UTM
UNIVERSITI TEKNOLOGI MALAYSIA

FACULTY OF ENGINEERING

SCHOOL OF COMPUTING

SEMESTER 1/20212022

SECP1513 – TECHNOLOGY INFORMATION SYSTEM

SECTION 02

PROJECT – PHASE 2 (FINAL REPORT)

[FACIAL RECOGNITION ATTENDANCE SYSTEM]

LECTURERS: DR IZYAN IZZATI KAMSANI

GROUP NO: 1

Name	Matric ID
ABDUL MUHAIMIN BIN ABDUL RAZAK	A21EC0002
HAFIZULSHAH BIN SHAHROM	A21EC0027
IZZAT HAQEEMI BIN HAIRUDIN	A21EC0033
MUHAMMAD HAZIM BIN SALMAN	A21EC0078
MUHAMMAD FARHAN BIN IBRAHIM	A21EC0072

Table of contents

1.0 Introduction

Presently, the world is being hit by the covid virus and the population of people who are infected is increasing at a fast pace everyday. Even though the pandemic brought many inconveniences to us, it also brought many major changes in our life, including how we do trivial tasks of our life. From buying groceries to office work, most of them are now carried online and require less physical interaction. This is obviously beneficial as it requires less energy but having the same output. In this report, we proposed an attendance taking system which uses the advantage of the latest technology which is facial recognition. The reason why we choose this type of attendance taking instead of traditional ways of recording attendance is because we want to minimize the contact of one's body with other surfaces.

Our objectives in this project are :-

- To make attendance recording smoother, faster and easier to execute
- Reduce the risk of system malfunctioning since we use minimal hardware usage
- To achieve zero physical contact system
- To take attendance by requiring less actions to achieve the same goal,which is to take attendance

Aside from these adjectives of ours, we can also reduce the risk of the system malfunctioning as we only need the camera to do just face scanning. Not to mention, we also want to reduce the risk of one's getting infected by the virus because we are informed that the virus can be transmitted through body contact with other surfaces. By implementing facial recognition attendance systems we can even avoid touching our smartphones. It may appear to be a trivial cause, but many of us are unaware that our smartphone can serve as a medium for microbes to cling to and multiply (breed). Because the majority of the QR codes we need to scan are placed within the store or mall, this occurs. Before entering, we must first touch the door handle, and then we must touch our smartphone, which can spread viruses.

The goal of our project is to provide a system that allows students to quickly record their attendance at school, university, or college. We also intend to deploy the system to replace the MySejahtera QR scanner at malls and outlets to reduce the risk of the virus spreading through hand contact. This technology can also be utilized in the workplace to allow employees to conveniently clock in and depart. However, for the sake of this project, we will only use it for university purposes.

1.1 Steps on Inventing Facial Recognition Attendance System

First and foremost, the first step that we take to succeed in this project is brainstorming about the topic that we choose which facial recognition attendance taking system. It does take an amount of time choosing the topic because at first we are not clear about the instruction given but fortunately in the end we get a hold of it and we decide to choose the topic Facial Recognition Attendance System. Next, we divide task between our group members which are

ABDUL MUHAIMIN BIN ABDUL RAZAK :-
Providing the team with specific tasks for each member and collecting data from past research/prototype or invention and sharing it with the team.

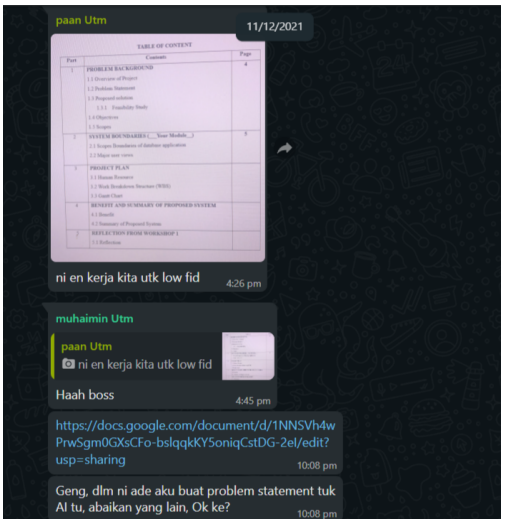
IZZAT HAQEEMI BIN HAIRUDIN :-
Provide a detailed report about feedback given from the client and discuss with the member about specification that meets both client and our team's needs and wants.

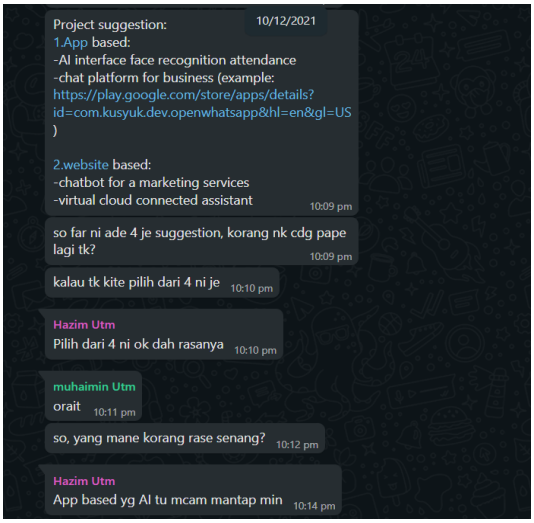
HAFIZULSHAH BIN SHAHROM :-
Design cloud storage system using AWS service which integrated with MySQL for a better database structure and develop course code for input data synthesis.

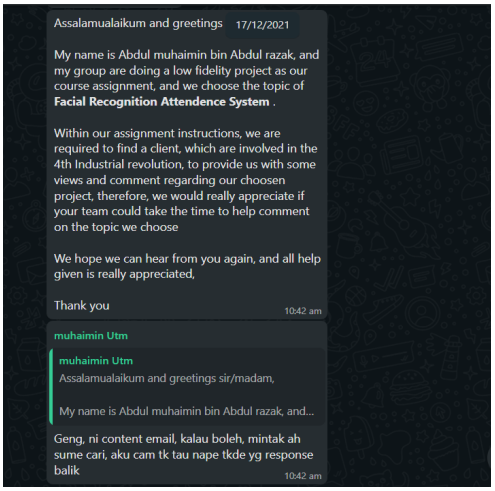
MUHAMMAD FARHAN BIN IBRAHIM :-
Purchase the necessary hardware within the budget constraints, install the system on the purchased hardware, and prepare them for system testing.

MUHAMMAD HAZIM BIN SALMAN :-
Perform system testing and send a report to the development team if any corrections or fixes are needed, as well as train the next system user for the corresponding customer to provide proper service.

Here are some proof that we brainstormed about our project on inventing Facial Recording Attendance System and prepared a proposal to our client and got feedback from it to improve any shortcomings in our project. Lastly, after everyone did their part we wrote down all the data needed into this report according to the rubric given at e-learning.







What is low fidelity prototype project
https://blog.adobe.com/en/publish/2017/11/29/prototyping-difference-low-fidelity-high-fidelity-prototypes-use#gs.ibqcvy
Cloud architecture explanation
https://www.vmware.com/topics/glossary/content/cloud-architecture

Project suggestion:
1.App based: AI interface face recognition attendance / chat platform for business

2.website based: Chatbot for a marketing services / virtual cloud connected assistant

2.0 Problem, Solutions and Team working

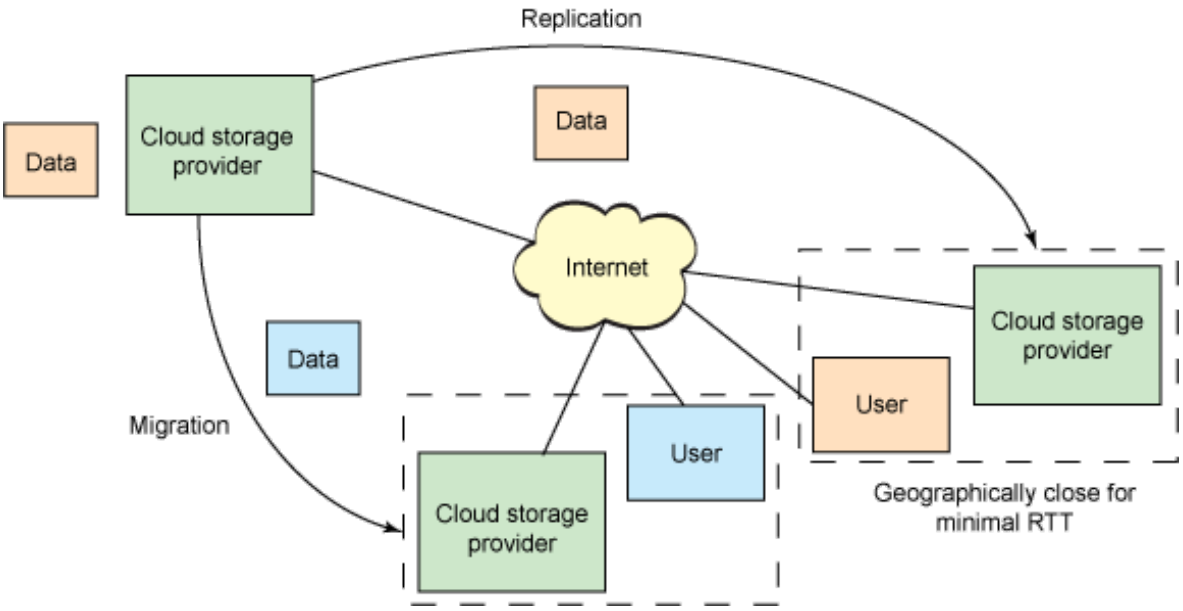
2.1 Problem

There are a few problems and challenges in implementing the Face Recognition system in the real world . Firstly , the problem of making this system **poses variations** . This is because of the independent movement of a person's face, this system has a difficult time recognizing faces. Next , the second problem occurs when the **facial expressions change individually** . This is because changes in human face expressions are influenced by an individual's emotions. Human expressions, in particular, are made up of a number of emotions that may be expressed, such as anger, disgust, fear, happiness, sadness, or surprise, as well as other spontaneous, quick facial patterns. Thirdly is **varying illumination conditions .** If the illumination rate is low during face recognition, the system will struggle to operate. In addition , high levels of lights also could lead to over-exposure of the face . Afterwards , the fourth problem is **image resolution and modality.** Every technology that makes use of a camera must be concerned with adequate resolution in order for the system to function correctly. As a result, faces gained in real life situations provide new obstacles .

2.2 Solution

Most of the face recognition systems consist in a two‑step process based firstly on facial feature extraction and second on facial feature classification/matching against an available face database. Thus , to solve the problem various techniques and technologies are used across the world to improve the accuracy and reliability of face recognition. If the creation technique is upgraded**,** the facial recognition problem will be solved. Eigenfaces, Active appearance models, Local binary patterns, and the SIFT approach are some of the methods used. This approach can deal with the issue of pose variation as well as when individual facial expressions change. To overcome the light condition , we should use infrared technology and create a level that will be the benchmark to all hardware.

3.0 AWS Architecture Design



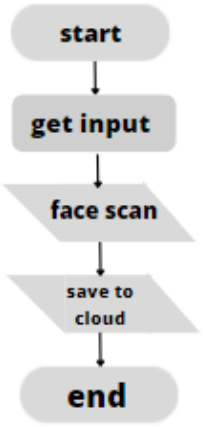
- For our cloud architecture, we decided to use cloud storage service via hybrid cloud. A hybrid cloud, as the name implies, combines public and private cloud storage into a single type of cloud storage that benefits from both. All data involved in our system can be moved between public and private clouds as needed, providing a more flexible data storage. The system can utilize the public cloud for spreadsheet data to be shared to the lecturer, but it requires a private cloud for safe data log storage. To build a unique solution, a hybrid cloud solution integrates both public and private clouds, which give us the advantages of greater control, highly customizable and cost effective.

- Furthermore,we chose to implement file-based and object-based storage for our system.File-based storage is a simple and uncomplicated method of storing data and is a good way to organise data in a hierarchical, straightforward, and accessible way. A specified nomenclature (naming) strategy and periodical clean-up are essential for enhancing data storage of student input such as. name, matric number, course and faculty. File storage, also known as shared file system, is useful for file sharing, archiving, and data security.

- To deal with unstructured data, object-based storage is used (videos, photos, audio, collaborative files, etc.). Object storage works by storing data in containers or "buckets" when the data is large or shared. Object storage is used in collaborative software because it works on numerous levels, from the device to the interface. With the rapid growth of data in the headlines almost every day, it's only natural that a new type of storage that provides for greater flexibility and scalability would thrive. The use of REST APIs in object storage allows for HTTP access to objects, making authentication, permissions, and properties more accessible.

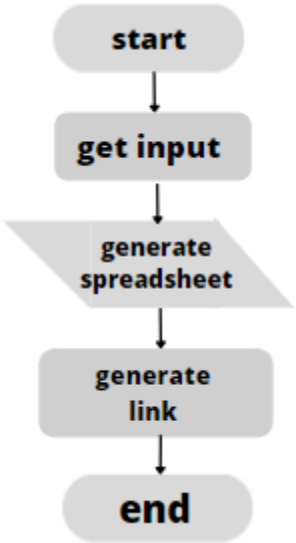
4.0 Business process flow and diagram

4.1 Student registration



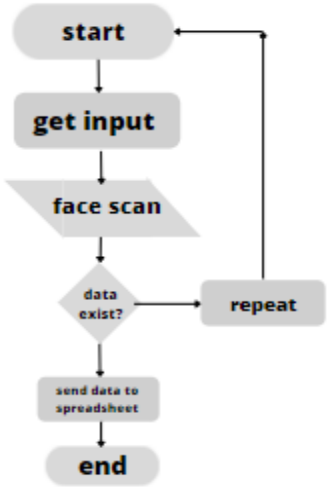
The system will take basic input from the user such as name, matric number, course and faculty, before scanning our faces to get an image capture. All these inputs will then be saved in the cloud database. The data taken during face scan include numerical values featured on our faces such as distance between eyes, distance from forehead to chin, shape of cheekbones and contour of lips, ear and chin and it will be recognized as storage faceprint in the database. The process is repeated 4 times as a security measure to prevent any data leakage or loss.

4.2 Attendance link generation



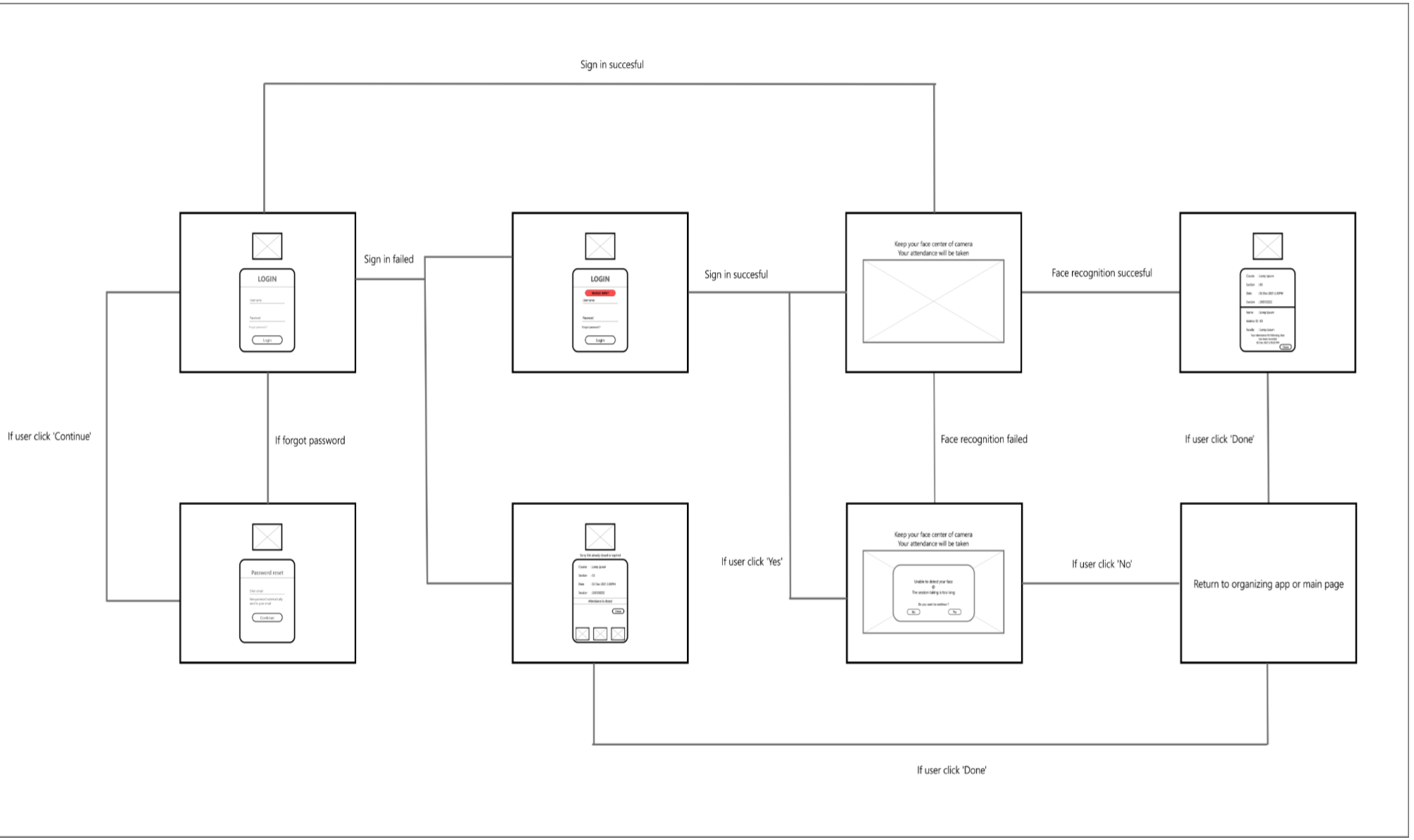
As for lecturers who intend to take attendance for their class, the system will request information that include class name,date and lecturer name. After that, it will automatically generate a spreadsheet used for attendance taking and a link which will expire based on the lecturers order. The link will then be passed on to the students for them to access the system for the attendance taking process.

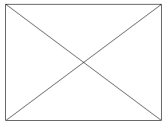
4.3 Attendance taking system



During attendance taking, the student will use the link provided by their lecturer to access the system,and open their camera to get their faces scanned. The features of the faces, such as distance between eyes, distance from forehead to chin, shape of cheekbones and contour of lips, ear and chin and all these inputs will be saved as input faceprint. The value from input faceprint will then be brought to the cloud database to search for the same value. If the same value is found, the data registered with the storage faceprint (name, matric number, course and faculty) will be sent to the spreadsheet generated, with the addition of date and time of the class. On the other hand, if no data is found in the cloud database, the system will run the program again, but only up to 4 times to prevent data leakage and loss.

5.0 Low fidelity mockups





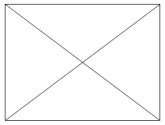
LOGIN

Username

Password

Forgot password ?

Login



LOGIN

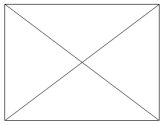
INVALID INPUT

Username

Password

Forgot password ?

Login



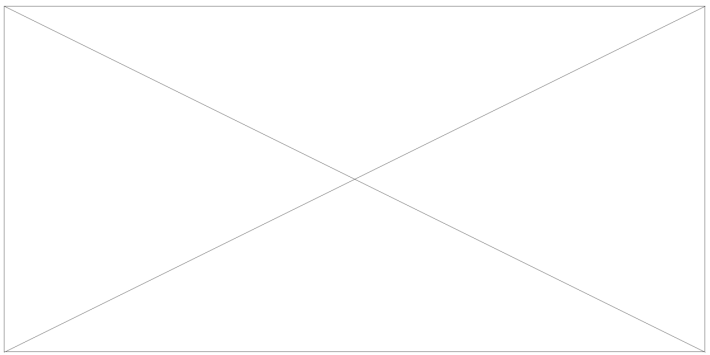
Password reset

Enter email

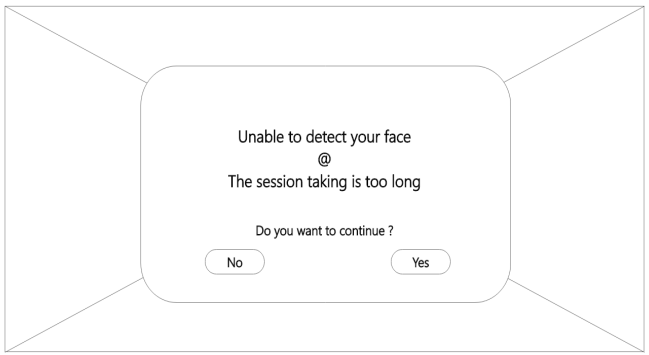
New password automatically send to your email

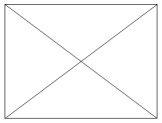
Continue

Keep your face center of camera
Your attendance will be taken



Keep your face center of camera
Your attendance will be taken





Sorry link already closed or expired

Course : Lorep ipsum

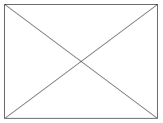
Section : 03

Date : 02 Dec 2021 2.00PM

Session : 202120222

Attendance is closed

Done



Course : Lorep ipsum

Section : 03

Date : 02 Dec 2021 2.00PM

Session : 202120222

Name : Lorep ipsum

Matrics ID : 03

Faculty : Lorep ipsum

Your attendance for following class has been recorded
02 Dec 2021 2:31:22 PM

Done

Keep your face center of camera
Your attendance will be taken

Unable to detect your face
@
The session taking is too long

Do you want to continue ?

No Yes

Return to organizing app or main page

6.0 Reflections

6.1 Reflections (Abdul Muhaimin bin Abdul Razak)

a) **What have you learned and your motivation to complete this project ?**

This project teaches me about a diversity of systems that exist within the cloud, the industry and also in our daily life as most processes in our daily activities still use conventional systems, which has become less and less practical in this endemic aftermath. Therefore, it really motivates me to create a system that is fully functional, practical and user friendly for everyone to ease everyday hurdles since I myself love to take things easily.

b) **What issues and solutions are implemented to make the project a success ?**

The issue brought forward here is the complication to take attendance via online learning as many educators are still having a hard time doing this trivial task using normal methods such as QR scan and Google Form. Therefore, taking into consideration time consumption,I do believe that using our proposed solution, facial recognition attendance system, it is much faster and easier to conduct the attendance taking process during online class.

c) **What is your direction after completing this project ?**

I am going to broaden my understanding on cloud architecture to help innovate many digital systems that are used in everyday life, and further polish our project details and specification, so we can develop this project properly and contribute to community and industries.

d) What is the improvement necessary for you to improve your potential in the industry ?

I want to strengthen my management and leadership skills,to ease every work process necessary for my team and enhance my hard skills,such as programming and data analytics to increase my value for the industry's intake.

6.2 Reflections (Hafizulshah bin Shahrom)

a) **What have you learned and your motivation to complete this project ?**

In my opinion, I have learned some new technology that started to take the place of the conventional system post-covid 19, thanks to the digitalization era and the rise of the internet of things. Due to that, I feel the need to indulge myself deeper into the technology that is going to be developed or used more frequently in the future to secure myself a high value in the job market.

b) **What issues and solutions are implemented to make the project a success ?**

I think the main issue will be convincing many major users to switch their method from conventional ways to the next technology. This is because the masses prefer to use whatever that is already in store and are very reluctant to change the way they used to do things. Therefore, I believe to solve this problem, a suitable prototype and an introduction of the technology to people are important, in order to expose them to many other ways to ease their lives with the solution that the latest technology has offered.

c) **What is your direction after completing this project ?**

Thanks to industrial revolution 4.0, I would like to come up with an innovation that further emphasizes on digitized structure to enhance our class attendance taking system which succeeds even AI and facial recognition.

d) What is the improvement necessary for you to improve your potential in the industry ?

As I mentioned before that we are experiencing industry revolution 4.0, I want to improve myself on becoming a better team player. Because to make a big project work, it requires some people that are able to work in groups. Said Robin Jones Gunn " If you want to go fast, go alone. If you want to go further, go together."

6.3 Reflections (Izzat Haqeemi bin Hairudin)

a) **What have you learned and your motivation to complete this project ?**

The input that I've gained from this project is that a simple attendance system can make a huge change.For instance, the project we made can make attendance making contactless and decrease the chance of people transmitting covid virus to the others. My motivation in completing this project is my interest in technology. As I am a student of computer science, I am very interested in making a new technology that would benefit others and this feeling is what boosted my mind in making the project run perfectly.

b) **What issues and solutions are implemented to make the project a success ?**

The issues that we faced is there are many types of attendance making systems that are on par with our project. Fortunately, our attendance plus point is that we make an attendance making contactless and easy to key in the attendance because we use facial recognition which is the fastest method and most efficient method in approaching to handle attendance records.

c) **What is your direction after completing this project ?**

The direction that I envisioned is that I want to make facial recognition attendance a default attendance system because it comes with many benefits such as time saving and more secure.

d) **What is the improvement necessary for you to improve your potential in the industry ?**

The improvement that I seek is that I want to improve my skills on problem solving because we face so many inconveniences in our daily life. So as a student of computer science, I want to implement technology to face daily problems and make our life easier.

6.4 Reflections (Muhammad Hazim bin Salman)

a) **What have you learned and your motivation to complete this project ?**

The knowledge I have gained while completing this project is that I was able to learn about how the facial recognition system operates. This project has opened the view to job opportunities in the IT industry. Furthermore, my interest in AI is growing. Due to my deep interest, I wanted to learn more about Artificial intelligence and be a motivation for the future.

b) What issues and solutions are implemented to make the project a success ?

Now, among the ways the covid-19 virus is transmitted to the world's population is by physical contact. Therefore, this Face Recognition Attendance System is desirable to be implemented in the real world. This project can also help in reducing the spread of this virus because it is touchless and is faster than the old system such as using a qr code .

c) **What is your direction after completing this project ?**

After completing this project, I hope to gain more knowledge about the Industry 4.0 revolution. As a result, I intend to improve on existing technology and make our Face Recognition project a success.

d) **What is the improvement necessary for you to improve your potential in the industry ?**

My problem-solving abilities are something I need to work on. Furthermore, in order to complete a project successfully, such skills must be present in every individual. Additionally, as a computer science student, you must be familiar with computers. As a result, I must improve my skills in areas such as programming.

6.5 Reflections (Muhammad Farhan bin Ibrahim)

a) What have you learned and your motivation to complete this project ?

Things that I learned in this project are to innovate existing systems to become better in terms of efficiency and how to use Adobe XD to make low-fidelity wireframes. My interest in Artificial Intelligence is a big motivation for me to complete this Facial Recognition Attendance System. I implemented some of my little pieces of knowledge in this project such as minimizing the errors and flaws seen in the traditional methods of taking attendance.

b) What issues and solutions are implemented to make the project a success ?

One of the issues in this project that I found in this project is proxy attendance. By using facial recognition, it is hard for a person to ask someone else to arrange their attendance. Therefore, we implemented by using a camera to detect the person's face to ensure that his/her not cheating. This is one of the solutions, my group and I implemented to make the project successful.

c) What is your direction after completing this project ?

To be honest, after completing this project I decided to focus on gaining more knowledge in contents of system structure in the industry. By doing that, I want to implement my knowledge into this project to become better and useful. Therefore, The effort put into this project will not be wasted.

d) What is the improvement necessary for you to improve your potential in the industry ?

In my opinion, the most improvement thing that I want to improve for me to be potential in the industry is I want to strengthen my foundation skills in computer science such as programming in C++ and other languages. Other than that, I also want to improve my creative thinking and analysis so that I can innovate more things in the future.