# SECP1513 TECHNOLOGY & INFORMATION SYSTEM

# SEMESTER I SESSION 2025/2026

# SECTION 04

# DESIGN THINKING PROJECT

# TITLE: STUDENT FACE SCAN

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## Introduction

The idea of a future digital campus focuses on using technology to improve daily campus activities, learning experiences, and the overall well-being of students and staff. As universities continue to develop, methods such as using physical student ID cards, QR-based attendance taking, and basic access control systems are becoming less effective. These methods often cause problems such as wasting time, losing ID cards, and creating security concerns since there is also money stored in the cards.

Many students face issues when they forget or lose their student ID cards, which can affect their access to classes, hostels, libraries, and examination halls as well as their money. Lecturers also experience difficulties with QR attendance, as it takes up valuable lecture time and probably server or internet connection problems. At the same time, campus staff and security officers need a more reliable way to manage access and ensure safety around campus.

To solve these problems, this project proposes the Student Face Scan System, a non-functional prototype designed for a future digital campus. The system uses facial recognition technology to support attendance, campus access, and identity verification. By replacing physical ID cards with a contactless face scan system, this will help to save time, reduce mistakes, improve security, and make campus life more convenient for students, academic staff, non-academic staff, and visitors. This solution enhances the vision of a smart digital campus that focuses on usability, user needs, and responsible use of technology.
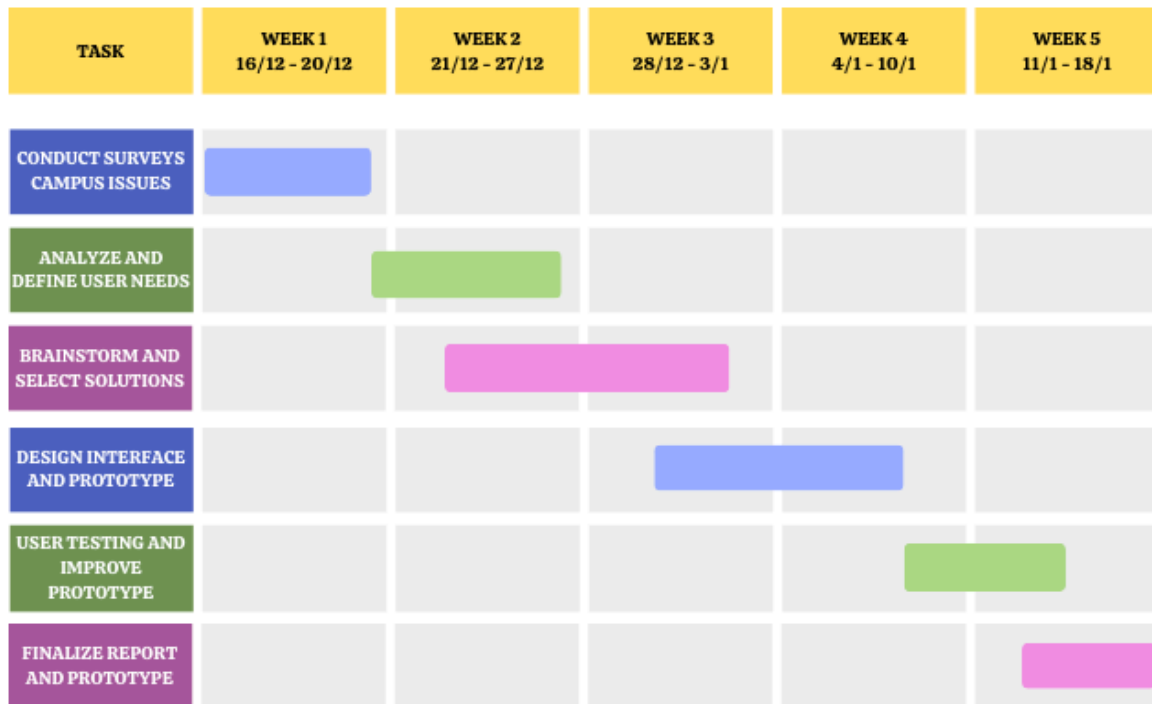
**Problem and Solution**

Through the discussion of team members, several problems have been discovered such as security concerns for the campus access through campus buildings, waste time for taking attendance and losing student ID cards for identity verification. To address these problems, a Student Face Scan System technology is suggested.

| Problem | Description | Solution |
|---|---|---|
| Security concerns about the campus access through the campus buildings. | The unauthorized individuals can enter the campus building at will. It can lead to the issues of theft or vandalism at high value areas especially for hostels and laboratories. | Creating a Student Face Scan System to restrict the specified campus buildings entrances. As an illustration, the system needs students to enter their ID number and name before face scan to verify identity. It will scan the face for each student who enters the hostel. The door will unlock with a successful scan. Otherwise, it displays the possible reasons and lets unauthorised individuals try again or contact campus security. |
| Problem of wasting time to take attendance. | To attend the class, students need to scan the QR codes by using UTM Smart. It will take an estimated 5 minutes for the lecturer to wait for all students to scan it. Additionally, it is inconvenient for lectures to manual attendance if UTM Smart is not functioning. | Creating a Student Face Scan System in each entrance of class with liveness face authentication. It utilises a 3D sensor camera to process the face scanning. The camera can detect the face of students and ensure that it is a real person rather than a photograph. Students have to enter their class code, date and time before scanning their face. The name, ID number, |

| | | class code, time in, and date will be recorded in the system with a corresponding successful scan. The advanced system not only can save time for attendance, but also avoid cheating attendance of students by sharing the QR code. |
|---|---|---|
| Issue of losing student ID cards for identity verification. | Students often forget or lose their student ID cards to enter some particular buildings such as libraries and examination halls. Moreover, the administrators always need to collect the attendance slip and verify the students ID card during the exam. | Creating a Student Face Scan System at the entrance of particular buildings such as libraries and examination halls. To ensure identity verification, the system requires the inputs as name and ID number. The camera can capture the facial features of students and compare it to the secure encrypted database. Once face scan is successful, it will record the profile of students in the system such as name, ID number, and time in. It can remove the risk of students being barred from libraries or examination halls due to forgetfulness or loss. During examinations, it decreases the burden of administrators to do time consuming tasks and help with identity verification. |

## Team Working

| TASK | WEEK 1 16/12 - 20/12 | WEEK 2 21/12 - 27/12 | WEEK 3 28/12 - 3/1 | WEEK 4 4/1 - 10/1 | WEEK 5 11/1 - 18/1 |
|---|---|---|---|---|---|
| CONDUCT SURVEYS CAMPUS ISSUES | ■ | | | | |
| ANALYZE AND DEFINE USER NEEDS | | ■ | | | |
| BRAINSTORM AND SELECT SOLUTIONS | | ■ | | | |
| DESIGN INTERFACE AND PROTOTYPE | | | ■ | | |
| USER TESTING AND IMPROVE PROTOTYPE | | | | ■ | |
| FINALIZE REPORT AND PROTOTYPE | | | | | ■ |

The team progress was planned by using a Gantt chart to ensure that each phase was completed on time. The project was released on 16 December and was scheduled to be completed before 19 January. Each design thinking phase was assigned a specific timeframe and progress was reviewed regularly.

The team conducts several data collection methods such as surveys, interviews and observations to identify the issues faced by students and understand students' needs for five days. After that, the team continued by analyzing empathy findings and defining user problems in order to brainstorm ideas and solutions in the following week. In the fourth week, the team proceeded with in-depth discussions to decide the interface design and develop a system prototype. Before finalizing the report and prototype, users are asked to test and provide feedback due to the improvement of the prototype.

## Empathy Phase

**Target user**

Students

**Methods**

    i.    Survey

   ii.    Interview

  iii.    Observation

Total respondents : 25 people

**Sample Questions and Responses**

**Q1:** Have you ever forgotten to bring your matric card?
**A1:** Yes, I have forgotten my matric card a few times which caused inconvenience when entering facilities like the library.

**Q2:** How long does attendance usually take?
**A2:** Usually takes around 2 – 3 minutes

**Q3:** Do you feel campus security is sufficient?
**A3:** Campus security is generally good but there is still room for improvement, especially in controlling access to the hostel.

**Q4:** Are you comfortable using face scan technology?
**A4:** Yes, I am comfortable using face scan technology as it is commonly used on smartphones.

**Q5:** What is the main benefit you expect from face scan?
**A5:** Faster and more convenient access

|  | Sample User 1 | Sample User 2 |
|---|---|---|
| **Name** | Masturina binti Mustafa | Teoh Yan Ling |
| **Age** | 19 | 21 |
| **Program** | Urban Planning | Chemical Engineering |
| **Background** | Active in campus activities and group projects | Busy and rushes between classes |
| **Pain Points** | Worried about attendance fraud | Forgets matric card |
| **Needs** | · Secure and reliable system<br><br>· Secure identity verification | · Fast and contactless identification<br><br>· Time-saving attendance method |
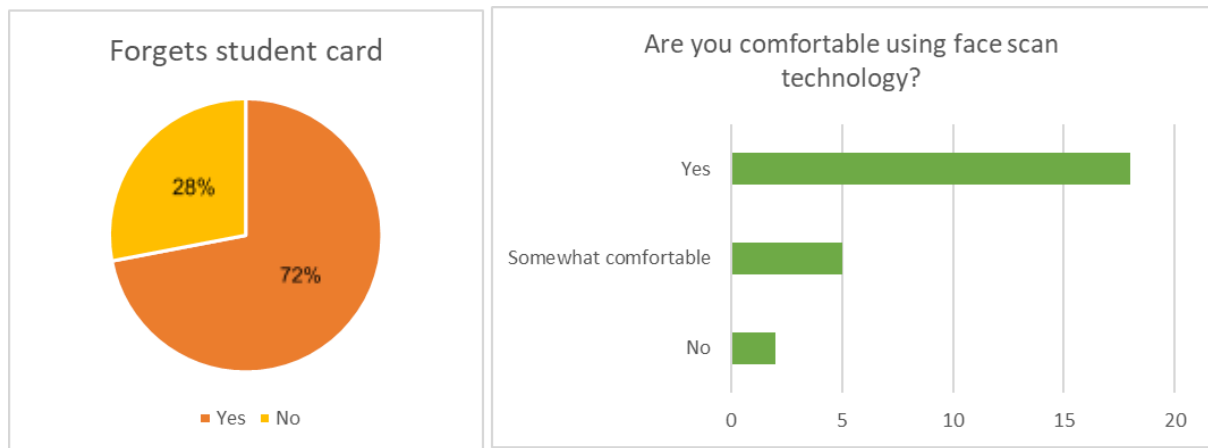
The results of data collection showed that students faced several campus issues such as forgetting their matric cards to verify their identity as a student, attendance cheating that usually happens during lectures and lack of security facilities to ensure their safety. From the survey conducted in this phase, students provided their demands for a better campus experience which helped the team identify the problems and brainstorm the useful solutions.

**Assessment**

The assessment for the Empathy phase is to understand students' real experiences, challenges and needs related to campus accessibility by going through simple responses collected using short questions. The team evaluated common problems such as forgotten cards, lack of security facilities and attendance fraud. These findings helped the team understand user needs before proposing solutions. Therefore, the assessment also emphasized the ability of the team in order to establish a strong foundation for defining the problem and developing solutions in the next phase.

**Define phase**

Define phase emphasizes sharpening the focus on identifying and rephrasing the overall problems experienced by users based on their insights learned during the empathy phase. Having examined the responses garnered by students and lecturers as well as campus employees, there were key concerns raised.

Although it uses the QR system for attendance marking that is internet-dependent and relies on mobile technology that could have potential delay problems or could be abused as in the case of proxy marking attendance. Additionally, access to certain places within the campus like the major gate and hostels could be inefficient.

On the basis of these findings, the key problems were proposed to be:
- Students require an efficient and convenient way of asserting their authenticity without relying on physical cards
- Lecturers require an effective attendance management system that ensures minimal disruptions in class.
- Campus staff must have a secure system in which their access and verification can be managed.

Define statement:

"Students and campus staff require a secure, contactless, and efficient identification system that ensures seamless campus services and enhances campus security and efficiency."

This particular definition of the problem informs the design of the proposed solution and even ensures that it is user-centric.
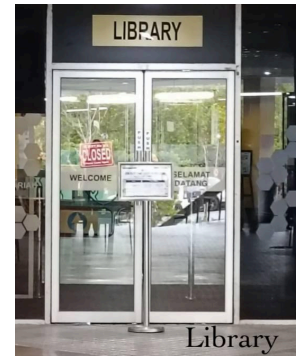
**<u>Assessment</u>**

In the define phase, the assessment included how clearly the team had identified major problems faced by users in the current campus system. To ascertain that the issues were real, relevant, and well-defined, feedback was sought from students, lecturers, and campus staff regarding dependence on QR-based attendance, the inconvenience of campus access at the main gate and hostels, and the risks in losing student ID cards used for cashless payments. The team reflected on whether these problems were stated in a user-centered way, with a correctly defined statement that reflected user needs. This confirmation was used to ensure that the key challenges would be addressed by the proposed face-scan system; a secure, reliable, and contactless solution would be available for attendance, campus access, and cashless transactions, forming a strong foundation for the ideate and prototype phases.

**<u>Ideate Phase</u>**

During the initial discussion of team members, the team focused on the central theme "Future Digital Campus". Since the team is aiming to increase the security and operational efficiency, the theme "Student Face Scan" is chosen. It can ensure a safer campus environment and provide convenience for students. Through the thinking process, the brainstorm ideas that have been analysed are face scan for attendance system, face scan for accessing control, face scan for payments, and face scan for health centre.

Considering it is difficult to develop a face scan system for a dynamic merchant landscape is the main reason for rejecting the face scan for payments. Since the new vendors or cafeterias being added, the challenge is hard to integrate the face scan for financial data to third-party vendors leading to its elimination. For the technology of face scan for health centres, it was rejected due to technical complexity to create several functions for the system compared to other ideas. It requires advanced medical algorithms that include high risk detection to detect the student if having any serious illness. The system may assign the queue number for students based on urgency. The team also concluded its system model is more complex for the prototype phase.

Thus, the selected ideas are face scan for attendance system and face scan for accessing control. Facial scan technology enhances the faster productivity, efficiency for students to obtain attendance and identity verification. It is efficient to restrict the access of campus buildings by using technological advancements of face scan. The team  ends up deciding the construction of a Face Scan System located in each entrance of the hostel, class, library, and examination hall.

Class

Hostel

Library

## Assessment

During the ideate phase, the team engaged in an assessment process to break the brainstormed concept as the theme "Student Face Scan" into a more feasible and particular function. The face scan system technology that the team initially proposed are attendance tracking, access control, payments, and health centre management. After the brainstormed progress, the assessment point focused on the implementation feasibility and technical complexity. The team selected face scan for attendance and access control as the final proposed solution.

**Prototype Phase**
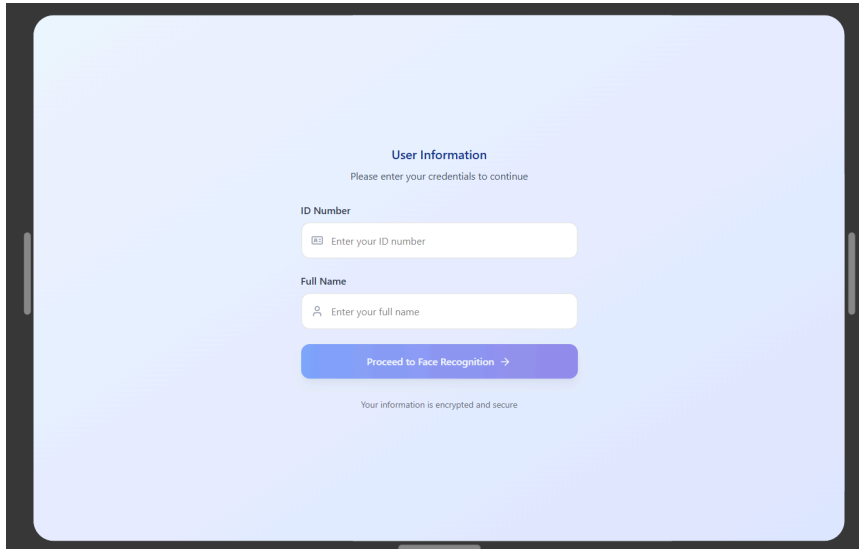
**Recognition building entry system**

1. Face Recognition Building Entry System Welcome Page
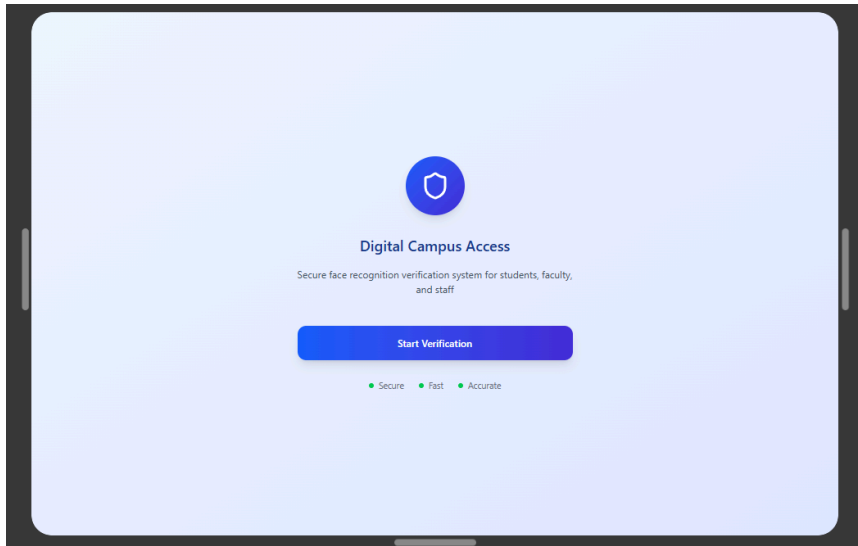


This page serves as the main entry point of the Face Recognition Building Entry System. It introduces the system and informs users that identity verification is required before entering the building. The clear layout and start option help users understand the process and proceed confidently.

2. User Information Input Page



On this page, users are required to enter their identification number and full name. This information is used to identify the user in the system before proceeding to face recognition verification. The page ensures that user details are correctly captured prior to the verification process.

3. Face Recognition Scanning Page
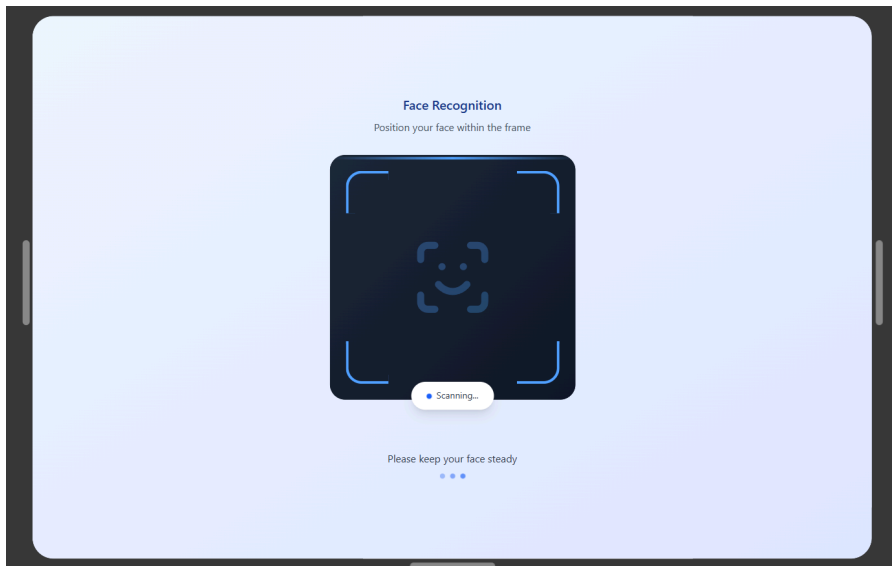


This page activates the face recognition feature for building access. Users are guided to position their face correctly within the scanning frame using visual instructions. This helps improve detection accuracy and ensures a smooth verification process.

## 4. Access Granted Page
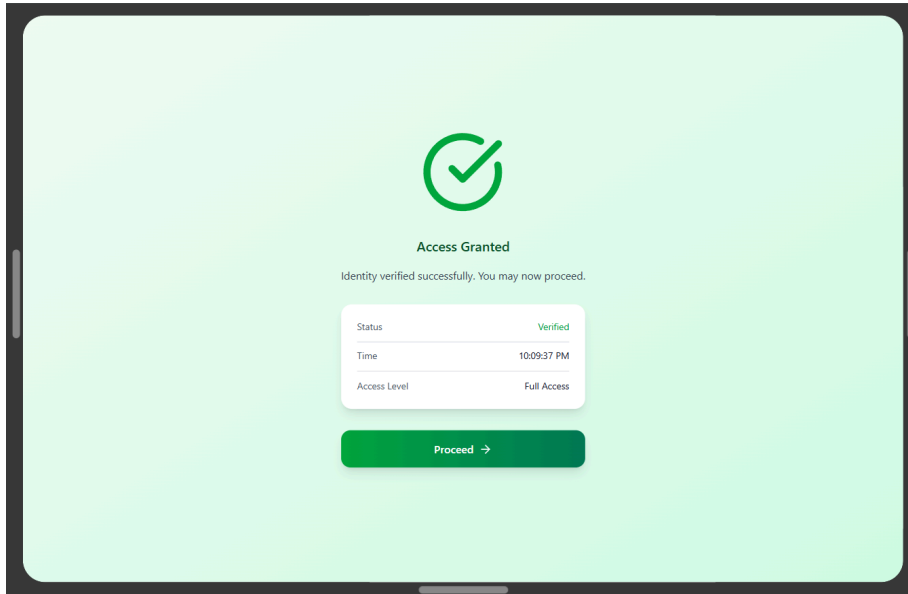


This page appears when the user's identity is successfully verified through face recognition. A confirmation message informs the user that access to the building has been granted. Clear visual indicators are used to ensure the user understands the verification result.

## 5. Access Denied Page
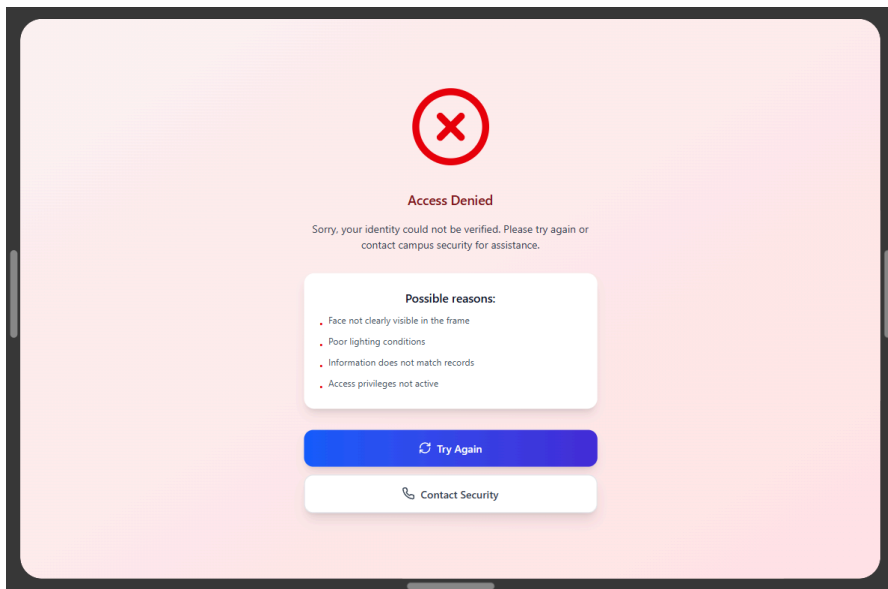


This page is displayed when the system fails to verify the user's identity. A clear message informs the user that access is denied, helping prevent unauthorized entry while maintaining system clarity.

**<u>Assessment</u>**

The assessment for the Face Recognition Building Entry System was done throughout the design thinking process and during the final prototype demonstration. In the early stages, the team assessed whether the security problems faced by users were clearly understood during the empathy and define phases. When moving to the ideate and prototype phases, we reviewed whether the proposed interface could support secure building access while still being easy for users to follow. The final assessment was carried out when presenting the prototype, focusing on the overall system flow and whether the access approval and denial screens were clear and understandable.
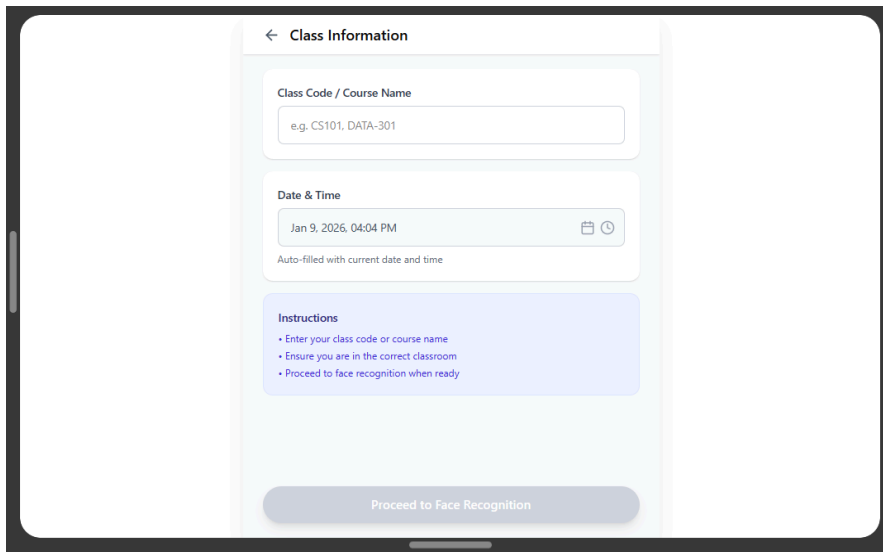
**Recognition attendance system**

1. Attendance System Welcome Page
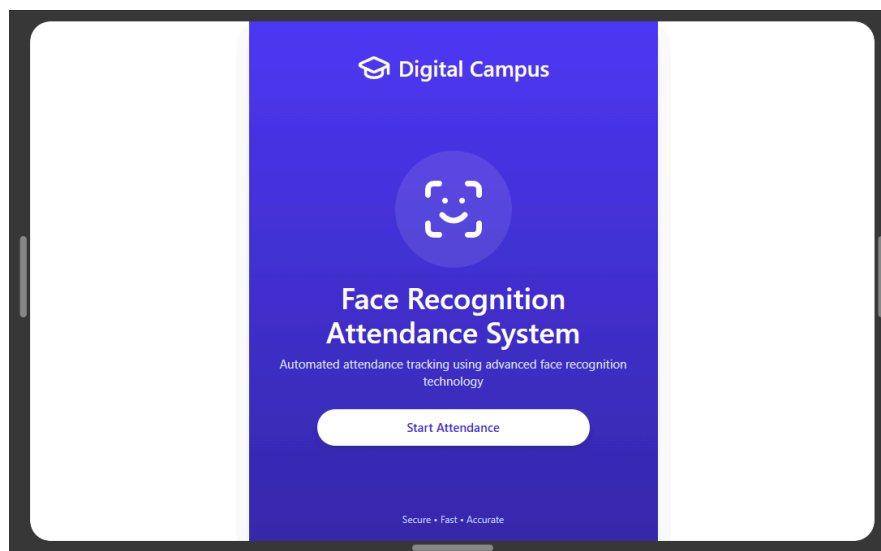


This page serves as the main entry point of the Face Recognition Attendance System. It introduces the purpose of the system and informs students that attendance will be recorded automatically using facial recognition technology. The page is designed with a simple and clear layout to ensure that users can easily understand the system's function before starting the attendance process.

## 2. Class Information Input Page



On this page, students are required to enter the class code or course name for the current session. This step ensures that attendance is accurately recorded for the correct class and prevents errors caused by incorrect or duplicate submissions. The system may also display the date and time automatically to confirm the attendance session details.

## 3. Face Recognition Scanning Page
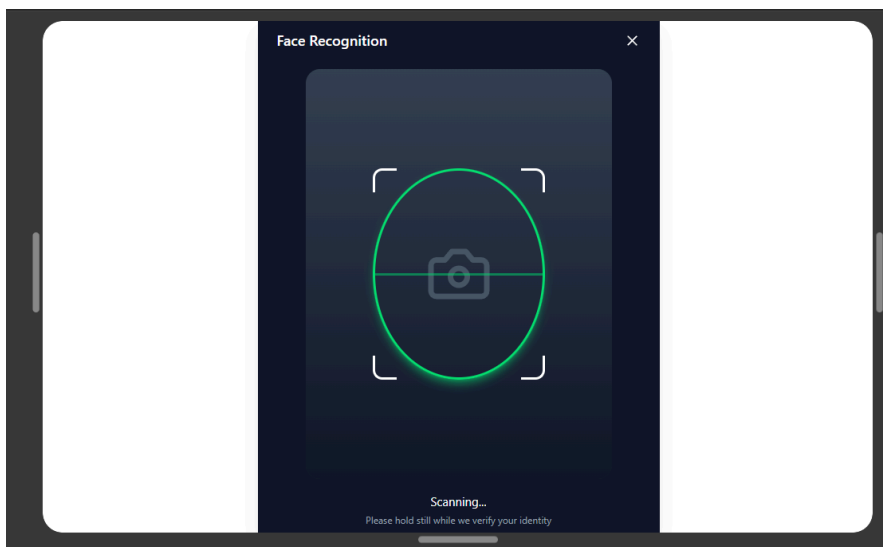


This page activates the face recognition process for attendance verification. Students are guided to position their face within the scanning frame using visual indicators and instructional text. This guidance helps improve detection accuracy and ensures that the face recognition process runs smoothly and efficiently.

4. Attendance Recorded Page
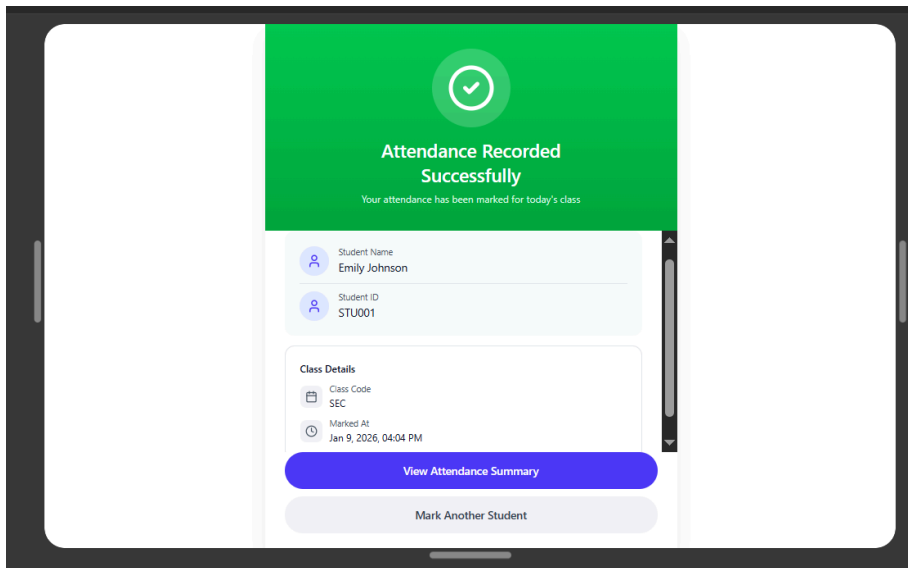


This page is displayed when the student's identity has been successfully verified. A confirmation message clearly states that attendance has been recorded for the class. The page may display the student's name and class information to ensure that the attendance was taken correctly and to increase user confidence in the system.

**Assessment**

The assessment for the Face Recognition Attendance System was conducted during each phase of design thinking and at the end of the project. During the empathy and define phases, we assessed whether the system addressed common attendance issues such as time consumption and proxy attendance. In the ideate and prototype phases, we evaluated whether the interface design supported accurate attendance recording using class code input and face recognition. The final assessment took place during testing, where user feedback was considered to check if the system was easy to use and suitable for a real classroom environment.

**Test Phase**

The system prototype was evaluated by students to assess its usability and comfort level. Students were asked to express their opinions on whether the system was easy to use, whether they felt comfortable using it through a short questionnaire. The results of this feedback are presented using charts to provide a clear visual representation of user responses.

Based on the chart analysis, the majority of users indicated that the system is easy to use and user-friendly. This shows that the interface design, navigation flow and overall functionality of the system are intuitive and do not require extensive guidance. In addition, most students felt comfortable when using the face scan system and indicating that the system meets user expectations.

**Is the system easy to understand?**

| Response | Number of students |
|---|---|
| Strongly agree | 16 |
| Agree | 5 |
| Neutral | 1 |
| Disagree | 2 |
| Strongly Disagree | 1 |

**Do you feel comfortable using face scan?**

| Response | Number of students |
|---|---|
| Strongly agree | 15 |
| Agree | 7 |
| Neutral | 1 |
| Disagree | 2 |
| Strongly Disagree | 0 |
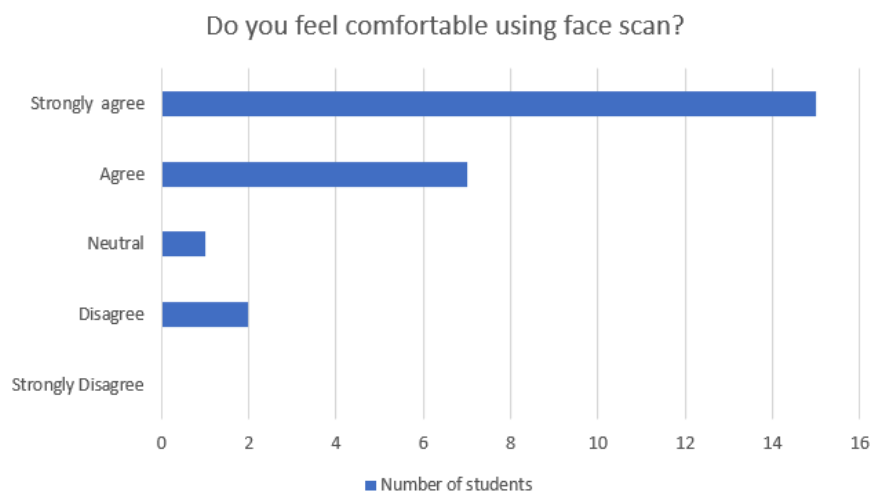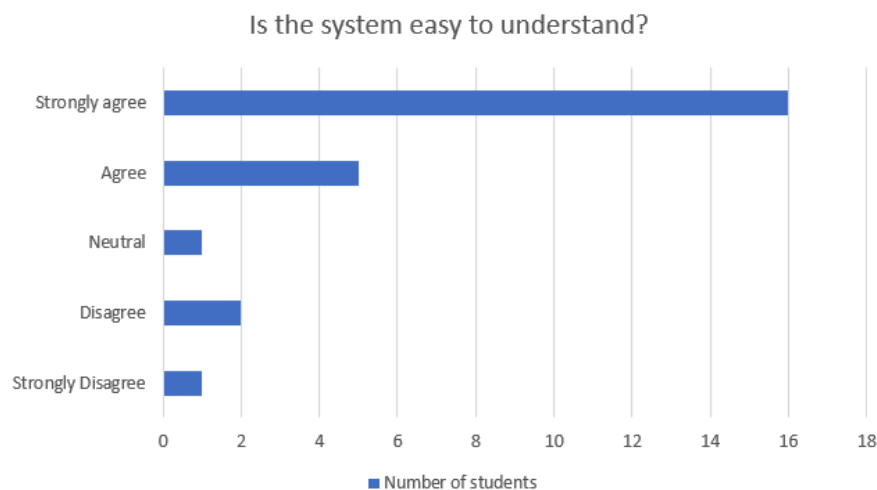
**Testimonial**

Students were required to provide their real experience while using the system prototype and suggest improvements after testing, if needed. The following are short messages provided by students as users:

"I feel comfortable while using face scan technology because it is contactless and really convenient. The reason I am saying this is because it saves time and improves my daily campus experience. At the same time, I feel safer knowing that only registered students can enter our campus."

– Ahmad Hakimi bin Hanapi

"The system helps to prevent attendance cheating and also improves campus security by allowing only registered students after a face scan as evidence. It improves the efficiency while taking attendance and avoids attendance fraud."

– Joey Choo Jin Wen

"I feel more secure on campus since knowing that face scan helps to control accessibility among campus which can protect our benefits and gives confidence about campus safety. Small things like this really improve my overall campus experience."

– Rajesh Kumar A/L Darwen Kumar

**Assessment**

The assessment for the Test phase focused on evaluating the effectiveness, usability and students' acceptance of the face scan system prototype. This phase was conducted by reviewing user feedback after interacting with the prototype and experiencing the interface flow. Short testimonials were collected to evaluate ease of use, productivity and efficiency of the system. The team identified the improvement of the system to meet students' expectations and fulfills their needs by understanding the system's impact. The assessment emphasized how effectively user feedback was used to validate the proposed solutions and improve the prototype before final submission.

**<u>Conclusion</u>**

In conclusion, this Design Thinking project report successfully applied the five phases – empathy, define, ideate, prototype and test to demonstrate how technology can improve campus environment through the implementation of Student Face Scan System for campus accessibility and attendance process. Throughout the design thinking process, each member of the team distributed the tasks evenly to make sure all assessments were completed on time and according to the project requirements.

The team conducted user research to understand students' challenges and needs. Based on the findings, the team analysed problems and generated ideas in order to design interface and system prototypes. After that, feedback was gathered to refine the system prototype by improving the system's usability, accessibility and overall user experience to better  meet user requirements.

Overall, meaningful insights were gained by identifying user needs, generating creative ideas and developing a system prototype. This project not only enhanced our problem-solving and critical thinking skills but also improved teamwork and communication abilities. The experience provided valuable knowledge and skills that can be applied to future academic projects and real-world situations, especially in developing innovative and effective digital solutions.

**Reflection**

| Name | Reflection |
|------|------------|
| Hee Hui En | As a computer science of networking student, my goal is to become a backend developer that can establish advanced safety technology to the community. It can really serve, easily use, and ensure security for people such as the elderly, children, adults, and disabled people. I dream to remove the gap between complex security technology and the daily lives of people.<br><br>Through the design thinking, I realize its framework is a significant tool to help me target my goal. If any phase of design thinking (Empathy, Define, Ideate, Prototype, and Test) skip one ends up the technology will be practically useless. The design thinking helps me to understand the user demand through analysing data and fulfil it by solving problems.<br><br>Hence, I would like to enhance my technical skills to improve my potential in the industry. I plan to explore and learn more programming languages such as Java and Python to improve my experience about coding. I will focus on improving my logical thinking and comprehension since a strong understanding is a need in the industry. Moreover, I have to improve my communication skills to ensure the team collaboration integrates smoothly. It is an essential skill for the future industry since developing advanced technology is not an individual project. |
| Aleeya Maisarah | As a student studying Computer Science with a major in Network Security, my intention is to develop safe, functioning, and user-friendly technological solutions for making the campus environment safer, more efficient, and convenient for everyone. This design thinking assignment proved the value of an effective |

| | |
|---|---|
| | procedure for solving design problems by appropriately encompassing phases such as Empathy, Define, Ideate, Prototype, and Testing in design thinking. It was helpful to divide a problematic system into smaller components for effective design.<br><br>I also realized the importance of understanding users' problems before solving them. Analyzing the data of the users, as well as observing their needs, taught me that highly innovative solutions can go to waste if they are unable to meet the users' demands. This experience taught me the importance of skills such as problem-solving, critical thinking, as well as working in a team, as it is as necessary as programming for the development of technology.<br><br>In this regard, I plan to enhance my technical, communication, and teamwork skills in subsequent projects and group activities. I would also like to enhance my skills in gathering and analyzing feedback for the efficiency and security of solutions. These experiences will surely make me an industry-ready professional who will be able to design innovative systems to truly serve and protect the community. |
| Gan Yu Xuan | As a Year One student taking the Computer Networks and Security course, my goal is to gain professional knowledge and practical skills in computing. I aim to become a cybersecurity specialist who can design useful systems that can reduce cyber scams and prevent the leakage of citizens' identification information. In the future, I hope to work in the technology industry and contribute to developing systems that solve real-world problems plus improve the efficiency and security of current systems used.<br><br>This design thinking project has helped me to understand the importance of user-centered design and the challenges may be faced in each phase of the process. Through the empathy, define, ideate, |

| | prototype and test phases, I learned a lot of valuable skills that can be applied in different situations in the future. For example, I understand how to identify real user problems before developing the solution and system prototype. This experience has enhanced my problem-solving, critical thinking, leadership and teamwork skills which are significant and required by industry. It also showed me that good systems are not only technically complex but also easy to use and meaningful to users.<br><br>In order to improve my potential in the industry, I plan to strengthen my technical skills, communication skills and teamwork abilities. The action I will take will include continuous practice through projects and assignments. Additionally, I plan to improve my ability to gather and analyze data collected by taking part in more group activities and seeking feedback that will help me to grow into a more confident and industry-ready graduate. |
|---|---|
| Aimi Nurafina Izzati | As a computer science student, my goal is to create practical and secure technology solutions that can make a real difference, particularly in a digital campus environment. I want to deepen my understanding of system design and security so that I can contribute to building systems that are not only reliable and efficient but also user-friendly. I believe technology should be innovative yet accessible, helping users achieve their goals with ease.<br><br>This design thinking project has given me a clear perspective on why a user-centred approach is crucial in system development. Going through the empathy, define, ideate, prototype, and test phases showed me how important it is to fully understand user needs before proposing solutions. Working on the face recognition system allowed me to see how each phase connects to the next, and how skipping any step can weaken the final solution. I also improved my teamwork and communication skills, learning how to |

| | share ideas effectively and collaborate with others during discussions. |
| --- | --- |
| | To further prepare myself for the industry, I aim to continue developing both my technical and soft skills. I plan to enhance my programming and system analysis abilities through ongoing practice and learning. At the same time, I want to strengthen my problem-solving, communication, and teamwork skills, which are vital when working on technology projects in professional settings. This project has inspired me to be more proactive, confident, and ready to face challenges in the tech industry. |

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