POLITEKNIK MALAYSIA
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KEMENTERIAN PENGAJIAN TINGGI

DEPARTMENT OF INFORMATION ANDCOMMUNICATION

TECHNOLOGY

DIPLOMA IN INFORMATION TECHNOLOGY

(DIGITAL TECHNOLOGY)

DFT50114

INTERGRATE DPROJECT (SOFTWARE)

(SECURESWIPE)

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SESSION : 2 2022/2023

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DECLARATION

We hereby declare that the SecureSwipe Fingerprint Attendance System has been designed and developed with utmost consideration for data security and user privacy. Stringent measures have been implemented to safeguard biometric data, ensure secure transmission, and comply with relevant regulations. Our commitment to maintaining the highest standards of security underscores our dedication to providing a trustworthy and reliable attendance management solution.

1. Signature :
   Name : BATHMAROOBAN A/L THANGMUTHU
   Registration No : 17DDT21F1039
   Date :

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   Date :

3. Signature :
   Name : LAVANYAA A/P SELAPAN
   Registration No : 17DDT21F1048
   Date :

DECLARATION

Project Title : **SECURESWIPE**

Session : 1 2021/2022

Submitted by : BATHMAROOBAN A/L THANGAMUTHU
DARMENDREN A/L THAVA SINGH
LAVANYAA A/P SELAPAN

"This technical report has been read, checked and approved in term of scope and quality for the award of Diploma in Information Technology (Digital Technology)."

Checked by

Supervisor's Signature :

Supervisor's Name :

Date :

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ABSTRACT

SECURESWIPE (FINGERPRINT ATTENDANCE SYSTEM) is a web-based final year project specifically designed to address the issue of proxy attendance in Moral Lecture (Kuliah Moral). The traditional method of scanning student ID cards for attendance is prone to misuse, as students can ask their friends to scan their cards on their behalf. To overcome this problem, SECURESWIPE implements fingerprint recognition technology as a secure and foolproof authentication method. By requiring students to physically present and verify their fingerprints, the system ensures that only the actual individuals are recorded as present in Moral Lecture sessions. The project aims to provide a reliable attendance recording mechanism that eliminates the possibility of proxy attendance, promoting accountability and accurate attendance management. Using Agile methodology, the project utilizes web development technologies like HTML, CSS, and JavaScript for the frontend, while Python with frameworks like Django or Flask is used for the backend development. Database management tools such as MySQL or PostgreSQL are employed for secure storage of attendance records. Although the project results are not yet available, SECURESWIPE is expected to significantly mitigate the issue of proxy attendance in Moral Lecture, thereby enhancing the integrity of attendance records and improving overall attendance management in educational institutions. The contribution of SECURESWIPE lies in its ability to ensure the authenticity of attendance by leveraging fingerprint recognition, ultimately promoting fairness and accountability among students.

2.0 PROJECT PLAN

2.0 Introduction

Taking attendance in kuliah moral can be a time-consuming task, with students often lining
up to scan qr code manually. To address this issue, a group of three students conducted preliminary research on a 'Fingerprint Attendance System' project. The aim of the project was
to create a system that enables students to register their attendance using their fingerprints, thus saving time and improving accuracy.

The report outlined the project scope, cost, scheduling, finding techniques, and system viability, using the System Development Life Cycle Agile. The proposed system would involve
the installation of fingerprint scanners in kuliah moral class which will be held at Dewan Seri
Sabak, linked to a centralized database. Students would simply need to scan their fingerprints
at the beginning of each kuliah to register their attendance. The system would also generate
automated reports for staff, making it easier to track attendance and identify any issues.

Overall, the group found that the Fingerprint Attendance System was a viable solution to the problem of manual attendance taking. However, they noted that the system would require
a significant investment in terms of hardware, software, and training, and would need to be
carefully managed to ensure the security and privacy of student data.

2.1 Problem Statement

The following are the issues that have been identified:

i. Time-consuming process of taking attendance in classes: Traditional attendance-taking methods that require manual sign-in sheets can be timeconsuming for both instructors and students. Instructors must wait for students to arrive, distribute and collect sign-in sheets, and then manually input the data into their records. This process can be even more time-consuming in large classes or when classes have limited time to complete their work.

ii. Students lining up to sign in manually: When attendance is taken manually, students often have to form a line or crowd around the instructor to sign in. This can cause delays and disruptions, especially in smaller classrooms where space is limited.

iii. Delays and lateness to classes: The manual attendance-taking process can lead to delays and lateness to classes, as students may arrive late to avoid the line or simply forget to sign in. This can disrupt the flow of the class and negatively impact learning outcomes.

2.2 Project Objectives

i. The objective of implementing a fingerprint attendance system is to save time by streamlining the attendance-taking process. With fingerprint scanners installed in each kuliah moral and linked to a centralized database, students will be able to register their attendance quickly and easily, without the need for manual sign-in sheets or data entry. This will ultimately save time for both instructors and students.

ii. By providing a fingerprint attendance system, students will no longer need to form lines or crowds to sign in manually. They will simply need to scan their fingerprint to register their attendance, reducing the need for physical queues.

iii. With the quick and easy registration of attendance through the fingerprint system, students will be less likely to arrive late or miss class due to long queues or forgetfulness. This will improve the overall timeliness of the class and reduce delays.

2.3 Project Scope

Developing a web-based system that enables students to register their attendance using fingerprint scanners.

1) User's Scope:

- Student

- The student user will be able to use the fingerprint scanner to register their attendance in kuliah moral quickly and easily. The system will provide real-time feedback to the student, confirming their attendance has been successfully recorded. Students will also have access to their attendance records and be able to check their attendance history.

- Staff

- The staff user will have access to the attendance records of their students and will be able to generate reports to track attendance trends and patterns. They will also be able to monitor attendance in real-time, which can help identify students who may need additional support or intervention.

- Admin

- The IT support staff will be responsible for maintaining and updating the system. This may include installing software updates, troubleshooting any issues that arise, and ensuring the system is functioning properly. Administrators will have access to the system and be able to oversee its use, ensuring the system is being used effectively and efficiently. They will also be able to set system-wide and permissions, as well as add or remove users from the system.

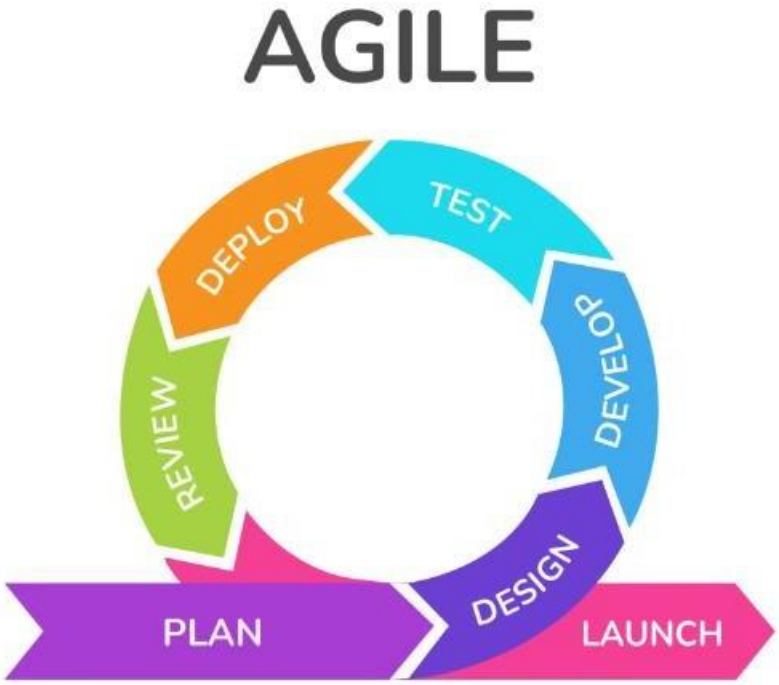
2) System Scope :

- The 'Fingerprint Attendance System' project involves the development of a web-based application to manage attendance records using fingerprint scanners. The system scope includes the installation of fingerprint scanners in kuliah moral, which will be connected to a centralized database server. The system will also include a secure and reliable database to store attendance records, as well as a user-friendly interface for students, staff, and administrators to register attendance and generate reports. Security measures will be implemented to protect student data and ensure privacy. The project also involves the provision of training and support to users of the system, and ensuring the system is cost-effective and provides value for money. In addition, the system will be designed to be scalable and capable of handling future expansion if necessary, and compatible with a range of devices and web browsers.

2.4 Literature Review

LOGO		
NAME	Time Dynamo	ACTAtek Biometric
Programming Language	Python	C/C++
Advantages	- Scalable solutions like Time Dynamo are simple to modify to meet the demands of expanding enterprises. - Easy to set up and utilise, Time Dynamo is a user-friendly solution.	- You may save labour expenses with ACTAtek Biometric by eliminating the requirement for security officers to be stationed at access points. - Due to the system's cloud hosting, you may access it from anywhere.
Disadvantages	- Time Dynamo's initial setup might be difficult, especially for companies with a big number of employees. - Not all businesses, such as those that need extensive attendance monitoring or those that have several locations to operate, may be a good fit for Time Dynamo.	- Setting up and implementing the system might be costly. - The use of biometric authentication may raise privacy issues for some individuals.

2.5 Methodology



Agile method has been selected as the project's technique since it can be used for projects of all sizes. Agile was chosen because it enables the development team to concentrate on softwaredevelopment as opposed to thorough design and documentation, leading to a shorter development timeframe. Agile allows for timetable flexibility with its incremental release methodology. The development of applications, whose system requirements frequently changethroughout the course of development, benefits especially from it. Agile also encourages greater customer satisfaction by incorporating clients at every stage of the project.

- Plan and Prioritise: Divide the system into manageable tasks and order them accordingto priority.
- Sprint development involves focusing on achievable, brief tasks.
- Communicate and work together with your team members all the time to monitorprogress and resolve problems.
- Regular testing is necessary to guarantee that the system performs as planned.
- To make improvements, routinely ask users and stakeholders for their comments.
- Adapt and Iterate: Constantly improve the system based on user feedback and evolvingrequirements.
- Repeat until the system satisfies all requirements: Carry out the procedure again inconsecutive sprints
-

NO	PHASE	ACTIVITY
1.	Project Start-Up	- Set project objectives and goals. - Identify the needs of the user
2.	Sprint Planning	- Divide the needs into smaller jobs. - Sort tasks according to their priority. - Brainstorm together to estimate the time required for each activity.
3.	Sprint Execution	- Tasks should be developed and implemented in stages. - Make use of web development technologies such as HTML, CSS, and JavaScript. - Use Python with backend frameworks (Django or Flask). - Use database management technologies (MySQL) to implement safe storage.
4.	Testing and Quality Assurance	- Conduct frequent testing. - Examine and enhance the code quality - Ensure the system's functioning and dependability.
5.	Sprint Review	- Compare accomplished activities to the criteria - Collect input from stakeholders and client. - Make the required changes and

		improvements.
6.	Adaptation and Iteration	- Based on comments and priorities, plan the next sprint. - Repeat and upgrade the system. - As required, resolve bugs and add new functionality.
7.	Repeat	- In succeeding sprints, repeatthe process. - Continuously improve and develop the system - Continue to iterate until all requirements are fulfilled.

2.6 Gantt Chart

Gantt Chart

Table 1:Project Development Gantt Chart

A Gantt chart serves as a valuable project management tool designed to aid in the organization and timing of various projects, with particular effectiveness in streamlining intricate tasks. By facilitating the optimal distribution of resources and strategic arrangement of work within designated timeframes, Gantt charts play a pivotal role.

TASKS	WEEKS														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.0 PROJECT PROPOSAL 1.1 Prepare project plan and project design (Lavanyaa)															
Proposal Presentation															
2.0 PROJECT DEVELOPMENT 2.1 Plan requirement and design specification 2.2 Manage the hardware and software configuration 2.3 Develop problem specification (Darmendran , Bathmarooban)															
Demostration 1															
2.0 PROJECT DEVELOPMENT 2.1 Plan requirement and design specification 2.2 Manage the hardware and software configuration 2.3 Develop problem specification (Darmendran , Lavanyaa)															
Demostration 2															
3.0 DELIVERABLES 3.1 Present deliverables 3.2 Prepare project documentation 3.3 Present final project (Lavanyaa , Darmendran , Bathmarooban)															
Demostration 3															
Final Presentation															

3.0 Requirements specification

Software Requirement

Requirements specification, which is a set of documented requirements to be used in the design, project. It is very important to document for future reference.

3.1 Functional Requirement

User Registration:

- The system should allow administrators to register new users (employees, students, etc.).
- Users' basic information, along with their fingerprint data, should be stored securely.

Fingerprint Enrollment:

- The system should have the capability to enroll users' fingerprints during registration.
- It should ensure accurate and reliable fingerprint scanning and storage.

Real-time Tracking:

The system should provide real-time tracking of attendance, allowing administrators to monitor who is currently present.

3.2 Non-Functional Requirement

Performance:

- The system should be capable of handling a high number of concurrent users without significant slowdowns.
- Response times for fingerprint recognition and attendance marking should be near-instantaneous.

Scalability:

- The system should be designed to scale easily as the number of users and terminals increase.
- Adding new users or devices should not result in a significant performance degradation.

Usability:

- The user interface should be intuitive and user-friendly, requiring minimal training for users to interact with the system effectively.
- Fingerprint scanning should be easy for users and produce accurate results consistently.

3.3 Hardware and Software Requirement

Hardware Requirement

Fingerprint scanner

No	ITEM	QUANTITY	PRICE(RM)
1.	FINGERPRINT SCNNER	1	RM 200.00
	Total Price		RM 200.00

Table 2.0 : Hardware Requirement cost

Software

Netbeans

NetBeans is a free and open-source integrated development environment (IDE) widely used for Java programming. It offers an intuitive interface, smart code completion, and supports Java Standard Edition (SE) and Java Enterprise Edition (EE) development. Additionally, it integrates with Maven and Ant build tools, has a plugin ecosystem, and supports other languages like PHP. NetBeans has an active community that contributes to its development, making it a popular choice for Java developers seeking a user-friendly and feature-rich IDE.

Adobe Dreamweaver

Adobe Dreamweaver is a professional web development tool and integrated development environment (IDE) developed by Adobe Systems. It is widely used by web designers and developers to create, edit, and manage websites, web applications, and mobile apps. Dreamweaver provides both a visual design interface and a code editor, allowing users to work with visual elements and raw code simultaneously. Key features include live preview, responsive design capabilities, syntax highlighting, code autocompletion, and integration with popular web technologies such as HTML, CSS, JavaScript, and more. Dreamweaver also supports dynamic web content development with server-side scripting languages like PHP and ASP.NET. It is part of Adobe Creative Cloud, a subscription-based suite of creative software tools, and is available for both Windows and macOS platforms.

Canva (Free)

Canva is used to create social media graphics, presentations, posters, documents,and other.

Xampp

XAMPP is a software package that creates a local web development environment. It includes Apache for web hosting, MariaDB for databases, PHP for scripting, and optional components like Perl and FTP server. It simplifies the setup of these tools, allowing developers to build and test web applications on their computers before deploying them live.

phpMyAdmin

phpMyAdmin is a web-based application included in XAMPP that provides a graphical interface for managing and interacting with MySQL or MariaDB databases. It allows users to create, modify, and manage databases, tables, and data, making database management tasks more user-friendly and accessible, especially for those who might not be comfortable with command-line database administration.

No	SOFTWARE	PRICE(RM)
1.	NETBEANS	FREE
2.	Canva	FREE
3.	adobe Dreamweaver	RM 98.00
4.	Xampp	FREE
5.	phpMyAdmin	FREE
TOTAL COST		RM 98.00

Table 3.0 : Software Requirement cost

3.4 System configuration

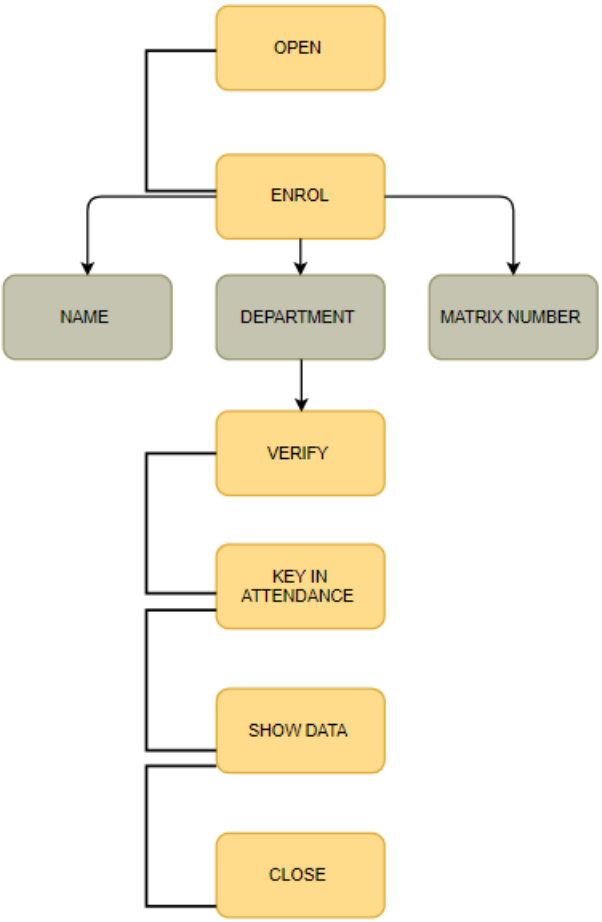
- Click the SecureSwipe system
- Click the button open to activate the system and the scanner
- Click button Enrol to enrol the student fingerprint and the details
- Click the button verify to confirm the student
- Click the button close to log out the system

3.5 Security Requirement

The security requirements for a fingerprint attendance system include robust encryption for the storage and transmission of fingerprint data, implementation of multi-factor authentication for administrative access, regular security audits and vulnerability assessments, strict access controls to ensure only authorized personnel can manage and access the system, adherence to relevant data protection regulations, such as GDPR, and continuous monitoring for unusual or unauthorized activities to mitigate potential security breaches and protect sensitive biometric information.

4.0 FINAL DESIGN

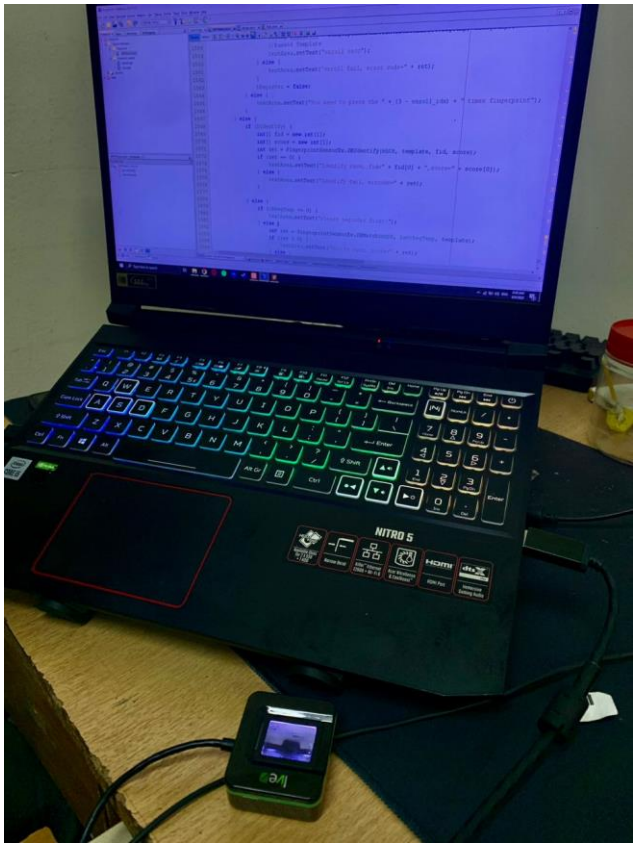
4.1 Logical Design



4.2 Physical Design

The physical design of a fingerprint attendance system encompasses the tangible aspects of its hardware and layout. This design phase involves careful considerations to ensure the system's practicality, user-friendliness, and visual harmony within its environment. Key factors include determining optimal locations for fingerprint scanning terminals, selecting reliable and compatible hardware components, and ensuring proper installation and cabling. The user interface should be intuitively designed to guide users through the attendance process, while the overall aesthetics should seamlessly integrate with the surrounding decor. Durability is crucial, necessitating materials that can withstand daily usage and environmental conditions. Security measures, such as anti-tamper mechanisms, should be incorporated, and accessibility for all users, including those with disabilities, must be accounted for. Moreover, attention to factors like lighting conditions, power backup solutions, and scalability ensures a well-rounded and effective physical design. By adhering to safety and accessibility standards and collaborating with design and

technology experts, a thoughtfully designed physical setup enhances the system's functionality and user experience.



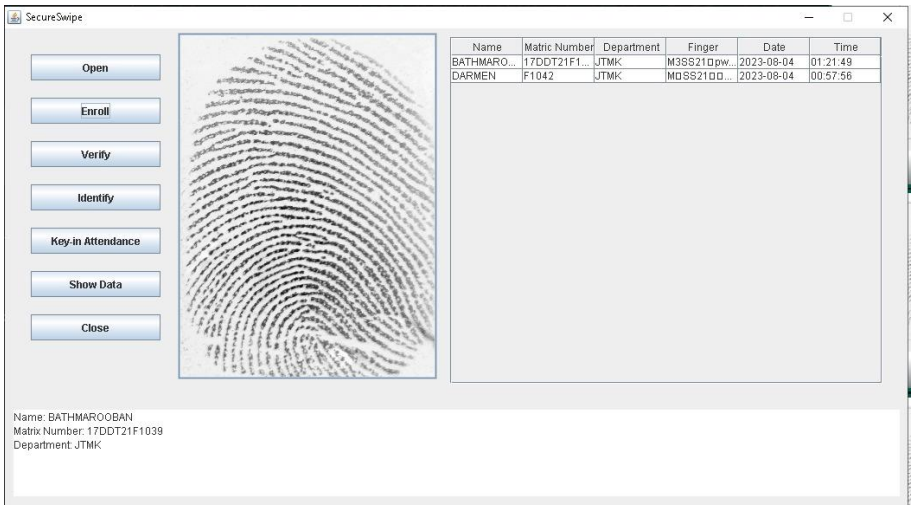
The "Open" button in a system is a user interface element that, when clicked, reveals hidden content or activates specific functions. It enables users to access additional

information or features that are initially hidden, enhancing usability and interaction within the system.

HAVE TO ENTER THE USER NAME

MATRIC NUMBER

DEPARTMENT

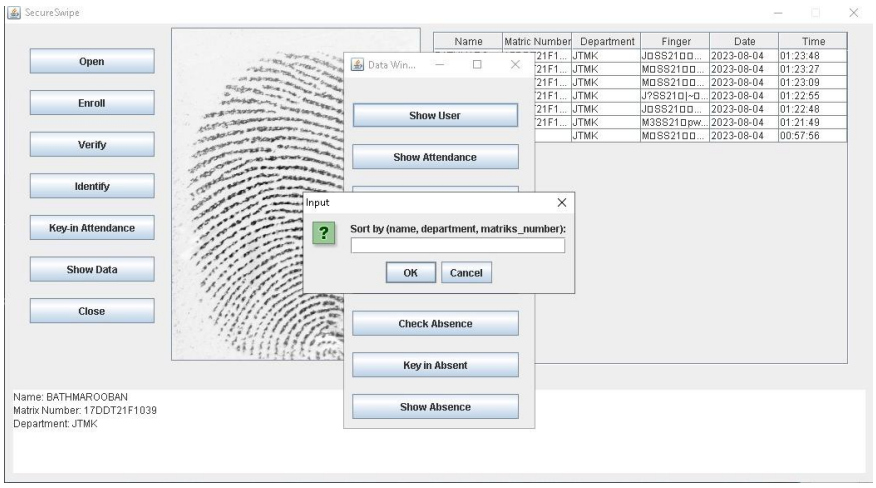


FINNALY HAVE TO SCAN THE FINGERPRINT 3 TIMES TO ENROL TO THE SYSTEM AND REGISTER

Verify the fingerprint

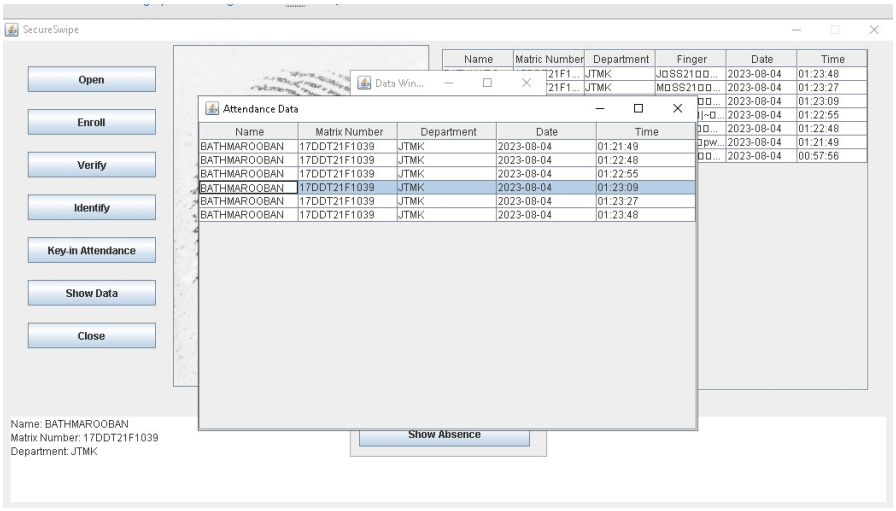
Identify the fingerprint

Key in attendance

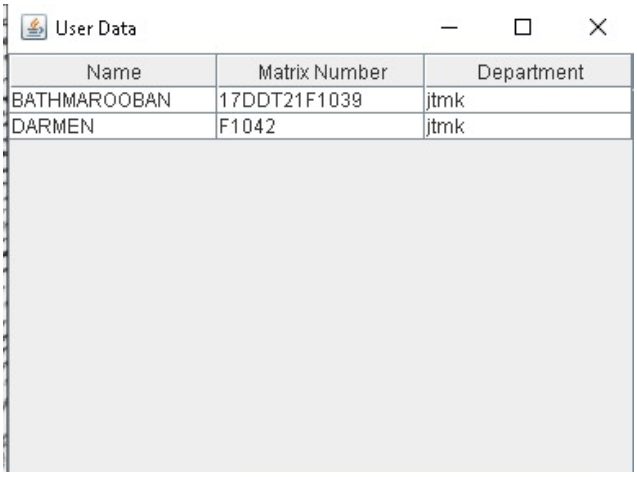


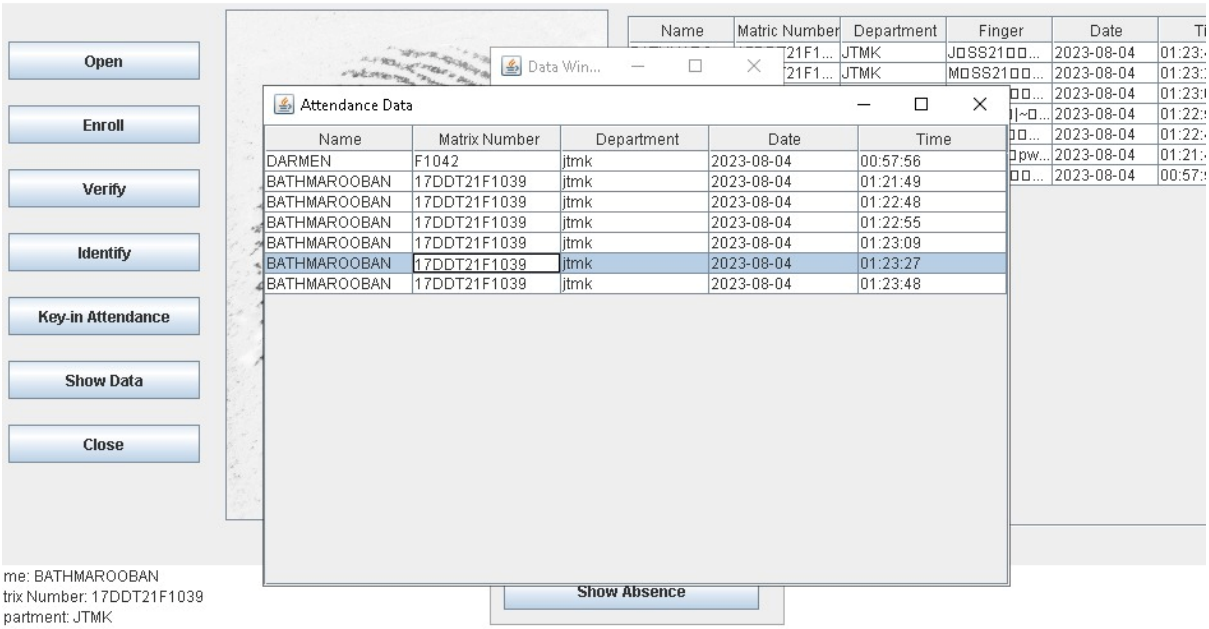
Show data in the table

Enter the matric number

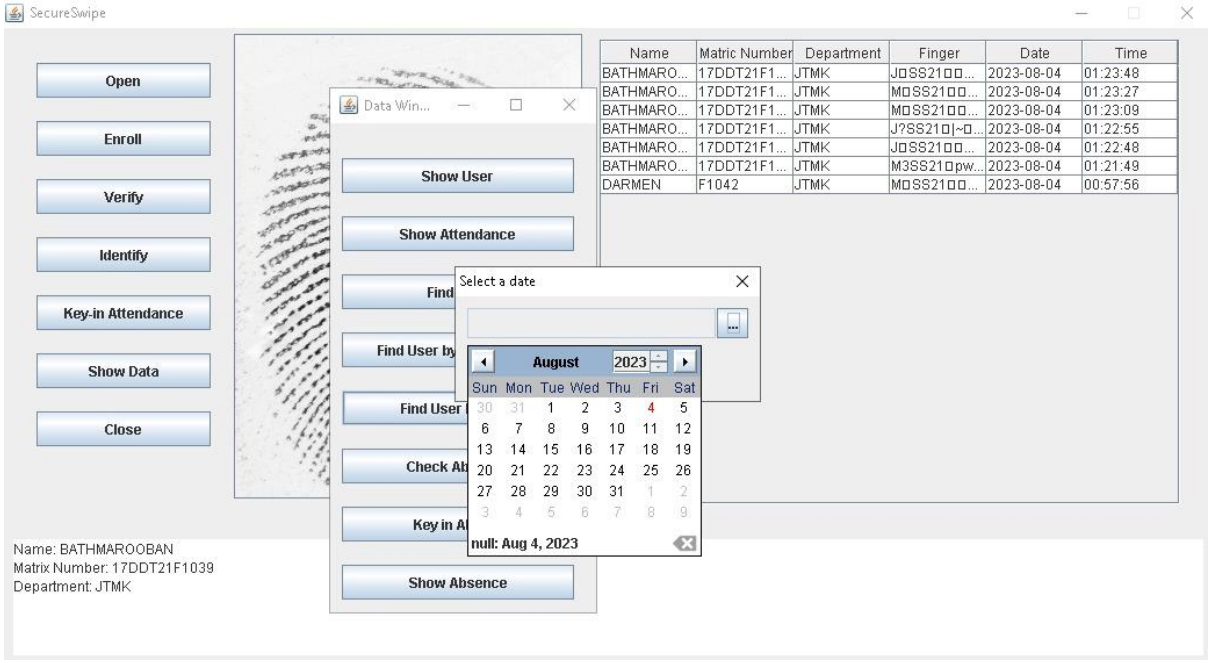


Able to view the date and time

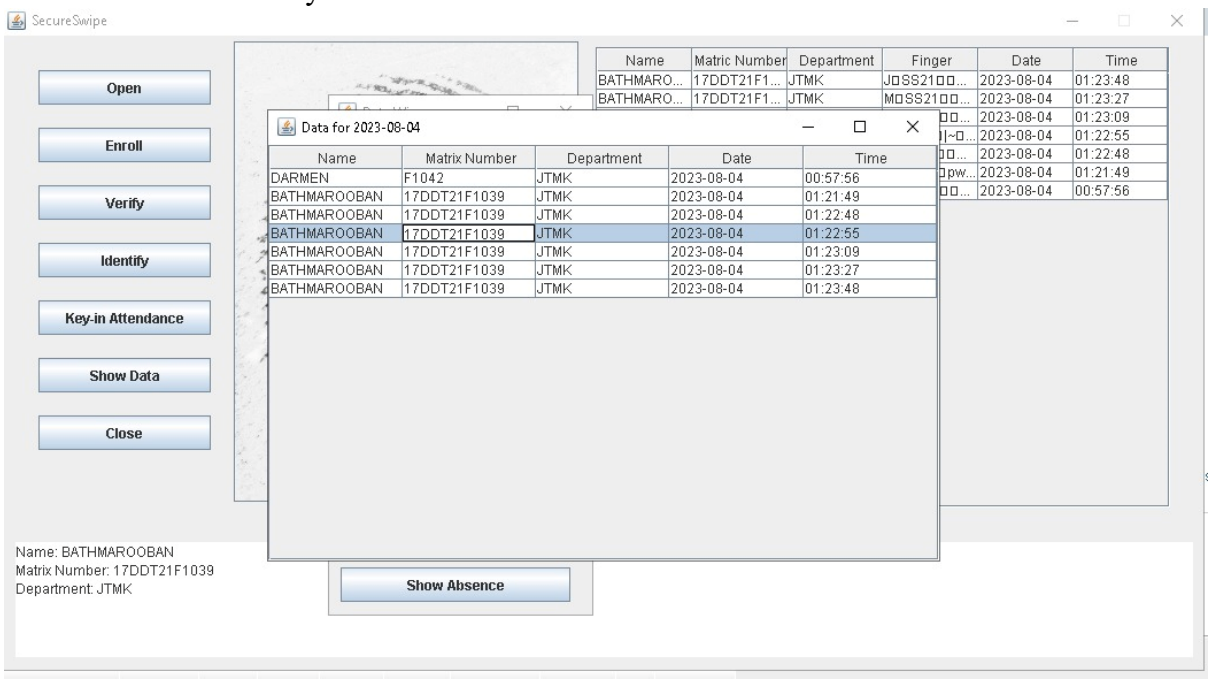


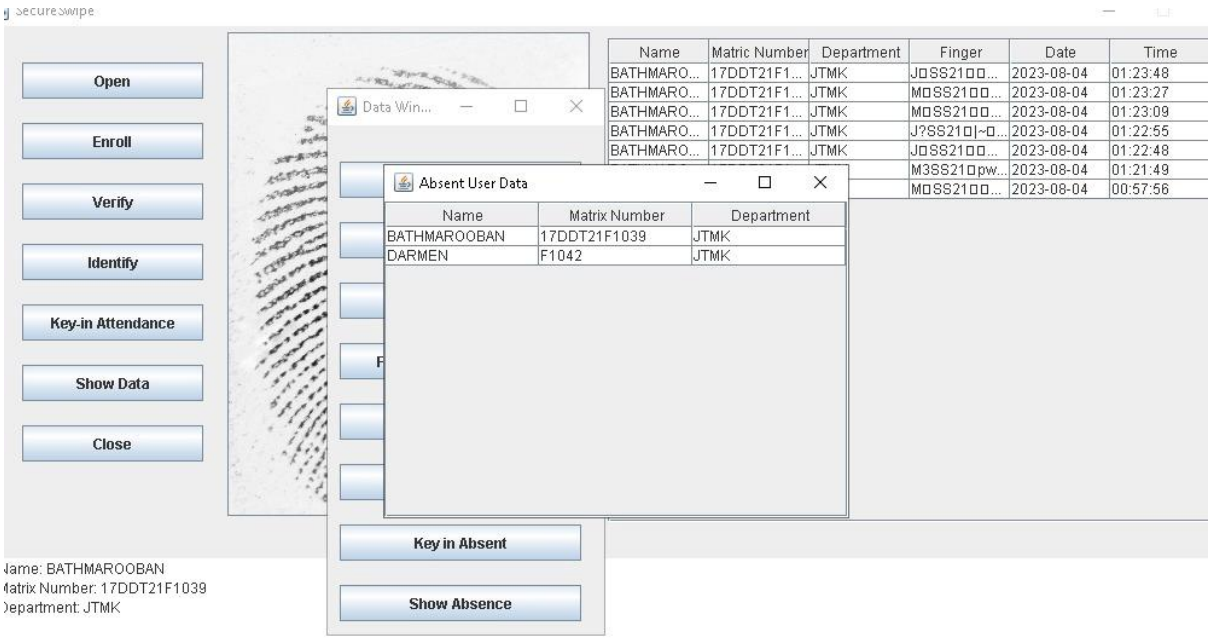


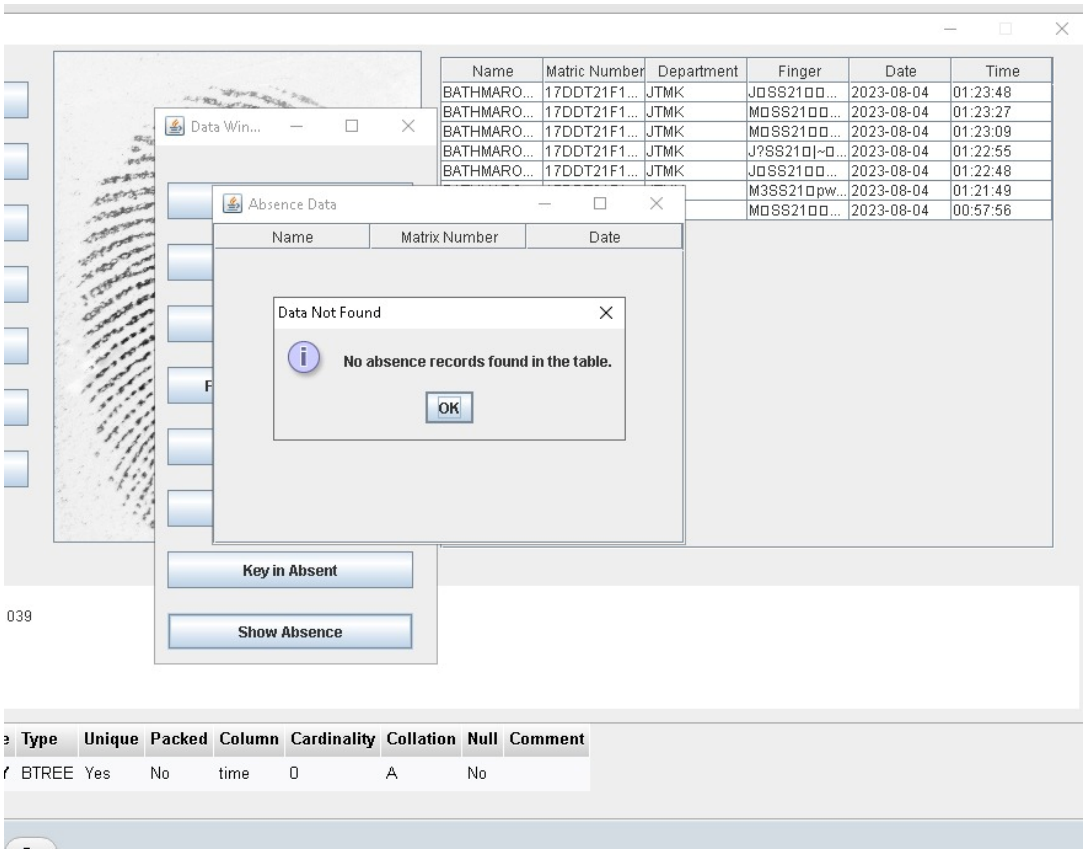
Also can filter by department



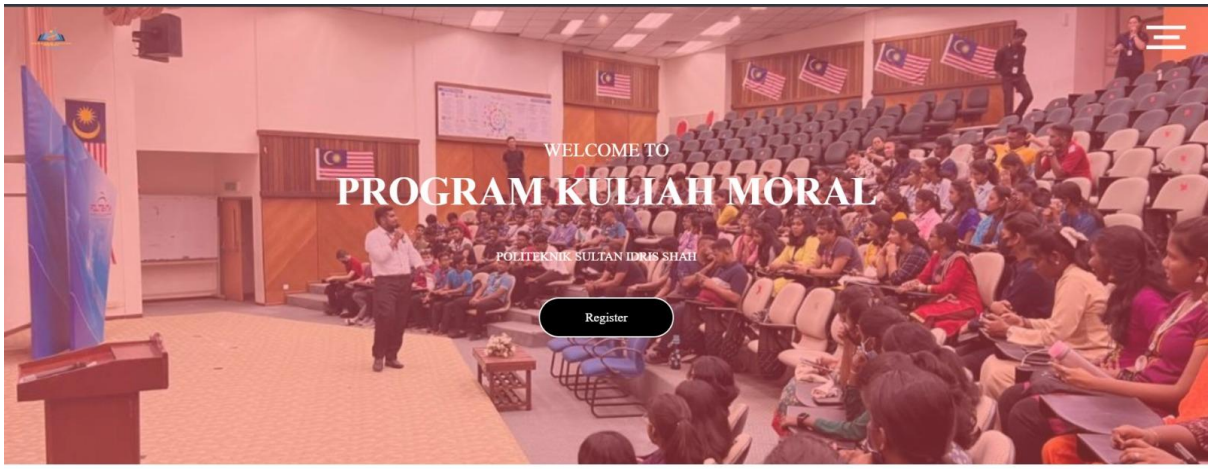
Also can able to view by date







Website Main Page



ABOUT OUR PROGRAM KULIAH MORAL

Kuliah moral yang Anda hadiri ini memiliki tujuan mulia untuk meningkatkan tingkah laku baik dan tertinggi pada para mahasiswa dan mahasiswi. Selain itu, melalui kuliah moral ini, diharapkan pelajar politeknik sultan idris shah akan lebih mematuhi peraturan-peraturan yang ada dalam buku peraturan. Dengan demikian, pelajar akan semakin meningkatkan nilai-nilai murni dalam diri mereka dan menjadi pribadi yang lebih berguna di masa depan.

Read More

ACTIVITIES

Some of the activities that take place during Kuliah Moral

01

PRESENTATION

Students present about the tradisional games , dances , culturals of many countries.

02

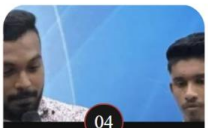
ICE BREAKING

Before kuliah moral start , there will be one session called ice breaking.

03

INDOOR GAMES

Two hosts will be conducting this activity by randomly selecting students using a spin wheel.

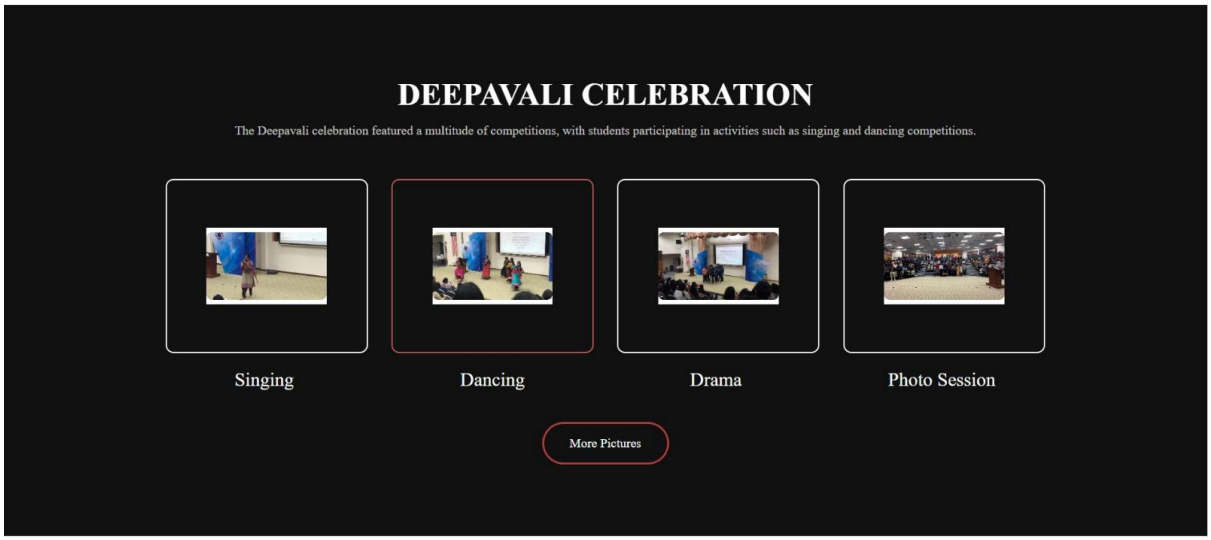


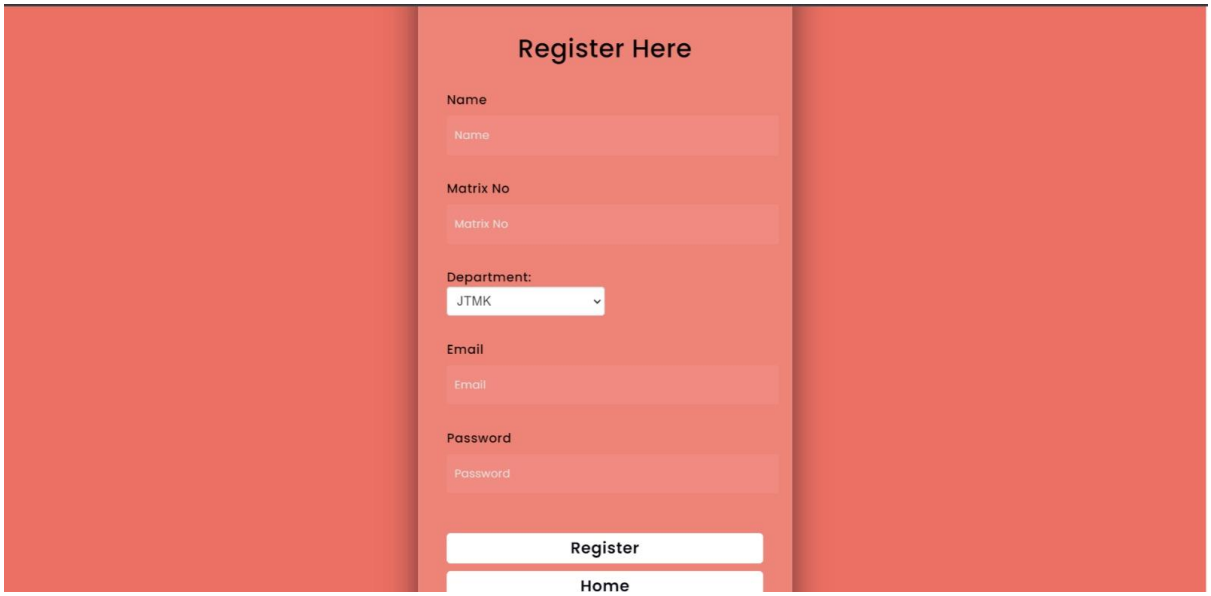
04

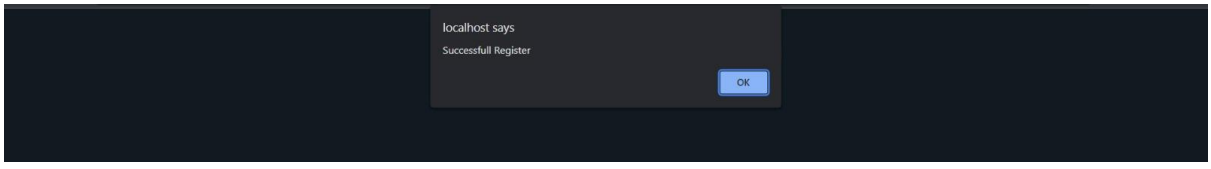
CERAMAH DISIPLIN

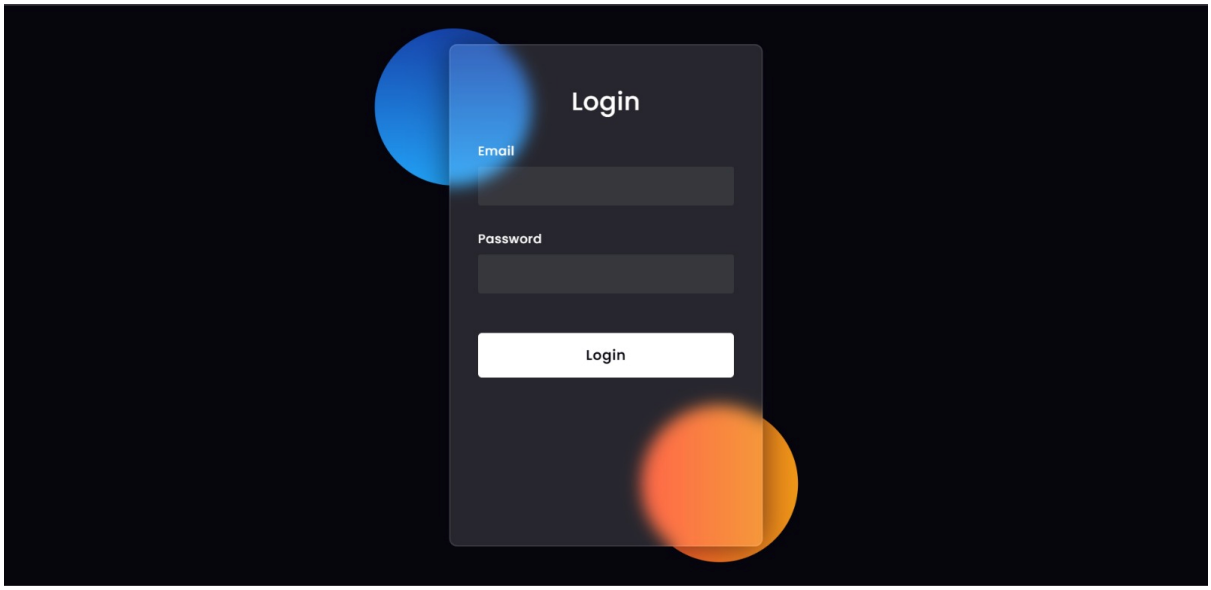
There are many variations of passages of Lorem Ipsum available, but the

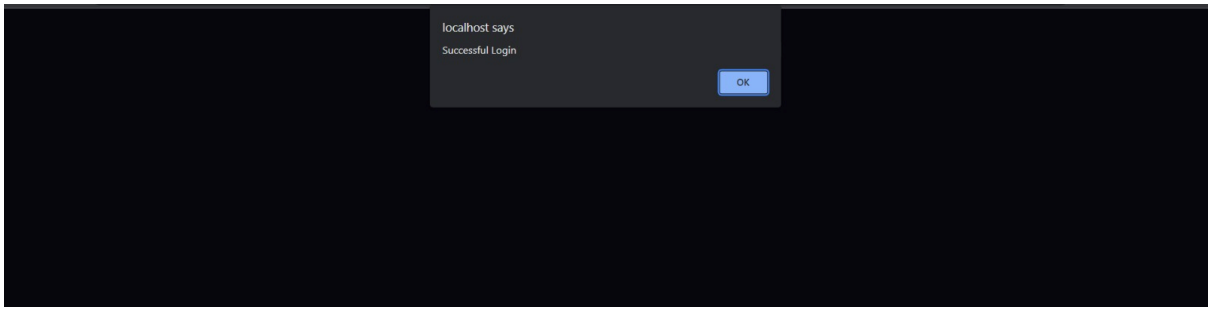
PICTURES


DEEPAVALI CELEBRATION
The Deepavali celebration featured a multitude of competitions, with students participating in activities such as singing and dancing competitions.
Singing
Dancing
Drama
Photo Session
More Pictures


Register Here
Name
Name
Matrix No
Matrix No
Department:
JTMK
Email
Email
Password
Password
Register
Home

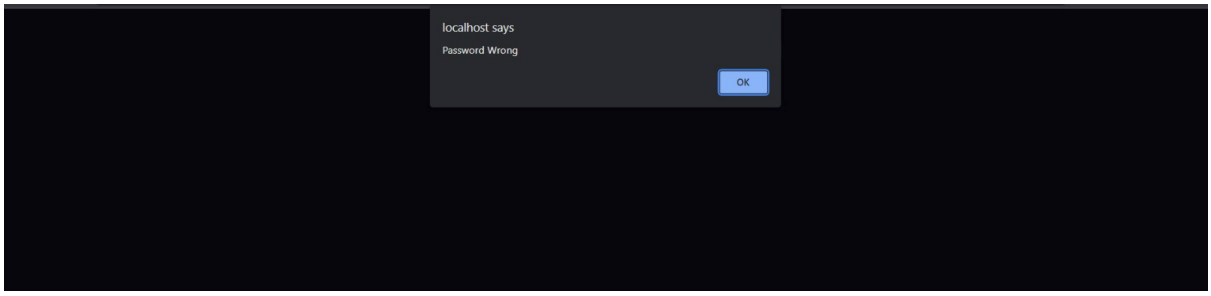

localhost says
Successfull Register
OK

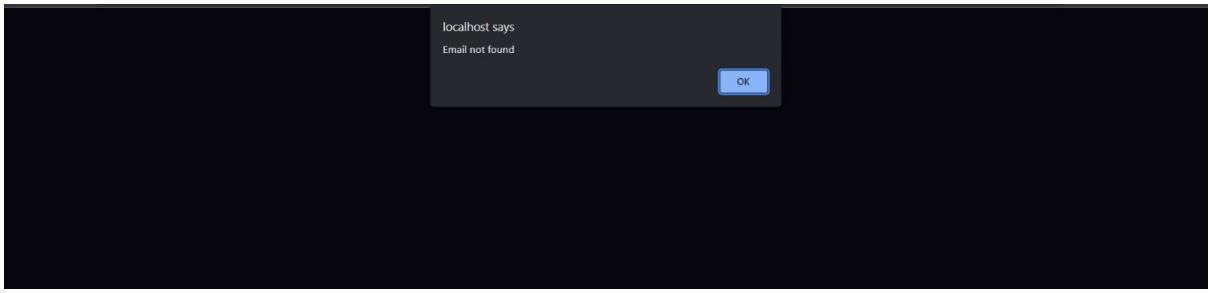




Student Attendance

Date	Status
2023-08-01	Present
2023-08-02	Absent




localhost says
Email not found
OK

4.3 Experimental Concept: Assessing the Impact of Agile Practices on Software Development Efficiency

Objective: To investigate the effects of implementing agile practices on software development efficiency, team collaboration, and project outcomes.

Hypothesis: The adoption of agile practices will lead to improved software development efficiency, enhanced team collaboration, and better project outcomes compared to traditional waterfall methodologies.

Experimental Design:

1. **Participants:** Assemble two software development teams with similar skill sets and experience levels. Assign one team to follow an agile methodology (e.g., Scrum) and the other to follow a traditional waterfall methodology.
2. **Variables:**
    - Independent Variable: Development methodology (Agile vs. Waterfall).
    - Dependent Variables: Development speed (measured by completed features per iteration or month), quality of the delivered product, team satisfaction, and adherence to project schedule.
3. **Experimental Setup:**
    - Define a sample software project that's complex enough to reflect real-world challenges but manageable within the scope of the experiment.
    - Train both teams on their respective methodologies and provide necessary resources.
4. **Procedure:**
    - Both teams will work on the same software project, starting and finishing at the same time.
    - The agile team will work in iterative sprints, holding regular ceremonies like sprint planning, daily stand-ups, and sprint reviews.
    - The waterfall team will follow a sequential development process, with distinct phases such as requirements gathering, design, development, testing, and deployment.
5. **Data Collection and Analysis:**
    - Collect data on completed features, development time, defects, and team satisfaction for each team throughout the project.
    - Analyse development speed, defect rates, and other relevant metrics to compare the two methodologies' outcomes.

- Use surveys or interviews to gather qualitative data on team collaboration, communication, and overall satisfaction.

6. **Results and Conclusion:**
    - Present the quantitative and qualitative findings, showcasing any differences in development efficiency, defect rates, and team dynamics between the two methodologies.
    - Discuss the implications of the results for software development teams, project managers, and organizations aiming to adopt agile practices.
    - Address any limitations of the experiment, such as the specific project chosen or potential biases.

5.0 TEST DESCRIPTION AND RESULTS

5.1 UNIT TESTING PLAN (UTP)

UNIT TESTING PLAN (UTP)						
No.	**Test Case Name**	**Test Procedure**	**Pre condition**	**Expected Result**	**Tester**	**Result (Pass/ Failure)**
1.	Login Page	User is required to enter username and password to login	User required to fill up the required	If username and password valid, the main page will open	Rooban	Pass
2.	Main Page	User is required to Main Page	-	If user clicked one of the categories Activity, it will open Activity page	Darmen	Pass
3.	Register page	User is required to click Register page	User need to Register putting the information	If user clicked yes after putting the information that have to successfully store in database	Lavanyaa	Pass
4.	Attendance page	User is required to click Attendance page on the website	None	The user can able to view that they have attend to the class or not	Rooban	Pass
5.	Activity page	User is require to click the Activity page	None	The user can able to view the weekly activity of the class and the latest update from the kuliah moral.	Darmen	Pass

6.	About page	User is required to clicked the About page	None	By user Clicking the about page they can view the information about the kualih moral and the objective of the kuliah moral.	Lavanyaa	Pass

5.2 INTEGRATION TESTING PLAN (ITP)

INTEGRATION TESTING PLAN (ITP)						
No.	**Test Case Name**	**Test Procedure**	**Pre condition**	**Expected Result**	**Tester**	**Result (Pass/ Failure)**
1.	Open Button	Admin is required to enter open button to on the system	-	Once click the open button the fingerprint scanner ready to read	Rooban	Pass
2.	Enrol button	Admin is required to click enrol button	User required to fill up the required such as Name, Matric card and department	If admin clicked Enrol button can add student details to register	Darmen	Pass
3.	Verify button	Admin is required to click Verify button on the system	Scan the fingerprint	Once click the button verify and and scan the fingerprint to ensure they are register	Lavanyaa	Pass

4.	Identify	Admin is required to click identify on the system	Confirmed the matric card number	Once done it will show the person details once type the matric number	Rooban	Pass
5.	Key-in Attendance	Admin is require to click Key in button	Scan the fingerprint	It must shoe the real time and date of they student scan	Darmen	Pass
6.	Show data	Admin is required to click the Show data button	None	The table will show to the admin of the data of student have attend the class	Lavanyaa	Pass
	Close	Admin is required to clicked the close Button	None	To admin logout from the system	Rooban	Pass

6.0 MAJOR FINDING AND DISCUSSION

6.1 a) The Advantage(s) of the Project

- Enhanced Accuracy: Ensures precise and reliable tracking of attendance data.
- Fraud Prevention: Reduces instances of buddy punching and time theft.
- Real-time Insights: Provides instant access to up-to-date attendance information for informed decision-making.
- Automated Processes: Streamlines administrative tasks through automated data collection and processing.

6.2 b) The Disadvantage(s) of the Project

- Privacy Concerns: Raises worries about the collection and storage of biometric data.
- Recognition Accuracy: Fingerprint recognition might be impacted by environmental factors or physical changes.
- Implementation Costs: Initial investment required for hardware, software, and infrastructure.
- Technical Expertise: Demands technical knowledge for setup, maintenance, and troubleshooting.

7.0 Recommendations

- **Data Privacy and Security:** Prioritize data privacy by implementing strong encryption, regular security audits, and compliance with relevant regulations (e.g., GDPR). Ensure user consent for biometric data collection.
- **Pilot Testing:** Conduct a pilot phase to assess the system's performance and user feedback before full-scale deployment. This helps identify and address potential issues early on.
- **User Training:** Provide comprehensive training for both administrators and users to ensure proper system usage, alleviate concerns, and maximize its benefits.
- **Redundancy and Backups:** Implement redundancy measures to minimize downtime risks. Regularly back up attendance data to prevent loss during system failures.
- **Technical Support:** Establish a responsive technical support system to promptly address user inquiries and troubleshoot any technical issues.
- **Change Management:** Develop a change management plan to address resistance from users and facilitate a smooth transition to the new system.
- **Regular Maintenance:** Set up a schedule for routine system maintenance, updates, and optimization to ensure continued performance.

Conclusion

In conclusion, the implementation of a fingerprint attendance system offers numerous advantages such as accurate tracking, automation, and enhanced security. While the project presents challenges related to privacy, accuracy, and initial costs, these can be mitigated through careful planning and robust measures. By addressing these challenges and following the recommendations outlined above, the organization can harness the benefits of the system, streamline attendance management, and foster a culture of accountability and punctuality. Ultimately, the success of the project hinges on effective execution, user acceptance, and continuous monitoring to ensure the system aligns with the organization's goals and values.

8.0 Reference

Website

1. **Biometric Update**: A comprehensive news source for the biometrics industry, including fingerprint technology. Website: biometricupdate.com
2. **FindBiometrics**: Offers news, articles, and resources on various biometric technologies, including fingerprints. Website: findbiometrics.com
3. **National Institute of Standards and Technology (NIST) - Biometric Standards**: Provides information about biometric standards and research, including fingerprint technology. Website: nist.gov/biometrics
4. **The Biometrics Institute**: An independent organization that promotes the responsible use of biometrics, including fingerprint technology. Website: biometricsinstitute.org
5. **Gemalto**: A digital security company that offers biometric solutions, including fingerprint recognition. Website: gemalto.com/biometrics

Books

1. **"Biometric Technology: Authentication, Biocryptography, and Cloud-Based Architecture"** by David Zhang, Yong Xu, and Jian Yang. This book covers various biometric technologies, including fingerprint recognition, and discusses their applications, challenges, and future directions.
2. **"Introduction to Biometrics"** by Anil K. Jain, Arun A. Ross, and Karthik Nandakumar. This book offers an introduction to various biometric modalities, including fingerprints, explaining the principles, algorithms, and real-world applications.
3. **"Biometrics: Identity Verification in a Networked World"** by Samir Nanavati, Michael Thieme, and Raj Nanavati. This book provides a comprehensive overview of biometrics, including fingerprint recognition, in the context of identity verification and security.