Terms Of Reference

**Module Code:** KV6002

**Module Title:** Team Project and Professionalism

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**The vision of the Project:**

With the current circumstances, the demand for online learning platforms has risen drastically. Whilst certain platforms such as Microsoft teams, Zoom or Skype provide services that can be adapted for online learning there are certain aspects that these platforms do not cover. For example, when it comes to identifying the other users since these apps are commonly used outside the academic environment most of the users have pre-existing accounts that are not always tied to or resemble their names. Along with this the issue of knowing who is behind the computer at any given time due to the students not always wanting or being able to share their video feed due to various reasons. Another shortcoming of these platforms comes from the fact that they are mostly separate from the university learning platform, requiring the students to access multiple platforms in order to keep up with their courses. As an example, if you need to set up a class meeting you would first have to set it up by emailing each of the students then posting the course work in a repository that the students can access. With all these considered we propose a system that uses a facial authentication system to address identity issue along with this as a quality-of-life improvement along with the chat functions present in the aforementioned applications, the system would also include a calendar for easy scheduling and a grade book system to make it easy for a student to access their grades.

**Subsystems:**

**User system:**

Subsystem Login and Registration:

a) The subsystem must provide a way for the student to log in and register to the network, it must have at least a basic method for accessing the camera of any given device as well as allowing for the upload of photos regarding training the face recognition model for registration.

b) The subsystem also requires a database containing the information for each student as well as the images used in the registration process.

c) Along with this, the data sent to and from the user's platform to the Dataset should be secured with at least a basic level of encryption.

d) There should also be a certain level of privacy protection when it comes to the images stored in the dataset.

e) Another aspect that could be covered is the outsourcing of the face recognition operation, rather than doing so locally on the computer it could all be achieved on a cloud system and the result could then be used to proceed with the login.

**Web Interface:**

Web application with the intent to:

a) Allows the students and the tutor to get easily in touch via a chat.

b) Allows the students to check their grades.

c) Help the students to track their schedule.

d) Allows the student to login on to the platform via facial recognition.

e) Allows the students to view their profile.

**Facial Recognition:**

1. Identification and authenticate the student into the system
2. Secure the sign-in process

c) Sign the user in without using a password or and a user-id

d) Authenticate the user using the camera from the device that is used

**Gradebook:**

1. Allows the student to check when the grades are going to be uploaded
2. Allows the student to check their grades
3. Allows the teacher to upload the grades into the system for each student
4. Allows the teacher to modify the grades
5. Allows the teacher to change the date when the grades are going to be uploaded

# **Calendar Component**

An online academic calendar that:

a) can display a schedule or timetable for students and staff members.

b) can show students their deadlines for homework or assignments.

c) can send students reminders when homework or assignment is due.

d) allows only staff members to modify the times, dates and information about events, lessons, and deadlines.

**Scope of the Project:**

Common Element Analysis

The concept of using facial recognition in an academic or professional environment is a sought after and well-researched topic. One study in particular by Abhishek (2007) proposes a face recognition solution in order to monitor student attendance is particularly relevant for the system we are trying to implement. In the study, the facial recognition process is divided into four stages: face detection, face alignment, feature extraction and face matching. The face detection process separates the facial area from the background of the image or uses a face-tracking component in the case of a video stream. After using the face detection process to estimate the position the alignment process finds the best localization and normalization of the face by outlining face components such as the eyes, the mouth, the ears, the nose and naturally the face outline. The other two steps are used for extracting information used in distinguishing between faces and matching the information with the features stored in the database.

The face recognition solution also poses a couple of issues outside the training of the model. One of these issues consists of the variation of computational power between systems There are a few possible ways of addressing this issue. Firstly outsourcing the computation, whilst this is the most optimal way of going about the issue it does involve two-way encryption between the users and the cloud, One way of solving this is by using a basic key system where the information sent to and from the cloud is encrypted and the decryption happens on the side of the user. The second option is keeping making a compromise when it comes to the complexity so that the operations can run locally. Even if the computations will be done locally looking into ways of encrypting the images for storage in a database is still important, this there a possible option is using a privacy-preserving matrix transformation (Zhang et al 2019) but there are multiple ways of securing the information both in the login and the registration process.

After covering the authentication system we need to look into the design of the platform which can be defined as an e-learning platform as it will cover all the basis for one, students, therefore, being able to attend courses, monitor their university schedule, and receive grades for their work. The benefit of such platforms over conventional learning methods is the increase in attendance, as shown in a study by Benda et al (2014) the number of absent students decreased from 17% with the traditional learning methods to 4% while using an E-learning platform. Along with this the willingness for students to undertake more complex homework also increased. Whilst in our current situation we are entirely reliant on these platforms for our study their usefulness is not limited just to the pandemic as they have been stable to university life for a long time.

Common Element Requirements

**Must**

* Provide an educational platform that allows the user to log-in via facial recognition
* Allow the user to check their schedule
* Have a database for holding student information (course, year, name)
* Allow the user to view its grades via a gradebook platform

**Should**

* Provide a way of communication between the student and the tutor
* Allowed the user to book meetings on their schedule
* Add a way of securing the login process by encryption or other means

**Could**

* Allow the user to see the members of a classroom
* Provide a profile page of the user which may contain basic information

**Would**

* Allow the tutor to add or modify student’s grades
* Allow the users to communicate via calls

**Stakeholder stories:**

**Headmaster:**

As a headmaster, I need an educational platform so that students will find it easy to get in contact with their teachers, classmates or even to check their school schedule and the grade book. Numerous students complained about their issues faced during their assignments. To help them to get easier over this stressful period an educational platform is needed in order to get in touch with their teachers for more clarifications.

**Teacher1:**

As a teacher, I need an educational platform so that I can be sure that the student himself is behind the computer through a facial identification logging system. During remote learning, the students can ask other people to stay behind the laptop during the meeting with their teacher, in order to avoid this is an issue the identity of the student should be verified. Since facial imagery is sensitive data and as a teacher, I need to be sure that the system adheres to data privacy legislation to help students feel comfortable using the facial authentication system.

**Teacher2:**

As a teacher, I want an educational platform where I can upgrade students' grades and schedule meetings. The way tutors submit the student’s grade is unprofessional; they have to send the grade via e-mail or WhatsApp, for example, the teacher submits on group chat a table with the name of each student and the grade received. This issue is making it hard for a student to keep track of his grades and it can also affect his confidence by making their grade public to his classmates which lead to a significant ethical issue by revealing their private data to other students.

**Student1:**

As a student, I want a platform where I can easily login with a facial recognition system in order to avoid memorising the passwords and the id for each chat platform. The use of various platforms can be hard to manage and due to numerous passwords needed, moreover, facial authentication is a safer method to access an account.

**Student2:**

As a student I want to use a single platform in order to contact my teachers, avoiding the use of different chat platforms regarding each teacher’s preference. Each tutor has different preferences regarding the chat platforms used during remote learning. Because the students must adapt to their tutor’s preferences, them is hard to manage multiple chat platforms and a solution for this issue could be a platform that can be used by the entire school.

# **Code of conduct**

## Following the code:

The whole team must follow this code proposed in this document for the duration of the project.

## Meetings:

We agreed to have one meeting each week with the supervisor on Tuesday at 14:00. Also, group meetings will occur when needed to put the whole system together. The details about the time and day will be discussed three days before.

## Performance logs:

The progress of our project and the performance of our work as a team will be tracked and recorded through a task-based system. Tasks for each milestone in the project will be assigned to members periodically and performance will be recorded by the completion of such tasks.

## Attendance:

There will be an attendance record for meetings with the supervisor as well as team meetings that will specify how long the meeting took and when the meeting took place (week, day, time, date). The attendance will be recorded on a list by marking an X at every session.

## Absences:

In case that a member of the group cannot attend to the specific date it must announce at least 24 hours in advance so in that case, we will be able to reschedule the meeting in such a way that all the members manage to arrive. Otherwise, those who will not respect this rule will be marked as absent from that session.

## Communication policy:

* Every member of the team should adopt a friendly tone when speaking.
* All members have the right to express his/her idea or to say what is their point of view about someone else's idea.
* When somebody has something to say nobody should interrupt while they are speaking.
* If someone did not understand what their tasks are or what must be done, he/she has the right to ask the team members in every moment what he/she did not understand.
* You should not marginalize or exclude any member of your team.

## Team aspects:

* Try to be useful in every situation.
* Be civil to one another.
* If someone cannot handle a certain task the other members should support that person.
* Team members should not be judged if they fail or are weak in certain tasks.
* The team should create a professional environment.

## Communication app:

To communicate with each other we will create a group chat on messenger by Facebook. For meeting with our supervisor or for video conference Microsoft Teams will be used.

## Sharing the project and documentation:

To be able to have access to each subsystem of the whole system the code should be uploaded by each team member on Google drive or GitHub. This is also available for documentation.

## Layout for documentation:

The theme font which we will use for the documentation in the body will be Calibri and for the headings will use Calibri Light. The size of the characters will be 12 for the body and 18 for headings. Also, the spacing after each paragraph should be 12 points and line spacing should be set to single.

# **Legal, Social, Ethical, and professional dimension of the group project**

Since this is an educational app some ethical considerations must be resolved. This system will be used by students that are in high-school or university. To use such a system, the educational institution should make the commitment of providing guidance on how the system works and how it can be used. Also, a consent form should be provided because the system requires pictures of the user. Furthermore, some of the students will be under the age of eighteen. Therefore, they must take into consideration to ask their parents to complete the consent form. This system will secure the data for each user so they can be sure that all their personal details remain confidential and none of the other students will be able to access their profile. Before implementing such a system in an institution, the headmaster or the leader of that institution should grant access if needed for the students to a device that is equipped with a camera and has an internet connection so that they can use the product.

Socially, the platform can be used for educational purposes, the project’s target being the educational institutions that need a virtual environment in order to facilitate e-learning. The users of the platform will have access to various data. Considering that the platform contains sensitive data such as student’s grade, the platform users are divided into two groups, students and tutors. For example, only the tutors have permission to edit, add or remove student grades.

In terms of the professional standards that our team will hold for the duration of the project alongside the code of conduct established by our team, we should also strive to conduct the development process in such a way as to mimic working in a professional environment. Therefore professional practices such as the one detailed by the ACM/IEEE- CS Software engineering code or the standards will be taken into account when working on the project internally and externally. (in the case of testing the system).

The proposed system will need to take into consideration the Data Protection Act of 2018. This involves making sure the system is robust against unauthorised access and processing from attacks such as XSS and SQL-injection. In addition, GDPR (General Data Protection Regulation) also needs to be considered as this system will be handling personal data from students and staff members. This involves being transparent about how data is being used and giving more control to users by simplifying access to their data and giving users the right to be forgotten.

**Costings**

To work out the cost for this project a few assumptions have been made. The salary for an employee is derived from an average full stack developer salary and is in-line with the UK living wage of £9.50 (Living Wage Foundation, 2021), the number of team members is 5, an FTE of 5.0 and a 20-day work month is assumed in calculations.

From looking at the governments Civil Service Jobs website, the average annual salary for a full stack developer can be assumed to be £30,000 (Civil Service Jobs, 2021). That is £2500 a month, and thus the hourly wage per employee is approximately £16.

In working out the employer’s contributions towards national insurance, it is assumed that the employee’s national insurance category letter is A for the 2020 to 2021 tax year. A £2500 monthly wage is £625 a week. The first £183 is not deductible which leaves £442. An employee would need to pay 12% of £442 towards national insurance which is £53.04. The employer would need to contribute 13.8%, which is £7.32 (UK Government, 2021). That is approximately £30 a month to contribute towards each employee’s national insurance. The updated total monthly cost per employee is £2530.

The day-rate for an employee is therefore approximately £125 (£2530 / 20 days).

If an office space is required, a fully serviced office from a company named Regus in Newcastle upon Tyne would cost £140 per person per month. For our team, this is £700 per month. Additionally, according to Yurday (2021), the average cost of £1 million public liability insurance is approximately £100.

The monthly running cost based on office space and insurance is £800; hence the running cost per day is £40.

The updated day-rate for an employee now including running costs is £133.

*(£40 running cost / 5 team members) + £125 employee day-rate = £133*

Assuming the timescale of this project is four months, the total cost is £10,640.

*4 months x 20 days = 80 days x £133 day-rate = £10,640*

**Reference**

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