Final Year Project (Computer Science)

UMS UNIVERSITI MALAYSIA SABAH

FACULTY OF COMPUTING & INFORMATICS
FAKULTI KOMPUTERAN DAN INFORMATIK

Campus Safe: Safeguarding GPS-Based Physical Identity and Access Management (PIAM) System with a Lightweight Geo-Encryption

YEO ZI ZIAN
BI18110159, BI18110159@student.ums.edu.my

DR TAN SOO FUN
soofun@ums.edu.my

ABSTRACT

Universiti Malaysia Sabah (UMS) has transformed itself into an attraction point for tourists who travel to Sabah in recent years. The increase in the number of tourists who visit UMS has raised concerns on campus safety issues. The registered tourists cannot be identified and tracked, so they may do whatever they want and go whenever they like. Some restricted areas such as the faculty, Dewan Canselori hall or even the hostel will become the place for the tourists to challenge to go. Recent industrial solutions such as using 125kHz proximity card can obtain visitors' personal information without detecting their real-time location at a large area such as in UMS. Recent mobile apps that rely on QR code scanning in the campus entrance gates lack the real-time GPS tracking system to track the visitor's location. This project aimed to develop a GPS-based Physical Identity and Access Management (PIAM) System for UMS security division to address these gaps. Subsequently, this project embedded with a lightweight Geo-Encryption algorithm to preserve the privacy of real-time GPS location. The objective of this project includes, (i) To investigate the lightweight geo-encryption in terms of their computation speed, generated ciphertext, and key size by using literature review and experimental approach. (ii) To design and develop a GPS-Based Physical Identity and Access Management System in web Firebase platform by using prototype approach. (iii) To evaluate the usability performance of the developed GPS-Based Physical Identity and Access Management (PIAM) System by using the System Usability Scale (SUS) approach. Literature review and experiment aimed to select the fastest lightweight geo-encryption algorithms and the smallest ciphertext and key size. The user's requirements will be collected using a quantitative questionnaire online surveying tool. The collected user and system requirements will be used to design and develop the proposed project. Data Flow Diagram (DFD) will be used to develop the system flow, while Entity Relationship Diagram is used to design the system's database. The selected lightweight geo-encryption algorithm will be implemented in the proposed system, which develops by using Java language. Business logic and interfaces of the system will be tested by using unit testing and system integration testing while user acceptance testing (UAT) and system usability scare (SUS) is used for system evaluation. The project's expected outcome is a GPS-Based Physical Identity and Access Management System with the selected lightweight geo-encryption algorithm that can be used to support the control access and management operations of UMS security division.

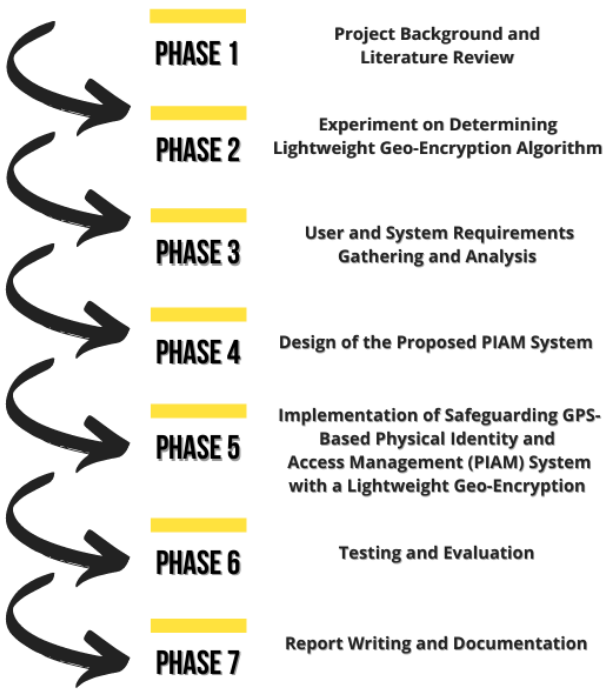
PROBLEM STATEMENT

- Difficulty in tracking visitor's Real-time Location
- Privacy of user information is not secure
- Application was limited to the internal user and did not support external users such as visitors

OBJECTIVES

- To investigate the lightweight geo-encryption algorithms in terms of their computation speed, generated ciphertext, and key size by using system literature review and experimental approach.
- To design and develop a GPS-Based Physical Identity and Access Management System in web Firebase platform by using prototype approach.
- To evaluate the usability performance of the developed GPS-Based Physical Identity and Access Management System by using the System Usability Scale (SUS) approach.

METHODOLOGY

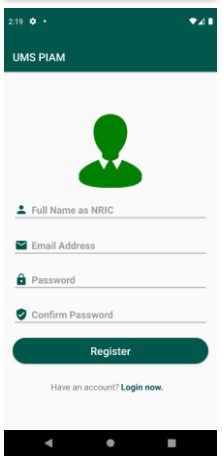


CONCLUSION

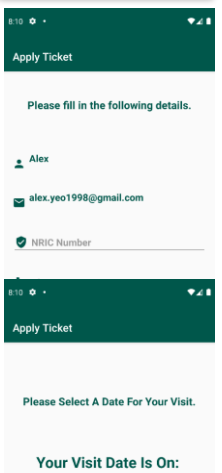
- A Safeguarding GPS-Based Physical Identity and Access Management (PIAM) System with a Lightweight Geo-Encryption is provided.
- The system was able to protect the real-time location of the users by implementing a lightweight Geo-Encryption.

IMPLEMENTATION

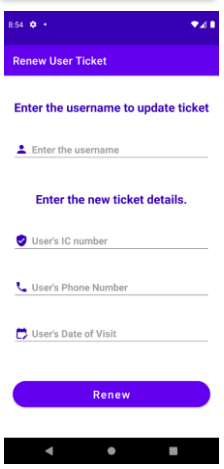
Register Page



Apply Ticket

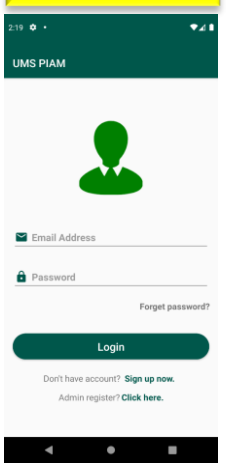


Renew Ticket

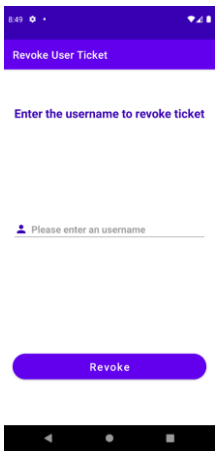


Generate Report

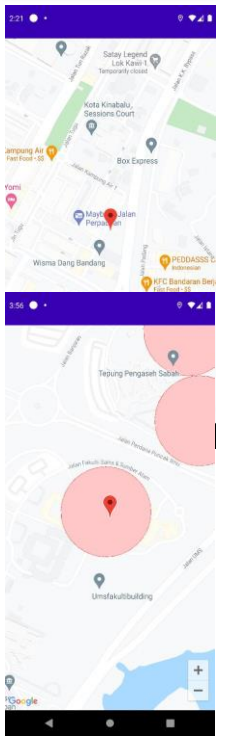
Login Page



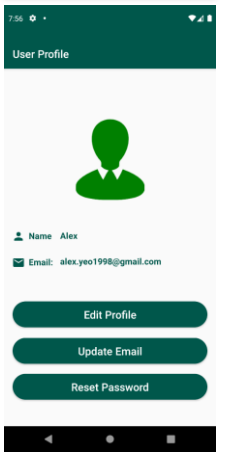
Revoke Ticket



Real-Time GPS Location Tracking



User Profile



Encrypted Data in Firebase