Loh Min Yu

Software Development, Research, and Systems Projects

About Me

I am a Bachelor of Information Technology (Honours) student at Raffles University with a strong interest in software engineering, game development, and artificial intelligence systems. I enjoy solving complex problems through pragmatic thinking and structured logic, whether in IoT system design, game production, or language-focused development in Python, C++, and C#.

At my core, I am both analytical and reflective: I learn from failure, adapt strategy quickly, and ask deeper questions about not only how systems function, but why they are built. My interests span both technical and philosophical domains, including existential and nihilistic thought, as I work to balance personal meaning with professional fulfillment.

Outside of technology, I enjoy literature and the art of tea—practices that cultivate mindfulness, patience, and clarity. I welcome collaboration on software projects of all kinds, especially those involving advanced technology, artificial intelligence, educational technology, or cultural expression through digital media.

Project Portfolio Table

No.	Project	Category
1	Web-Based System for Monitoring Postgraduate Research Progress	Full-Stack / FYP
2	JiuXi Mindscape — AI Conversation Service	AI / Web Application
3	Colorella Ticketing System	Desktop Application
4	ReMind — Mobile Relationship Manager	Mobile Application
5	Telecom Customer Churn Prediction System (Malaysia)	Data Mining / ML
6	AIoT Environmental Recording Framework for AI Training Source	Hardware / AIoT
7	Hangman Game	C++ Game
8	Student Score Management System	Python + PHP Web
9	Network Security Protocols Simulation	Cybersecurity
10	Malaysia's Internet Penetration Rate Analysis	Data Science
11	University Database System	SQL Architecture
12	Smart Rain Alert System	Hardware / IoT
13	Digital Passport Management System	System Analysis
14	UniMate Campus Companion App	UI/UX + Mobile App
15	Stakeholder-Centric Evaluation of Postgraduate Process Monitoring System	Research Paper

Project Breakdowns

1. Web-Based System for Monitoring Postgraduate Research Progress

Type: Final year project
Role: Lead Developer
Technologies: Web frameworks, relational databases, Laravel PHP, SDLC, Redis

Description: A dedicated web platform to streamline and monitor postgraduate research milestones and progress.

Key Contributions

- Engineered progress tracking dashboards and milestone submission workflows.
- Developed communication pathways between students, supervisors, and relevant stakeholders.

Skills Demonstrated: Full-stack web development, project management, system architecture

What I Learned: Managing end-to-end SDLC for academic systems and addressing administrative workflows in higher education.

2. JiuXi Mindscape — AI Conversation Service

Type: AI / Web application project
Role: Developer
Technologies: HTML, CSS, JavaScript, iFLYTEK ASR/TTS,
Web Speech/SpeechSynthesis APIs, configurable LLM REST endpoints,
WebSockets, Python (Whisper local server), PHP (local testing)

Description: A lightweight single page application (SPA) serving as a voice-enabled AI narrator and concierge for on-site cultural tours.

Key Contributions

- Integrated dual-input voice UX with push-to-talk microphone controls and text input.
- Implemented context management through persona profiles and simplified RAG logic using local JSON knowledge bases.
- Built a dynamic avatar state system (idle, listening, thinking, talking) and an offline *Mock Mode* for zero-credential demonstrations.

Skills Demonstrated: Frontend web development, AI/LLM API integration, ASR/TTS implementation, asynchronous state management, RAG implementation

What I Learned: How to structure modular frontend architectures for asynchronous conversational flows and design resilient fallback behavior with browser APIs when primary WebSocket services fail.

3. Colorella Ticketing System

Type: System development project
Role: Software Developer
Technologies: Python 3.10+, Tkinter, Google Sheets API (gspread, oauth2client), pandas, openpyxl

Description: A lightweight Tkinter desktop application for ingesting Google Form responses, managing ticket tiers (e.g., Early Bird), and tracking payments and attendance with Google Sheets as the backend.

Key Contributions

- Implemented bidirectional synchronization between Google Forms responses and the local ticketing workflow.
- Built email-based de-duplication, search functionality, and one-click attendance marking.
- Added batched I/O, background threading, and rotating file logging to maintain a responsive UI.

Skills Demonstrated: Desktop application development, API integration, OOP design, concurrency, data management

What I Learned: Integrating third-party APIs as a reliable data backend and managing responsive Python GUIs through background workers.

4. ReMind — Mobile Relationship Manager

Type: Mobile application project
Role: Project Lead / Mobile Developer
Technologies: Ionic, Angular, Capacitor, SQLite, Ionic Storage

Description: A privacy-focused offline-first mobile application for managing personal relationships and social information such as birthdays, notes, and contact details.

Key Contributions

- Designed and implemented an offline-first architecture using SQLite with Capacitor plugins.
- Developed full CRUD workflows for friend records with real-time UI updates through Angular data binding.
- Implemented client-side caching using Ionic Storage for faster startup and reliable offline operation.
- Integrated Ionic, Angular, and Capacitor to deliver cross-platform hybrid mobile functionality.

Skills Demonstrated: Hybrid mobile development, SQLite database design, Angular frontend architecture, offline-first application design, Capacitor plugin integration

What I Learned: Designing reliable local-data mobile applications and maintaining consistency between persistent database storage and cached state.

5. Telecom Customer Churn Prediction System (Malaysia)

Type: Data mining / machine learning project
Role: Data Scientist / System Developer
Technologies: Python, scikit-learn, Orange 3, pandas, Tkinter, joblib

Description: Developed a telecom customer churn prediction system using a Malaysia-based dataset synthesized from IBM Telco Churn data and DOSM telecommunications statistics.

Key Contributions

- Designed a synthetic telecom dataset (5,000 customers) combining demographic, behavioral, and churn decision features based on Malaysian market conditions.
- Performed exploratory data analysis (EDA) and feature engineering to identify churn drivers such as tenure, complaint frequency, late payments, and network quality.
- Implemented and compared machine learning models including Logistic Regression, Random Forest, and Decision Trees using scikit-learn and Orange.
- Built a Tkinter-based decision-support GUI that predicts churn probability and assigns retention priority tiers for telecom operators.

Skills Demonstrated: Machine learning, predictive modeling, EDA, data preprocessing, feature engineering, GUI-based ML deployment

What I Learned: Translating predictive models into practical decision-support tools for business applications.

6. AIoT Environmental Recording Framework for AI Training Source

Type: IoT project
Role: IoT / Systems Developer
Technologies: IoT hardware, sensors, data pipelines, AI modeling frameworks

Description: An AIoT framework that captures and processes environmental data in formats suitable for model training.

Key Contributions

- Built sensor arrays and ingestion pipelines.
- Structured environmental output for machine learning workflows.

Skills Demonstrated: AIoT integration, hardware programming, data pipeline engineering

What I Learned: Bridging hardware data acquisition with machine learning dataset preparation.

7. Hangman Game

Type: Course project (Object-Oriented Programming)
Role: Lead Developer, Project Manager
Technologies: C++17, CMake, Git, SFML

Description: A modular console-based Hangman game supporting single-player, local cooperative, and online TCP multiplayer modes.

Key Contributions

- Designed a modular architecture using inheritance, polymorphism, and encapsulation.
- Integrated SFML for networking and audio (background music and effects).
- Configured a cross-platform CMake build setup.

Skills Demonstrated: C++ programming, object-oriented design, TCP/IP network programming, build management

What I Learned: Applying SRP for scalability and synchronizing game state over sockets.

8. Student Score Management System

Type: Course project (Principles of Computer Programming and Web Programming)
Role: Developer
Technologies: Python, HTML, CSS, JavaScript, PHP, MySQL, phpMyAdmin

Description: A score management system that evolved from a Python desktop app into a full-stack web application.

Key Contributions

- Implemented CRUD workflows, sorting/search features, and normalized MySQL schema design.
- Built web interfaces with performance visualization, assignment PDF viewing, and secure authentication workflows.

Skills Demonstrated: Python programming, full-stack development, database normalization, algorithm design

What I Learned: Refactoring many-to-many structures into efficient one-to-many relationships and transitioning local tools into web systems.

9. Network Security Protocols Simulation

Type: Course project (Data Communication)
Role: Network Security Researcher
Technologies: Python, VPN setups, Cloudflare, OpenSSL

Description: A simulation and comparative study of network security protocols for secure transmission.

Key Contributions

- Built a Python blockchain prototype to demonstrate hashing and immutability.
- Configured DNS/SSL protection via Cloudflare.
- Performed manual TLS/SSL handshake simulations using OpenSSL.

Skills Demonstrated: Cryptography fundamentals, network protocol analysis, server-client security configuration

What I Learned: Practical mechanics of secure communications and certificate-based trust workflows.

10. Malaysia's Internet Penetration Rate Analysis

Type: Data analysis project
Role: Data Analyst
Technologies: Python, pandas, data visualization libraries

Description: A quantitative study of internet penetration trends in Malaysia (2000–2023), benchmarked against selected countries.

Key Contributions

- Retrieved datasets from the World Bank and performed extensive cleaning.
- Reshaped data from wide to long format for analysis.
- Produced trend visualizations and correlation analysis outputs.

Skills Demonstrated: EDA, data cleaning, statistical analysis, visualization

What I Learned: Building end-to-end analytical pipelines from extraction through interpretable insight generation.

11. University Database System

Type: Course project (Databases)
Role: Database Designer
Technologies: SQL, ERD design

Description: A relational database for managing students, lecturers, courses, examinations, and academic programs.

Key Contributions

- Designed and iteratively refined ERDs.
- Implemented schema constraints using primary and foreign keys.
- Wrote complex SQL for enrollment, demographic, and program analytics.

Skills Demonstrated: Relational modeling, normalization, advanced SQL, data integrity management

What I Learned: The importance of normalization for scalability and the iterative nature of conceptual-to-physical design.

12. Smart Rain Alert System

Type: IoT project (Human Computer Interaction)
Role: IoT Developer / UI Researcher
Technologies: ESP-32, HW-038 water sensor, LEDs, buzzer, Figma

Description: An IoT system that detects rainfall and triggers real-time visual, audio, and mobile alerts.

Key Contributions

- Integrated sensors and calibrated intensity thresholds.
- Mapped rain levels to LED and buzzer alerts.
- Designed companion app wireframes and conducted usability testing.

Skills Demonstrated: Hardware-software integration, IoT development, UI/UX prototyping, user testing

What I Learned: Tuning sensor logic to reduce false positives and designing urgency-aware multimodal feedback.

13. Digital Passport Management System

Type: Course project (System Analysis and Design)
Role: Systems Analyst / Co-Developer
Technologies: Tablets, fingerprint readers, servers, database systems

Description: A proposed digital passport locker system replacing manual logbooks with biometric and server-backed workflows.

Key Contributions

- Conducted technical, economic, legal, and operational feasibility analyses.
- Drafted architecture and deployment specifications for migration from manual processes.

Skills Demonstrated: Systems analysis, feasibility studies, requirements engineering, architecture planning

What I Learned: Translating stakeholder requirements into practical system specifications with implementation constraints.

14. UniMate Campus Companion App

Type: UI/UX design project / mobile application development
Role: UI/UX Designer and Mobile App Developer
Technologies: Figma, mobile app frameworks

Description: A campus mobile app concept combining schedules, announcements, events, and a gamified rewards experience.

Key Contributions

- Built personas, empathy maps, and end-to-end user journeys.
- Conducted competitor case studies and produced interactive wireframes/mockups for core modules.

Skills Demonstrated: UI/UX research, wireframing, interaction design, information architecture, rapid prototyping

What I Learned: Converting fragmented user pain points into a cohesive mobile-first design and using gamification for retention.

15. Stakeholder-Centric Evaluation of Postgraduate Process Monitoring System in Malaysia

Type: Research project / conference paper
Role: Researcher / Author
Technologies: Data collection methods, statistical analysis tools, academic formatting workflows

Description: A conference paper evaluating postgraduate monitoring systems from multiple stakeholder perspectives.

Key Contributions

- Conducted stakeholder analysis and evaluated system-level impacts.
- Synthesized findings into publication-ready academic writing.

Skills Demonstrated: Academic writing, research methodology, critical analysis

What I Learned: Translating technical system evaluations into structured, human-centric research outputs.

Extracurricular & Leadership Experience

Treasurer, Student Representative Council (SRC)
November 2024 – December 2025 — Johor Bahru, Malaysia

- Spearheaded financial operations for a major university-wide festival (*Colorella*) catering to 250–300 attendees, effectively managing a total event budget exceeding RM 20,000.
- Drove revenue generation by managing over RM 10,000 in income from ticket sales, donations, and vendor fees, while overseeing the allocation of RM 12,000 in secured sponsorships and institutional subsidies.
- Acted as a cross-functional team leader, directly overseeing six critical operational departments: Security, Medical, Check-in, Sponsorship, Finance, and Ticketing.
- Engineered and deployed a custom Python-based Ticketing Management System to automate attendee registrations, track real-time attendance, and securely process high-volume payment reviews.

- Maintained meticulous organizational financial records, prepared comprehensive expenditure reports, and executed strategic financial planning for ongoing campus initiatives.

Vice-President, Digital Technology Club (RUDT)
December 2024 – October 2025 — Johor Bahru, Malaysia

- Directed internal club operations by managing committee members and overseeing end-to-end execution of digital technology events and workshops.
- Served as the primary strategic liaison, facilitating communication and alignment between the club, academic supervisors, Student Affairs Services (SAS), and the Student Representative Council (SRC).
- Authored and reviewed official event proposals, post-event reports, and administrative documentation to support institutional compliance and track performance outcomes.

Certifications & Specialized Knowledge

- **Certifications:** SPM, UEC, Micro-credential in AI, AutoCount Computerized Accounting Course (with assignment)
- **Cross-Disciplinary Knowledge:** Background in Arts and Commerce (Foon Yew High School), with foundations in business operations, bookkeeping, mathematics, and geography
- **Languages:** Fluent in English and Chinese

Skills Summary

- **Programming Languages:** Python, C++, PHP, JavaScript, TypeScript, HTML, CSS, SQL
- **Frameworks & Libraries:** Angular, Ionic Framework, scikit-learn, pandas, Tkinter, SFML, CMake
- **Databases:** MySQL, SQLite, relational database design, Google Sheets API
- **UI/UX & Prototyping:** Figma, wireframing, user research, usability testing
- **IoT & Hardware:** ESP-32, sensor integration, IoT frameworks
- **Networking & Security:** TCP/IP sockets, OpenSSL, VPN configuration, cryptographic hashing
- **System & Data Analysis:** Exploratory Data Analysis (EDA), feasibility studies, ERD, database normalization
- **Transferable Skills:** Cross-functional leadership, financial planning, project management, technical documentation, academic writing