Student’s activity monitoring in online learning environments

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The candidate confirms that the work submitted is their own and appropriate credit has been given where reference has been made to the work of others.

DECLARATION

We hereby declare that this application, neither whole nor as a part has been copied out from any source. It is declared that we have developed this app and accompanied report entirely based on our personal efforts. If any part of the project is proved to be copied out from any source or found to be reproduction of some other. We will stand by the consequences. No Portion of the work presented has been submitted of any application for any other degree or qualification of this or any other university or institute of learning.

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CERTIFICATE OF APPROVAL

It is to certify that the final year project of BS (CS) "Student Activity Monitoring In Online Learning Environment" was developed by **Saad Bin Aziz (CUI/FA17-BCS-068/ATK)** and **Jahanzeb (CUI/FA17-BCS-050/ATK)** under the supervision of "Dr. Muhammad Shahzad Faisal" and under the co-supervision of " Mr. Najam Dar" that in (their/his/her) opinion; it is fully adequate, in scope and quality for the degree of Bachelors of Science in Computer Sciences.

Supervisor

Co-Supervisor

External Examiner

Head of Department

(Department of Computer Science)

Acknowledgement

By the grace of Allah almighty; who is the most gracious and most merciful by which we are able to complete our project. We are thankful to Allah almighty who make us able to complete our task timely. All praises are for Him.

First, we would like to express profound tribute to our parents who always motivate us and never let us down morally and financially. What we are now is only due to their prayers.

“Dr. Muhammad Shahzad Faisal” is a continuous source of motivation, guidance and inspiration. He is a complete institution, our trainer; our supervisor has guided us in a way that we learn many things. We are grateful to him for making us able to achieve our goal.

We are grateful to our institution who gave us opportunity to complete our task. Some special thanks to those who are always there for boasting up, their support and their prayers who encouraged us at certain phases.

May Allah Almighty keep providing us with all the resources and the guidance to serve people. Ameen.

Saad Bin Aziz

Jahanzeb

Executive Summary

Virtual learning or online learning became most suitable and safe learning method due to this pandemic and nearly every institution and organizations are giving their lectures online and this method is also cheaper and time saving. Now as teachers are using different platforms for teaching students like Microsoft teams, zoom and Google classroom and many more and in all of these applications teacher can't see all of the faces of the students and in most of the cases teacher don't ask students to turn their webcam on or students don't so in both of the cases how the teacher will know that how many students had watched their lecture and in the case of virtual learning in which recorded lectures are given to the students and student had to watched that lectures and its difficult for the teacher to record the lecture but he does for the facility of the students but if the students don't even watch the lectures and just read the handouts then the hard work of the teacher is just waste For this type of situation we are making an application that helps the teacher to see that how many students had watched the video lecture and how much did they watch and he can also make attendance on the percentage of the watched lecture. Our application will make a graph that will show the teacher that how much a student had watched the video lecture.

Table of Contents

List Of Tables

List Of Figures

Chapter 1
Introduction

1. Introduction:

Online or virtual learning is the learning method that is administrated through internet. Our application will be used in a very positive manner in the context of the helping the teacher to let him/her know that how much his recorded lecture is being watched.

2

Online education has gained immense popularity among working professionals and students pursuing higher education. These categories of online learners find immense benefit in the autonomy and flexibility that these courses offer. Online courses can be planned around their schedule which may include full-time employment, internships and caring for family. Online learning can also help them take out some quiet time to study.

Distance learning has been around for a long time, even before technology made it extremely accessible. Traditional schooling is now seeing an increased proliferation of virtual training materials and online courses. Even in a world of tried and tested schooling systems and curricula, the most successful schools are the ones who adapt to the changing times, as well as to the expectations of students, parents and the society. If online education is here to stay, then what are its implications for traditional learning? Instead of focusing on pros and cons, the conversation we should be having today is about leveraging online education to make our education systems more conducive to learning.

Online courses call for a greater amount motivation and self-discipline than a classroom-based course. A classroom has one or more instructors and peers, who can hold a student accountable for their course work. In contrast, online courses involve setting our own goals, tracking progress and meeting deadlines. One does not learn effectively in isolation so online courses do offer discussion forums, email and one-on-one support. Technology also adds on to the visual experience by incorporating animations that can be used interactively for effective learning and communication.

In our app, we have two main users Students and Teachers. Teachers will be able to see the percentage of the watched video and students will be able to log in in order to get monetarized by our application.

Every teacher will have their separate profile which includes teacher's data such as his email, organization name, current post, contact information etc. Through graph that will be built after the video ended we will get the feedback of the students that how was the lecture.

Feedback of users helps the teacher to know that how was his lecture like may be the lecture was in same pitch of sound that students had watched the lecture and their interest was not developed in that lecture and students want to change the way of giving lectures of the teacher then they can easily suggest him in the

feedbacks and also if teacher had taught something wrong because we all are humans and mistake are done by humans then students can tell teacher that you had made a mistake at this point in a very gentle manner through feedback.

1.1 Brief:

In short, the main aim of this project is to provide a platform for the teachers where they will know that their students are watching the videos lectures which they were recording with lots of hard work. It will also help them to know the feedback of the students that how was the lecture. On the user end, this app will only monetarize them and will take feedback of the lecture.

1.2 Relevance to Course Modules:

1.2.1 **Report Writing Skills (RWS):** through which we are able to write our documentation, able to know how to select format and structure to meet formal needs, ensuring that document sequence is logical, meaningful and presentable. Presenting information differently through text, graphs, tables and diagrams.

1.2.2 Artificial Intelligence (AI): is the core subject of CS regarding the development of projects using python through which we are able to learn how to code in python. This course helps us to cope up with the various issue and features of python.

1.2.3 Machine Learning (ML): is one of the main subject through which we are able to apply different techniques and algorithms to classify the data, extract required results from this classification and achieve accuracy.

1.2.4 Web Technologies (WT): is the core subject of CS regarding the development of web applications through which we are able to learn how to make websites using HTML and CSS. This course helps us to cope up with the various issue and features of web applications

1.2.5 **Human computer interaction (HCI):** is a multidisciplinary field of study that focuses on the design of computer and technology and especially interaction between human and computers. The design principles to improve human interaction with computer. Through this subject, we are able to make interactive and user friendly interface.

1.2.6 **Software engineering (SE1 and SE2):** helps us to start our final year project by 5 phases of software engineering i.e. requirement gathering, design, implementation, testing and

maintenance. Different types of software models we have learn helps to decide which software model is to be used in our project according to our requirements.eg water fall, agile, spiral etc.

1.2.7 **Software Design and Architecture** enables us to learn the Unified Modeling Language Diagrams. How to design a software system based on requirement. This course helps in our project that how to design a system. We learn following diagram from this course.

- Activity Diagram
- Use Case Diagram
- Sequence Diagram
- Class Diagram
- Communication Diagram

1.2.8 **Database Management System** is one of the core course of our program that we have studied. This course helps in interacting with the relational databases that are used by most of the applications now a days. It helps in understanding queries, joins, constraints, validations, stored procedures, function etc. These all are the techniques that we have used in this project.

1.3 Motivation and Scope:

Education has the most important effects on society that is giving the people who live in a society the skills they need to compete in the global marketplace, and the skills they need to produce technological goods that can be sold on the open market. Usually teachers are just giving their lectures online and providing students recorded lectures in hybrid courses without knowing student had watched the lecture or not and in most of the cases a teacher is just wasting his hard work because some of the students watch the lecture and understand it and at the time of papers or evaluation they just teach others then why the teacher is making the recorded lecture for the whole class he will send the lecture to only specific students and why he is marking the attendance of all students in order to handle this situation we are making this application

Instead of marking the attendance of the students on the basis of quiz and assignments the teacher will mark attendance of every class like he or she does in physical mode of learning and also he or she don't have to do anything attendance will be marked present if the student had watched the video lecture at least 80%.

1.4 Literature review:

Education is the act or process of imparting or acquiring general knowledge, developing the powers of reasoning and judgment, and generally of preparing oneself or others intellectually for mature life. the act or process of imparting or acquiring particular knowledge or skills, as for a profession. As it is era of technology and almost everything is being held online and education is also converted to online mode and this is so much effective in every aspect like cost and time so we are trying to make this mode of learning more efficient that the imprudence of the students will not be there and everyone will forcefully focus on the lectures and the thing is if students knows that he had to watched to lecture then he will listen it and will don't even cheat in evaluation because he will know about the lectures and will solve the exam by his or herself . No such type of any app is designed and developed yet in Pakistan

1.5 Analysis from Literature Review:

Table 1 Analysis of Literature Review

Application Name	Features	Weakness
Online Student Attendance System in PHP MySQL	Store student daily attendance record and make PDF report from attendance data.	These all apps are just maintain and manage the attendance of student by only face detection and making use of face recognition technique.
Online attendance management system.	Innovative tool to maintain and manage the attendance of students/employees.	
Online Student Management System in PHP	The user can view announcements, recent posts, and departments. From the instructor account, the user can view the student's list and take actions on their grades by adding on each.	
Smart attendance management system using face recognition	Used to detect faces in images and deep learning method is used to compute and compare feature facial of student to recognize them	
Face Detection and Recognition Student Attendance System	Face detection and recognition in image	

	processing to build a system that will detect and recognize frontal faces of students in a classroom.	
14 Real-Time Smart Attendance System using Face Recognition Techniques	14 automated attendance management system for students of a class by making use of face recognition technique	

1.5.1 Features of our App:

- Student Activity monitoring of online lectures
- Summarize the student's history of watched lecture
- Student gives the feedback to the teacher
- Teacher can modify his lecture according to the feedback
- Attendance will be marked automatically by our app based on monetarizing of student

1.6 Methodology and life cycle:

Methodology selection is as important as first building block for development of application. After designing of this app, the methodology selected should be flexible so that it can be molded as user's interest changes or with any increase in features of application. For example introducing new fields and features. So, our project will follow agile process model.

1.6.1 Benefit of agile development

Following are the benefits of agile development, that correctly justifies our choice of choosing the agile development for the completion of this project;

Agile development improves the quality of the work as it goes through the evaluation phase after every module is done.

- It prioritizes the user' values on other things and considers the user's expectations from a project.
- It involves the user during development stage of project and considers the client suggestions
- Under agile development, we have an opportunity to constantly refine and reprioritize the

actual product.

- All the features of the product are quickly delivered, to save time and burden. This thing also satisfies the customers that what is the progress status of project.
- It allows the product changes if the feedback from the stakeholders are not good.

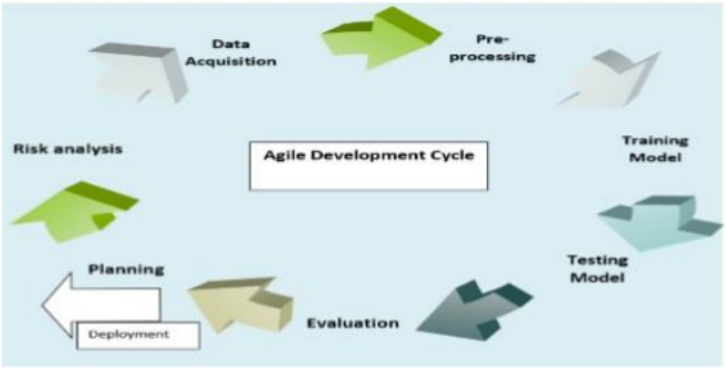


Figure 1 Agile development

1.7 Rational behind selected Methodology

We selected agile development as the possibilities of changes in system are high as user's interest and priorities may change or may be new features will introduced. This development focuses on user's satisfaction. In this case teacher are the main users who have to motivate the student to watch the whole lecture and learn and understand from the recorded lecture. So the main objective of this app is to provide an integrated communication platform where they will satisfy the teacher and student.

Chapter 2
Problem Definition

2 Problem Definition

In this chapter, we will introduce our problem statements, our objective followed by discussing the deliverables and development requirements of our project.

2.1 Problem Statement

Problems are just like uninvited guests; but only solution is to face or searching for better solution. Technology is advancing day by day but there is a gap between student interest and the adoption of the right field. Educational issues impact essentially every part of our lives.

In online learning environment the main problem arises it the students don't watch the video lectures and just give their exams through cheating and this just wastes the hard work of the teacher who had made recorded lectures for them in the whole course and the thing is when the student is being bound on watching the lectures the lecture then he will definitely learn from that lecture and will not do the cheating in the exam and teachers will not go blindly that students had watched the lecture and when he had learned the things taught to him then there will be no need to him to use unwanted means to solve his exam.

2.2 Deliverable s and Development Requirements:

Our project delivers only on one platform i.e. Web Application. Our app will help the teachers to know that how many students had watched the lecture and also how much they had watched

2.2.1 Tools:

- MS Word
- MS PowerPoint
- Visual Studio Code
- Visio 2016
- Xampp
- Google Chrome

2.2.2 Languages:

- Python
- Django

2.2.2.1 Python:

Python is a general-purpose coding language which means that, unlike HTML, CSS, and JavaScript, it can be used for other types of programming and software development besides web development. That includes backend development, software development, data science and writing system scripts among other things.

2.2.2.2 Django:

Django is a high-level Python Web framework that encourages rapid development and clean, pragmatic design. Built by experienced developers, it takes care of much of the hassle of Web development, so you can focus on writing your app without needing to reinvent the wheel. It's free and open source. We have used Django framework because Django was designed to help developers take applications from concept to completion as quickly as possible and Django takes security seriously and helps developers avoid many common security mistakes, such as SQL injection, cross-site scripting, cross-site request forgery and clickjacking. Its user authentication system provides a secure way to manage user accounts and passwords.

Chapter 3

Requirement Specification

3 Requirement Specification:

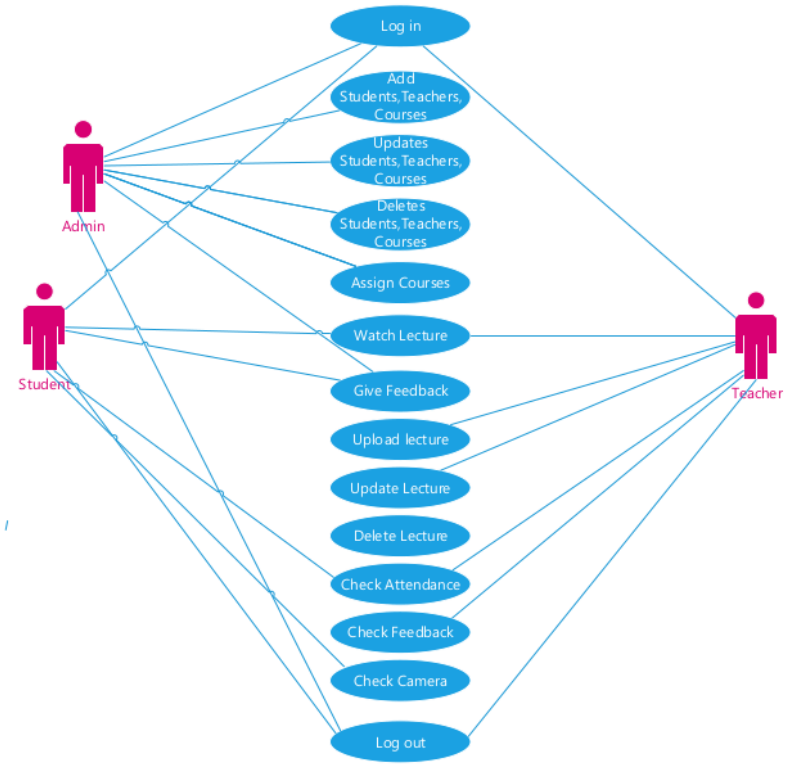
In Requirement Analysis we focus on requirements means need and its details. In this process we are determining user expectations and needs and conditions. We analysis the requirements like what are the things we want to do this. In this phase we communicate with system users to identify what they exactly want. Requirement Analysis also dealing with the functional analysis and system analysis and focus on both hardware ware software requirements. Requirement analysis is very important phase in software development. The requirements are always gathered either we make a new product from the ground level or we do some modifications in existing project. It is very necessary to identify customer needs and to examine the system for feasibility and evaluating the technical and economic analysis of the system and to identify the limitations and constraints of the system. Further, it helps the development team to gather information from the customers in form of model, flow charts etc. Once the requirements are gathered from the user, we write all the requirements in the SRS (software requirement specification), in form use cases, or as user stories or in the form of context diagram, entity relationship diagrams etc. which are then again shared with the customers for the approval of the requirements. We write the use cases in simple words so that it can be easily understandable by the users and developers. Requirement engineering involves the four major steps, feasibility study, Requirement gathering, software requirement specification, followed by software requirement validations. In feasibility study, the client explains its rough idea to the project team, after this analyst perform analysis to gather requirements and written that requirements in formal form in SRS and then customer feedback is given on that requirements.

3.1 Use case Diagram[s].

Use case diagram is used to show the actions and functionalities, which are allowable to application users. The functions application can perform. Basically, here we show the interaction between different entities of the system application. The functionalities are interrelated. Front end shows interactive interface and functions that application can perform. They are very helpful in viewing. Use case diagram describe the high level view and technical view of the system for stakeholders. Use case diagram describes the relationship between the system that can be modelled and the outside world. In Student's activity monitoring system in use case diagram we have two Actors;

- Teacher
- Student
- Admin

3.1.1 Teacher student and admin Use case:



3.2 Detailed use case:

Detailed use case diagram is about the detail of every points that discuss in use case to make it more detailed. In Detailed use case we are gives the id and name to each use cases and make it elaborate. In Detailed use case we are including the details about actor, triggers, post conditions, preconditions, alternative flow, expectations, business rules and assumptions as well for each use case.

In Student's activity monitoring system use case first of all we discuss about lecture monitorization and detailed use case we explain all the point that are trigger, post condition, pre-conditions and so on. This is same for all use cases lectures uploaded, face and eyeball recognitions, watching lectures and computing results i.e. Attendance. We include all the details according to their specific conditions. In the below tables we have the detailed use case diagram of Gait recognition with explanation of each use-case.

3.2.1 Student use case:

3.2.1.1 Login for student

Table 2 Log in

Use case name	**Login for student**
Actor	Student
Description	Student can login to the system to perform related activities
Pre-condition	Student's data already in the database.
Post-condition	Connection to server establishes, and student logged in successfully.

3.2.1.2 Check Camera before watching video lecture

Table 3 Check Camera

Use case name	**Check Camera**
Actor	Student
Description	Student can check camera before watching any video lecture uploaded by the teacher
Pre-condition	Student camera must be in working state.

Post-condition	After pressing the Check Camera button student can check camera of system.

3.2.1.3 Camera permission :

Table 4 camera permission

Use case name	**Camera permission**
Actor	Student
Description	Student has to give permission to camera before watching any video lecture uploaded by teacher in course.
Pre-condition	Student must be registered into the course and camera must be accessible
Post-condition	After camera permission the system will start to generate the attendance of a student by monitoring the motion of student.

3.2.1.4 Watching videos lectures :

Table 5 watching videos lectures

Use case name	**Watching videos lectures**
Actor	Student
Description	Student can watch the uploaded video lectures given by the teacher in particular course.
Pre-condition	Student must be registered into the course and camera or must be accessible
Post-condition	After Watching video lectures the system will start to generate the attendance of a student by monitoring the motion of student.

3.2.1.5 Give a Feedback:

Table 6 Give a feedback

Use case name	**Give a feedback**
Actor	Student
Description	Student can give a feedback on the video lecture uploaded by a teacher. Student's comment can be positive or negative depends on whether he like that lecture or not.
Pre-condition	Student must be registered into the course.
Post-condition	That comment is stored in database for further processing such as classifiers will classify them to negative or positive and it help in marking the reputation of teacher.

3.2.1.6 Logout for Student:

Table 7 Logout for student

Use case name	Logout
Actor	Student
Decription	Student can logout from the system to secure its data
Pre-condition	Student must be logged in.
Post-condition	Student will navigate to the start page of system which shows that he logged out successfully.

3.2.2 Teacher use case:

3.2.2.1 Login for teacher

Table 8 Login for teacher

Use case name	Login for teacher
Actor	Teacher
Description	Teacher can login to the system to perform related activities
Pre-condition	Teacher's data already in the database.
Post-condition	Connection to server establishes, and teacher logged in successfully.

3.2.2.2 Upload video lecture:

Table 9 Upload video lecture

Use case name	Upload video lecture
Actor	Teacher
Description	Teacher can upload video lecture related to subject or can post any other video related to that topic.
Pre-condition	Teacher must be logged into the system.

Post-condition	Uploaded item will be saved in database and will be displayed to the students.

3.2.2.3 Search student:

Table 10 search student

Use case name	**Search student**
Actor	Teacher
Description	Teacher can Search any student and mark his/her attendance accounting to the summery generated by system.
Pre-condition	Teacher must be logged into the system.
Post-condition	Teacher can search any student and mark his/her attendance accounting to the summery generated by system.

3.2.2.4 Check feedback:

Table 11check feedback

Use case name	**Check feedback**
Actor	Teacher
Description	Student can give a comment on the lecture uploaded by a teacher and teacher can check the student feedback easily but cannot remove any feedback and neither reply to any feedback given by student.
Pre-condition	Teacher must be logged into the system.
Post-condition	That comment is stored in database for further processing it helps in marking the reputation of teacher lectures.

3.2.2.5 Check Attendance:

Table 12 check Attendance

Use case name	**Check summery**
Actor	Teacher
Description	Teacher will check the summary that which student had watched the lecture and how much.
Pre-condition	Teacher must be logged into the system.
Post-condition	Teacher will be able to know the report of every student and can mark attendance on the basis of that summary generated by system.

3.2.2.6 Logout for teacher:

Table 13 Logout for teacher

Use case name	**Logout**
Actor	teacher
Description	Teacher can logout from the system to secure its data.
Pre-condition	Teacher must be logged in.
Post-condition	Teacher will navigate to the start page of system which shows that he/she logged out successfully.

3.2.3 Admin Use Case:

3.2.3.1 Login for admin

Table 14 Login for Admin

Use case name	**Login for admin**
Actor	Admin
Description	Admin can login to the system to perform related activities
Pre-condition	Admin's data already in the database.
Post-condition	Connection to server establishes, and Admin logged in successfully.

3.2.3.2 Register students and teacher

Table 15register student and teacher

Use case name	**Register students and teacher**
Actor	Admin
Description	Admin can register student and teacher in database

Pre-condition	Teacher and student must not be registered before.
Post-condition	After registration the teacher and student can see and login to the system.

3.2.3.3 Update the teacher and student data

Table 16 register student and teacher

Use case name	**Update students and teacher**
Actor	Admin
Description	Admin can update student and teacher in database
Pre-condition	Teacher and student must be registered before.
Post-condition	After updating the teacher and student can see the update and login to the system.

3.2.3.4. Delete the teacher and student

Table 17 delete the teacher and student

Use case name	**Delete students and teacher**
Actor	Admin
Description	Admin can delete student and teacher from database
Pre-condition	Teacher and student must be registered before.
Post-condition	After deleting the teacher and student cannot see any data and cannot login to the system.

3.2.3.5 Assign courses to teacher

Table 18 Assign courses to teacher

Use case name	**Assign courses to teacher.**
Actor	Admin

Description	Admin can assign courses to teacher.
Pre-condition	Teacher must be registered before.
Post-condition	After assigning the courses to teacher. The teacher can see the courses and can upload any video for the student in that particular course.

3.2.3.4 Logout for admin

Table 19 Logout for admin

Use case name	**Logout**
Actor	Admin
Description	Admin can logout from the system to secure its data.
Pre-condition	Admin must be logged in system.
Post-condition	Admin will navigate to the start page of system which shows that he/she logged out successfully.

3.3 Functional Requirements

The Functional Requirements is the requirements in which we discuss that what the system is exactly for. We describe the main reason for making this system in other word basic functionality of the system is called its functional requirements. Functional requirements include a specific task, technical details, calculations, logic, processing, and data manipulation of a system.

3.3.1 Login for Student/ Teacher/admin

Table 20 FR-1 login

Name	FR-01 : login for student/teacher/admin
Function	login student , teacher and admin into the system
Priority	Required for every class(High)
Requirements	The student, teacher and admin shall be able to login to the system by entering the valid email address and password. The homepage requires having a login mechanism in order to identify unique person and maintain session.

3.3.2 Upload lecture and videos:

Table 21 FR-2 upload lecture and video

Name	FR-02: upload lecture and videos
Function	Teacher will upload video lecture and post anything related to course and topic.
Priority	Required for every class (High)
Requirements	For uploading videos lecture application must be connected to database.

3.3.3 Camera accessibility:

Table 22 FR-3 camera accessibility

Name	FR-03: camera accessibility
Function	Student will give permission to application to start the camera.
Priority	Required for every class (High)
Requirements	Camera must be installed and in working condition and the student focus must be towards the video lecture.

3.3.4 Generate the summery of video lecture:

Table 23 generate the attendance of video lecture

Name	FR-04 Generate the summery of video lecture
Function	This application will generate a summary of watched video lecture and give an output to teacher.
Priority	Required for every video lecture (High)
Requirements	Student must watcj the video lecture and must on the camera

27

3.4 Non-functional Requirements:

Non-functional requirements are those requirements that participate with functional requirements to help and define the system quality with respect to the following parameter from NFR-01 to NFR- 5.

3.4.1 NFR-01 user interface:

Table 24 NFR-01 user interface:

NFR-01-1	• User Interface should be clean and compatible with laptop.
NFR-01-2	• User Interface should be simple so the teacher and student can easily understand it.

3.4.2 NFR-02 usability of application

Table 25NFR-02 usability of application

NFR-02-1	• The user interface of the app shall be responsive.
NFR-02-2	• Easy use as chances of error will be minimum and the user can navigate through the app easily.

3.4.3 NFR-03 Devices:

Table 26 NFR-03 Devices:

NR-03-1: RAM	The device should have at least 4 GB RAM
NR-03-2: Camera	The device should have a better camera to detect the face of student and eye ball.

3.4.4 NFR-04 Performance:

Table 27NFR-04 Performance:

NFR-04-1	• The user interface of the app shall be responsive.
NFR-04-2	• Easy to use as chances of error will be minimum and the user can navigate through the app easily.

3.4.5 NFR-05 Security:

Table 28NFR-05 Security:

NFR-05-1	A student will not be able to access the account of any other student or teacher

Chapter 04
Design and Architecture:

4 Design and Architecture:

An architecture and design is the conceptual model of system that make the visualization of system. It helps us to understand the deep structure of system because it is easy to understand using diagrams. It gives the blue-print of the given system. In this phase of software development, we have to understand that how the components of the system communicate with each other and to understand the complexity of the system. All the functional requirements that we gathered in the second phase of the software development, are now converted into architecture. The interfaces behaviors and components are defined by this architecture. The design stage determines the how system's elements work, it guides us during the implementation phase of the project, it helps us in getting requirements approvals from the user in more precise way, it also shows how different code modules are related from each other, it hides the implementation details but the system internal flow is not hided, all the use-cases that we defined in previous software requirement stage are now put into the architecture of the project at their appropriate locations, the requirements of various stakeholders are now inserted into the system architecture, it helps us in identifying risks in the project during development, and also the architecture we define in this phase also effect the final deliverable product (hardware or software product .So a well-designed architecture is able to provide a bridge and clears the paths to build the project by considering the business, user, and technical requirements and also reduces the business risks that is associated with the solution of the project.

Furthermore, the design and architecture phase of the software development also builds and increase the confidence in either organization or a system. A good architect is the one, who correctly examines the functional requirements of the required project and maps into an architecture, which can further have implemented by the technical team to build the final application or product. A software architect should must have the domain knowledge, technology knowledge, methodological, and design expertise. The requirements and architecture are shown in a pictorial way that correctly showing the concepts of the system and also by optimizing the performance and security which are the quality

attributes of the system. In this chapter, we are going to explore the design and architecture of our project with the help of different diagrams that best depicts the overall flow of the system in the form of basic architecture diagram, activity, sequence, and class and Data flow diagrams

4.1 system Architecture

A system architecture is abstract and explained model that help us to understand the behavior of a system. An architecture is organized in such a way that supports about the details structures of the system. The basic architecture of system is the structural flow of system starts from inputting a video, and that video is display to the student after that student will play the video and the camera start to monitor the motion of the student, and system will automatically generate a attendance of the student, then the system will show the attendance to student as well as to the teacher.

4.2 Data representation [diagram + flow diagram]

Data Representation means to represent the flow of data and how is it interlink. DFD data flow diagram is an example of flow of data in diagrammatically. Another word we can say that graphical representation of data we can represent data in the form of symbols and provides a different information.

4.2.1 Data flow diagram

The Data Flow Diagram (DFD) is a structured analysis and design method. The visual representations of the flow of data is captured by data flow diagram. It depicts the system data requirement from one use case to another use case. It supports both the analysis and requirement stage of the system, and it is step- wise refinement of the processes through hierarchical decomposition. The key components of the Data Flow diagram include process, external entities, data stores and data flows. The external entities are either a human, system or s subsystem. These are the external parts of the system. A process is a function or module in which manipulation of the data takes place. A single process is further composed at different levels of DFD, while data store represents the storage of the data, and Data flows represents the flow of information

4.2.1.1 DFD LEVEL 0

DFD Level 0 shows how the student accesses the application and thus how he/she use application

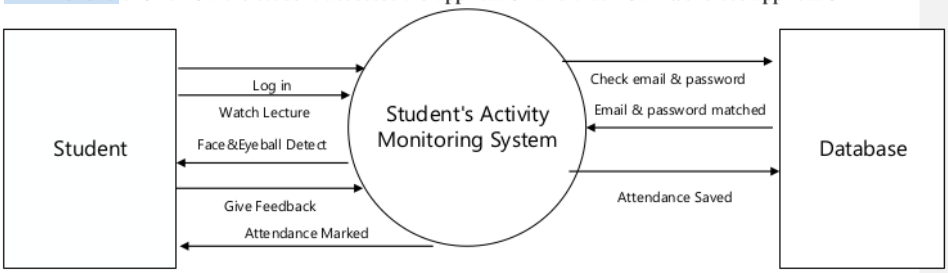


Figure 2 DFD Level 0

4.2.1.2 DFD LEVEL 1

This DFD shows gives more clarity as compared to the previous one.

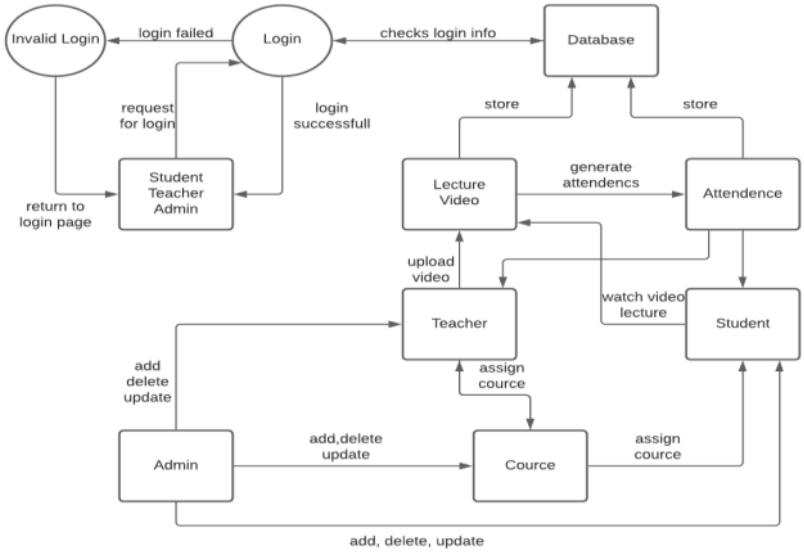


Figure 3 DFD level 1

4.2.2 Flow chart

Flowchart for teacher :-

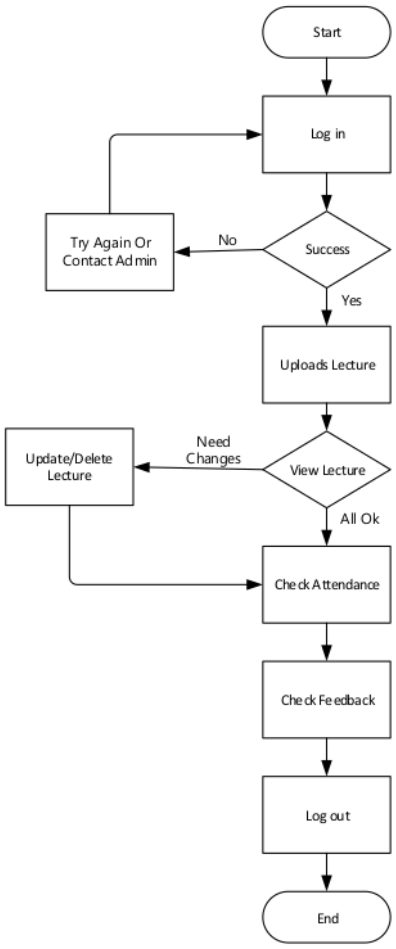


Figure 4 Flow chart of teacher

Flowchart for student:-

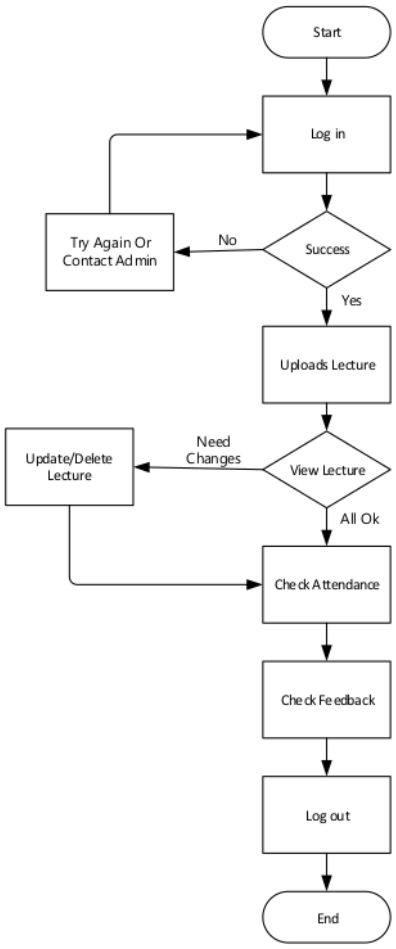


Figure 5 Flow chart of Student

Flowchart for admin: -

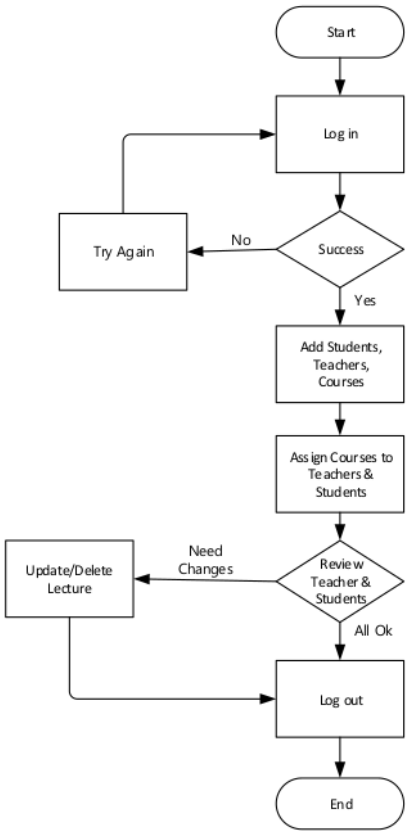


Figure 6 Flow chart of Admin

4.3 Project Design

In this chapter we discuss about the methodology, tools, programming language, and game architecture used to develop our project.

4.4 Methodology

Methodology selection is as important as first building block for development of application. After designing of this app, the methodology selected should be flexible so that it can be molded as user's interest changes or with any increase in features of application. For example introducing new fields and features. So, our project will follow agile process model.

4.5 Programming Language

- Django
- Python

4.6 Development Tools

- Visual Studio code

4.7 Design Description

The product configures the models described below. For the sake of simplicity, readability and comprehension, we only mention the important features and processes of each module.

4.7.1 Sequence Diagram

Students click on the application to launch it, and after a few seconds the screen loads. After Some seconds, menu loads and the interface is displayed to students and teachers.

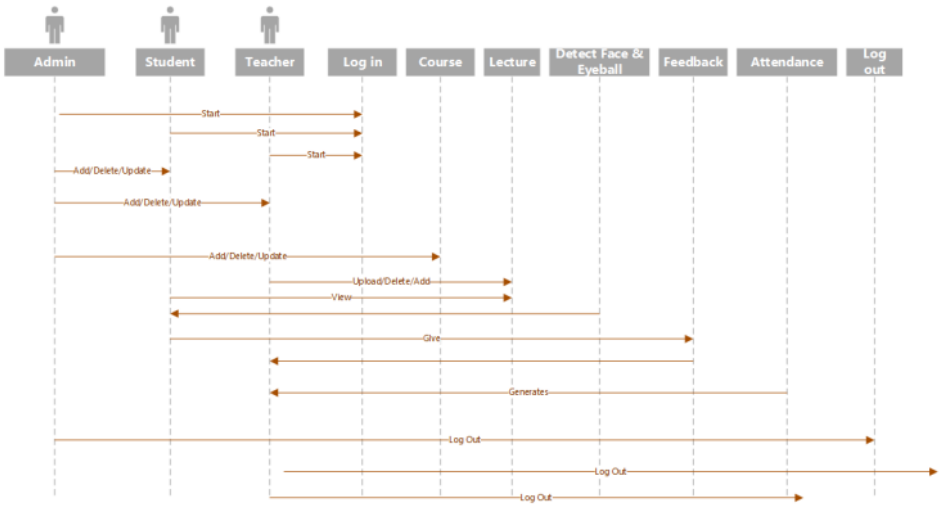


Figure 7 Sequence Diagram

4.7.2 Activity Diagram

Activity diagrams (such as flowcharts and data flow diagrams) visually represent a set of actions or control flows in the system. Single black dot represents the initial node/starting point and at the end black dot in the circle represent final node. Arrows is basically work as connector. And the black line represents a fork node means divide a single incoming flow into multiple flows.

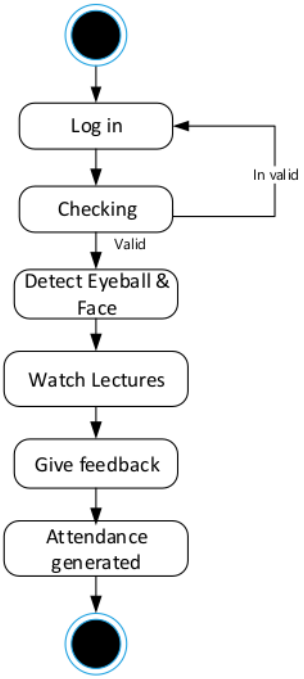


Figure 8 Activity diagram

4.1.1 Entity Relation Diagram:

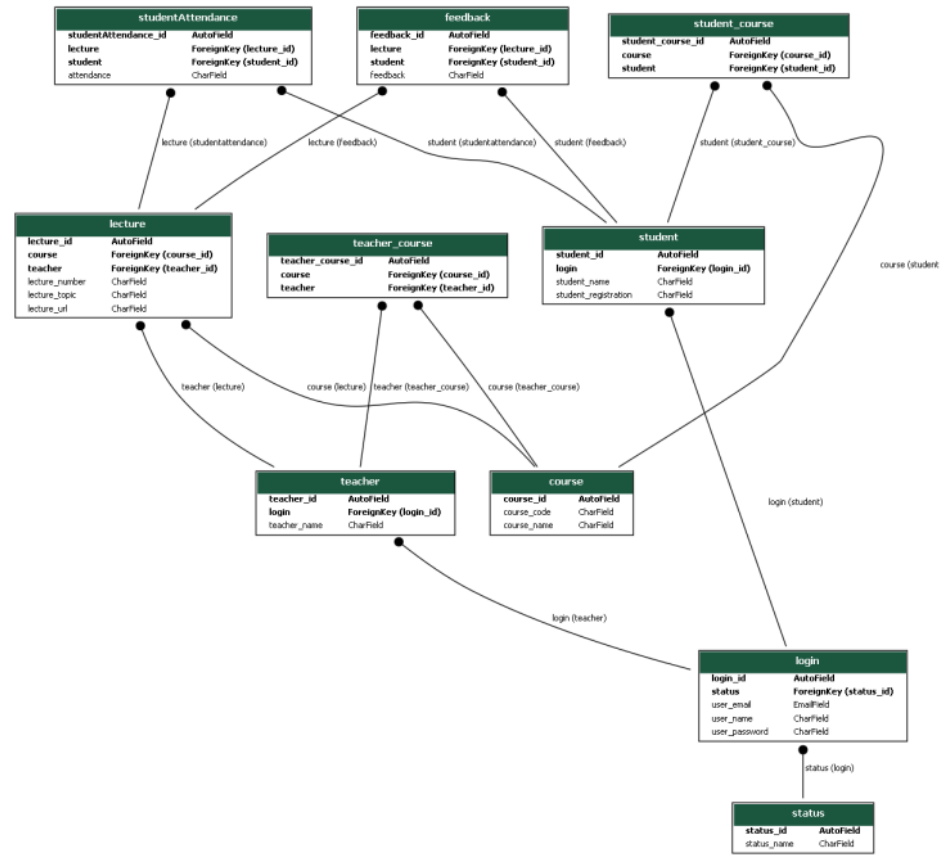


Figure 9 ERD

Chapter 5
Implementation

5 Implementation

In this chapter, we will discuss our implementation techniques that we use to develop the project. This phase is the most prominent phase of development; as from this step, we transform our idea into meaningful picture. This is significant and challenging step towards learning or developing skills. Following are the datasets and algorithms we use during development of our project;

5.1 Datasets:

We don't use any Dataset because in our program we will capture the image live and will make a graph and will show the attendance of the student. Our system will have 3 different panels

- Admin panel (main panel)
- Teacher's panel
- Student panel

5.1.1 Admin:

In the Admin panel admin will login through his login id and password which is given by the university. The login page of our project is in figure 10 .in which we can easily see the user name and password to login.

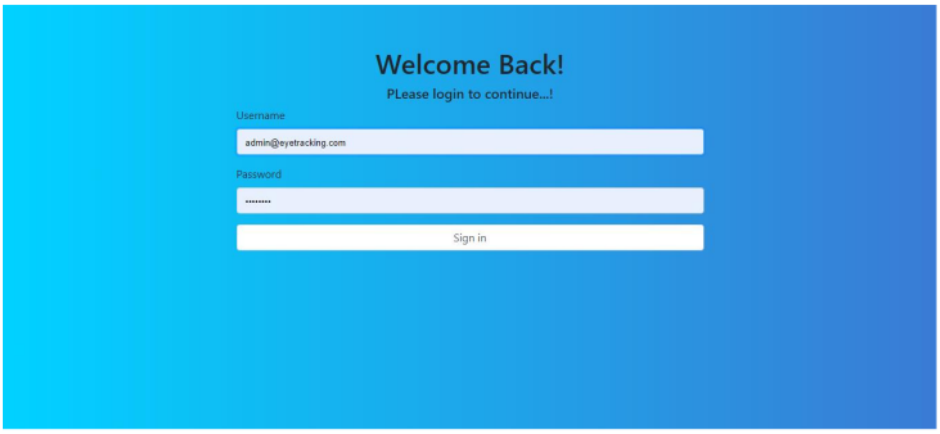


Figure 10 Log in page

5.1.1.1 Main page of Admin: -

After login admin can perform many task which are given below

- Add Teacher
- Add Student
- Add Another Admin
- Update Admin
- Update Teacher
- Update Student
- Delete Teacher
- Delete student
- Assign Courses
- Delete Courses
- Change Password of Teacher
- Change password of Student

The main views of admin panel are in Figure 12 , Figure 13, Figure 14 and Figure 15 .

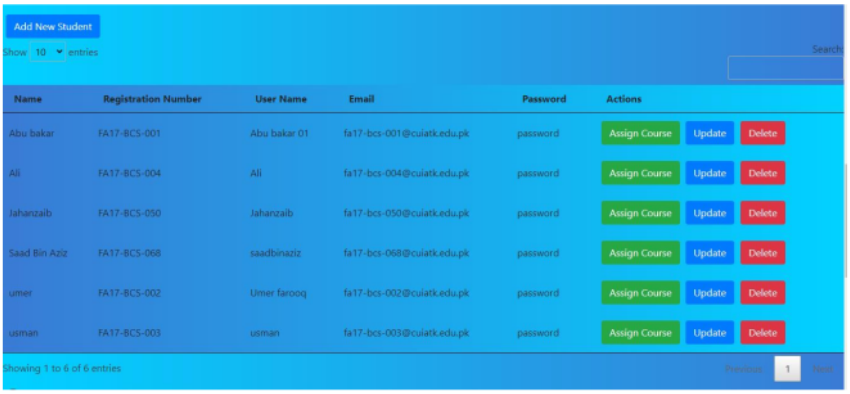


Figure 11Main view page(1)

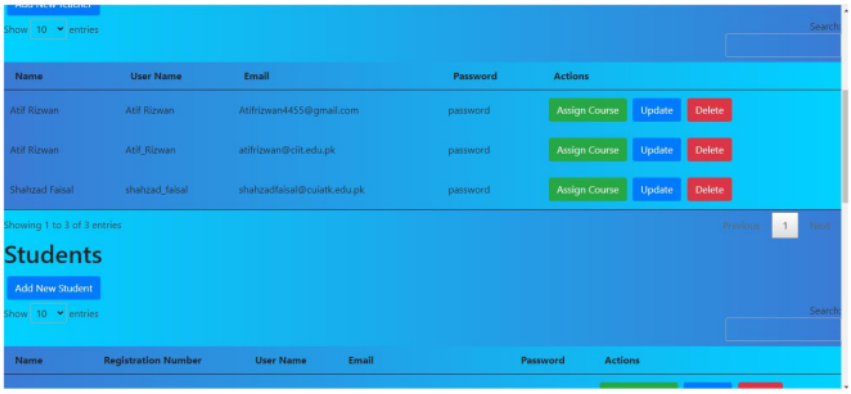


Figure 12Main view page(2)

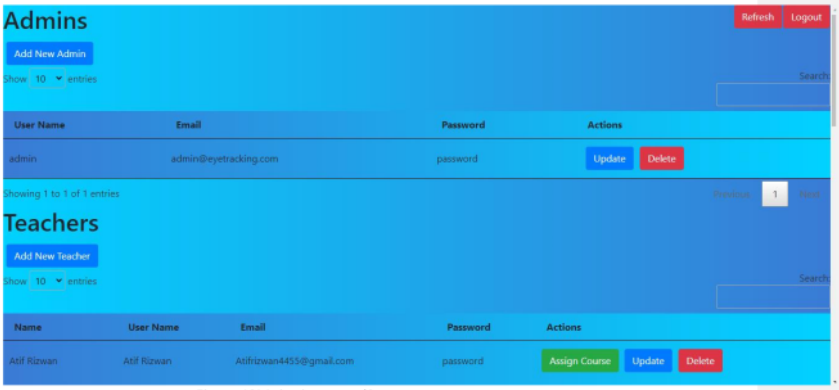


Figure 13Main view page(3

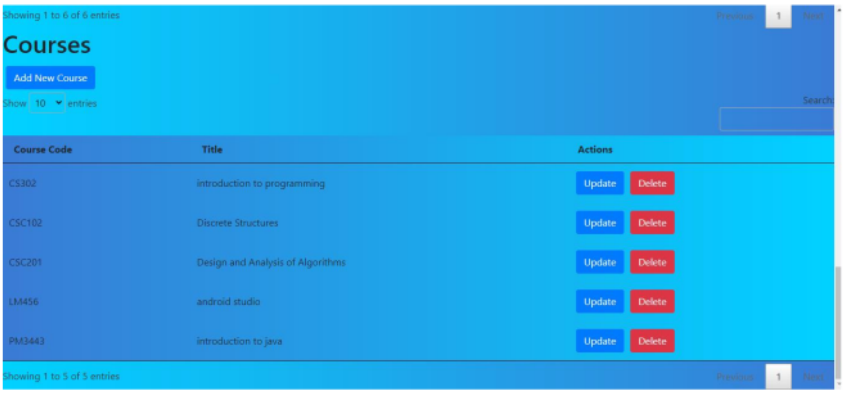


Figure 14Main view page(4)

5.1.1.2 Add Admin: -

If admin wants to add other admin then he can also add him by clicking on add new admin shown in figure 15 Also update details of Admin shown in figure 16.

The detail required for another admin are

- Name of admin
- Email of admin
- Password for the admin

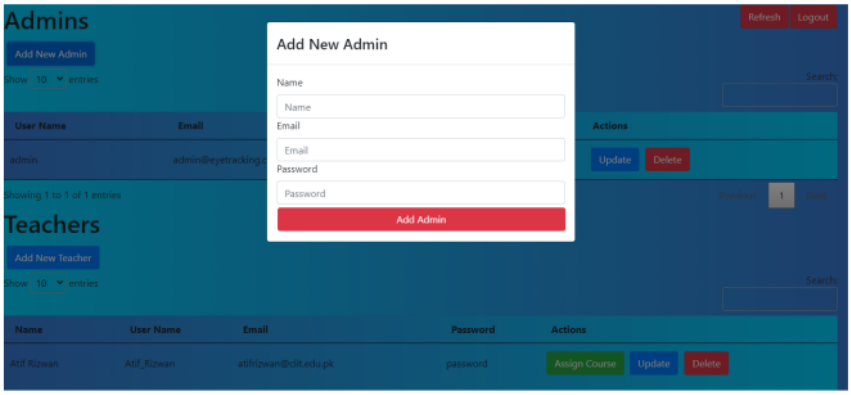


Figure 15Add New Admin

5.1.1.3 Updates Admin information:-

Admin can update the detail of another admin as show in fig 16

Admin can update the details

- Name of admin
- Email of admin
- Password of admin

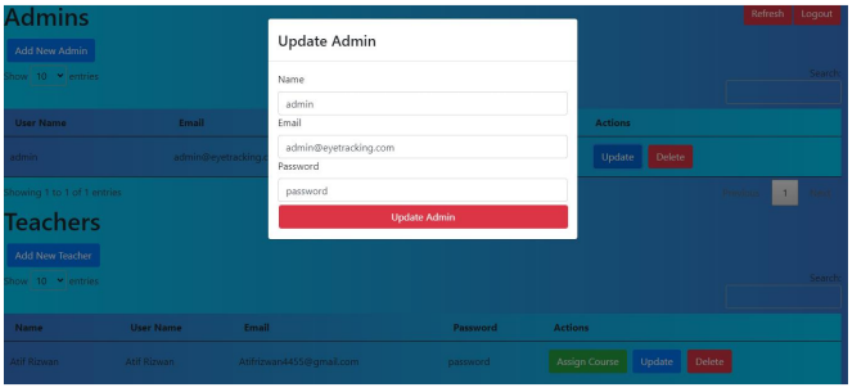


Figure 16 Update New Admin

5.1.1.4 Add Teacher information: -

Admin can add teachers in system as shown in figure 17.

The detail required for the add teachers are

- Name of teacher
- User name of teacher
- Email of teacher
- Password of teacher

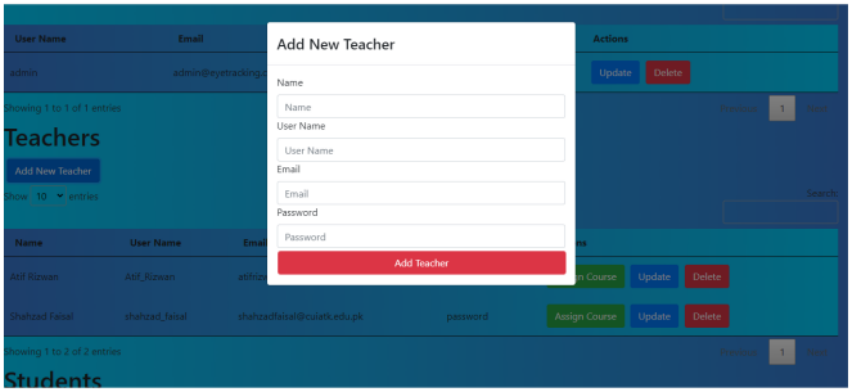


Figure 17 Add teacher

5.1.1.5 Update Teacher information: -

Admin can update the details of the teacher as shown in figure 18.

- Name of teacher
- User name of teacher
- Email of teacher
- Password of teacher

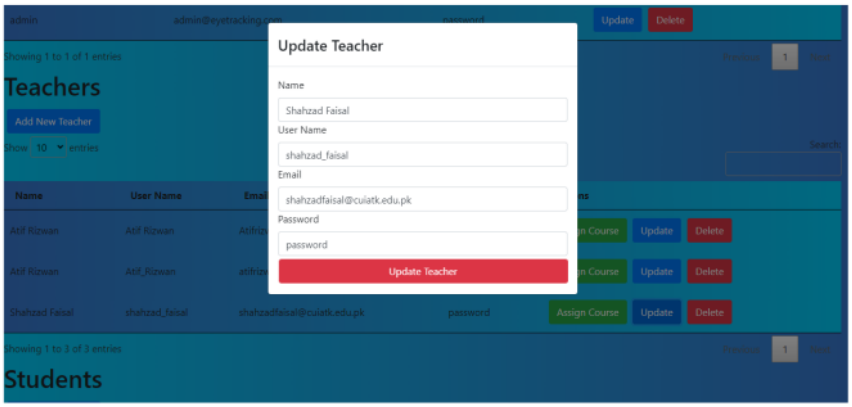


Figure 18 Update teache

5.1.1.6 Delete teacher information: -

He can delete the teacher from the database, and it is shown in figure 19 in which alert will be generated for the confirmation if deletion of teacher and if admin clicks on OK then the teacher will be deleted from the database whereas if he clicks on cancel then the alert will be removed and teacher remains in the database and can upload lectures and can perform all the functionality provided to him

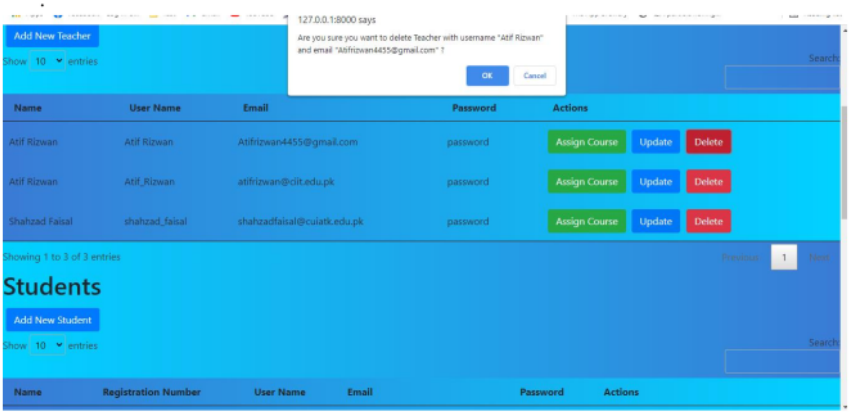


Figure 19 Delete teacher

5.1.1.7 Delete Confirms: -

And if the admin confirms the deletion of the teacher alert will be generated as shown in figure 20.

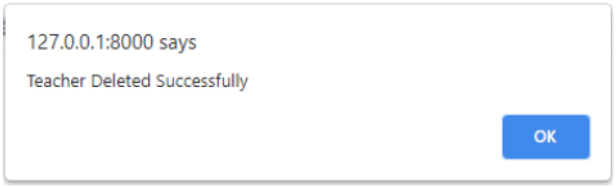


Figure 20 Teacher Deleted

5.1.1.8 Assign Course to teacher: -

Admin can assign courses to the teachers and only those courses will be show that are already added to the database as shown in figure 21 and figure 22.

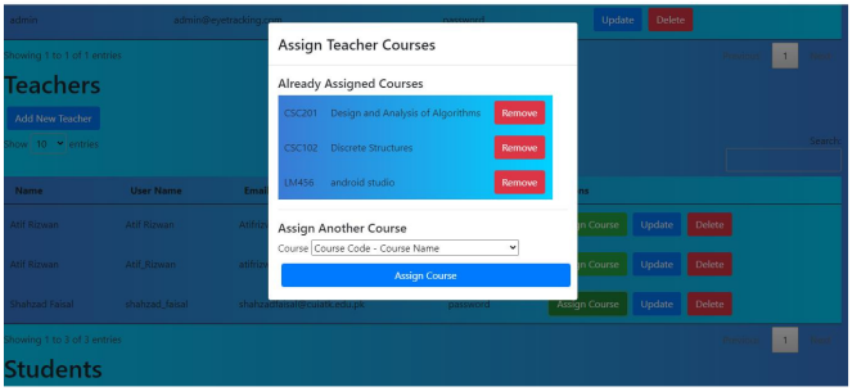


Figure 21 Assign Course to the Teacher

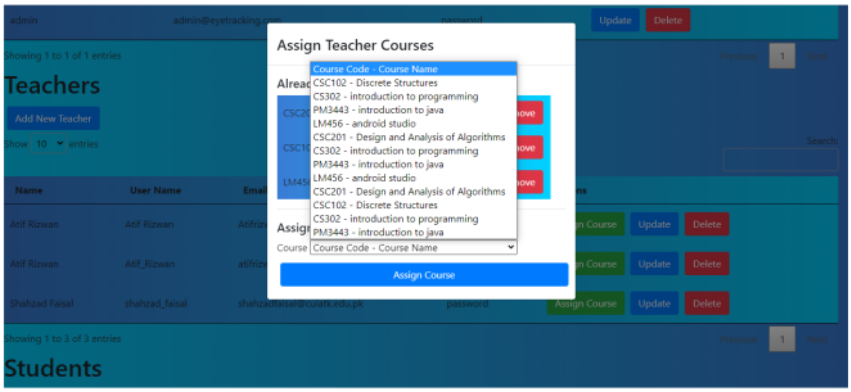


Figure 22 List of the courses available

5.1.1.9 Add Student: -

Admin can add a student to the database by adding different details of the student as shown in figure 23.

The detail required for the student are

- Name of student
- User name of student
- Registration number of student
- Email of student
- Password of student

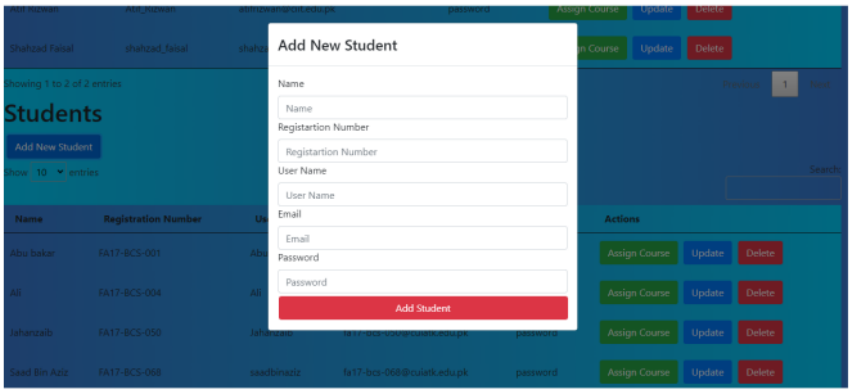


Figure 23 Adding New Student

5.1.1.10 Assign Course to Student: -

Admin can assign any course to the student that is already added to the database as shown in figure 24.

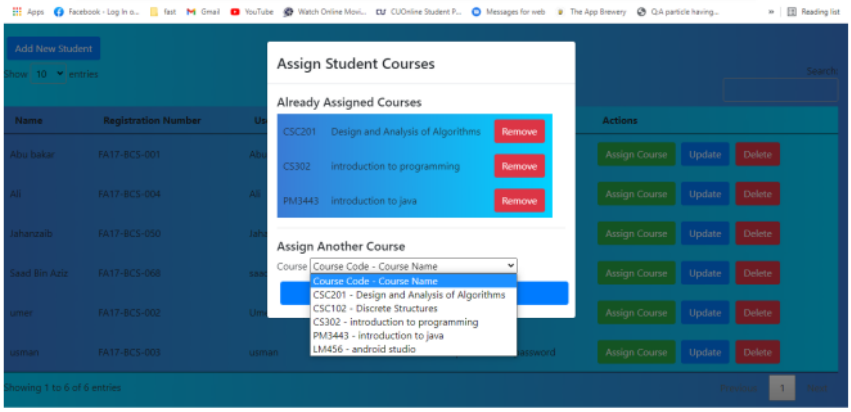


Figure 24 Assigning Course to Student

5.1.1.11 Update student information: -

Admin can update the details of the student in which admin can update the

- Name of student
- Registration number of student
- User name
- Email of student
- Password

as shown in figure 25.

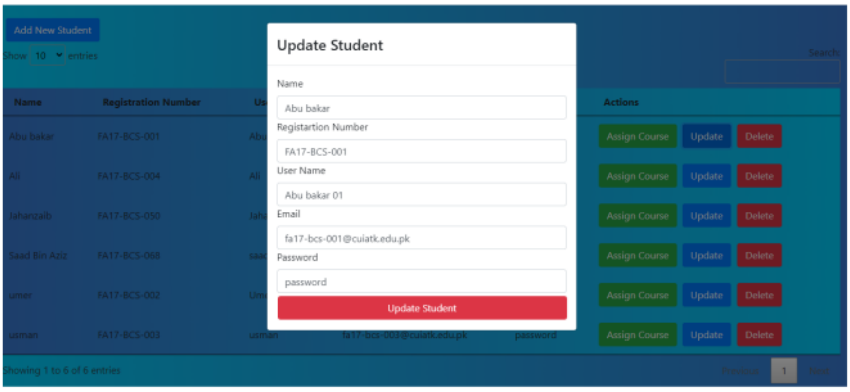


Figure 25Update Details of Student

5.1.1.12 Delete student information: -

Admin can also delete the student from the database as shown in figure 26 in which alert will be generated for the confirmation if deletion of student and if admin clicks on OK then the student will be deleted from the database whereas if he clicks on cancel then the alert will be removed and student remains in the database and can watch the lecture and can perform all the functionality provided to him.

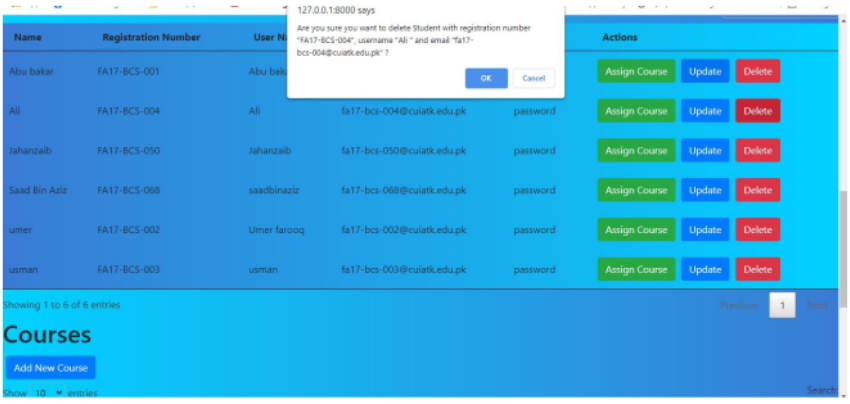


Figure 26 Delete a Student

5.1.1.13 Delete Confirm: -

And if the admin confirms the deletion of the student alert will be generated student data will be deleted and the student will be not able to login and not able to watch any video lecture as shown in figure 27.

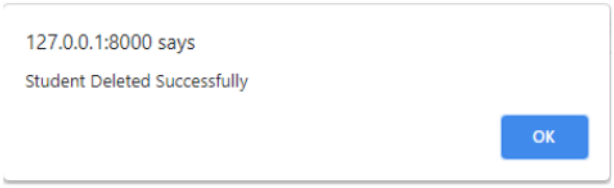


Figure 27 Student Deleted

5.1.1.14 Add Course

Admin can add course in database. The detail of courses are:

- Course Code
- Course Name

As shown in figure 18.

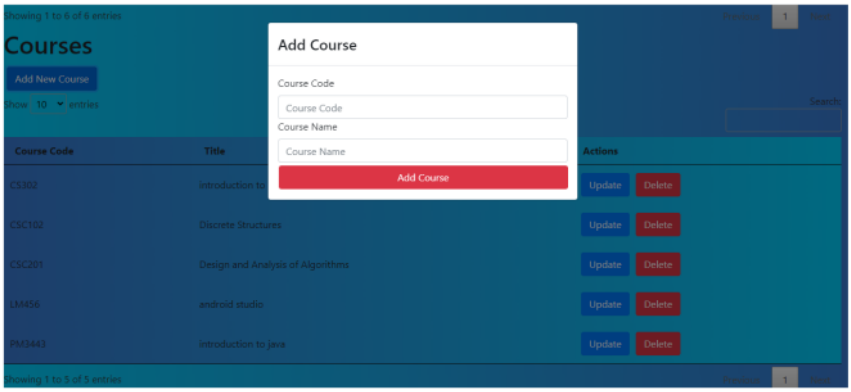


Figure 28 Add a Course

5.1.1.15 Update Course: -

Admin can update the course if by mistakenly he had entered wrong details of the course. Admin can update

- Course Code
- Course Name

as shown in figure 29.

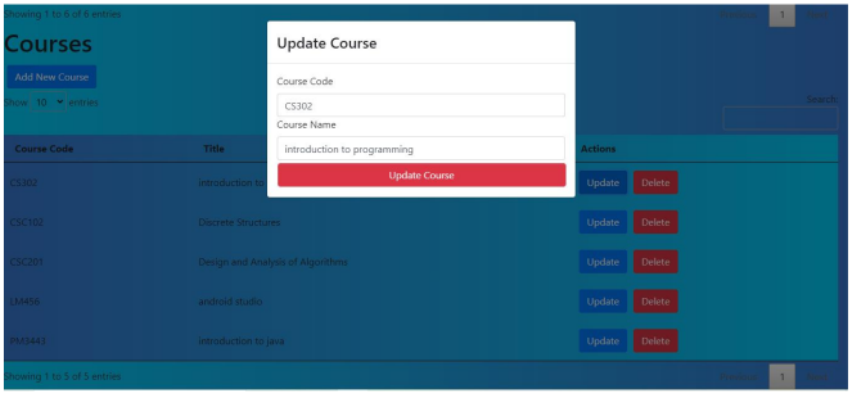


Figure 29 Update Course

5.1.1.16 Delete courses: -

Admin can delete the course as shown in figure 30 in which alert will be generated for the confirmation if deletion of course and if admin clicks on OK then the course will be deleted from the database whereas if he clicks on cancel then the alert will be removed, and course remains in the database and will be available for those whom that course was assigned

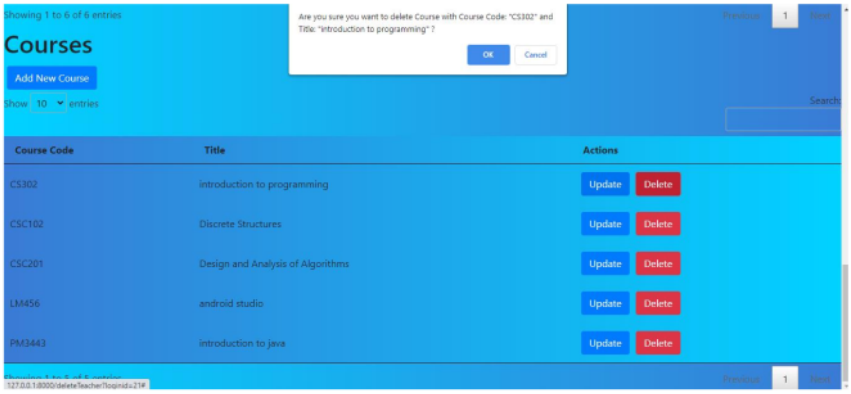


Figure 30 Delete a Course

5.1.1.17 Delete Confirm: -

And if the admin clicks on ok then the course will be deleted from the database and this alert will be generated as shown in figure 31

Figure 31 Course Deleted

5.1.2 Teacher:

The main view of the teacher panel is shown in figure 32.in which teacher can easily visit any course he/she want and can upload any video easily.

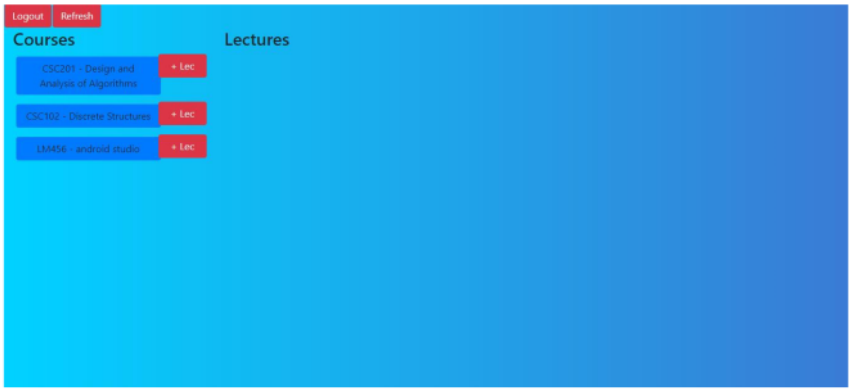


Figure 32 Main view of Teacher

5.1.2.1 Course Lectures: -

Only those courses will be showed to teacher that is assigned by the admin. When the teacher will click on the course this view will be shown to him as shown in figure 33

The teacher can

- View lecture
- Update lecture
- Delete lecture
- Can see the attendance
- And feedback of student

Figure 33 Course Details

5.1.2.2 Update Lecture: -

Teacher can also update the lecture if he/she had added wrong URL, or the wrong lecture name as shown in figure 34.

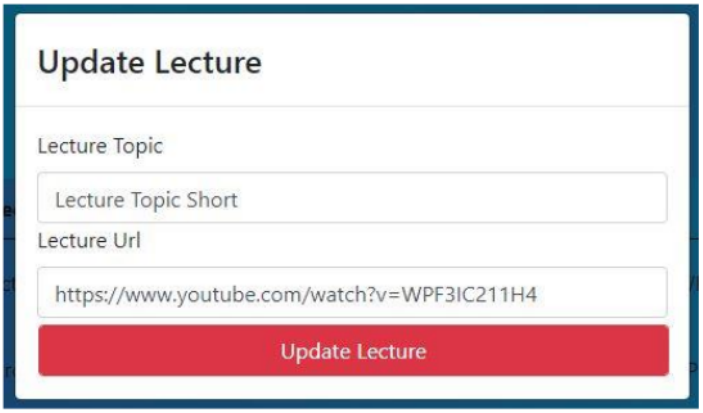


Figure 34 Update Lecture

5.1.2.3 Add Lecture

Teacher can add as many lectures as he/she wants simply by clicking on +Lec button as shown in figure 35.

The detail required for the lecture are

- Lecture number
- Lecture topic
- Lecture url

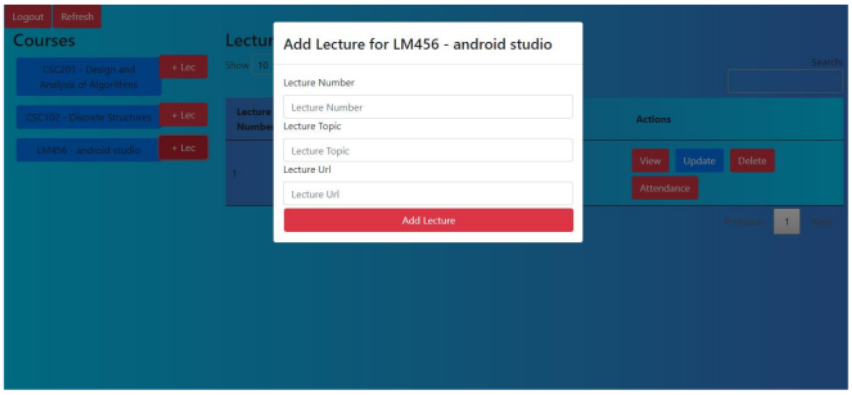


Figure 35 Add Lecture

5.1.2.4 View Attendance

Teacher can view the attendance of the students who are registered in his or her course by clicking on the Attendance button and progress bar will be showed to him/her so he/she can easily see the attendance as shown in figure 36.

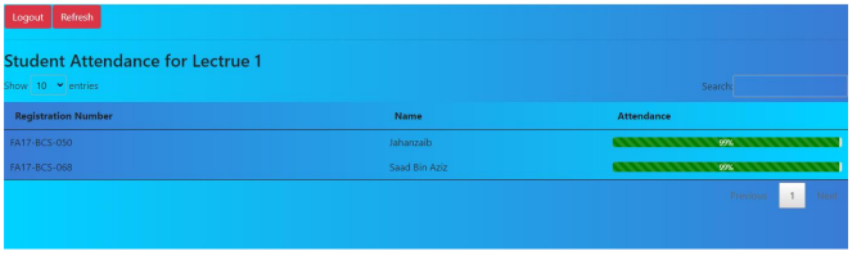


Figure 36Lecture Attendance

5.1.2.5 Delete lecture: -

Teacher can delete lecture if he wants to delete the lecture due to any reason by simply clicking on and Delete button as shown in figure 37 in which alert will be generated for the confirmation if deletion of lecture and if teacher clicks on OK then the lecture will be deleted from the database whereas if he clicks on cancel then the alert will be removed, and lecture remains in the database and will be available for those whom that course was assigned.

\

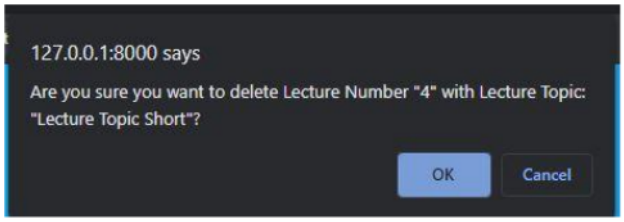


Figure 37 Delete A Lecture

5.1.2.6 Delete Confirm: -

If teacher Confirms to delete the lecture, then alert will be generated as shown in figure 38.

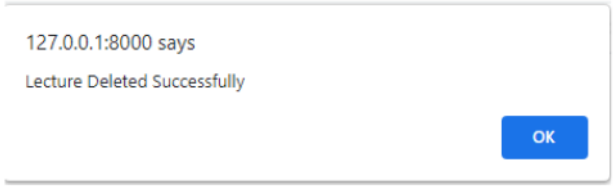


Figure 38 Lecture Deleted

5.1.2.7 Feedback from student: -

Student can send any feedback to teacher as shown in fig 39

Figure 39 Feedback on Teacher's portal

5.1.3 Student:

When a student will log in his id then this view will be shown to him as shown in figure 40.in which student can see the courses in which he/she is registered .

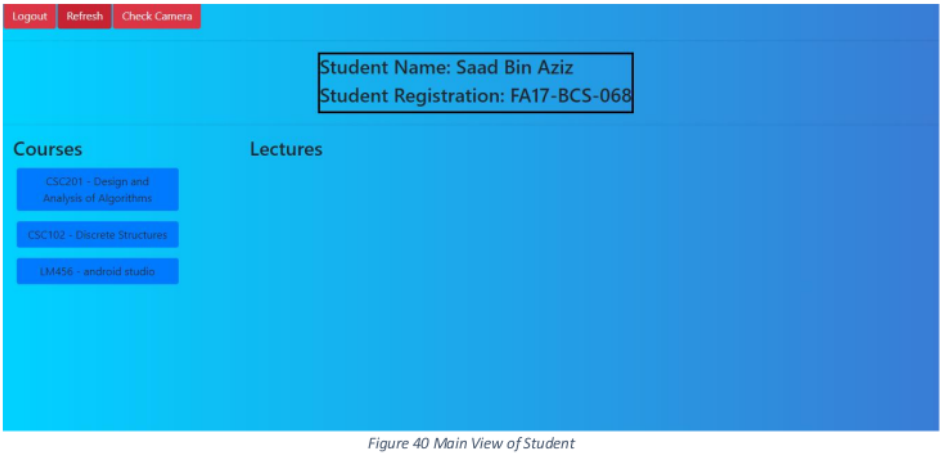


Figure 40 Main View of Student

5.1.3.1 Attendance of student

When he will click on any course then this screen will be showed to him, He can view his attendance and can view the lecture and if his attendance comes less due to any reason then he can watch the lecture again to update the attendance automatically as shown in figure 41.

Figure 41 Lecture Details

5.1.3.2 Feedback of Student: -

Student can send any feedback to teacher as shown in fig 42.

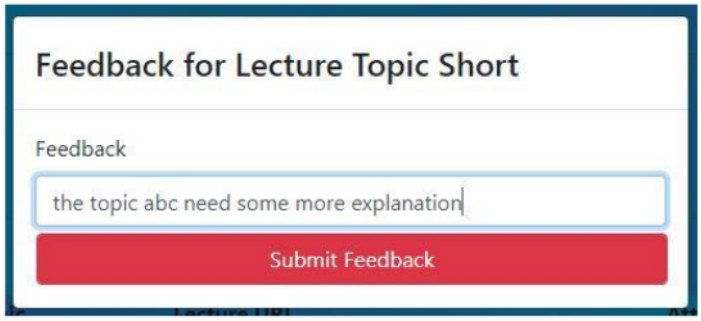


Figure 42 Student Feed back

5.1.4 Check camera:

It is the feature in which student can check whether his camera is working or not by clicking on it.

5.2 Methodology:

We had use an algorithm in which when a student log in to their account lectures have been uploaded and he will watch the lecture and his attendance will be counted automatically through webcam and when our code will run first it will capture the frames and it will capture 6 frames per second which is defined by us and we had done different experiments through which we came to know that using 6 frames per second will give us accurate result because if we will increase the size of the frames our execution time increases and size of the video which will be made of the user or the student will be very large , which may cause memory issue. Then our code will convert the image into greyscale in order to make to colors of the image even and after that it will generate the thresh hold which will point out the place of eyeball and after that is will generate contours and contours will differentiate eyeball from the whole image and draw a red color boundary outside the eyeball and after that our program points out the exact location of eyeball on plane. After that it stores the location of the iris and then make a graph according to that point and then calculate the mean of the graph and after that it calculates the standard deviation which is our attendance and then shows it to the student and the teacher. Teacher uploads the lecture and students watch the lecture and during lecture their attendance is counted automatically.

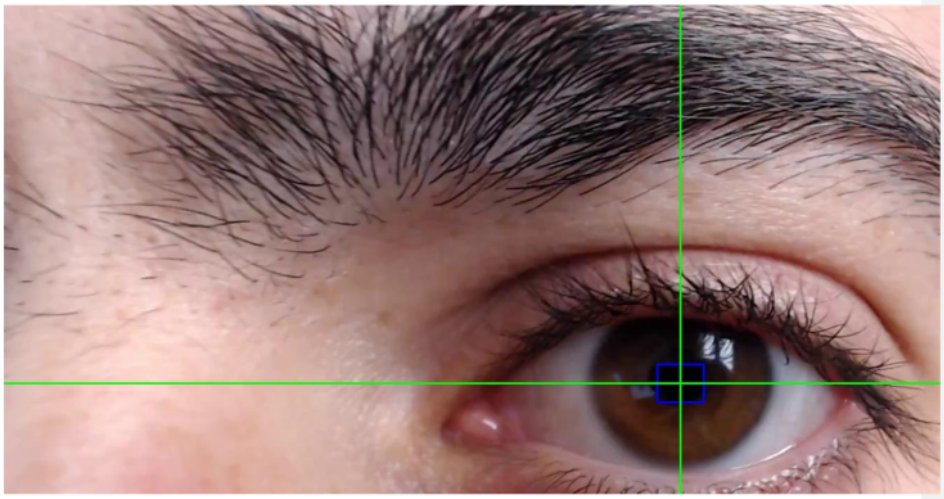


Figure 43 Eyeball Detection

5.2.1 Greyscale

The reason for differentiating such images from any other sort of color image is that less information needs to be provided for each pixel. Greyscale images are entirely sufficient for many tasks and so there is no need to use more complicated and harder to process color images.

Figure 44 Greyscale

5.2.2 Threshold:

Thresholds allow us to tweak a face recognition system based on the degree of accuracy we desire for our individual use case.

Figure 45 Threshold

5.3.3 Contours:-

The advantage of using contour is that the structure of the face is strongly represented in its description along with its algorithmic and computational simplicity that makes it suitable for hardware implementation. The input contour is matched with registered contour using simple matching algorithms.

Figure 46 Contours

5.2.4 Graph:-

The graph is made according to the point of iris and on its basis our attendance is marked. Graph is shown in figure 47 and results are shown in figure 48 on which the graph is made.

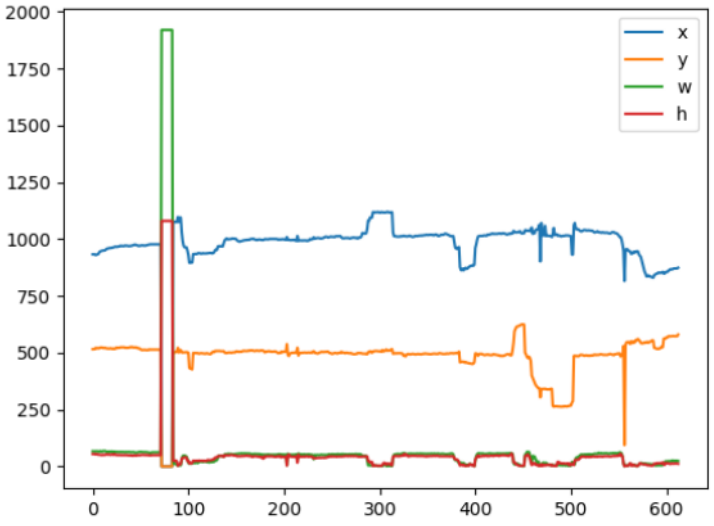


Figure 47 Graph

```
eye_recording.flv EOF
Starting point of Iris 936
971.7128874388254
148.5191144408875
Range (890, 1120)
Attendance 89.23 %
```

Figure 48 Results

5.3 *Interface:-*

We create a unique and attractive user interface student monitoring system. Interface designing is major step in any application development. The main focus is user understanding so design should be interactive and responsive. When it is attractive and responsive so it takes less time of user to get familiar with application and get the result effectively .The color scheming and design should be user friendly and attractive. We select shade for interface is blue.

Besides this, simple interface helps the user to understand easily how to navigate in the system. Buttons allow user for clicking and uploading the video. Each button is named as per functionality so that it make sense and all button are consistent. Application will start with splash screen with main log in page. Below is the figure of our first screen shown in Figure 49.

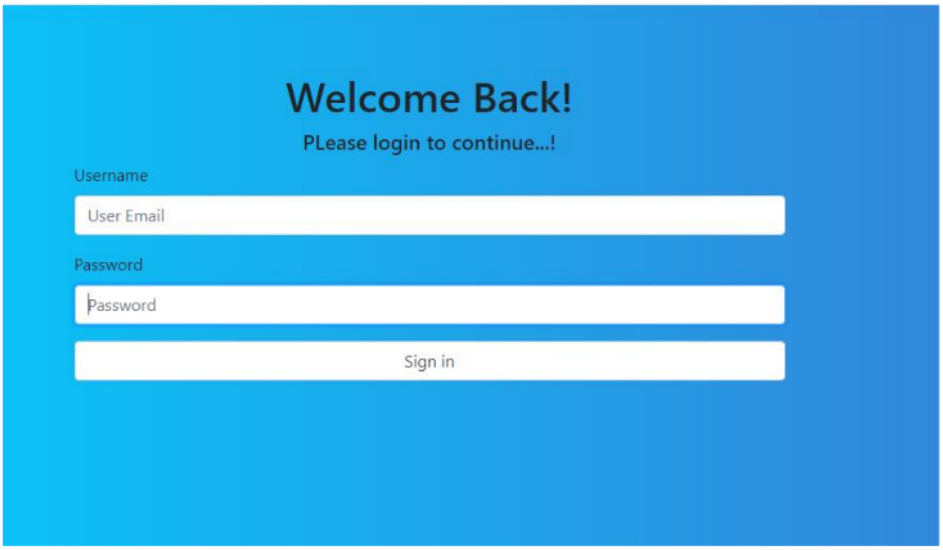


Figure 49 Home Page

40

Chapter 6

Testing and Evaluation

64

6 Testing and Evaluation

In this chapter we test and evaluate the functionality of our final year project as a system and check that requirements and objectives are fulfilled or not that we defined at our very first stage. After integrating all parts of code, there is need to test functionalities of each part of the code to ensure quality of the system, satisfying the user requirements, and improvement in consistency and performance. This stage is very helpful in finding small bugs and errors in the system and resolve the weak areas and improve the defects in the system.

The purpose of testing includes to execute the code in different types of the environment to analyze the different aspects of the code and to examine the working of code according to the requirements and specifications. Different scenarios are developed called test cases to test the system. When system pass the testing cases, then the reliability of the software increases with more confidence. Furthermore, Testing is the very important part of software development because we test our product quality and working. The testing can be either done manually or by using some automated tools. In manual testing, we have further types which includes unit testing, functional testing, system testing and integration testing.

6.1 Manual testing

This is a process of manual testing in which developer test software manually without using any tools. The purpose of manual testing is to find the errors and bugs in the software. This type of testing is very useful in identifying critical types of errors in the code. Every system should must be tested manually before performing testing using an automated tools. It does not require the information and knowledge about the tools that is used for manual testing. This type of testing takes more time and effort but it increases the efficiency of the system to remove the bugs if they are found in the code. All the test cases are prepared and planned before performing this testing. When the test case is performed, the output produced by the system is matched with desired output. If it is matched then test case is passed otherwise the test case is failed and we record it as a defect in the system which need to be fixed. After this testing is performed, an error free system is established.

At this point the developer run each test case manually and checks the results. Manual testing is first step towards the success of program if this step is pass then its mean 50% software testing is passed successfully and software is reliable. If any error or bug found, we have to fix it to make it efficient. We have followed below series of steps in order to perform manual testing;

- The system should allow us to login into the system and lectures URL should run and camera captures the user or student.
- For teacher add lecture button is created to add lecture and updating and deletion of lecture is working.
- Lecture must be selected by the student. If no lecture is selected then no further processing will performed.

6.1.1 System testing

To evaluate the complete system according to requirements specified, a system testing is performed. This type of testing test the system functionalities from end-to-end system. This testing is done by team which is not a development team of the system in order to calculate and measure the performance of the system without creating any biasness. It is also called as end to end testing, to make sure that all the scenarios are working according to our made requirements and objectives. The test data is used to perform the testing that is created by the testers. This type of testing includes unit testing, functional testing and integration testing.

6.1.2 Unit testing

In unit testing separate units or modules of the system are tested so that we check errors in each unit one by one. The main Purpose of unit testing is to check whether each unit is performing its task well on time or not. Every module or parts of this system was tried to test one by one individually. Each unit of the software is tested to validate it according to our desired output. We isolate each part of the code from whole code as a unit for validation. This unit can be a single piece of code written inside a function, class or it is module or one part of the whole system. This testing is very helpful in finding errors because it is easier to test unit which is small part of whole system and error can be identified accurately. The logic of small piece of code is correctly analyses in unit testing. If we test code then we called as code under test or when we test whole application then we called as application under test. Another term used in unit testing is test coverage which is defined as code percentage which is tested in a unit testing. This type of testing can also be performed manually and by using automated tools. The names of the automated tools include JUnit, NUnit and Mockit. In our project we also perform unit testing to get more efficient and quality system. Below are our test cases designed for the unit testing of our system or project.

6.1.2.1 Unit Testing 1: Camera activation Testing

Objective: To ensure Camera is activated and working properly

Table 29 Camera Activation Testing

Sr.no	Test case/Test script	Attribute and value	Expected result	Pass/fail
1	Check weather if camera is not activated	Video lecture does not visible	Video lecture was not visible	pass
2	Check weather if Camera is activated	Video lecture becomes visible	Video lecture was visible	Pass

6.1.2.2 Unit Testing 2: Presence of Video lecture URL in Folder:

Objective: To ensure video lecture URL presence in a folder.

Table 30 video URL Testing

Sr.no	Test case/Test script	Attribute and value	Expected result	Pass/fail
1	Check if video URL is not in test folder	Video will not play	Error was generated	pass
2	Check if video URL is in test folder	Video will play and start to generate graph.	Video will play and start to generate graph.	pass

6.1.2.3 Unit Testing 3: Constraint testing

Objective: To ensure all constraints are working properly.

Table 31 Constraint Testing

Sr.no	Test case/Test script	Attribute and value	Expected result	Pass/fail
1	Check if video URL is not in test folder	Video.mp4	Error was generated	Pass
2	Check if video is in test folder	Video.avi	Video will play and start to generate graph.	Pass

After unit testing is completed in which we check all the module individually it is observed that our system is working properly and there is no bugs in it. All units and modules are tested not only in development phase as well as we can check it after completion of project and test them in different environments .After integrating the modules we are moving towards next type of testing that is functional testing and integration testing.

6.1.3 Functional testing

All the functional requirements of the project is validated in the functional testing phase. Each function of the system is tested by giving different inputs and validate the results by matching them with functional requirements of the system. It is also a type of black box testing and this type of testing it is not concerned with project source code. This type of testing usually checks the interface of the system, client server communication and security etc. It involves the main functions testing and basic utility testing in which we examine that we or user move or navigate to all parts of the screen or not. In this we can also check for error conditions that if certain error Occurs then user friendly notification or messages displayed or not having information describing the cause of an error and guidance that what went wrong and how the error can be solved. Moreover, the Functional testing is done to check that the software is functionally correct or not and check the functional requirements of system is fulfilled or not. Purpose of this testing

is to check the validity that each function of system is doing its job correctly without any exceptions and errors. In our problem of gait recognition system, different test cases are designed to functionally test the performance of the system by ensuring that all functional requirements are satisfied.

6.1.3.1 Functional Testing 1: Button Testing:

Objective: To ensure button pressed correctly and the video lecture plays and start to generate graph.

Table 32 Button Testing

No.	Test case/Test script	Attribute and value	Expected result	Result
1	Checked if view button is not working when we press no respond	Button (Not Clickable and does not play for video)	It was clickable and browsed for video.	pass
2	Check if view button is working after pressing	Button (Clickable and browse for video)	It was clickable and browsed for video.	pass
3	Check user notification is displayed or not if user name and passwords are not correct	Error message is displayed or not (describing the cause of error)	Error message is shown	Pass

It is testing on integration of a complete project in which separate units like modules are merged to make a complete system. The purpose of this testing is to check the bugs that could occur whenwe merge the separate units. Sometimes after integration the system is not working properly so we can check the whole work together as one system. As our system has two modules that is backend face recognition software as well as we have front end user interface. When these two modules are integrated then we perform integration testing order to check that these two modules can work properly or not and whether all the exceptions could be handled. Besides this, the performance of our whole system is measure in this type of testing

Chapter 7

Conclusion and Future work

7 Conclusion

In online learning environment teachers make recorded lecture for students and uploads them on different platforms so that students can watch the lecture but most of the students don't watch lectures and just use unwanted means to solve the exam and some of them just do group study with those who had watched the lecture and trough this they pass the exam but what about teacher who had made lecture with so much hard work and most of the student's don't even open the lecture and there are many online attendance applications but they just do face detection in the start and mark attendance but what if student detects his face by application in the start and then closes the application like there were many drawbacks in the applications but we had made application that not only measures the face but also eyeball and it continuously detects face and eyeball and measures the consistency of the students by pointing out the position of iris and then by making graph of the consistency of student and then after doing calculations our application generates the attendance and if the student had missed half lecture due to any reason then he can watch the lecture again in order to update his attendance in specific lecture , so now teacher don't need to worry about attendance of the students they will just mark their attendance by clicking on view attendance button and then he can watch attendance of every student who is registered in his course and we had made admin who will add, delete or update course, students and teachers and we had given this authority to admin because if students had this authority then he may sign up using wrong details and similarly with teachers. So our application is beneficial for both teachers and students because teacher will easily upload lectures and see attendance and student can watch lecture and if he wants to watch the lecture again then it will always be there in database unless teacher deletes the lecture. Student can also give feedback to the teacher about the lecture and teacher can updates his lecture according to the feedback of the students.

7.1 Future Work

In future if someone wants to do addition in this project then he can build an algorithm in which he will continuously check that whether the registered student is watching the lecture or someone else and can create a chat box of whole class and the teacher so that if teacher wants to send assignment then he can send assignment there and then not every student will ask the same question and teacher had to reply separately to every student so in order to overcome this type of situation developer should made a chat box. Also for log in instead of password face detection is used so that only that student can open the application

Chapter8
References

Student's activity monitoring in online learning environments

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