METandance: A Smart Classroom Management And Analysis

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Abstract - *All educational systems are moving towards digital media nowadays. Education has been the most affected by Covid, but they have come up with an online class system as a response, therefore there was a need for a digital attendance solution to track students from remote locations. In our digital age, face recognition systems are used in almost every business. Face recognition is one of the most extensively used biometrics. It offers several benefits, including identity, authentication, and security. The goal of our suggested system is to speed up classroom tasks by marking the student attendance by detecting and recognizing the registered faces of students. For starters, the faculty must upload 100 pictures captured by the camera of registered students for attendance updation and be able to take attendance of the right student's. Additionally, our suggested system allows teachers to publish academic notices and students to provide feedback and leave applications. The paper explains the implementation details of the proposed system, a new method for attendance marking using facial recognition with the integration of the Django framework.*

*Key Words***: Attendance System, Face Recognition, Analysis, Educational System, Digitalization.**

1. INTRODUCTION

The popularity of smartphones has increased over the years. This could change and speed up the attendance-taking process in institutes. The idea is to digitize the way attendance is taken in colleges. This system is not only for attendance marking but teachers can also post notices, and be able to view detailed analyses of attendance for particular students, where students can view notices, track their attendance, apply for leave and feedback.

The vision is to create a software that is simple to use for the faculties with any size of classes and manage the classroom. A face recognition system is a technology that has the ability to recognize the face of a person from a digital image or a video frame is compared with that of the background in the face, which is often used to authenticate users by means of a verification of the identity of a service, through the identification and measurement of the features of the face in the image.

1.1 Problem Statement

The manual process of taking attendance is a time consuming and inefficient way. The project aims to automate the process, and reduce human errors and Provides transparency between teacher and students.

Our Proposed system is for students and teachers to mark the attendance using the face recognition so Admin can add students details for registration and students will mark attendance for In-time as well as for Out-time, Also it will help teachers to display the notices to students. Nowadays the education system is using online platforms for reaching out to the students who are at remote locations so our proposed system will help them to mark attendance at remote locations as well as in offline sessions.

2. Literature Survey

In the literature and on the market, there are numerous proposals for Automatic Attendance Systems. The majority of them concentrate on applications that should be installed on the lecturer's device, whether it be a smartphone or a laptop. A number of these concepts will be briefly discussed in this section.

Reference [1] A mobile device and a web application are part of the proposed system. Students' registrations are distributed around among participants one by one. Users can choose between two registration methods: selfie registration or signature registration. Following registration, previously registered IDs and names are deleted from the list of participants. A Monaca-application is a mobile application that runs on a mobile device.

Reference [2] Is based on the identification of face recognition in order to resolve the concerns with the previous attendance system. Using a camera to record photographs of the employee, this technology detects and recognizes faces.

Reference [3] Proposes software to be installed in the staff's smart phone. It will allow it to connect to the student's smartphone through Bluetooth and validate the student's attendance by transferring or sending the student's smartphone's Media Access Control (MAC) addresses to the staff's smartphone.

Reference [4] Discusses how to solve present challenges while also promoting a paperless environment. The goal was to create an attendance system that required little hardware, setup, and maintenance, such as running the software on the instructor's existing Android mobile device.

Reference [5] Another idea that incorporates real-time facial identification techniques into an existing Learning Management System is (LMS). It detects and registers students who are attending a lecture automatically. The technology serves as a supplement for instructors, combining algorithms with adaptive ways for tracking facial changes over time.

3. PROPOSED SYSTEM

The Current Attendance system is time consuming and requires manual workload. Thus, our proposed system is used to smartly manage various classroom tasks, which uses facial recognition-based attendance. The system will be able to verify students' identity and prevent false registration. In our proposed system students will able to view their attendance analysis, he/she can apply for leave, be able to give feedback and also receive notice from admin/faculty.
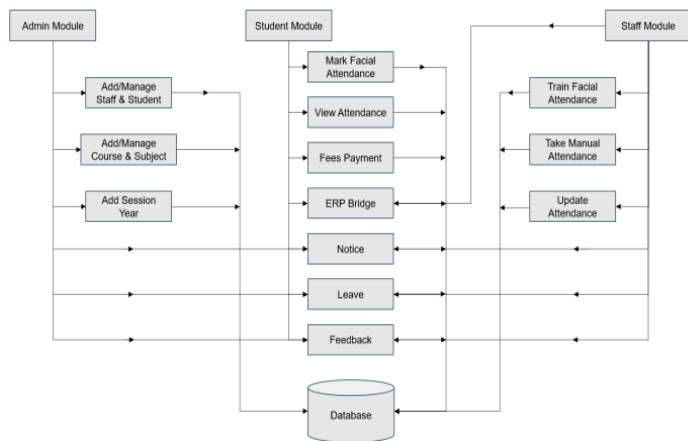
Fig 1: System Architecture

Our proposed system has three modules/login:

1. Admin
2. Faculty
3. Student
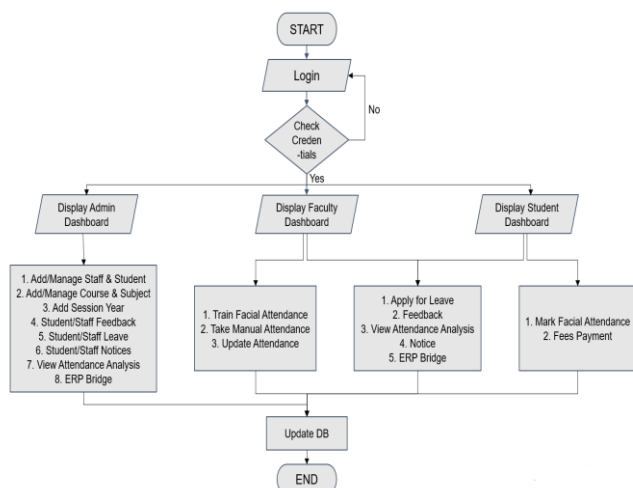
A. Admin Module:

1. Add/Manage Staff & Student

Add new students and staff by entering details, also able to update/delete details.

2. Add/Manage Course & Subjects

Add subject by entering subject name, course and faculty name.

3. Add Session Year

Add the academic year with the help of a calendar.

4. Student/Staff feedback

Admin will be able to view feedback given by staff/students and also reply to the same.

5. Student/Staff Leave

Receives leave application sent by staff/students and has right to approve or not.

6. Notices to Student/Staff

Admin will be able to send notices to particular staff and students

7. View Attendance Analysis

Admin would be able to view attendance analysis in the form of charts.

8. ERP Bridge

Simple Bridge between College ERP and our proposed system.

B. Faculty Module:

1. Train Facial Attendance

Register new students and their photos to train facial recognition model and be able to view analysis of the attendance.

2. Take Manual Attendance

Proposed system also support process of taking attendance manually by tick/untick of student name.

3. Update Attendance

View/Update attendance manually by fetching students' attendance data of a particular date.

4. Apply for Leave

Faculty will be able to apply for leave and send for an approval.

5. Feedback

Able to give feedback to students.

6. View Attendance Analysis

Individual student attendance analysis will be available on the dashboard in the form of charts.

7. Notice

Able to view notice and reply to the same.

C. Student Module:

1. Mark Facial Attendance

Students can mark there in/out facial attendance with the help of a pre-trained dataset.

2. Apply for Leave

Students are able to apply for leave and send for an approval.

3. Feedback

Able to give feedback to staff or on custom topics.

4. View Attendance Analysis

He/she can view their attendance analysis on the dashboard.

5. Notice

Receives important notices from admin/staff.

Facial Recognition based attendance

All students in the class must first register by providing the necessary information, after which their photographs will be taken and placed in the dataset. Faces will be detected from live streaming video of the classroom during each session. Faces will be recognized and matched to photographs in the dataset. If a match is found, the student's attendance will be recorded on time. The technology will recognize faces from video marked out attendance at the end of that session. This procedure is usually separated into four stages:
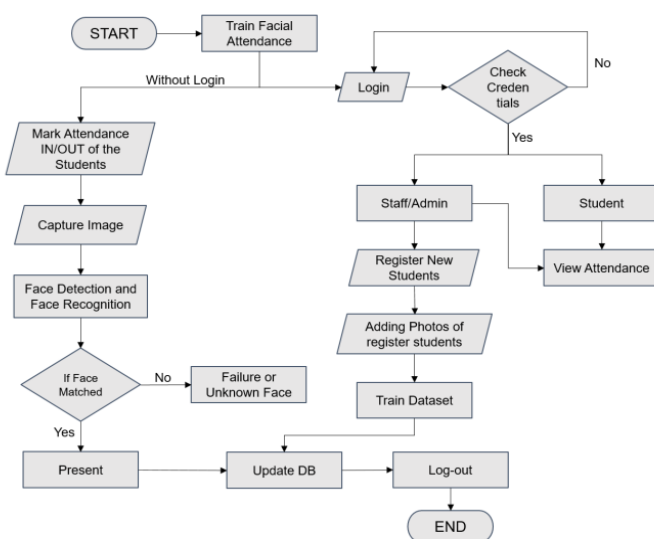
Fig 3: Facial Attendance Flow

1. Creating a Dataset: A web cam is used to collect images of students. A single student will be photographed multiple times from various angles and motions. These images have been pre-processed. The Region of Interest is created by cropping the photographs (ROI). The photographs are then cropped and scaled to a specified pixel point. The images will then be saved in a folder labelled with the students' names.

2. Recognition of faces Face detection is done with OpenCV, the detect Multiscale module from OpenCV is used here. This is required to create a rectangle around the faces in a picture. There are three factors to consider: scale Neighbors, minFactor, min Size. scale Factor is used to indicate how much an image must be reduced in each image scale. min Neighbors specifies how many neighbours each candidate rectangle must have. Higher values detect fewer faces but detect higher image quality, minSize specifies the minimum object size.

3. Face Recognition: The face recognition process can be divided into three stages: prepare training data, train face recognizer, prediction. Here training data will be the images present in the dataset. They will be given the integer label of the student to whom they belong. Face recognition is then performed on these photos.

4. Attendance Updation, After face recognition process, the recognized faces will be marked as present in the database and the rest will be marked as absent.

4. System Workflow

Attendance - an unavoidable part of any class or lecture! Marking attendance is quite important for a number of reasons. As significant as attendance is, it consumes a lot of class time and doesn't contribute toward student progress.

Attendance taking process with facial recognition will save time, reduce teacher workload and streamline the process of classroom management.

A. Student Portal
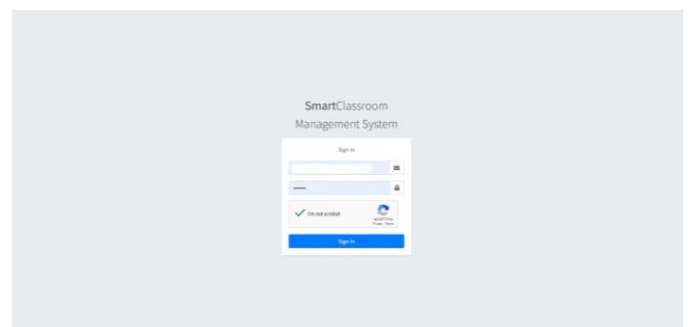
Students are supposed to login using their email-ids and Password. Along with Captcha verification to avoid robots/bots from login.
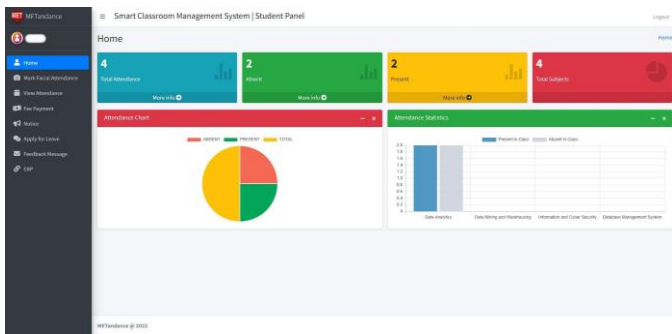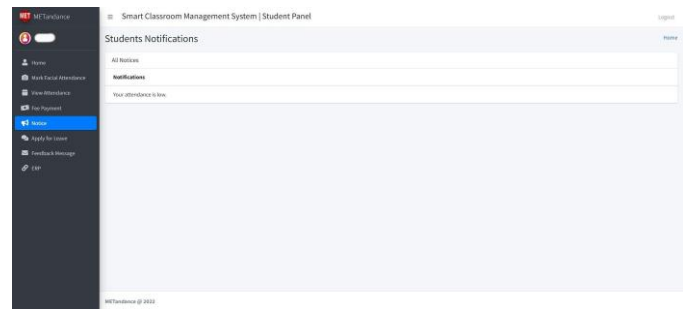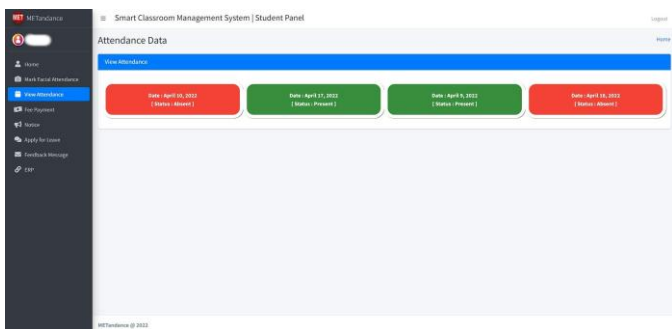
Student will be able to navigate in system via dashboard, in this student can view their overall attendance analysis in charts.
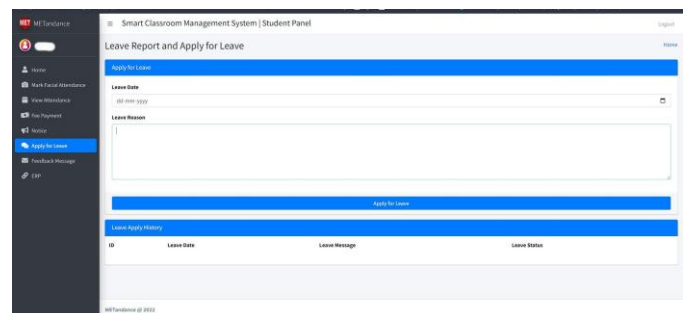

Students can mark there in/out attendance in portal, web camera will capture their faces mark attendance.
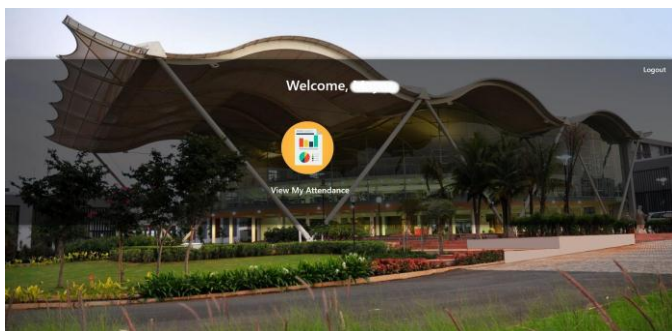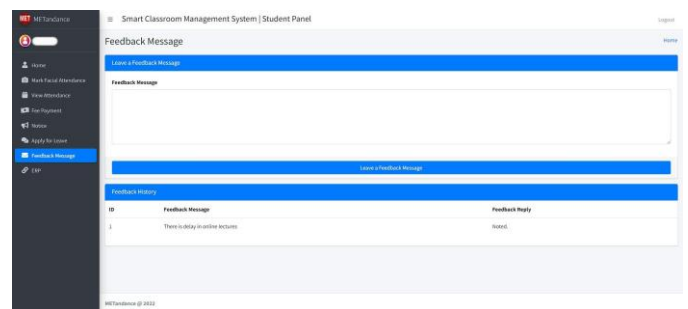

After marking attendance students can check their attended sessions time and analysis.

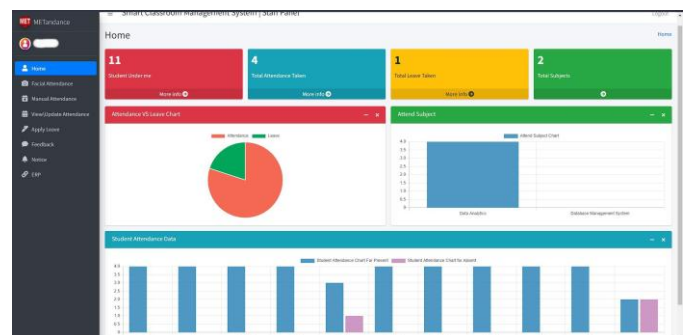Students are able to see the notification sent by the admin/Faculty.

Students can apply for leave and able to check their previous applied leave.

In this student gave feedback of staff to admin by mentioning details.

B. Faculty Portal

On the dashboard faculty will able to see number of students under them, individual student attendance data, total subjects he/she is teaching, along with being able to view all data in the form of charts.

For the facial attendance faculty will register students, add their photos by capturing via web cam to trains the facial recognition model.
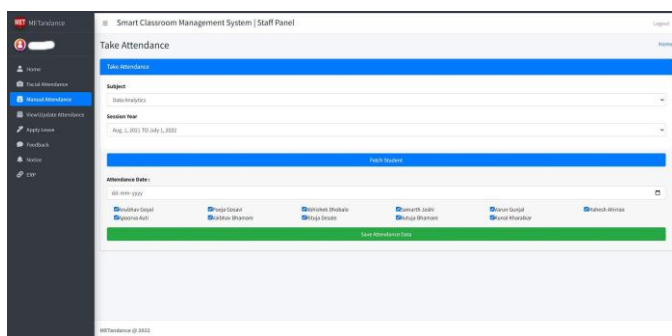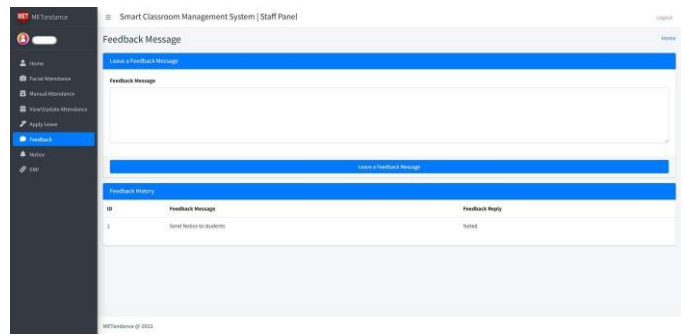

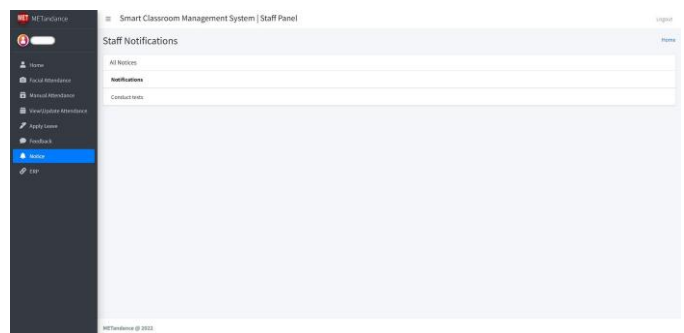Also faculty can take manual attendance by fetching student's data.
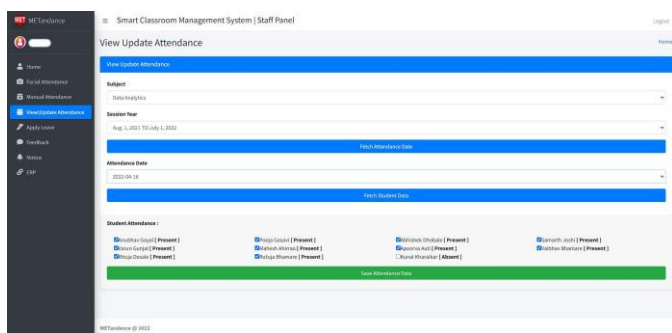
After taking attendance faculty will be able to modify attendance data by using tick/untick on student names.
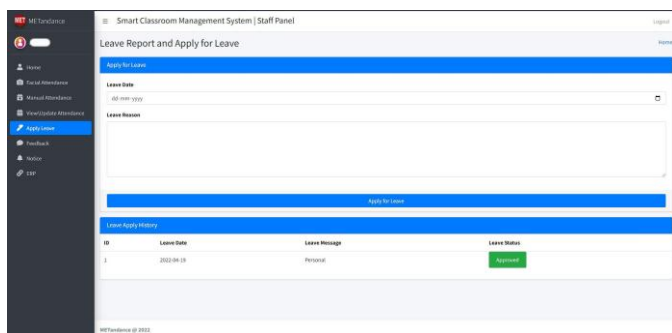
Faculty can apply for leave by entering a leave message, able to view their leave status being approved or not.
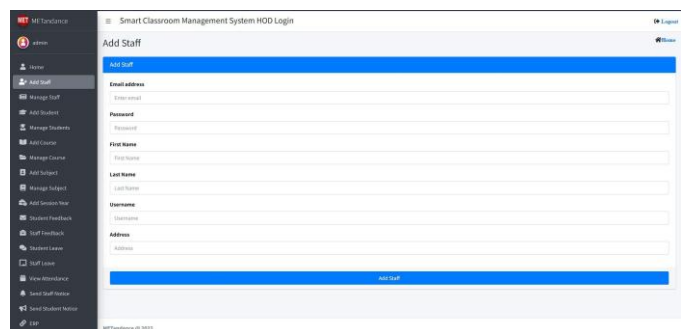

Faculty will be able to give feedback.

Faculty can see the notice/notification received via admin.

C. Admin Portal

On the dashboard admin will be able to see the total number of students, faculty, courses and subjects. Also, able to view all these data in data graphical form.
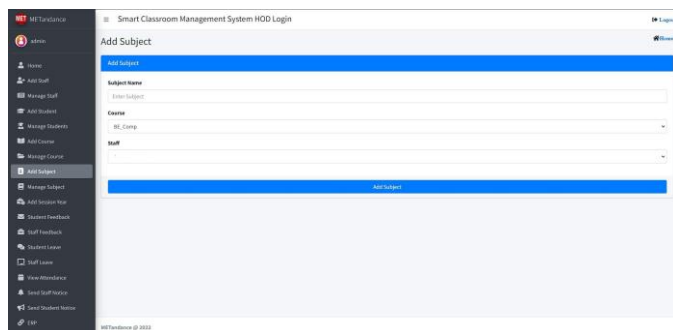
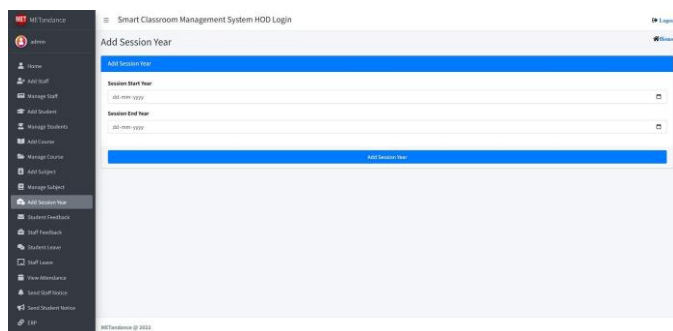Faculty and students' attendance vs leave bar charts available in admin dashboard.
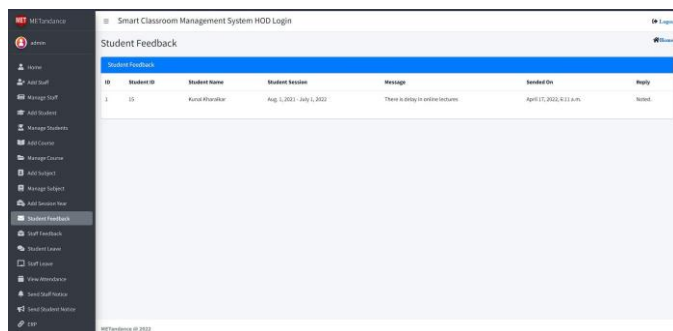
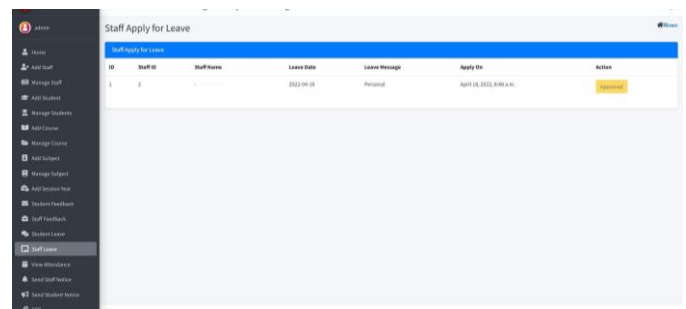Admin can add/manage faculty.
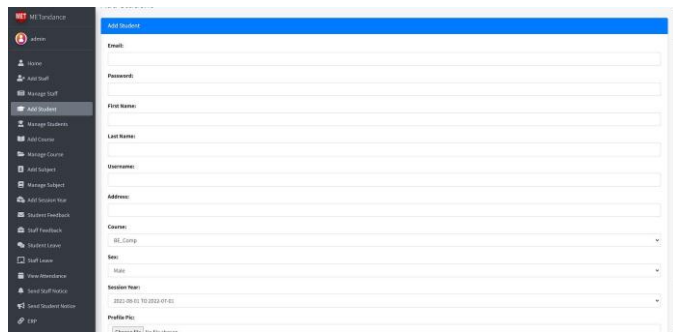
Admin can add/manage students.
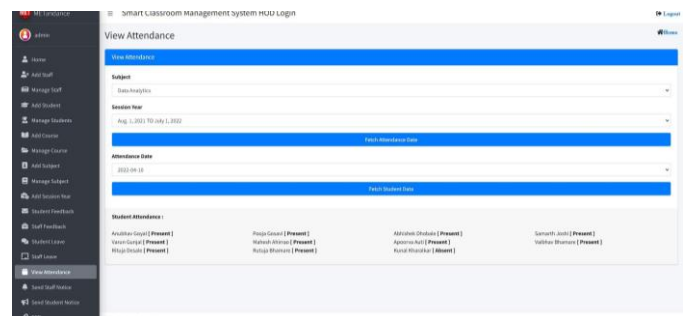
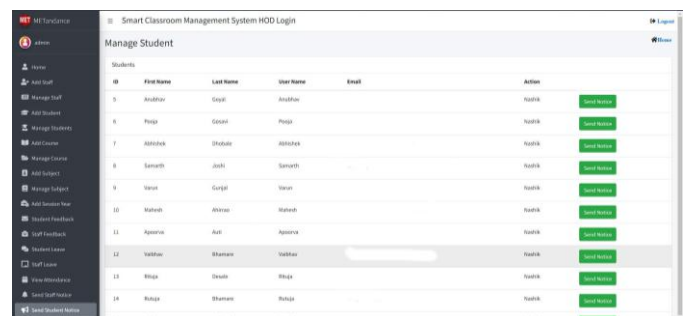Admin will able to add/manage subjects

Admin can add a session year.

Admin will be able to view feedback sent by students/faculty and reply to that feedback.

Admin will be able to approve faculty/students leave.

Admin will able to view the attendees list by date.

Admin will also able to send notice/notification to particular Student or faculty.

5. CONCLUSIONS

These days it's needed to stay up with the most recent technologies, particularly within the field of education.

Educational establishments are trying to find ways to reinforce the academic method exploitation of the most recent technologies. Observing the prevailing state of affairs, we've got the thought of exploiting mobile technology to efficiently enjoy the entire time allotted to a lecture. Time taken by instructors for attendance is also viewed generally as a waste of lecture time, particularly one with huge classes.

The attendance management system is extremely vital in our daily life. It possesses a really great advantage, among the whole types of technologies, Facial Recognition Attendance System is the most efficient and Time Saving.

In this proposed system, we have given an introduction to the Attendance management system and its advantages. It is an efficient method to store the attendance on the server rather than wasting paper.

6. ACKNOWLEDGEMENT

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