

# **A First Project Report On TechJobs - Connecting Tech Talent to Tomorrow's Opportunities**

Submitted in Partial Fulfillment of the Requirements for the Degree of  
**Bachelor of Engineering in IT Engineering**  
under Pokhara University

Submitted by:

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## **Acknowledgement**

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Last, but not the least, we would like to thank our teacher and colleagues who have been knowingly or unknowingly been the part of this project and lent support and views during the entire development time.

## **Abstract**

TechJobs is a dynamic and innovative platform designed to revolutionize the way professionals and employers connect in the ever-evolving landscape of the technology industry. This platform leverages cutting-edge technologies to streamline the job search and recruitment processes, addressing the unique challenges faced by both job seekers and employers in the tech sector.

For job seekers, TechJobs offers a user-friendly interface with advanced search and filtering options tailored specifically for technology-related roles. The platform employs state-of-the-art algorithms to match candidates with positions that align with their skills, experience, and career aspirations. Additionally, TechJobs provides a comprehensive suite of resources, including career development insights, skill enhancement opportunities, and networking events, empowering individuals to thrive in their tech careers.

Employers benefit from a robust and efficient recruitment ecosystem on TechJobs. The platform utilizes artificial intelligence and machine learning algorithms to analyze job descriptions, ensuring accurate and relevant candidate matches. Employers can showcase their company culture, values, and projects through multimedia-rich profiles, attracting top-tier talent. TechJobs also facilitates seamless communication between recruiters and candidates, enhancing the overall recruitment experience.

Furthermore, TechJobs adapts to the fast-paced nature of the tech industry by staying abreast of emerging trends and skill requirements. The platform actively collaborates with industry leaders, educational institutions, and professional organizations to ensure that both candidates and employers are equipped to thrive in an ever-changing technological landscape.

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# 1 Introduction

In the dynamic realm of technology, where innovation is a constant and the demand for skilled professionals is ever-growing, TechJobs emerges as a pivotal platform at the intersection of talent and opportunity. As the tech industry continues to evolve, so does the need for a revolutionary approach to job seeking and recruitment. TechJobs addresses this need by offering a sophisticated, AI-driven solution that not only streamlines the job search process but also transforms how employers discover and engage with top-tier tech talent. This introduction provides a glimpse into the essence of TechJobs, a platform poised to redefine the landscape of tech employment, connecting individuals with their ideal roles and empowering companies to thrive in the digital age.

TechJobs serves as a beacon for professionals seeking to navigate the ever-expanding landscape of the tech sector. Beyond being a conventional job portal, TechJobs is an immersive platform designed to cater specifically to the nuances of the technology industry. With a focus on user experience and powered by cutting-edge algorithms, it offers a seamless interface for job seekers to discover roles that align with their expertise and ambitions. Simultaneously, TechJobs empowers employers by providing them with a toolset that goes beyond traditional recruitment, offering an insightful glimpse into the skills, culture, and innovations that define their organizations. As technology becomes increasingly integral to every facet of our lives, TechJobs stands as a gateway for individuals to forge meaningful careers and for companies to harness the talents that will propel them into the future.

## 2 Problem Statement

Traditional attendance system in universities relies on using paper and manual methods. This leads to problems such as mistakes, delays, and inefficiencies in keeping track of students' attendance. It takes a lot of time and effort for teachers and staff to record attendance manually for each student, and the process is prone to errors. Additionally, the existing system lacks a centralized database, making it difficult to access and manage attendance records easily. Students and parents also face inconvenience in tracking and viewing their attendance records. Furthermore, the manual system lacks proper security measures, making it vulnerable to tampering or loss of attendance records.

1. Inefficient and error-prone manual attendance system.
2. Lack of centralized database and difficulty in accessing and managing attendance records.
3. Vulnerability to tampering and loss of attendance records due to inadequate security measures.

### **3 Problem Objectives**

The objective of our project is to develop an automated attendance system using face recognition technology that eliminates manual processes, reduces errors, and improves efficiency. Our goal is to create a user-friendly system that accurately tracks and records attendance in real-time, replaces the traditional paper-based system, and provides secure access to attendance data for teachers, students, parents and administrators. The main aim of the project is:

1. To develop an automated attendance system using face recognition technology.
2. To eliminate manual processes, reduce errors, and improve efficiency.
3. To create a user-friendly system for real-time attendance tracking, replacing traditional paper-based methods, and ensuring secure access to attendance data.



## **4 Scope and Limitations**

### **4.1 Scope**

The scope of this project is to ease the attendance process in real-time through AI-powered desktop application with the help of deep learning and computer vision. Our system provides the following scope:

1. Development of a desktop application for administrators to manage the attendance system, including adding classrooms, assigning teachers, registering new students, and generating attendance reports.
2. Creation of a web application for students, parents, and teachers to view their attendance records, providing easy access to attendance information.
3. Implementation of face recognition technology to capture live images of students using CCTV footage, detect and recognize their faces, and update the attendance database in real-time.

### **4.2 Limitations:**

Due to time and resource constraints, our application might have the following limitations:

1. The system may have limitations in terms of hardware and software resources, which may limit the number of students it can handle simultaneously.
2. The system may require additional training data to improve the accuracy of the face recognition technology.
3. The system may face challenges in terms of privacy and data protection regulations.
4. The system may not work effectively in low-light conditions or if the students are wearing face masks.

## 5 Significance of the study

The proposed attendance system using face recognition technology brings several important benefits to the college department facility:

- **Improved Efficiency:** By automating the attendance process, the system eliminates the need for manual paperwork and reduces the time and effort required to record and manage attendance. This frees up valuable resources for faculty members and administrative staff to focus on other important tasks.
- **Accurate and Real-time Attendance Tracking:** The face recognition technology ensures accurate attendance tracking by matching students' faces with the existing database. The system updates attendance records in real-time, providing up-to-date information for teachers, students, and administrators.
- **Convenience for Students:** With the new system, students no longer need to physically shout their names, making the process more convenient and less disruptive during class time. It also provides a reliable means of tracking attendance across different periods and classes.
- **Centralized Database and Easy Access:** The attendance system stores all attendance records in a centralized database, enabling easy access and management for authorized personnel. Generating reports, analyzing attendance patterns, and identifying students with poor attendance become more efficient and streamlined processes.
- **Enhanced Security and Integrity:** The automated system ensures the security and integrity of attendance data. With manual systems, there is a risk of tampering or loss of attendance records, but the proposed system minimizes such concerns through secure and reliable digital storage.

## 6 Literature Review

### 6.1 Similar works

**Safepro AI Video Research Labs Pvt Ltd** provides cognitive integrated smart security & video analytics solutions for smart cities, smart platforms for railways and other public transport agencies, law enforcement, defence, critical infrastructure, highways, traffic management, industries, retail & homes in India.

**NeoFace** by NEC is a facial recognition algorithm that quickly and accurately identifies people, even in difficult situations. It is effective regardless of a person's age, ethnicity, or gender, and can handle factors such as lighting and headwear. It also has privacy safeguards and retention tools.

### 6.2 Similar concepts

**Amazon Rekognition** is a popular facial recognition software that offers various features, including facial analysis, facial search, object and scene recognition, and content moderation. It also provides custom labeling and PPE detection services.

**Betaface** specializes in image and video analysis, facial recognition, identification, and verification. It offers facial recognition SDKs, custom software development services, and hosted web services, and can recognize emotions, ethnicity, and facial features.

**BioID** provides biometrics-as-a-service through cloud-based FRS services that can be accessed using APIs. Its solutions include a web service, liveness detection, and PhotoVerify, and it caters to industries like finance, healthcare, and online exams.

**Cognitec** offers scalable and customizable FRS solutions through its open system architecture called FaceVacs. Its solutions include FaceVACS-VideoScan ES Live, catering to various industries such as law enforcement and border control.

## 7 Methodology

The use diagram for our proposed system is shown below:



Figure 1: Use Case Diagram

The E-R diagram for our proposed system is shown below:

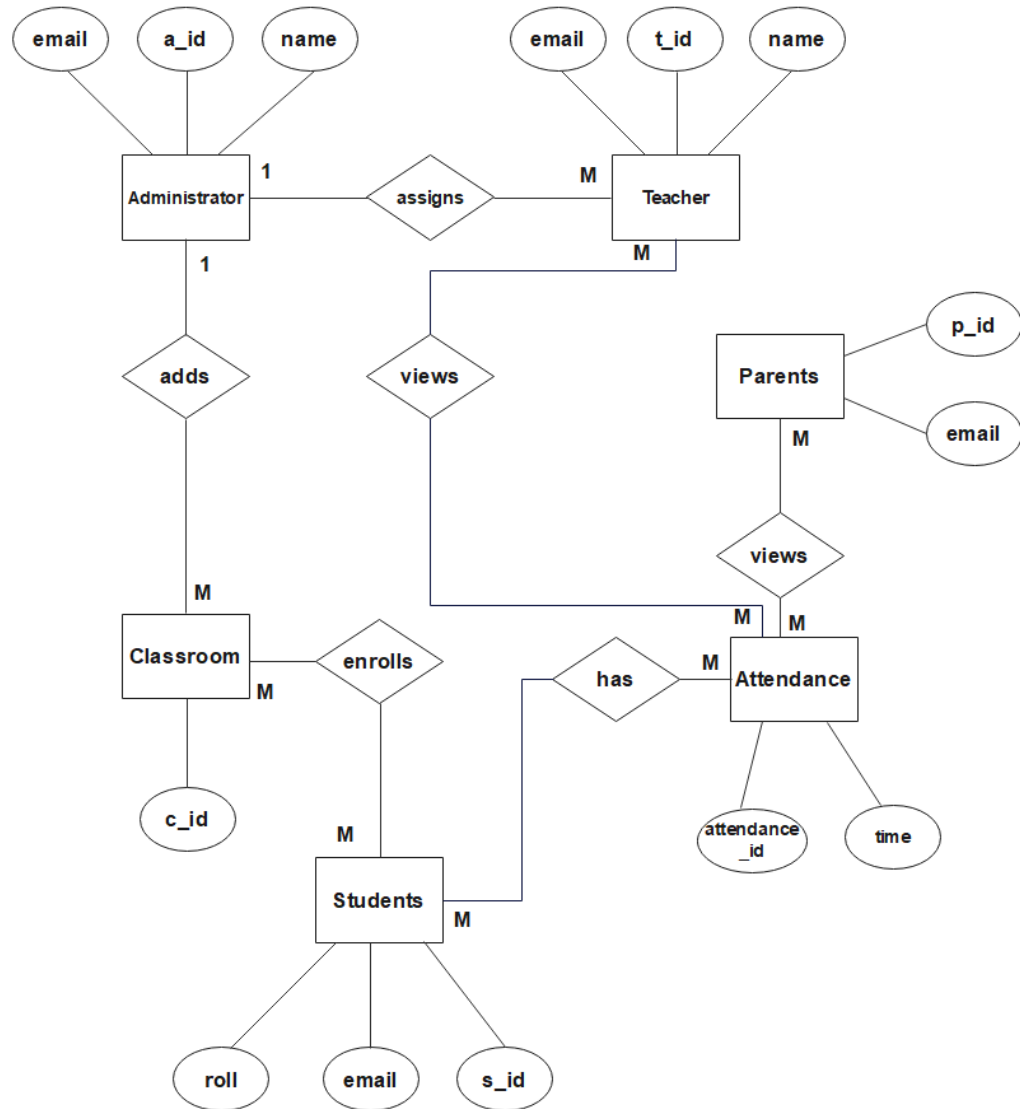


Figure 2: E-R Diagram

We will follow an incremental approach to develop the attendance system using face recognition. The project will be divided into several increments, each focusing on a specific functionality or component of the system. This approach allows us to build and test the system incrementally, ensuring continuous progress and feedback throughout the development process.

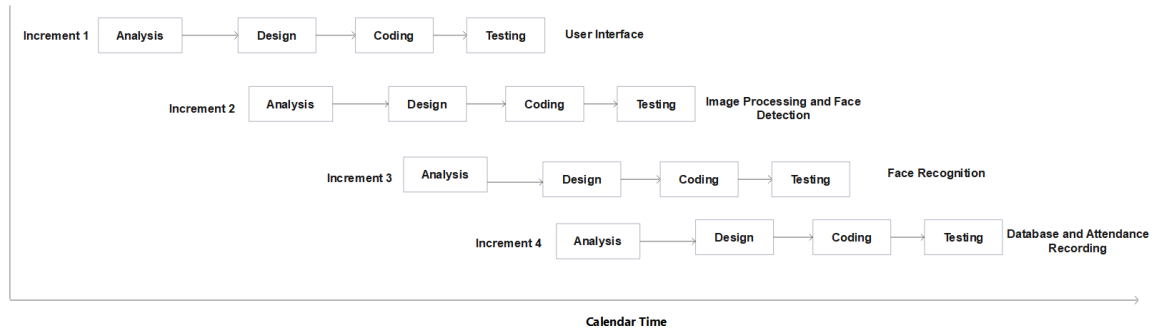


Figure 3: Increment Model

### Project Initiation:

- Define the overall project goals and objectives.
- Identify the key stakeholders and gather their requirements.
- Create the project vision and define the initial scope.

## 7.1 Increment Model

### 1. Increment 1: User Interface

In final increment, we will

- Develop a user-friendly desktop application interface for authorized personnel to manage attendance records and generate reports.
- Develop a user-friendly web-app for end users and teachers view the attendance reports.

- Test the integration of the database and user interface functionality to ensure seamless usability.

## 2. **Increment 2:** Image Processing and Face Detection

In this increment, we will

- Gather the images of students for image processing and face detection.
- Develop the image processing module using OpenCV to detect and extract faces from captured images.
- Test and validate the opencv functionality.

## 3. **Increment 3:** Face Recognition

In second increment, we will

- Develop the deep learning model for face recognition, trained on a dataset of student images and names.
- Implement the face recognition model and test its accuracy and reliability.

## 4. **Increment 4:** Database and Attendance Recording

In third increment, we will

- Design and implement the centralized attendance database.
- Integrate the attendance recording functionality, marking students as present in real-time.

## 7.2 Technology and Frameworks

### Overleaf

Overleaf is an online collaborative writing and publishing platform that allows users to create, edit, and share LaTeX documents. It provides a user-friendly interface with real-time collaboration features, making it easy for multiple authors to work together on a document simultaneously. We will be using overleaf to prepare reports and documentation for the project.

## **Git**

We will be using an open source distributed version control system called Git throughout the project development process. It helps us in tracking changes in programs and coordinating work on those programs among the project team members.

## **LibreDraw**

LibreDraw is a free and open-source software application that allows you to create and edit various types of graphical illustrations and diagrams. It provides a user-friendly interface with a wide range of tools and features for creating UML diagrams. These diagrams will be published in the final report and documentation.

## **Python**

Python is a programming language that is easy to read and write. It is widely used for various tasks, including working with computer vision and machine learning. We will use Python to write code for libraries like OpenCV and TensorFlow, which will help us process images and build machine learning models for tasks like face recognition. Python's simplicity and object-oriented nature make it a suitable choice for these projects.

## **OpenCV**

OpenCV, also known as Open Source Computer Vision Library, is a freely available software library for computer vision and machine learning. It offers a comprehensive set of tools and algorithms that enable tasks such as image and video processing, object detection and recognition, and feature extraction. We will be utilizing OpenCV in our project to leverage its powerful capabilities for tasks related to computer vision and image processing, specifically for our face recognition implementation.

## **Figma**

Figma is a cloud-based design and prototyping tool that allows users to create and collaborate on user interface (UI) designs. It provides a range of features such as real-time



collaboration, vector editing, design components, and interactive prototyping. Figma is widely used in the design industry for creating visually appealing and interactive UI/UX designs. We will be using Figma in our project to create and refine the user interface design for our desktop application.

### **Tauri**

Tauri is an open-source software development framework used to build native desktop applications. It allows developers to create cross-platform applications using web technologies like HTML, CSS, and JavaScript. Tauri provides a lightweight and secure runtime for building desktop apps with a focus on performance and security.

### **ReactJS**

ReactJS is a JavaScript library used for building user interfaces. It allows developers to create reusable UI components and efficiently manage the state of an application. We will be utilizing ReactJS in our project to develop the frontend of our face recognition attendance system, enabling us to create dynamic and interactive user interfaces for a seamless user experience.

### **MySQL**

MySQL is a popular open-source relational database management system. It allows users to store, organize, and manage structured data efficiently. We will be using MySQL as the backend database for our project to store and retrieve data related to attendance records, student information, and other relevant data.

### **Spring**

Spring Java is a popular framework for building enterprise-level Java applications. It provides a robust infrastructure for developing scalable and modular applications, simplifying the development process and promoting good programming practices. We will be using Spring Java in our project to leverage its features and benefits, such as dependency injection, aspect-oriented programming, and easy integration with other frameworks and li-

braries. It will help us develop a reliable and maintainable backend system for our face recognition attendance application.

## 8 Performance Analysis Methodology

### 8.1 System Test Case:

**Test Case Name:** Attendance Capture and Recognition

**Test Case Description:** This test will verify the system's ability to capture live images, detect faces, and recognize them accurately for attendance marking.

**Test Steps:**

1. Provide a live video feed to the system. Verify that the system captures frames from the video feed. Ensure that the system detects faces in the captured frames.
2. Validate that the system accurately recognizes the detected faces. Verify that the attendance is marked correctly based on the recognized faces.

**Expected Result:** The system should successfully capture images, detects faces, recognizes them accurately, and marks attendance correctly.

### 8.2 Model Test Case:

**Test Case Name:** Face Recognition Accuracy

**Test Case Description:** This test will evaluate the performance of the machine learning model used for face recognition in the attendance system. The objective is to assess the precision, recall, and overall accuracy of the model and generate metrics such as the confusion matrix, ROC curve, and AUC score.

**Test Steps:**

- Prepare a labeled dataset of face images, with ground truth identities.
- Train the machine learning model using the labeled dataset.
- Evaluate the model's performance using a separate test dataset.
- Calculate the precision and recall of the model by comparing the predicted identities with the ground truth labels.

- Generate a confusion matrix to assess the model's accuracy in correctly classifying different identities.
- Plot the ROC curve and calculate the AUC to measure the model's ability to distinguish between positive and negative samples.

**Expected Result :** The face recognition model should exhibit high precision, indicating that the majority of correctly recognized faces are indeed correct. The model should also demonstrate high recall, indicating that it can correctly identify a significant portion of the faces in the dataset.

## 9 Deliverable

### 1. Desktop Application for Administrators:

- Development of a user-friendly desktop application for administrators to manage the attendance system.
- Functionality to generate comprehensive attendance reports.
- Capability to view and analyze attendance data for different classrooms and time periods. Intuitive user interface for easy navigation and interaction.

### 2. Web Application for Students, Parents, and Teachers:

- Creation of a web application accessible to students, parents, and teachers for viewing attendance reports.
- Secure login and personalized access to individual attendance records.
- User-friendly interface for easy browsing and retrieval of attendance data. Compatibility with different devices, allowing convenient access from desktops, laptops, tablets, and smartphones.

### 3. Face Recognition Model:

- Integration of a trained face recognition model into the web application.
- Accurate detection and recognition of faces from live images or video frames.
- Utilization of CCTV footage for capturing images and facilitating face recognition.

### 4. Centralized Attendance Database:

- Implementation of a centralized database for storing and managing attendance records.
- Real-time updating of attendance data in the database.
- Secure storage of attendance records and convenient retrieval and analysis of data.

## **5. User Documentation:**

- User manuals, installation guides, and system requirements provided.
- Step-by-step instructions for using the web application.
- Effective management of attendance records with clear guidance.

## **6. Maintenance and Updates:**

- Ongoing maintenance and updates for the web application, face recognition model, and attendance database.
- Ensuring optimal performance, security, and compatibility with future technologies.
- Regular monitoring, bug fixes, and enhancements to improve system functionality and reliability.

## 10 Project Task and Time schedule

### 10.1 Project Task



Figure 4: Tasks

### 10.2 Time Schedule

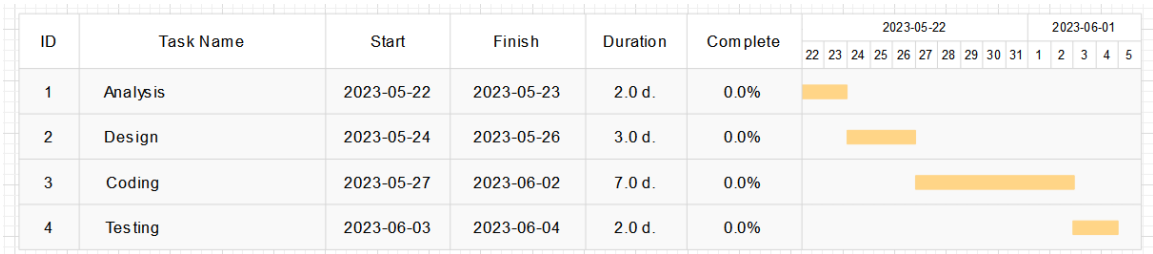


Figure 5: Gantt chart for Increment 1

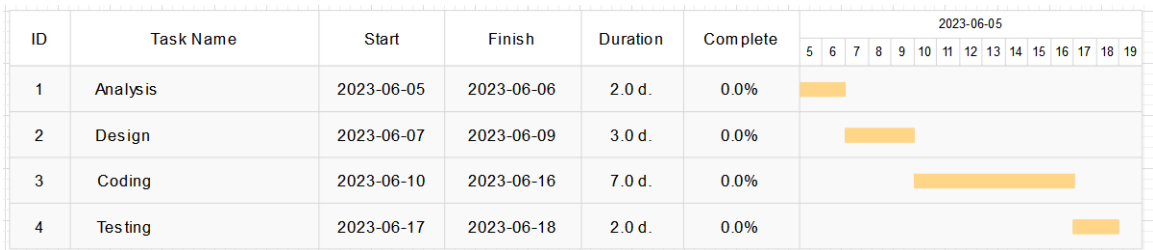


Figure 6: Gantt chart for Increment 2

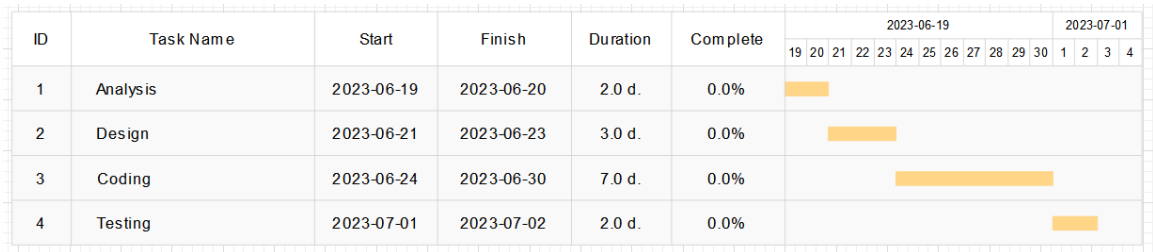


Figure 7: Gantt chart for Increment 3

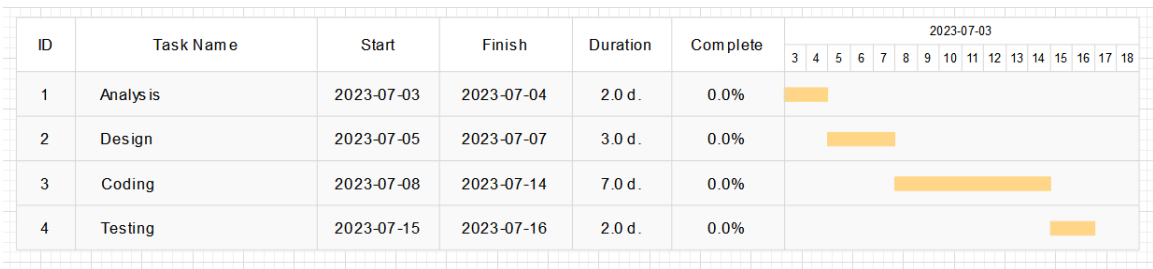


Figure 8: Gantt chart for Increment 4



## 11 Conclusion and Future Extensions

The AttendanceGuru is now at the initial phase having most of the basic functionalities discussed before. All the modules have been working after integrating and are ready for the demonstration. As the features add up the level of complexity has been increasing as well. However, it is not complete with the ideas we have put through and might need more improvisation in the coming days as well. This makes us think about the future extensions that can be implemented in this application. Some of the extensions are:

- Develop a mobile app for remote access and attendance marking.
- Notify faculty and students instantly about attendance.
- Enhance recognition algorithms with AI.
- Encourage attendance with rewards.
- Strengthen data privacy and security measures.
- Make the system adaptable to different institutions.

## References

# APPENDIX

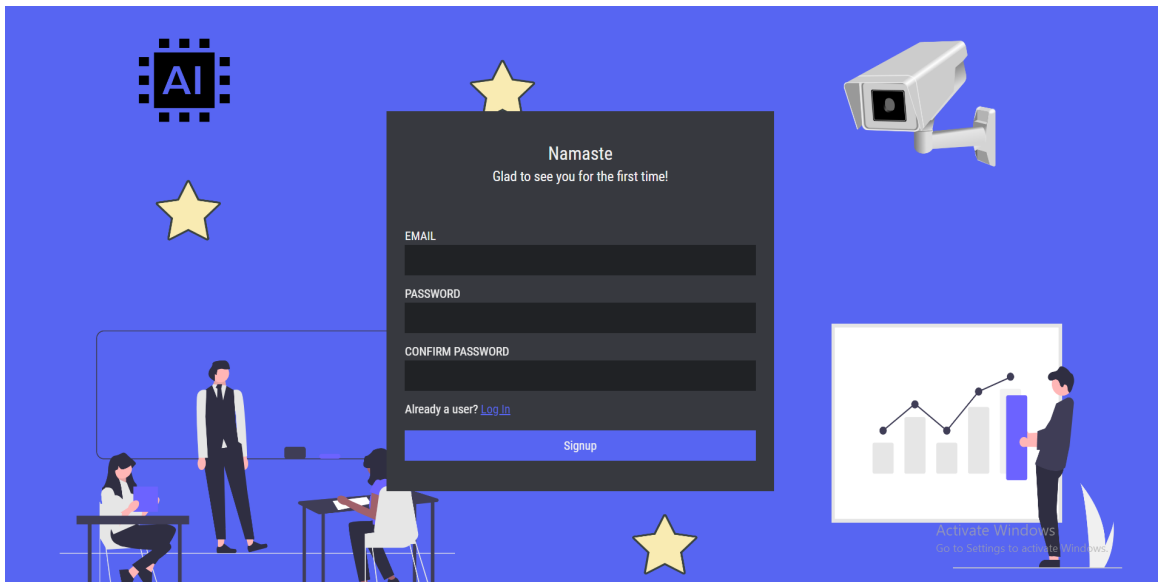


Figure 9: Signup

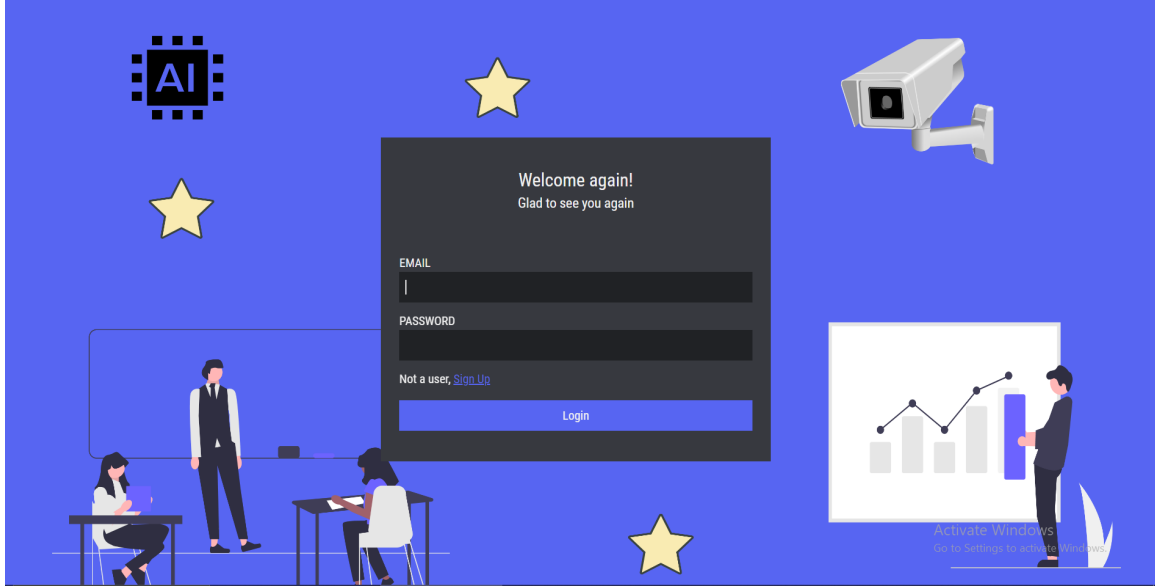


Figure 10: Login



Figure 11: Admin Dashboard(Desktop Application)

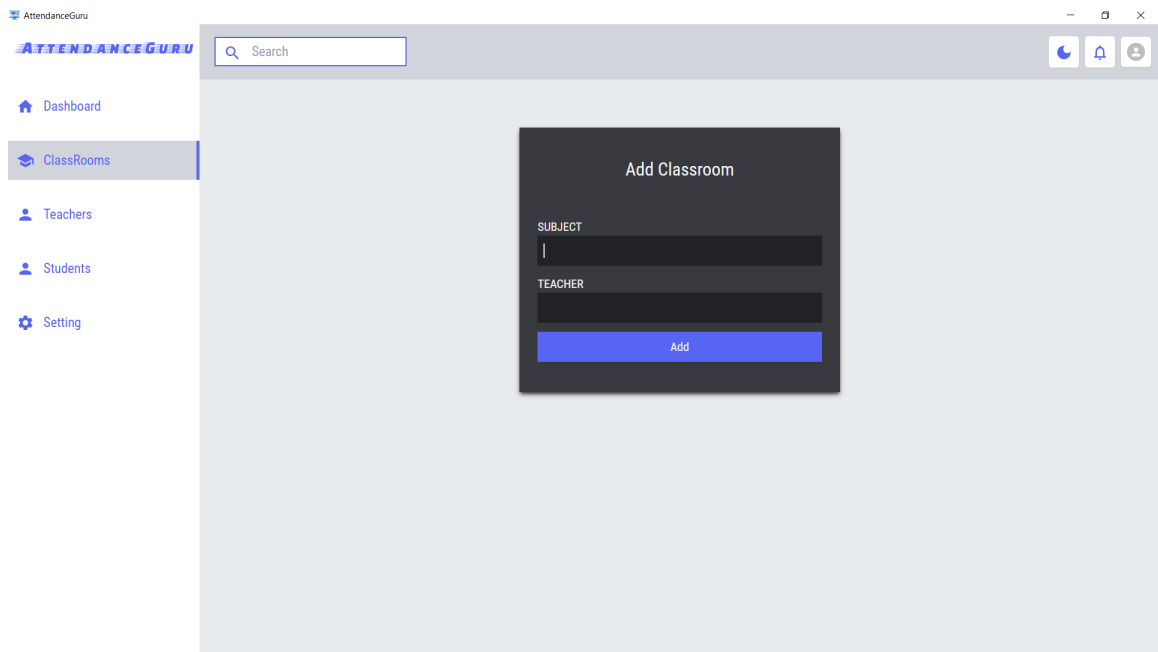


Figure 12: Add Classroom

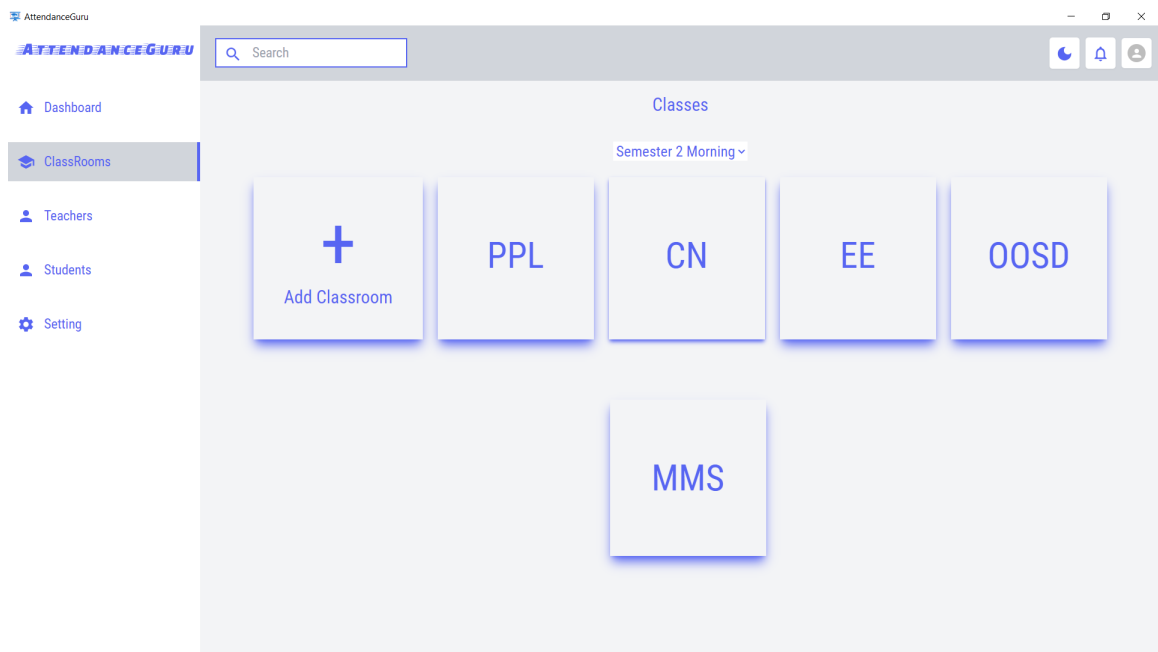


Figure 13: Classes

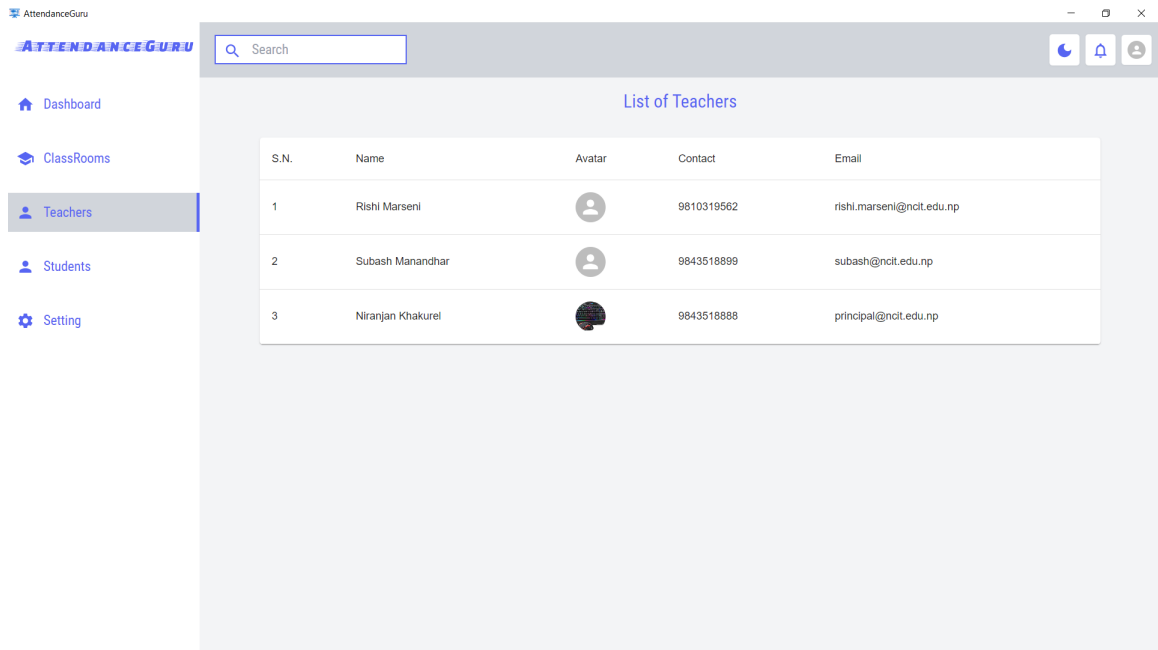


Figure 14: List of Teachers

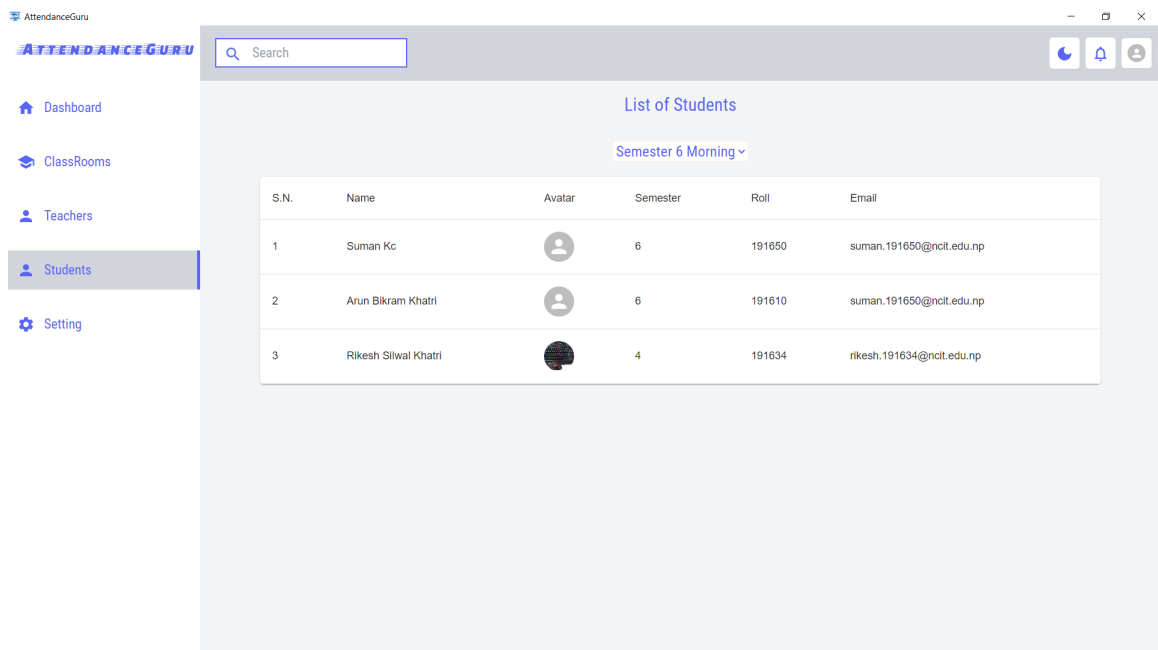


Figure 15: List of Students

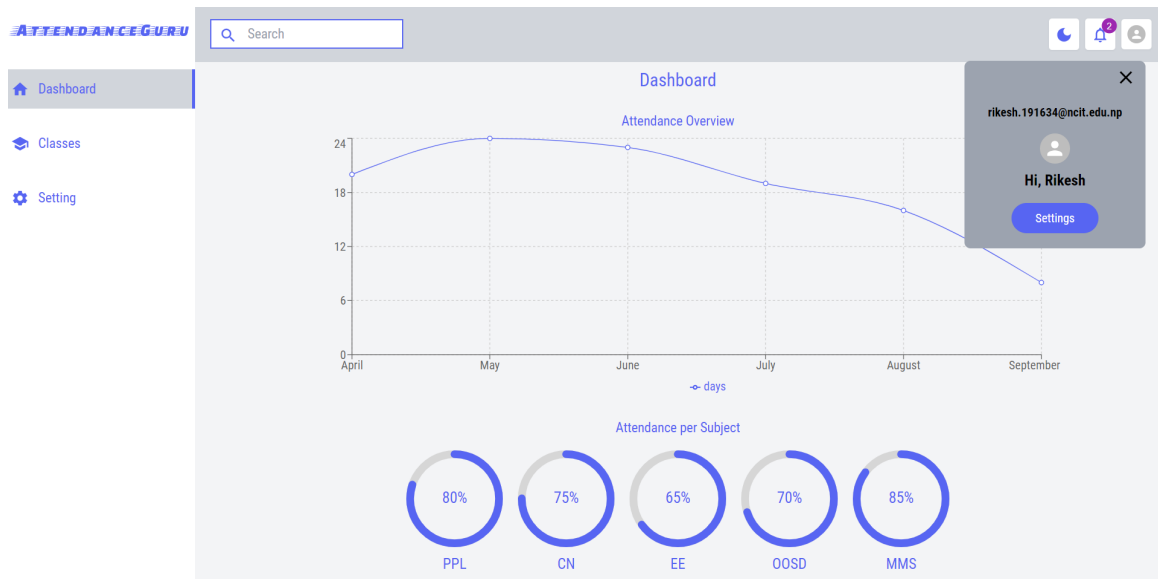


Figure 16: Student Dashboard(Web Application)



Figure 17: Classes Attendance

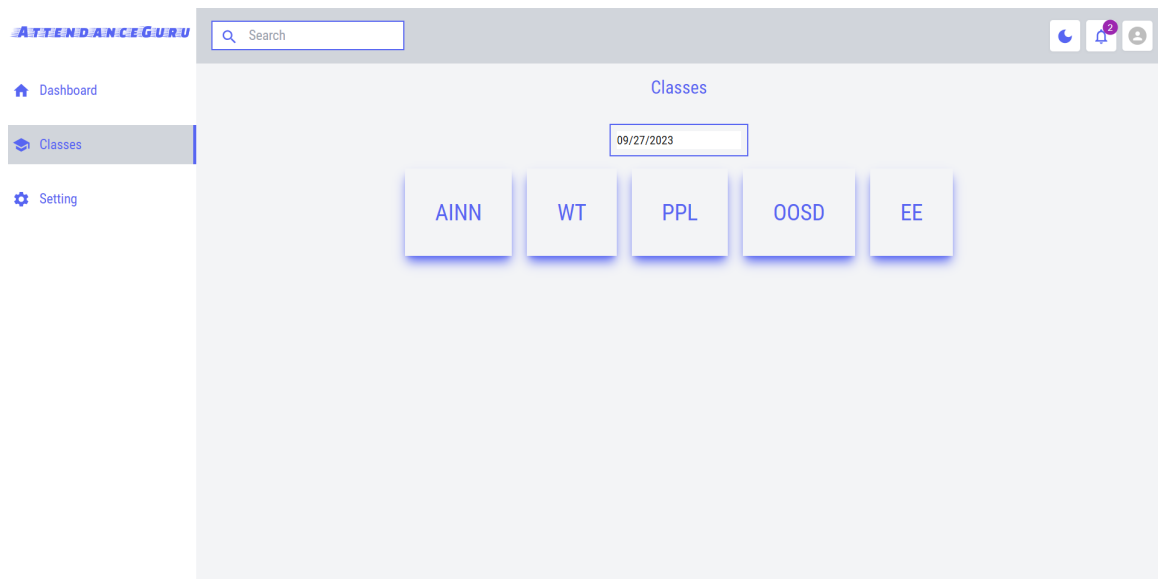


Figure 18: Classes

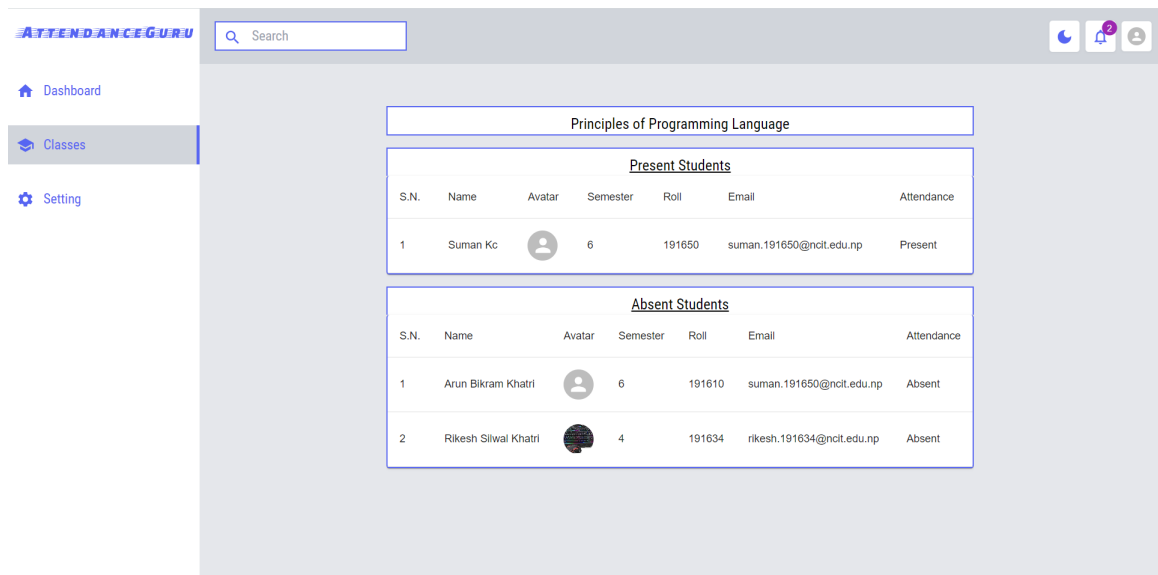


Figure 19: Present and Absent Students



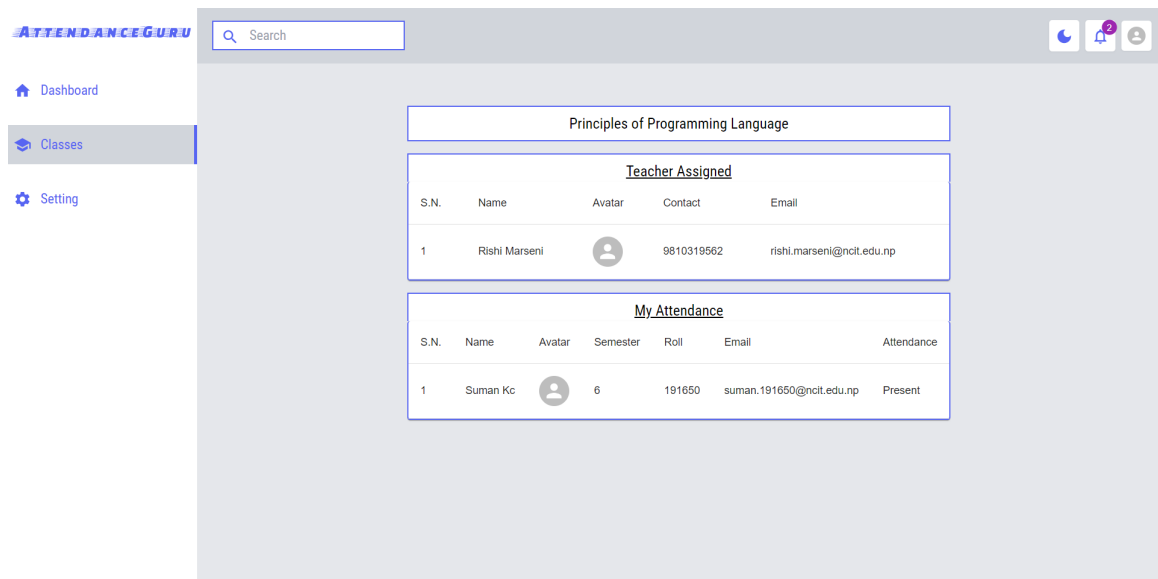


Figure 20: Teacher Assigned and Student Attendance

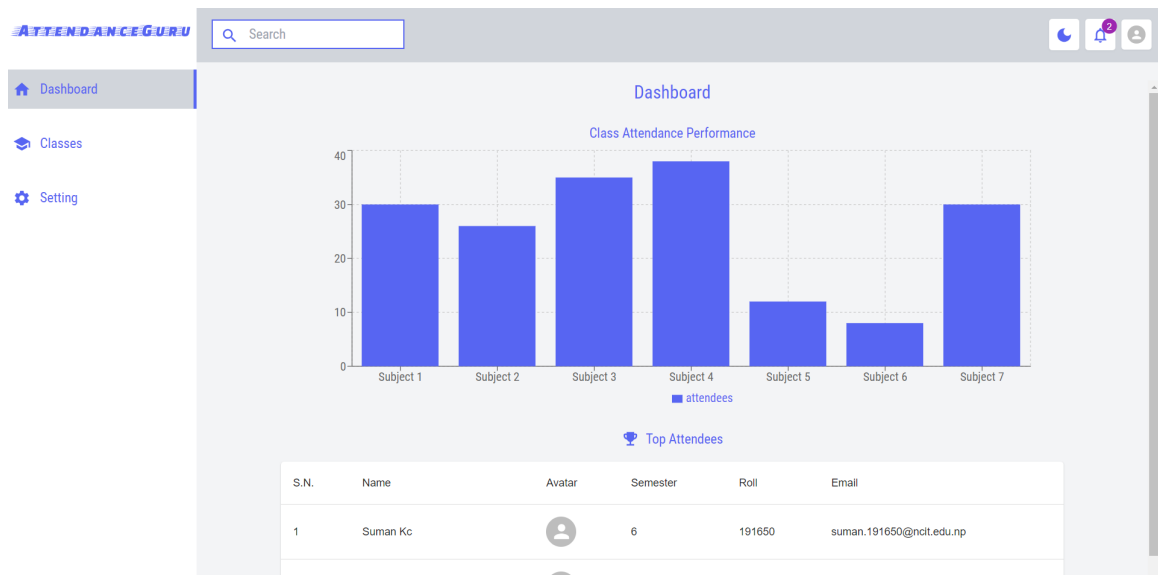


Figure 21: Attendance Per Subject