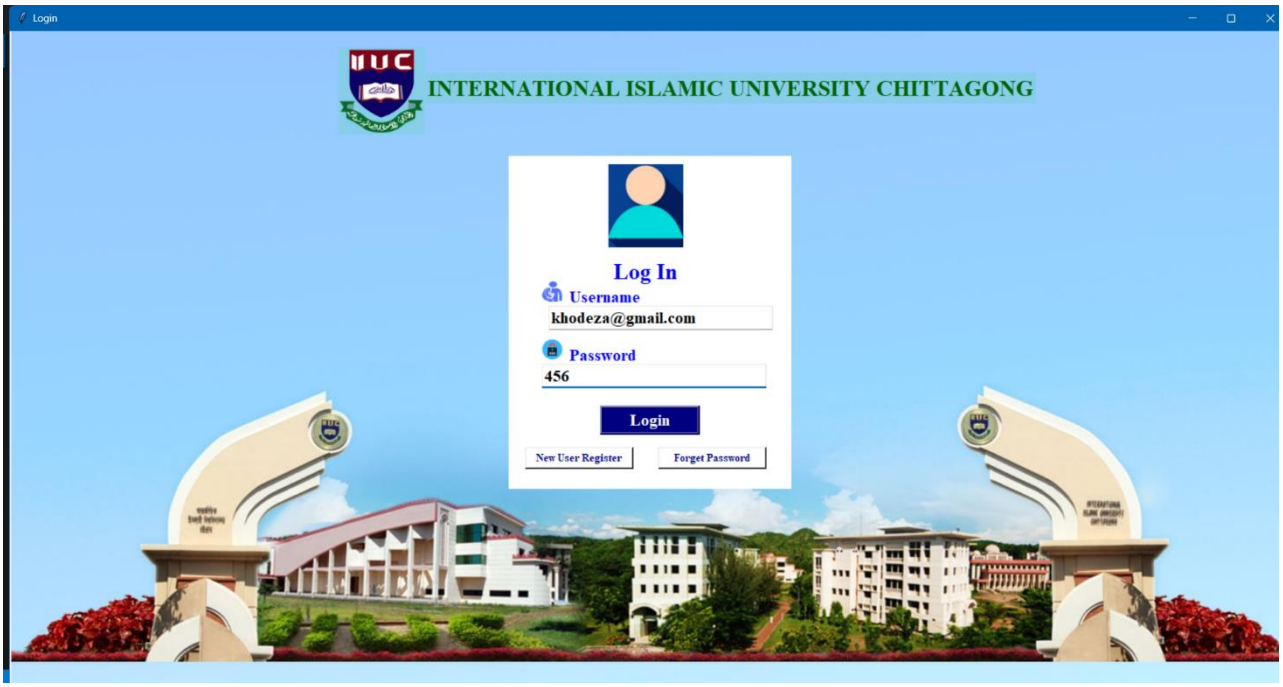
Database Schema:

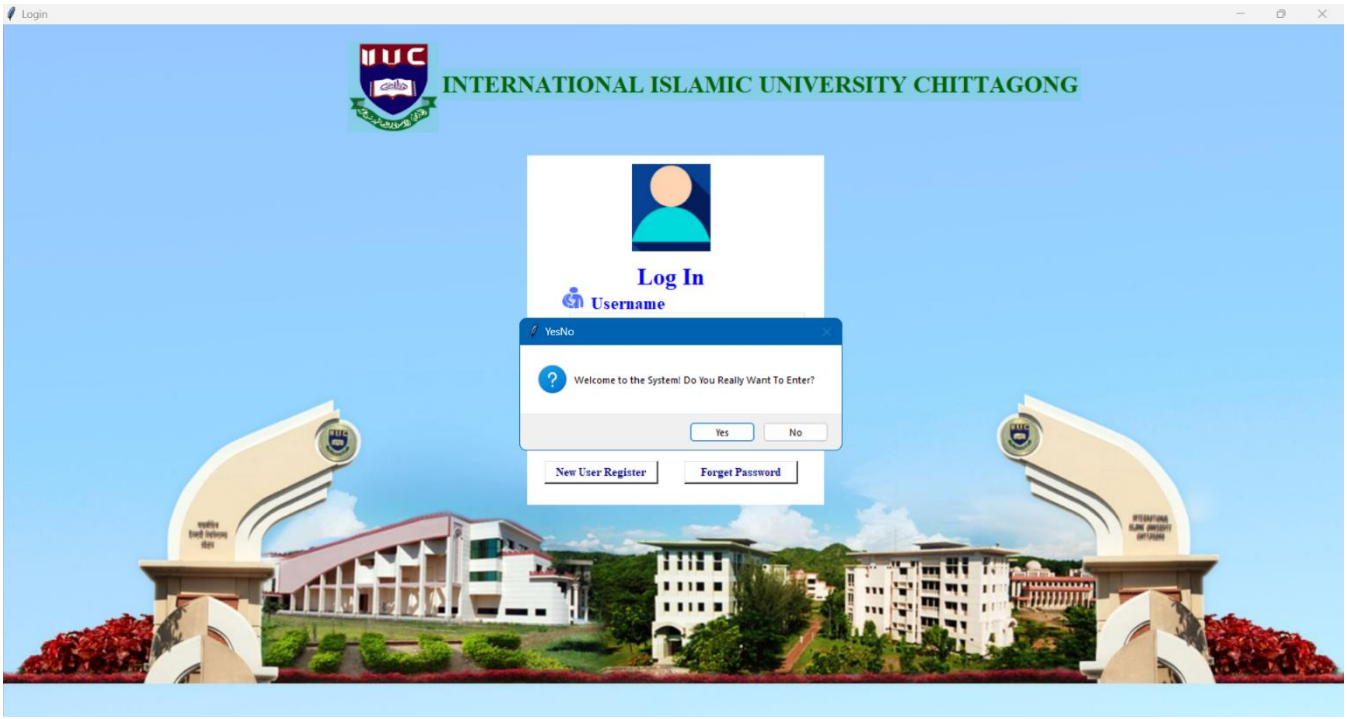
Tables:

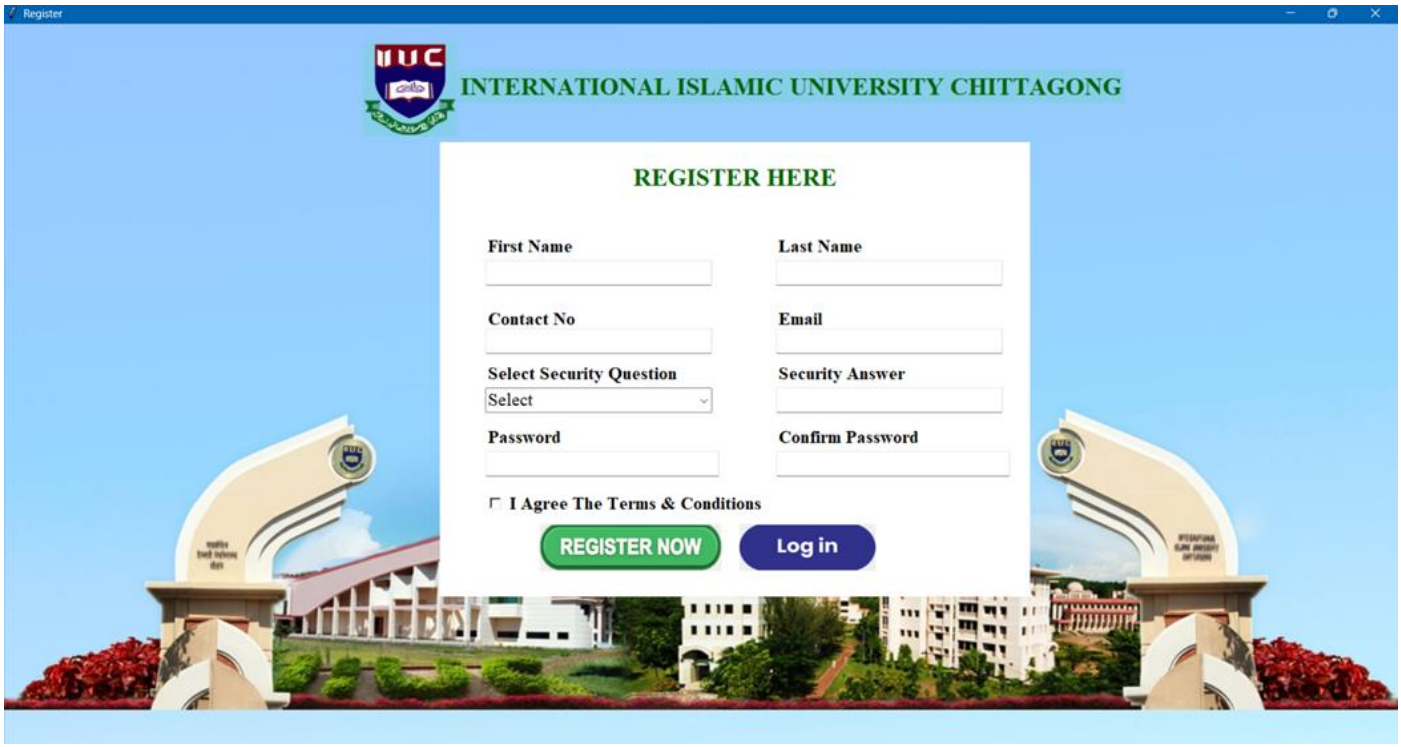
students (student_id, name, department, photo_path, etc.)

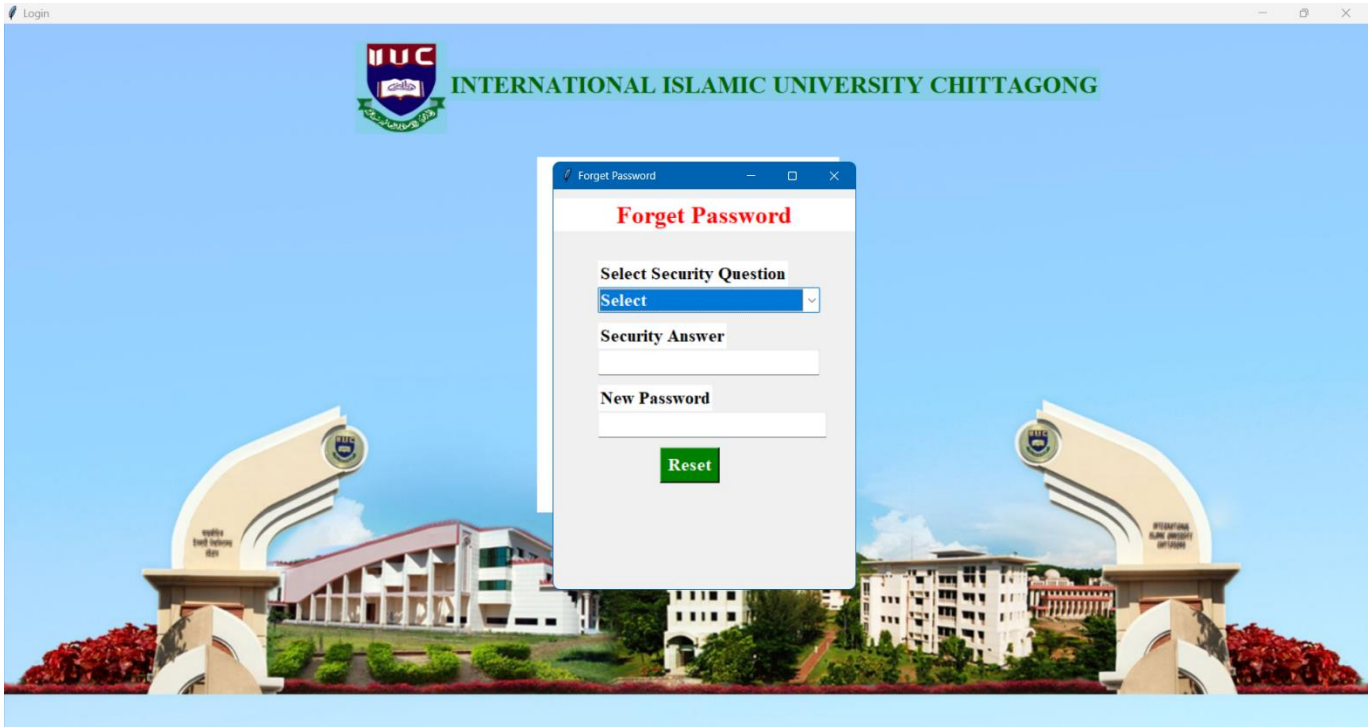
attendance (attendance_id, student_id, date, status, etc.)

Screenshots of project output



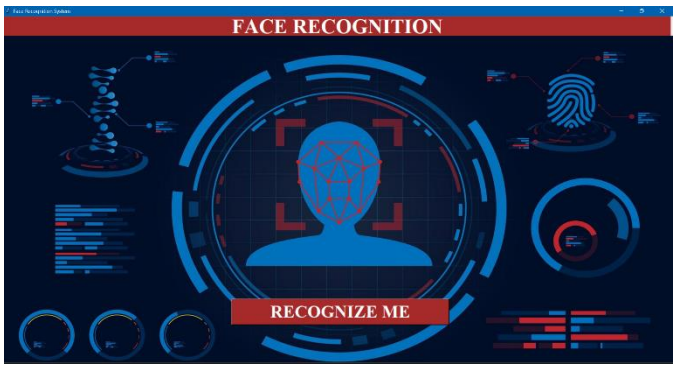



Register
INTERNATIONAL ISLAMIC UNIVERSITY CHITTAGONG
REGISTER HERE
First Name
Last Name
Contact No
Email
Select Security Question
Select
Security Answer
Password
Confirm Password
I Agree The Terms & Conditions
REGISTER NOW
Log in

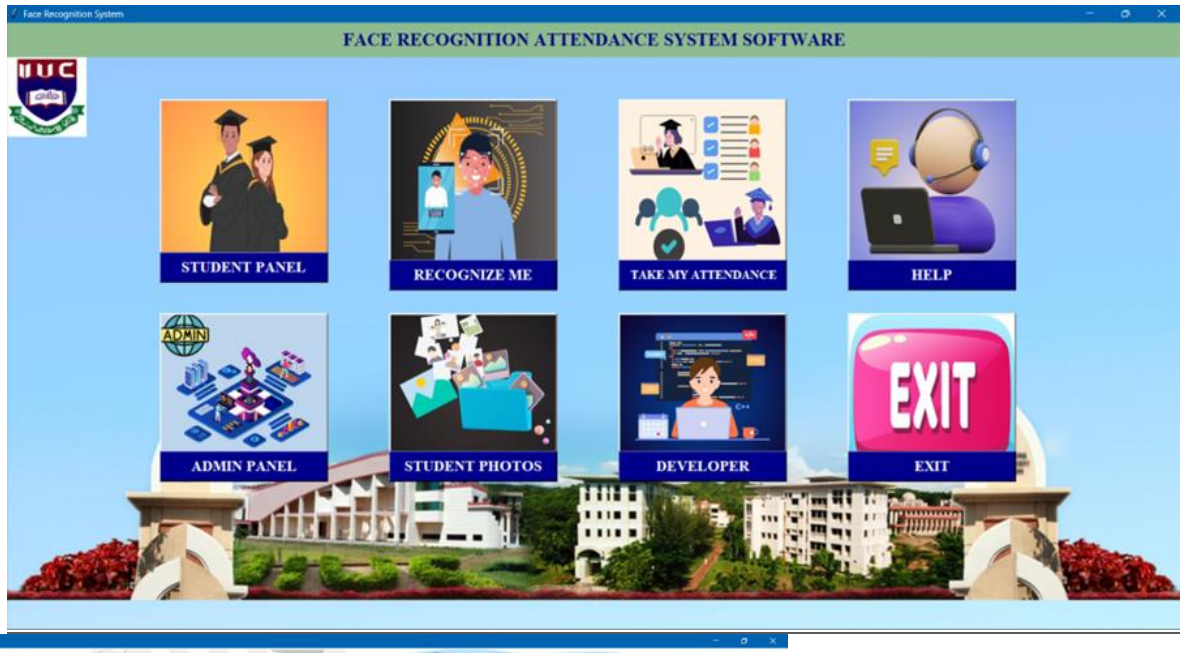

Login
INTERNATIONAL ISLAMIC UNIVERSITY CHITTAGONG
Forget Password
Forget Password
Select Security Question
Select
Security Answer
New Password
Reset

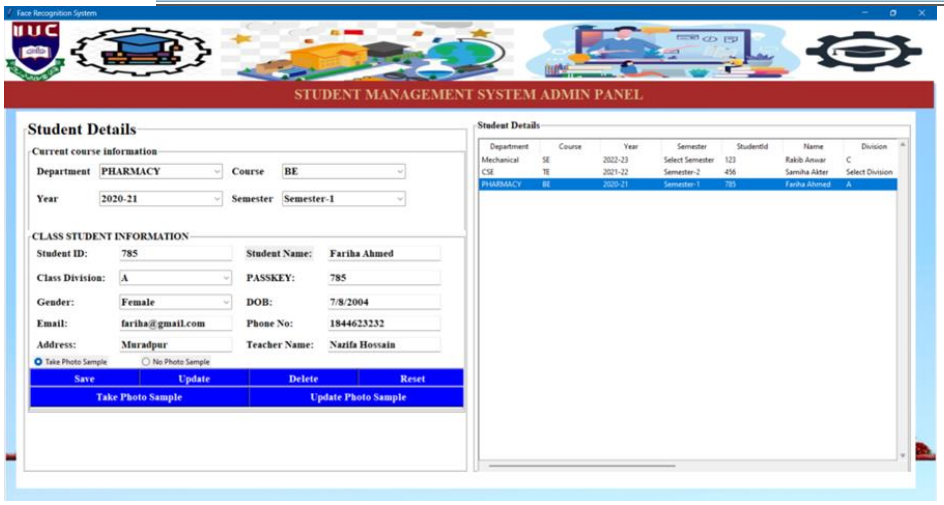

FACE RECOGNITION ATTENDANCE SYSTEM SOFTWARE
STUDENT PANEL
RECOGNIZE ME
TAKE MY ATTENDANCE
HELP
Password
Only admin have access in this section!Enter admin password:
OK
Cancel
ADMIN
ADMIN PANEL
STUDENT PHOTOS
DEVELOPER
EXIT
EXIT

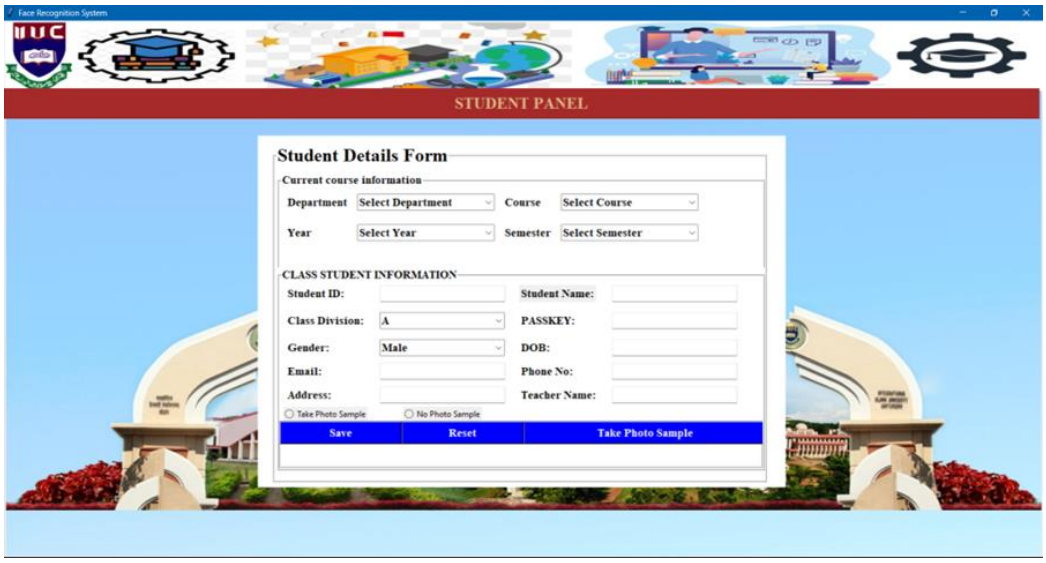

HELP DESK
Email:nahreennazrana@gmail.com

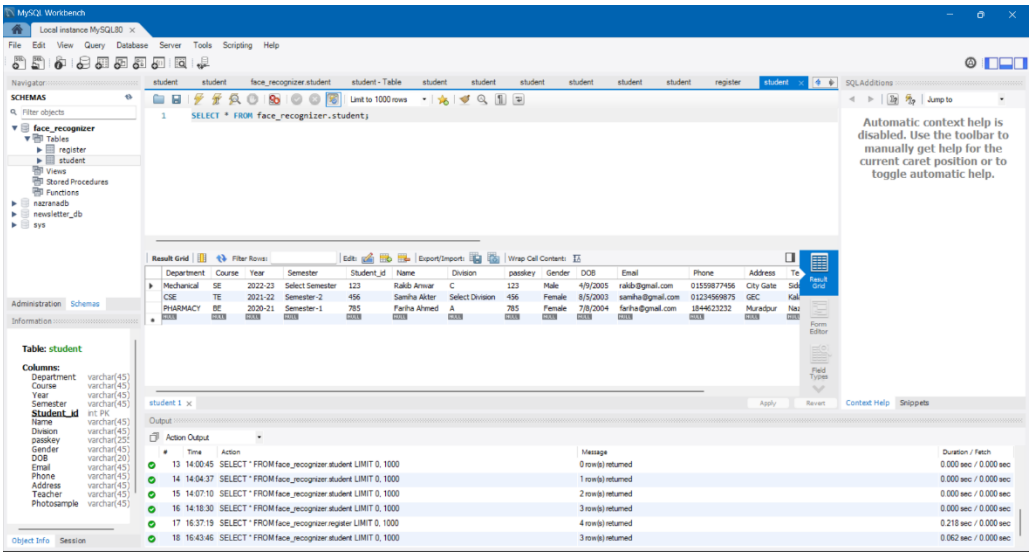

FACE RECOGNITION
RECOGNIZE ME

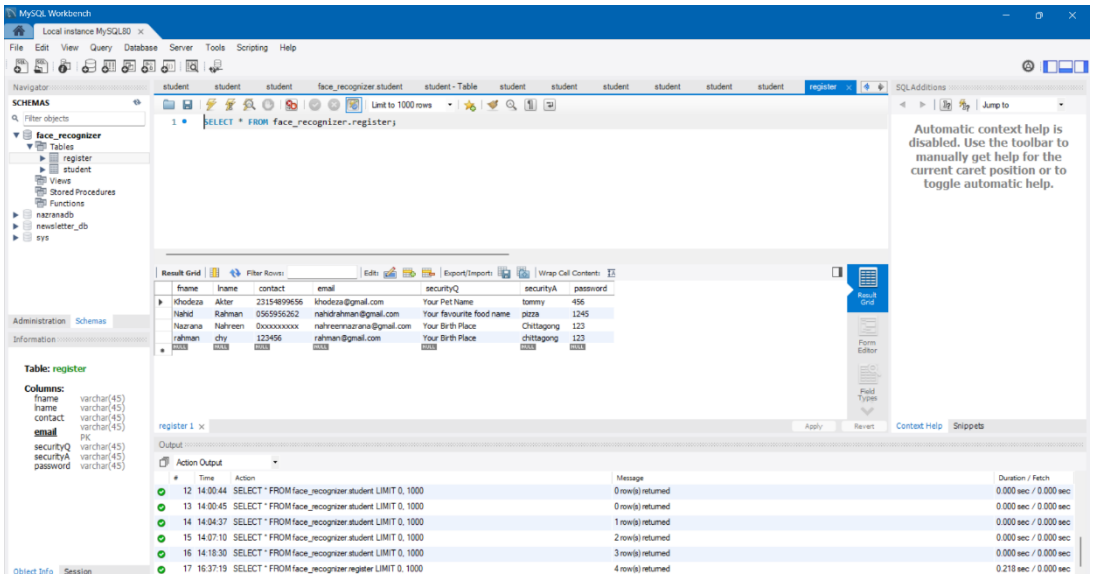

TAKE MY ATTENDANCE
ATTENDANCE
ATTENDANCE
I am present

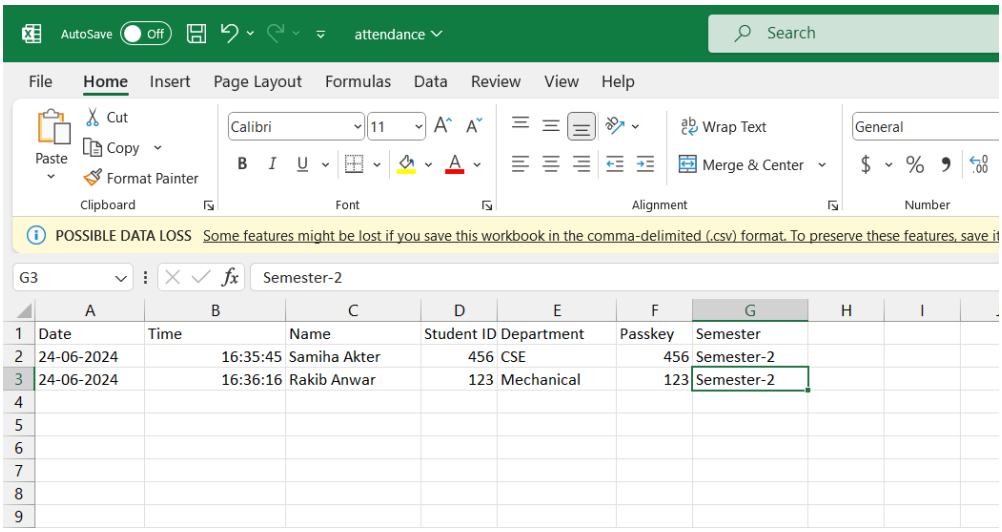

Face Recognition System
FACE RECOGNITION ATTENDANCE SYSTEM SOFTWARE
STUDENT PANEL
RECOGNIZE ME
TAKE MY ATTENDANCE
HELP
ADMIN PANEL
STUDENT PHOTOS
DEVELOPER
EXIT


Face Recognition System
STUDENT MANAGEMENT SYSTEM ADMIN PANEL
Student Details
Current course information
Department PHARMACY
Course BE
Year 2020-21
Semester Semester-1
CLASS STUDENT INFORMATION
Student ID: 785
Student Name: Fariha Ahmed
Class Division: A
PASSKEY: 785
Gender: Female
DOB: 7/8/2004
Email: fariha@gmail.com
Phone No: 1844623232
Address: Muradpur
Teacher Name: Nazifa Hossain
Take Photo Sample
No Photo Sample
Save
Update
Delete
Reset
Take Photo Sample
Update Photo Sample
Student Details
Department Course Year Semester StudentId Name Division
Mechanical SE 2022-23 Select Semester 123 Rakib Anwar C
CSE TE 2021-22 Semester-2 456 Samiha Akter Select Division
PHARMACY BE 2020-21 Semester-1 785 Fariha Ahmed A


Face Recognition System
STUDENT PANEL
Student Details Form
Current course information
Department Select Department
Course Select Course
Year Select Year
Semester Select Semester
CLASS STUDENT INFORMATION
Student ID:
Student Name:
Class Division: A
PASSKEY:
Gender: Male
DOB:
Email:
Phone No:
Address:
Teacher Name:
Take Photo Sample
No Photo Sample
Save
Reset
Take Photo Sample


MySQL Workbench
SELECT * FROM face_recognizer.student;
Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.
Table: student
Columns:
Department varchar(45)
Course varchar(45)
Year varchar(45)
Semester varchar(45)
Student_id int PK
Name varchar(45)
Division varchar(45)
passkey varchar(25)
Gender varchar(45)
DOB varchar(20)
Email varchar(45)
Phone varchar(45)
Address varchar(45)
Teacher varchar(45)
Photosample varchar(45)


MySQL Workbench
SELECT * FROM face_recognizer.register;
Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.
Table: register
Columns:
fname varchar(45)
lname varchar(45)
contact varchar(45)
email varchar(45) PK
securityQ varchar(45)
securityA varchar(45)
password varchar(45)


AutoSave Off
attendance
Search
File Home Insert Page Layout Formulas Data Review View Help
Paste Cut Copy Format Painter
Clipboard
Calibri 11
Font
Wrap Text Merge & Center
Alignment
General
Number
POSSIBLE DATA LOSS Some features might be lost if you save this workbook in the comma-delimited (.csv) format. To preserve these features, save it
G3
Semester-2
Date Time Name Student ID Department Passkey Semester
24-06-2024 16:35:45 Samiha Akter 456 CSE 456 Semester-2
24-06-2024 16:36:16 Rakib Anwar 123 Mechanical 123 Semester-2

FUTURE WORK

The current implementation relies on pre-set photos for face recognition. Future work could involve: Integrating a machine learning model for improved accuracy.Implementing real-time model training to adapt to new student photos dynamically.Enhancing the security features of the system.Expanding the system for use in other applications, such as access control.

CONCLUSION

This project successfully demonstrates the implementation of a Face Recognition-based Student Attendance System using OpenCV and Tkinter. By automating attendance recording, the system saves time and reduces manual errors. Despite initial limitations in machine learning expertise, the project showcases a functional solution that can be further enhanced and scaled for broader applications.