PROPOSAL FOR NEXUSNTU: ALL-IN-ONE WEB APP FOR INTERNATIONAL STUDENTS

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Contents

Executive Summary

Arriving at Nanyang Technological University (NTU) presents a significant challenge for new international students, who are immediately confronted with a maze of scattered information for critical tasks such as visa processing, health screenings, and campus navigation. This disjointed experience creates unnecessary stress and delays their integration into the university community. To solve this, we propose NexusNTU, a comprehensive web application designed to serve as a single, centralised hub for the international student body.

NexusNTU directly confronts these issues by integrating four key features. A personalised information hub will cut through the noise by delivering relevant university news alongside updates from students' home countries. To demystify the large campus, an interactive navigation system will provide clear directions. A nearby amenities finder will help students quickly locate essential services such as MRT stations, bus stops, eateries, and hospitals around campus. Finally, an AI-powered chatbot will offer 24/7 support, providing instant answers to the many questions that arise outside of office hours.

By uniting these essential tools into one intuitive interface, NexusNTU will transform the student onboarding process from a fragmented challenge into a seamless and supportive experience. The platform is designed not just to provide information, but to foster a stronger sense of belonging and empower every international and exchange student to thrive from their very first day at NTU.

Statement of Problem

International students arriving at Nanyang Technological University (NTU) face a unique and complex set of challenges that can impact their academic success and overall well-being. Upon arrival, they must simultaneously navigate a new academic environment, a different cultural landscape, and the logistical complexities of living in a new country. This often leads to feelings of information overload, social isolation, and difficulty in accessing timely, relevant resources. For instance, finding news from their home country, navigating the expansive NTU campus, and connecting with peers from similar backgrounds are common hurdles that are not addressed by a single, centralised platform.

Even though NTU provides comprehensive services, they are scattered across multiple sites and offices, creating friction during students' first weeks. New students must simultaneously: (1) complete Student's Pass (STP) processes and health screening, (2) learn campus mobility using the Omnibus shuttle routes CL-B/CL-R/CR/CWR, (3) access healthcare with awareness of Fullerton Health @ NTU clinic hours and queue, (4) secure transit concessions, and (5) find wellbeing and safety resources. The absence of a single, student-centred hub delays task completion and increases anxiety—an issue compounded by fragmented references and labels that surface across materials, which further signals the lack of a clear, consolidated point of guidance.

Objectives

This project proposes the design and development of an all-in-one web application to enhance the experience of international students at NTU. Its objectives are to reduce first-week friction, centralise essential guidance, and provide always-available help across academic, administrative, social, mobility, and well-being needs.

- **Centralised Information Hub (News Viewer):** To aggregate and deliver personalised content, including news from students' home countries, official university announcements, and guides on local culture.

- **Navigation:** Design and implement a user-friendly tool that highlights key locations (lecture halls, administrative offices, dining options, student services) with building/stop search, a prebuilt route to Pioneer MRT, and deep links into the Omnibus shuttle system.

- **Nearest Amenities Finder:** To integrate a tool for locating essential amenities and services, such as clinics, hospitals, and dining options, making it a one-stop resource for navigating campus and local necessities.
- **AI-powered support (24/7):** To build an intelligent chatbot for round-the-clock support, capable of answering procedural questions, interpreting queries from images (such as forms or signs), and providing instant guidance outside of office hours.
- **Quick Links:** To provide a dashboard of personalised and verified deep links to essential services, including STP applications, health screenings (with live queue data), transit concessions, and other official NTU portals.
- **Currency Conversion:** To include a simple and accessible currency conversion tool for students' daily financial convenience.
- **Settings:** To allow for user personalisation through a dedicated settings page for profile management and content customisation.

Technical Approach

This section outlines the methodology and technologies that will be used to develop the NexusNTU web application, with a user-centric approach that keeps international students' needs at the centre. We begin by identifying customer needs through short surveys, interviews, and journey-mapping of the first week's experience; these inputs translate into clear target specifications (functional and non-functional) covering onboarding, navigation, healthcare access, concessions, wellbeing, performance, accessibility, and privacy. Those specifications drive technology selection and a robust system architecture so the platform is reliable, scalable, and simple to use. Throughout, official content is delivered via deep links to NTU One-Stop, Fullerton Health @ NTU, UWO/UCC, OGEM, SimplyGo, and the NTU Omnibus app.

The core system is a React single-page application (SPA) with Progressive Web App (PWA) capabilities for fast loads, installability, and graceful offline behaviour; the back end is a Node.js/Express service connected to MongoDB. We integrate only via deep links for official sources and deliberately avoid storing immigration identifiers; immigration-related flows route students directly to official systems, reducing risk and ensuring data accuracy.

Client–server communication uses REST over HTTPS, with GET/POST endpoints secured by JWT/Firebase Auth (Firebase Authentication issues tokens that the API verifies on each request). The deployment plan includes environment keys for

all external pointers so URLs can be rotated without code changes: Omnibus deep-link base, the NTU Fullerton Health Services link, and One-Stop/SimplyGo pages are set via configuration. Together, this stack—React SPA + PWA front end; Node/Express + MongoDB back end; scheduled refresh jobs; deep links to official sites; no storage of immigration IDs; REST over HTTPS with JWT/Firebase Auth; and environment-keyed links to Omnibus, Fullerton, One-Stop, and SimplyGo—ensures NexusNTU is secure, maintainable, and responsive to the real-time needs of NTU's international students.

Customer Needs

To ensure the application is genuinely valuable to its target audience, we will employ a multi-faceted approach to identify and validate the needs of international students at NTU.

Our methodology will include:

(1) **Surveys:** We will design and distribute an online survey to current international students to gather quantitative data on their primary challenges, desired features, and current methods for finding information and connecting with peers.
(2) **Interviews:** We will conduct one-on-one interviews with a diverse group of international students from various faculties and home countries, which will provide deep qualitative insights into their day-to-day experiences and pain points
(3) **Focus Groups:** We will organise small focus groups to facilitate discussions around specific app features, allowing us to gather direct feedback on proposed functionalities and user interface concepts.

This comprehensive research will form the foundation of our design and development process, ensuring that every feature is built with a clear user need in mind.

Target Specifications

This section defines measurable, testable targets for NexusNTU that act as acceptance criteria for build, QA, and post-launch evaluation.

Information Hub: Aggregate top-5 outlets for ≥20 countries with country-of-origin personalisation; surface NTU announcements ≤24 h from official release; all critical tiles deep-link to verified STP/health/contacts pages.

Campus Navigation: Searchable turn-by-turn directions to all key halls/admin/amenities; location accuracy 5–10 m; prebuilt routes to Pioneer/Boon Lay MRT.

AI Chatbot: KB of ≥100 FAQs (campus/visa/admin); ≥85% correct on in-scope queries; supports text+image Q&A with follow-ups and graceful handling of unsupported inputs.

Quick Links Dashboard: All possible links and resources for international and exchange students at NTU will be centralised under one "Quick Links" button. Clicking it opens a comprehensive, user-friendly dashboard packed with every conceivable link, grouped into four hubs for clarity and efficiency.

1) NTU Hub (NH)

Academic & Administrative Tools

- STARS planner (course registration, add/drop)
- Academic calendar
- Exam timetables
- Degree audit
- Course library guides
- FGO portal
- Leave of absence (LOA)
- MOOCs
- NTULearn / NTU Intranet
- ServiceNow
- Academic appeals procedures

Student Services & Support

- One-Stop (Student's Pass, concession card, insurance, appointments, phone lines & hours)
- UCC, UWO, PEL
- Career & Attachment Office
- Matriculation support
- Transcript requests
- English proficiency/testing
- Student Global Mobility
- Alumni services
- Wellbeing & mental health
- Housing services
- Sports & recreation
- Library services
- Campus security
- Shuttle bus
- Hall fault reporting

Campus & Facilities

- Interactive campus map
- Hall directory
- Emergency hotlines (security/fault)

- Shuttle schedules
- One-Stop physical location & hours
- Library branches and special collections

IT & Digital Setup

- Student email
- Eduroam and NTUSECURE Wi-Fi
- Global Protect VPN
- MFA / SSO
- Printing
- Software entitlements (e.g., Office, MATLAB, SPSS)
- Password reset / IT helpdesk

Communication & Community

- University-wide announcements
- NTU Student Union (NTUSU) resources
- Student clubs & societies
- CCA directory
- Integration committees
- Student-run resources (e.g., “All Things NTU”)

Accessibility & Inclusion

- Special needs/accessibility support contacts and processes

Conduct & Academic Integrity

- Plagiarism and exam conduct guidance (linked via academic handbooks)

2) School Hub (SH)

Faculty & Departmental Portals

- NTULearn links for each school (Engineering, Business, HASS, COM, etc.)
- Course outlines
- Lab booking systems
- Research centre information

Academic Contacts & Support

- Department offices
- Academic advisors
- School career offices
- School-specific wellbeing/support services (e.g., induction/orientation)

Exchange-Specific Academics

- Course mapping/credit transfer
- Workload rules
- Assessment differences
- Exam registration for incoming exchange students (via GEM/School pages)

3) Singapore Hub (SGH)

Immigration & Entry Essentials

- Student's Pass (STP) application
- In-Principle Approval (IPA)
- Overstaying warnings
- ICA portal
- Visa-to-entry guidance

Housing & Accommodation

- On-campus hall applications & guarantees
- Off-campus housing options (e.g., Boon Lay, Jurong East/West)
- Hall facilities (laundry, dining)

Living Costs & Financial Planning

- Estimated monthly budgets (housing, personal expenses, transport, textbooks)
- Cashless payment systems
- GST information
- Tuition/fees payment and financial aid/scholarships (for full-degree international students)

Banking & Mobile Setup

- Opening a bank account (letters needed, acceptable addresses)
- Student mobile/SIM plans.

Healthcare & Insurance

- Fullerton @ NTU clinic details (location, hours, queueing info)
- $3/visit GP scheme summary
- Hospital/clinic lists
- NTU student insurance
- Local telemedicine / other GP clinics

Transport & Transit Savings

- EZ-Link concession card process (apply/renew)
- Transit discounts
- Nearest TSC/TO
- Shuttle bus routes
- Renewal reminders

Wellbeing & Safety

- Medical hotlines
- PEL after-hours guidance
- Campus security numbers
- Counselling / mental health services
- Police emergency
- Embassy & consulate contacts in Singapore

4) Home Country Hub (HC)

Country-Specific Essentials

- Embassy/consulate contact info in Singapore
- Local student communities or associations

Visa & Immigration Portals

- Home-country visa renewal procedures
- STP cancellation/extension via One-Stop
- Overstaying tips and warnings

Support Networks

- Peer-mentor programmes
- Alumni groups from their home country
- Country-specific NTU clubs (diaspora networks)

Utility Suite: Registration with masked password, strength meter, unique-username check, OTP (intl codes); login with 6-digit OTP (5-min validity, resend/lockout); logout/reset/change password; change phone with re-verification; view/edit profile with avatar; currency converter (SGD↔home); news viewer (reverse-chrono); building/MRT navigation with autocomplete/current-location and clear error flows; nearest amenities (MRT/bus/eateries/hospitals) with favourites; AI chatbot as above.

School/Course Hubs: One-screen, template-driven hubs per School/Programme (Top Links, NTU Links, School Links, Footer); verified deep links refreshed ≤90 days; WCAG-labelled tiles with optional children; offline labels; auto-select hub from profile with manual switcher; role-based visibility (e.g., FYP Y3/4); feedback sends context (schoolCode/programmeCode/linkId); success = ≥80% of students open hub ≥2×/month in term, broken-link rate <0.5%.

Non-Functional Requirements: Boot ≤10 s; login ≤5 s; currency/route/amenities ≤5 s; OTP delivery ≤20 s; NTU tiles refresh ≤60 s; uptime ≥98% with cached fallbacks + "last updated" stamp; TLS, hashed passwords, 2FA, JWT rotation, rate-limited auth; no passport/FIN/STP collection; WCAG AA +

multilingual labels; handle add/drop bursts via caching/rate limits; support latest Chrome/Safari; PWA installable on iOS/Android with offline hotlines.

Technology Consideration

The selection of technology is critical to the project's success. Our approach prioritizes modern, scalable, and well-supported technologies to ensure a robust and maintainable application. The proposed technologies are summarised in the table below:

Technology Category	Selected Technology	Rationale
Frontend	React.js	A popular JavaScript library for building dynamic and responsive user interfaces.
Backend	Node.js / Express	Enables fast, scalable server-side development using JavaScript.
Database	MongoDB	A flexible NoSQL database ideal for managing user profiles and dynamic content.
Mapping/GIS	Mapbox API	Provides powerful and customizable mapping and navigation functionalities.
Chatbot Engine	Google Dialogflow (using the Gemini API)	A sophisticated platform for building natural language understanding and conversations.
Deployment	AWS / Heroku	A reliable cloud platform for hosting and scaling web applications.

Layer	What it Includes	Key Details
Client (React SPA + PWA)	Offline bundle	UWO/UCC/PEL/security/fault numbers; One-Stop address/hours; static campus map; verified deep links.

Server (Node/Express + MongoDB)	Core services	Auth (Firebase/JWT), profiles, preferences.
Server (Node/Express + MongoDB)	Schedulers & caching	Poll Omnibus, Fullerton hours/queue, One-Stop/SimplyGo pages; cache as {source_url, retrieved_at, valid_to}.
Comms	Protocols & flags	REST over HTTPS; feature flags for exchange-only tiles.

System Architecture/Platform

For the development of NexusNTU, we have chosen the Model-View-Controller (MVC) architectural pattern. This architecture is particularly well-suited for our web application due to the need for dynamic changes to the user interface (the "View") as students interact with different features like the news feed, campus map, and friend-finder. The MVC pattern separates the application into three interconnected components, which improves organisation and scalability.

The development tools will include Visual Studio Code as the primary code editor, Git and GitHub for version control and collaborative development, and project management tools like Trello to track progress and assign tasks. The breakdown of our MVC architecture is as follows:

(1) **Model:** The Model will manage the application's data and business logic. It is responsible for all data-related tasks, such as handling user profiles, fetching news articles, managing friend connections, and storing chatbot conversations. The Model will interact directly with our MongoDB database to retrieve and store information, ensuring that the data is structured and consistent.

(2) **View:** The View is the user interface (UI) that the international students will interact with. Built using the React.js library, the View will be responsible for displaying the data provided by the Model in a user-friendly format. Because our application has distinct features, the MVC pattern allows us to create multiple, dynamic Views (e.g., a map view, a profile view, a news feed view) that can be updated independently without affecting the underlying business logic.

(3) **Controller:** The Controller will act as the intermediary between the Model and the View. It will receive all user inputs from the View (such as a search query for a friend or a click on a campus location). It then processes these

inputs, interacts with the Model to update or retrieve data, and finally selects the appropriate View to display the results to the user. Our backend, built with Node.js and the Express framework, will implement the controller logic.

This separation of concerns is a key advantage of the MVC architecture. It will allow our team to work on the frontend (View) and backend (Model and Controller) simultaneously, streamlining the development process and making the application easier to debug, maintain, and scale in the future.

Prospective Platform/Tool	Description
React.js	A JavaScript library for building a dynamic and responsive user interface (UI) that students will interact with.
Node.js	A JavaScript runtime environment that will serve as the foundation of the application's backend.
Diagrams.net	System Architecture diagram
Visual Paradigm	Diagrams
Figma	Vector graphics editor and prototyping tool
MongoDB	A NoSQL database for storing and managing all application data, including user profiles, preferences, and dynamic content.
Mapbox API	A service providing customizable maps and navigation functionalities for the campus map and amenities finder.
Google Dialogflow	An AI platform for building a natural language chatbot to understand and answer student questions 24/7.
Visual Studio Code	The primary source-code editor for writing, editing, and debugging the application's code.

Project Management

With feature-oriented work streams and biweekly reviews, we will employ an Agile, sprint-based methodology. For the sponsor to review scope, schedule, and risk, a staging build mapped to the Gantt chart is delivered at the end of each sprint. Pull requests adhere to a simple checklist that includes accessibility notes, documentation, tests, and reviewer approval. The project manager is responsible for managing cross-team dependencies, maintaining the risk/change log, and coordinating integration. The following is our project timeline, which is shown in a Gantt chart format.

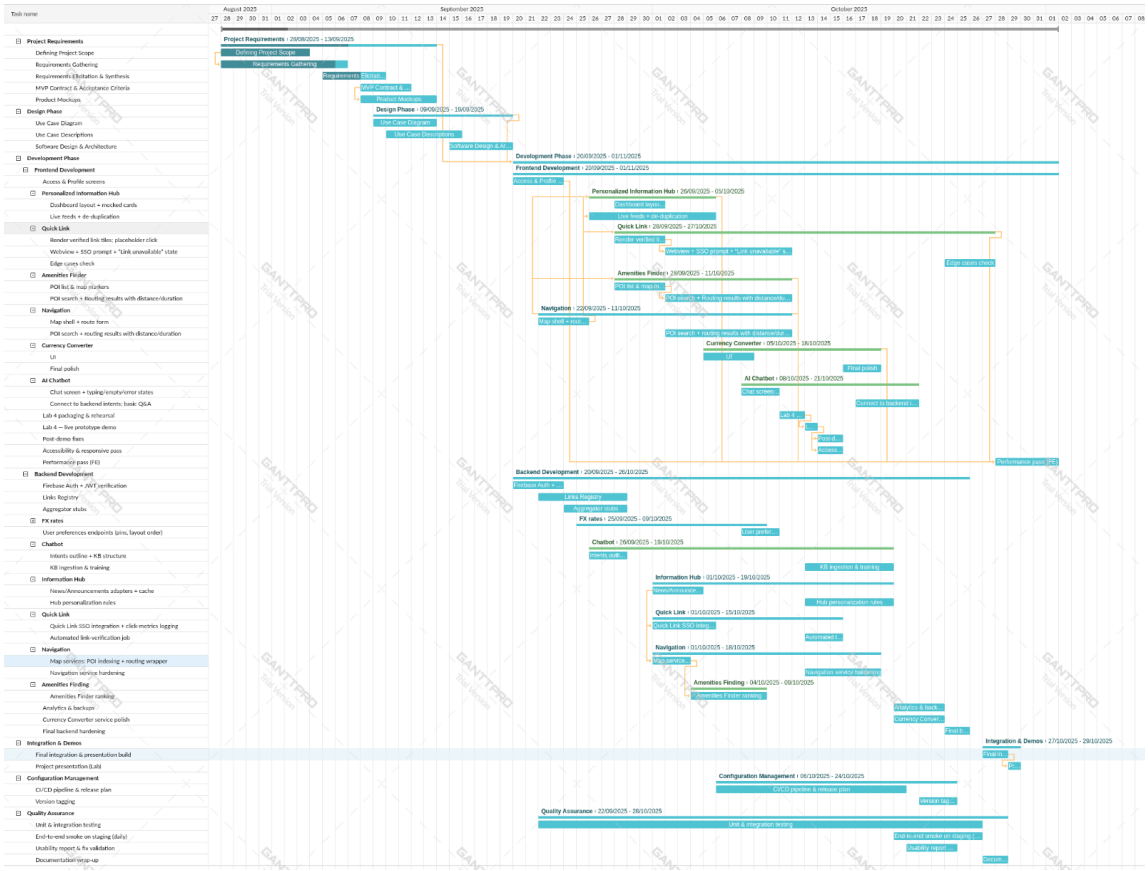

Figure 1: Gantt chart for the project. The solid bars indicate the portions of the tasks that we have accomplished. (Click here to see a higher quality version)

Deliverables

We will provide:

(1) Detailed requirement specifications (use-case model, descriptions, software requirements),
(2) Analysis models (DB schema, class, architecture, key sequence diagrams),
(3) Cloud database (Firebase) configured for the back end,
(4) Technical prototypes (website platform),
(5) Computer program code aligned to documentation and diagrams,
(6) Project documentation (program code, proposal, meeting minutes, etc.)
(7) Management plans (Configuration, Change, Release),
(8) Quality Assurance Plan (Software availability plan),
(9) The test procedures, the results, and the entire system meet the approved specifications.

Budget

We present a lean, student-project budget focused on staffing, essential equipment, platform services, and developer licenses needed to deliver, demo, and release the prototype.

Table 1: Requested items and funds for initial design.

Item	Supplier	Quantity	Unit Price (SGD)	Total
Project Manager	–	1	$8,000.00	**$8,000.00**
Software Developers	–	3	$5,000.00	**$15,000.00**
QA/Release Engineers	–	3	$4,000.00	**$12,000.00**
Computers	Dell	5	$1,000.00	**$5,000.00**
Computers	Apple	2	$1,400.00	**$2,800.00**
Printer	HP	1	$3,000.00	**$3,000.00**
Technology License	Android	1	$25.00	**$25.00**
Technology License	Apple	1	$99.00	**$99.00**
Back-end Services	Google	1	$2,000.00	**$2,000.00**
Database	Google	1	$2,000.00	**$2,000.00**
Total	–	–	–	**$55,224.00**

Communication and Coordination with Sponsor

Every Friday, all updates are sent via email through the Project Manager; on Fridays that fall on a holiday, the updates are sent on Monday. Sponsors raise any issues with deadlines or features during this window and acknowledge them within three working days. The Project Manager arranges a follow-up meeting for the following Friday (or as otherwise designated) if issues are raised. Unless an in-person session is requested, Microsoft Teams is used by default for meetings.

Team Qualifications

Our team combines platform operations, backend/API development, frontend engineering, UX research and design, and product management to produce a safe and functional student application in a short semester. Appendix B contains one-page resumes. As project requirements change, roles may be modified; Appendix B will be updated to reflect any changes.

Aishwarya Anand (Project Manager). Owns scope, schedule, and risk; coordinates sponsor communication and acceptance; and orchestrates cross-module integration. Experienced with Agile cadence, change control, and lightweight governance suitable for academic projects. Ensures weekly increments ship to staging, milestones are met, and freezes are observed before course presentations.

Vu Thao Nguyen (UX & Research). Leads discovery (surveys, interviews, usability tests) and converts findings into flows, wireframes, and content standards. Focuses on clear first-time experiences, website accessibility, and concise copy for Information Hub, Quick Link, Navigation, and Amenities Finding.

Akshay Krishna (UX/Frontend). Bridges UX into production-ready React components. Builds and maintains the design system, ensures responsiveness and keyboard accessibility, and tracks performance budgets on key pages (Information Hub, Quick Link, Navigation, Amenities Finding).

Shen Jia Cheng (Frontend/Maps). Implements POI search and routing, optimizes client-side performance for map interactions, and integrates mobility deep links (Omnibus) with graceful fallbacks when upstream data is stale.

Nguyen Phuong Linh (Backend). Designs Node/Express APIs and MongoDB schemas; implements caching and scheduled jobs; secures endpoints (Firebase Auth + JWT) and deployment configuration; supports news/map services, and daily backups.

Tran Son Viet (Backend/Chatbot). Develops Dialogflow intents and knowledge-base ingestion; builds service adapters and the link-verification job; supports release hardening, E2E test data, and performance tuning ahead of demos.

Conclusion

According to well-defined use cases and acceptance tests, NexusNTU is a web platform that integrates access/profile, a personalized information hub, verified quick links, campus navigation/amenities, currency conversion, and an AI chatbot. With biweekly staging drops and sponsor reviews, our Agile, feature-focused plan ensures that scope is constrained, feedback is prompt, and quality is quantifiable. Feature flags, contract tests, automated link verification, and a final hardening pass are used to limit risks. We will lock the MVP contract and begin Sprint 1 after the Gantt chart is approved in order to produce a reliable, timely web MVP.

References

Chang, S., McKay, D., Caidi, N., Mendoza, A., Gomes, C., & Ekmekcioglu, C. (2020). From way across the sea: Information overload and international students during the COVID‐19 pandemic. *Proceedings of the Association for Information Science and Technology*, *57*(1). https://doi.org/10.1002/pra2.289

Slaughter, L., Sie, L., Breakey, N., Macionis, N., & Zhang, J. (2023). Can we buffer them? Supporting healthy levels of stress and anxiety in first year international students. *Journal of Hospitality, Leisure, Sport & Tourism Education*, *32*, 100438. https://doi.org/10.1016/j.jhlste.2023.100438

Tan, T. H. B., Lim, S., & Vun, C. H. N. (2024). Role of technology self-efficacy and digital alliance in digital mental health tool acceptance among university students in Singapore. *International Journal of Crowd Science*, *8*(3), 101–109. https://doi.org/10.26599/IJCS.2024.9100001

Appendix A:

Detailed System Architecture

We will implement NexusNTU using a Model–View–Controller (MVC) architecture because the app's UI changes dynamically as students move between features such as the news feed, campus map, friend-finder, School/Course Hubs, and the "Start @ NTU" onboarding. MVC separates responsibilities cleanly: the Model manages data and business logic, the View renders responsive interfaces, and the Controller coordinates user intent and server actions. This separation lets frontend and backend work proceed in parallel, simplifies debugging, and supports long-term scalability.

The View is a React single-page application with Progressive Web App (PWA) capabilities to provide fast loads, installability, and graceful offline behavior. Distinct views (map, profile, news, School/Course Hubs, onboarding) update independently without touching core logic. Each School/Course Hub screen follows a reusable template with collapsible sections (Top Links, NTU Links, SCHOOL Links), tiles that include icon, label, optional descriptor, and verified deep links (with optional child sub-links), a persistent "Report an Issue/Feedback" action that sends context (schoolCode, programmeCode, linkId), and offline fallbacks where tile names and help text remain visible while links require connectivity.

The Controller is implemented in Node.js with Express, exposing REST endpoints over HTTPS for authentication, profiles, preferences, content lookup, hub configuration, and telemetry. Controllers handle user input from the View (e.g., search a building, open a School tile, request queue info), then call Model services and return normalized responses to the UI. Feature flags (e.g., exchange-only tiles, Year-based visibility for FYP) are applied here so the same codebase can adapt per persona and programme.

The Model layer persists and orchestrates data in MongoDB. Core collections include users (profiles and preferences), schools (one document per School), optional programme overrides, a global linkRegistry (deduplicated link definitions across Schools), and audits (who changed what, and when). Each link entry stores { id, schoolCode?, programmeCode?, label, url, description?, icon?, tags[], verifiedAt, verifiedBy, expiresAt? } so we can verify freshness, track provenance, and retire or replace stale URLs cleanly. Business services implement School hub selection (auto-select via profile schoolCode, programmeCode, yearOfStudy with a manual School → Programme → Year switcher), role-based visibility (e.g., show FYP only for Year 3/4; Teaching Support only for opted-in tutors/tutees), and end-to-end acceptance checks.

To keep time-sensitive pointers current without duplicating authoritative data, we run scheduled jobs ("data adapters") that read official reference pages and cache only metadata and link targets as { source_url, retrieved_at, valid_to }, using conservative TTLs (shorter around concession bulk-application windows). Adapters cover NTU Omnibus shuttle info (CL-B/CL-R/CR/CWR routes and, where available, ETA/occupancy), Fullerton Health @ NTU hours/queue links and contact details, One-Stop pages (STP apply/extend/cancel; concession pages for Apply/Collect/Extend/Replace), and other central services. On upstream outages (e.g., Omnibus, Fullerton), the app serves cached content with a visible "last updated" timestamp and an "Open official page" link; critical hotlines are always available offline.

Security and privacy are designed from day one. Transport is HTTPS everywhere with HSTS. Authentication uses Firebase Authentication issuing JWTs that the API validates on each request; we enforce 2FA/OTP, rate-limit login and OTP endpoints, and include replay protections. We practice strict data minimisation: the application never collects or stores passport/FIN/STP numbers; all immigration flows open official NTU/ICA pages directly. The offline pack contains only public information (addresses, numbers). All update operations are signed and audited. No personally identifiable information is transmitted when the user opens an external link; the feedback form includes only hub context (schoolCode, tileId) and the user's app UID (never passport/FIN/STP).

Requirements are traceable from screens and tiles to their authoritative sources. Onboarding → STP (Apply) links to NTU One-Stop: Student's Pass Application; Onboarding → STP (Extend) links to One-Stop: Extension/Re-application; Onboarding → STP (Cancel/Surrender) links to One-Stop: Cancellation/Surrender; the STP Warning surfaces the official legal note "Overstaying is a punishable offence." Health → Fullerton shows today's hours, "Get Queue Number," address/phone drawn from the Health Care and Medical Scheme pages (including the $3/visit scheme). Wellbeing → UWO/UCC exposes appointments, PEL after-hours, and critical care via the UWO/UCC Contact Us references. Safety & Fault links to Campus Security Division hotlines, including 6790-5200. Mobility → Omnibus deep-links to Campus Bus Shuttle / Internal Campus Shuttle resources for CL-B/CL-R/CR/CWR. Transit → Concession (Apply/Collect/Extend/Replace) maps to One-Stop's Undergraduate Concession pages covering eligibility, application windows, and steps.

The School/Course Hubs subsystem is first-class in the platform. A HubTemplate React component renders section headers and tile grids with optional child links. A LinkRegistry service caches link objects with TTL and verification flags; a nightly

Automated Link Checker validates all URLs, writes results to the audits collection, and dispatches a Slack/email summary to maintainers. A SchoolConfig CLI imports/updates each School's JSON (and optional Programme/Year overrides) from a CSV or Google Sheet. The Feedback endpoint posts tickets that are auto-labeled with hub context to speed up corrections. Performance targets include hub render times of ≤2 seconds from cache, registry hydration at app start with delta updates every 24 hours (and on demand), and offline mode that shows tiles and descriptions while greying out deep links until online.

The platform stack remains consistent with prior technical choices: React 18 + PWA on the client; Node/Express on the server; MongoDB for persistence. Communication is REST over HTTPS. Environment-scoped configuration stores the deep-link bases and reference URLs so they can be rotated without redeployments. Visual Studio Code is the primary editor; Git and GitHub handle version control and PR workflows; Trello supports project tracking and task assignment. Deliverables include this proposal, UX flows and wireframes, data model, API specification, acceptance tests, release notes, and student help pages, plus stakeholder link-verification with One-Stop, Fullerton, UWO/UCC, OGEM, and SimplyGo.

Finally, the MVC layering enables clean evolution. The View can add or refine tiles, hubs, or onboarding steps without changing server logic; Controllers can expose new endpoints or flags without touching UI structure; Models can adapt to additional Schools, programmes, or link fields while preserving existing contracts. Together—with traceable official references, defensive caching and failure modes, privacy-first design, automated link verification, and wave-based content rollout—this architecture delivers a secure, maintainable, and verifiably accurate platform for NTU's international students.

Appendix B:

Résumés of Team Members

The following pages present résumés of the team members for this project.

Aishwarya Anand

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https://aishwarya-portfolio-tau.vercel.app/

Internship Availability (Credit-Bearing & Full-Time): Dec 1, 2025 – Jul 31, 2026
Singapore Permanent Resident

EDUCATION

Nanyang Technological University (NTU), Singapore **Jul 2022 – Aug 2026**
B.Eng. **(Honours)** Computer Science & Specialisation in AI & Data Science *College of Computing & Data Science*

NPS International School, Singapore **Mar 2020 – Jul 2022**
International Baccalaureate (IB) Diploma Programme *High School (XI & XII)*

PROFESSIONAL WORK EXPERIENCE

Misumi Kaizen OÜ Group (MISUMI.AI) **Sep 2025 – Dec 2025**
Agentic AI DevOps Engineer *Singapore(Hybrid)*

- Deploying a scalable, cloud-native platform on AWS to digitalise used car import operations for four ASEAN markets, leveraging Kubernetes and CI/CD pipelines for automated, resilient deployment.
- Integrating multi-model LLM layer (OpenAI, DeepSeek R1, Gemini, Bedrock) to streamline sourcing and compliance.

DXC Technology (ICA Singapore Arrival Card) **May 2025 – Sep 2025**
Software Development Intern — Automation *Singapore (On-Site)*

- Built a Java tool to auto-generate test-case matrices from requirements, cutting QA preparation time by 60%.
- Shipped an ID-mapping service with Excel (Apache POI) export, which eliminated manual matching and versioning errors and reduced support tickets by 30%.
- Delivered a Swing CRUD UI with quick inline guides that onboarded new users in under one hour per session.

Earth Observatory of Singapore (Ventrx) & Asian School of the Environment, NTU **Jun 2025 – Aug 2025**
Climate Risk Web App — Data & Dashboards *Singapore (Hybrid)*

- Ingested multi-hazard REST feeds into Postgres and exposed key metrics via Rails APIs for a React dashboard.
- Deployed the app on Azure with Docker, optimising asset bundling and code-splitting to cut Largest Contentful Paint (LCP) from 2.8 s to 1.7 s at the 95th percentile (even the slowest 5% of users benefited).
- Hardened system monitoring and consolidated logs, reducing incident-triage time by 35% across services.

Singapore Food Agency (WKWSCI), NTU **May 2025 – Jul 2025**
Research Analyst — Singapore Food Study (Alt-Protein) *Singapore (Remote)*

- Analysed a nationwide survey (N=3,148) for the SFA's "30 by 30" initiative; found 60% higher willingness for plant-based vs insect-based protein.
- Ran a messaging test (N=811); framing alt-protein as "tastes like meat" lifted purchase intent by 22% ($p<0.05$).
- Tracked social discourse across 100+ campaigns, identifying a 3x growth in alt-protein conversation from 2022 to 2023.

The School of Mechanical and Aerospace Engineering (MAE), NTU **Jul 2025 – Aug 2025**
Process Automation (Excel/VBA) *Singapore (Remote)*

- Automated a Forms-to-Excel ETL pipeline, processing 70+ records in under 10 seconds with full audit trails.
- Built a tool to auto-generate 36 letters and batch-create PDFs in under 3 minutes, saving HR 2+ hours per week.
- Standardised the payment workflow, reducing claims processing time from 30 minutes to just 5 minutes.

Inspiraz Technology (VizCam) Pte Ltd **Dec 2024 – Feb 2025**
Deep Learning Engineer (Computer Vision/OCR) *Singapore (On-Site)*

- Deployed YOLOv8-based defect and OCR models, cutting production line inspection time by 50%.
- Achieved 99.8% character-level accuracy (0.2% CER) on a proprietary test set of 500 printed-label images.
- Automated the end-to-end ML pipeline (ingest, label, train, evaluate), reducing model iteration time by 40%.
- Developed a custom PyQt annotation tool that increased labelling throughput and consistency for the team.

SKILLS

- **Languages & Programming:** Python, Java (Swing), SQL, JavaScript, C, HTML/CSS
- **Machine Learning & AI:** Scikit-learn, XGBoost, CNNs, Transformers, GANs, Time Series, LLMs
- **Data Analysis & NLP:** Pandas, NumPy, NLTK, SpaCy, Sentiment Analysis, Regression, Clustering
- **Deep Learning & Computer Vision:** PyTorch, YOLOv8, OpenCV, OCR, Image Classification
- **Web & Full-Stack Development:** React, Ruby on Rails, Flask, FastAPI, REST APIs, MVC Architecture, PyQt
- **Tools & Platforms:** Docker, Git, Microsoft Azure, Streamlit, Jupyter, Postman, Excel (Advanced VBA), Apache POI
- **Databases:** PostgreSQL, MySQL, MongoDB, Firebase, Jupyter, Postman, Streamlit, Excel (ADdvanced VBA)

ACADEMIC PROJECTS

FYP: Predicting Antibody–Antigen Binding Affinity **Aug 2025 – Jun 2026**
GNN/Transformer on AlphaFold/ESM-2; Datasets: SAbDab, AlphaFold-DB *Biomedical/Health Informatics Lab, NTU*

- Integrating AlphaFold/ESM-2 features with GNN/Transformer for Antibody–Antigen binding affinity prediction.

Autonomous Robot Car (Maze Traversal) **YOLOv5, Raspberry Pi (RPi), STM32**
Perception + Control *Role: Data & Model; Embedded Integration*

- Trained a custom YOLOv5 model (Roboflow pipeline) and deployed real-time inference on RPi/OpenCV for object-based maze navigation.
- Integrated STM32 motor control over UART and fused detections with line-tracking; added an Android UI for manual override.

Cross-Border Worker App **React, REST APIs, i18n**
Frontend Development *Role: UI/UX, Feature Modules*

- Built user modules (auth/profile), a remittance calculator with live FX rates, and a curated news feed in React.
- Integrated the MITRA chatbot and multilingual support (i18n) to improve task completion for non-English users.

Camp Management System (Java CLI) **Java, MVC**
Console Application *Role: Application Coder; Documentation Lead*

- Implemented a modular MVC CLI for camp creation, registration, approvals, feedback, and reporting with clear service boundaries.

SELECTED INDIVIDUAL PROJECTS

MLB Attendance Forecasting **Gradient Boosting, Bayesian Inference**
R^2=0.83

- Trained on 26 seasons; **–20% MAE** vs baseline; **simulated +8%** target-day lift in historical what-if tests.

Fantasy Football Performance **Random Forest, SQL features**
+15% vs public projections

- Back-tested 3 seasons; **+15%** over public projections on hold-out weeks; shipped explainer charts for lineup decisions.

Wine Quality Classification **XGBoost, SMOTETomek**
Minority F1 +15%

- Improved minority-class performance **+15%** via SMOTETomek resampling and model tuning on 6,497 samples.

Job Salary Prediction (Indeed.com) **Web scraping, NLP features**
Regression (MAE/MAPE)

- Scraped 5,000+ postings across 50 cities; engineered text+structured features; **reduced MAE vs baseline** and shipped salary bands by city/level.

Diabetes Detection **Ensemble ML, Spark**
+10% over baseline

- Compared models on 700+ records; **+10%** diagnostic accuracy over baseline; streamlined Spark preprocessing.

CERTIFICATIONS

- **Cloud & DevOps:** AWS Cloud Technical Essentials, AWS EC2 (*AWS*); OCI Foundations (*Oracle Corporation*)
- **Machine Learning & Math Foundations:** Mathematics for Machine Learning (Linear Algebra, Multivariable Calculus) (*Imperial College London*); Mathematics for ML & DS Specialization (*DeepLearning.AI*); Data Structures & Algorithms / Databases (*CU Boulder / Stanford*)
- **Blockchain & Web3:** Blockchain & Cryptocurrency Explained (*University of Michigan*); Intro to Blockchain & Bitcoin (*INSEAD*)
- **NLP (self-paced):** Natural Language Processing with Transformers, NLP Practical Projects (*Udemy*)

LEADERSHIP, EVENTS, AND ADMINISTRATIVE EXPERIENCE

Leadership & Outreach (Selected)
High-Impact Roles

- **Chief Group Leader**, *NTU SCSE TOP* — Led 40 facilitators for a 5-day "Camp Interstellar" (600 freshmen; S$12k); **zero safety incidents** and **+18%** post-camp engagement.
- **Student Head Ambassador**, *NTU Welcome Centre* — Delivered **40+** sustainability-themed VIP tours; **9** corporate leads; trained **12** juniors (**25%** prep time).
- **Founder & President**, *Economics & Business Club (NPS)* — Built a 200-member club; monthly FinTech workshops (**92%** turnout); secured **S$2k** sponsorship for a first inter-school case competition.
- **Communication Coach**, *LCC* - Served as an academic mentor for NTU students to improve their written assignments.

Thao Nguyen Vu

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EDUCATION

Nanyang Technological University — **Singapore**
Bachelor of Computing in Computer Science — Jul 2027

- **Relevant Coursework:** Artificial Intelligence, Databases, Software Engineering, Probability & Statistics, Algorithm Design & Analysis
- **Awards:** Gold Medal in 2025 INNOVERSE International Invention & Innovation Expo

PROFESSIONAL EXPERIENCE

BKAV — Nov 2024 – Feb 2025
AI Intern | PyTorch, YOWOv3, SmolLM, TensorRT, ONNX, SQL

- Consulted with seniors to **define ML objectives**, then **designed a detect-track pipeline** (YOWOv3→ONNX→TensorRT, ByteTrack) with **FP16/INT8 calibration**, instrumented **FPS/latency at 720p/1080p**; achieved **real-time 32 FPS @1080p** under tight VRAM.
- **Researched and benchmarked lightweight MLLMs (SmolLM)** for **structured reporting, video-to-text captions, and chatbot-like interfaces**, demonstrating the application of **Generative AI** to **enterprise reporting** and **stakeholder communication**.
- Built an **evaluation harness** for detection **(mAP, IDF1, HOTA)** with **PyTest regression checks** and **auto-generated SQL reports** to **speed iteration** & compare PoC variants; **Explored LlamaIndex** for rapid PoCs, documented findings, and presented internal reports.
- Hardened the **FastAPI inference service** with **request queuing** and **Docker images**.

Viettel AI — May 2024 – Aug 2024
Data Science Intern | Python, Pandas, Scikit-learn, NumPy, SQL

- **Fine-tuned ML models** & **built data pipelines** using **Python** (Pandas, Scikit-learn) on **1M+ medical records**; presented evaluation results in clear terms for **non-technical stakeholders**, enabling **adoption decisions** and aligning projects with **organizational priorities**.
- **Automated dataset extraction and preprocessing workflows** with Python, ensuring **continuous updates** for large-scale medical datasets.
- **Designed custom CNNs** with **TensorFlow Functional API** for **classification tasks** and contributed to **data normalization, transformation, and feature engineering** via **Python** and **SQL (joins, window functions, aggregations)**.
- **Deployed** and **executed A/B experiments**, applied **causal inference methods** to **evaluate new product features**, enabling Product Managers to make **data-driven growth decisions**, improving **reporting speed** and **adoption**.
- Partnered with the Data Analysts Team to **validate statistical metrics**, **refining model outputs** for **higher clinical relevance**.

YooLife — Jan 2024 – Apr 2024
Software Engineer Intern | Python, PostgreSQL, React.js, Git, Firebase

- Leveraged **Cloud Firebase** for **backend operations**, such as data storage and user authentication, upping **user engagement by 15%**.
- **Collaborated** with a team of **13 developers** using **GitHub**, managing **50+ pull requests** and conducting **30+ code reviews**.
- Developed and **integrated new features** using **Python, PostgreSQL, and React.js**, improving **system performance by 30%**.
- Established **test suites** and **CI checks (Jest, PyTest)** to validate **service compliance** and **catch regressions pre-release** continuously.

PROJECTS

Early Parkinson's Detection Application | Python, OpenCV, Mediapipe, dlib, PyInstaller, CMake, Matplotlib

- Built a **real-time Parkinson's screening tool** extracting **68 facial landmarks** at **25 FPS with dlib & MediaPipe**.
- Extracted **multimodal audio biomarkers** (jitter, shimmer) via **Python audio libraries** and fused them with **vision metrics** to achieve **>90% early-symptom detection accuracy**.
- **Visualized combined indicators** and **generated automated reports**, translating **ML results** into **clear outputs** for **clinicians**.
- Packaged into a **PyInstaller standalone Windows executable** with an **integrated CvFpsCalc FPS monitor**.

Conversation Language | Python, YOLOv5, TensorFlow, PyAudio, NumPy, OpenCV, Mediapipe, dlib

- Built a **real-time Vietnamese↔sign translation ML system**, converting **hand-pose sensor data** into **text** with **>85% accuracy**.
- Designed a **modular pipeline** for **landmark extraction, normalization, and inference** using **Mediapipe** and **PyTorch**.
- Trained cross-validated deep-learning classifiers with data augmentation & statistical preprocessing for **robust recognition across 50 classes**.
- Deployed as a **Dockerized FastAPI service** with **CI checks** for performance, demonstrating **NLP + CV applications** to **accessibility-focused experiences**, similar to **chatbot-style interfaces**.

HomeQuest | Java, JavaScript, HTML, CSS, MongoDB, Express, Node.js, React.js, Supabase

- Deployed a **platform** for **rental & property investment**, allowing users to find **50+ suitable properties** across multiple requirements.
- Utilized **Supabase and MongoDB** for **data storage** and **user authentication**, tracking **25+ active users**.
- Established a robust **CI/CD pipeline** with **Git** and implemented comprehensive **unit/integration testing**, reducing **deployment times by 30%** and improving code quality with a **25% reduction in bugs** before release.

PUBLICATIONS

Detecting software vulnerabilities using Deep Learning. ***Ministry of Science and Technology Vietnam*****,** ***online first*****.**
https://doi.org/10.31276/vjst.2024.0019 | Co-author
Data Science Tools in Medical Drug Classification. ***Vietnam Journal of Science and Technology***. | Co-author

TECHNICAL SKILLS

Programming Languages: Python, SQL, C/C++, Java, JavaScript/TypeScript, HTML/CSS
Tools & Framework: TensorFlow, Keras, PyTorch, OpenCV, Mediapipe, dlib, Pandas, Scikit-learn, NumPy, React.js, MongoDB, Docker, FastAPI
Machine Learning & AI: ONNX, SmolLM, TensorRT, YOWOv3, YOLOv5, XGBoost, ETL Pipelines, Automation (Airflow/Python scripting)
Data/Visualization: Matplotlib, Seaborn, SQL reporting, with working familiarity in Power BI for dashboard creation

Akshay Krishna

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Education

Nanyang Technological University, BS in Computer Science — Aug 2022 – Dec 2025

Experience

Software Engineer Intern, POSYB Solutions – Singapore — July 2025 – July 2025

- Developed a multi-tenant SaaS appointment platform using FastAPI and React/TypeScript, with 15+ secure RESTful APIs and real-time dashboards
- Built authentication with JWT, refresh tokens, and Pydantic validation, enabling secure access and scalable onboarding across unlimited companies
- Created responsive UI with React Query, TailwindCSS, and custom hooks, supporting optimistic updates, live sync, and advanced filtering.

Software Intern, ACRA – Singapore — June 2024 – Dec 2024

- Automated Chartered Valuer & Appraiser membership workflows using UiPath, cutting processing time by 50%.
- Developed an AI chatbot with RAG (Retrieval-Augmented Generation) to streamline internal digital tool search, reducing lookup time by 30%.
- Presented CVA automation to 100+ government officials at the Open Government Platform (OGP) Meet-Up.

Projects

Image Recognition Model — 2025

- Trained YOLOv11 model with more than 20,000 images to achieve 95% accuracy for real-time symbol detection in robotics applications.
- Automated 70% of the data annotation process using semi-supervised techniques.
- Calibrated LibCamera and optimized the inference pipeline to handle varied lighting conditions.

Fashion-MNIST Image Classification — 2025

- Designed CNN and Vision Transformer models, reaching 96.1% test accuracy.
- Applied Visual Prompt Tuning and Mixup for improved generalization.

EcoComfort: Intelligent Climate Control — 2024

- Built Deep Q Network agent for dynamic AC temperature control in OpenAI Gym environment.
- Reduced simulated energy usage by 18% while retaining user comfort.
- Integrated machine learning techniques for energy consumption prediction, enhancing system's adaptability

Movie Success Predictor — 2023

- Cleaned and processed 10,000+ movie entries; engineered robust training dataset.
- Deployed ML models (LSTM, MLP, Random Forest), achieving 92
- Extracted viewer preference patterns via feature importance analysis.

Technologies

Frameworks : React, FastAPI, UiPath, React Query, Pydantic, Tailwind CSS

Programming : Python, TypeScript, JavaScript, Java, C/C++, HTML, CSS, SQL

AI & ML : PyTorch, TensorFlow, Scikit-Learn, CNNs, Vision Transformers, SHAP

Cybersecurity : Ghidra, gdb, Burp Suite, Wireshark, Volatility, ROP Chains

Tools : Git, Github, Docker, OpenAI Gym, LibCamera, Shell Scripting

Achievements

MLDA Hackathon Project - Ranked top 8 out of 60+ teams — 2024

- Built an intelligent energy control system using reinforcement learning.

DSO CTF Competition - Ranked 8^{th} out of 50 teams — 2025

- Showcased skills by completing all reverse engineering web and binary exploitation, and forensic challenges.

Shen Jia Cheng

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EDUCATION

Nanyang Technological University Aug 2022 - Jun 2026
Bachelor of Business (Specialization in Business Analytics)
Bachelor of Engineering (Computer Science)

WORK EXPERIENCE

Goldman Sachs May 2025 - Jul 2025
Summer Analyst - Corporate Treasury Operations

- Engineered an automated data processing solution using Alteryx that streamlined the aggregation of financial data for daily risk reporting, eliminating manual steps and saving the team 3+ hours per week.
- Gained proficiency in the end-to-end lifecycle of corporate payments, from initiation to settlement, by reconciling daily payment flows and investigating discrepancies to protect the firm's financial assets
- Conducted root cause analysis on failed payment transactions across different payment rails, identifying trends in rejection codes and presenting findings that contributed to a reduction in manual payment repairs.
- Collaborated with global counterparts to investigate payment processing alarms during the critical hypercare period following the Fedwire ISO 20022 go-live, ensuring settlement continuity and providing clarity on alarms.
- Developed and presented detailed variance analysis reports to senior team members, providing data-driven insights for increasing efficiency in the workplace.

Huawei May 2024 - Aug 2024
Cloud Service Engineer Intern

- Contributed to client projects by designing and developing interactive dashboards using Tableau, enhancing data visualization and reporting capabilities.
- Led the migration of dashboards from Superset to Tableau, ensuring seamless data integration and storage using Huawei Cloud architecture.
- Gained hands-on experience with Huawei Cloud architectures, deepening understanding of cloud infrastructure and services.
- Collaborated with cross-functional teams to deliver scalable and efficient cloud-based solutions, improving overall project outcomes.

SKILLS AND CERTIFICATIONS

Digital Skills: C, Python, R, HTML, CSS, JavaScript, PostgreSQL, NumPy, Pandas, Microsoft Office, SQL, Java, MongoDB, PowerBI, Tableau, Alteryx
Certification: Complete SQL Bootcamp (Udemy)

Languages: Proficient in English and Mandarin
Interests: Dance (Hip Hop), Piano, Fine Arts

ACHIEVEMENTS AND EXPERIENCE

Goldman Sachs Operations Case Competition Mar 2024

First Place

- Emerged as first place out of a selected group of 26 university students.
- Collaborated with like-minded individuals from different disciplines to work on deliverables and come up with viable solutions within a short time frame of 1.5 hours.
- Analyzed data provided on a Microsoft Excel platform to gather insights on the business units provided, and presented findings via a step-by-step process for easier understanding.
- Developed simple and viable solutions to target the pain points of the case study with minimal assumptions of different business processes to ensure scalability.

Personal Website Creation Jun 2023

https://jiacheng-portfolio.web.app/

- Created visually appealing web pages using a base of HTML, with CSS for styling and layout, while enhancing the website with JavaScript to provide dynamic and interactive features.
- Designed a responsive website ensuring optimal display on various devices, including desktops, tablets, and smartphones
- Implemented intuitive navigation and user-friendly interfaces for a smoother user experience

Cyber Youth Collective YouthxHack Hackathon Feb 2023

First Runners-Up

- Emerged as first runners-up out of a total of 70 students
- Formulated solutions that drove insights to address the growing urgency of food insecurity in Singapore
- Worked with an Arduino module and Python code to implement a Fiber Optic based light diffuser for indoor vertical farming

CO-CURRICULAR ACTIVITIES

Google Developer Student Club Aug 2023 - Current

Publications Committee

- Spearheaded the creation and distribution of engaging content across digital platforms to promote GDSC's initiatives, events, and success stories, significantly enhancing the club's visibility and member engagement.
- Organized and conducted workshops on topics such as technical writing and digital content creation, empowering club members with essential skills for their professional development.
- Demonstrated strong teamwork, communication, and project management skills in a fast-paced, collaborative environment.

NTU Resist4nce Captain Aug 2023 - Aug 2024

Hall Dance Club

- Led a team of 24 members
- Planned and organized mass bonding camps spanning all members of the team and handled liaison with multiple dance instructors to facilitate technical training
- Spearheaded new initiatives to raise funds and promote welfare for the team
- Instructed and choreographed in numerous dance sharings and performances

Nguyen Phuong Linh

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Education

Nanyang Technological University (NTU) **August 2022 – July 2026**
Bachelor of Engineering (Computer Science) *Singapore*

Experience

Data Engineering | ***Python, AWS, Lambda, ML, Vector Embeddings, Streamlit*** **Jan 2025 – Present**
Singapore Airlines *Singapore*

- Developed and deployed LLM API microservices in AWS, enabling sharing of future AI-powered solutions with business users on company infrastructure, while implementing cost-effective local testing with dummy **Lambda handlers**.
- Built a backend pipeline to extract structured content from markdown manuals, generate semantic embeddings using BGE, and export results to Excel for human review.
- Applied **BGE models and OpenAI GPT API embeddings**, for document-level semantic embedding, enabling contextual similarity scoring with cosine metrics.
- Designed a post-processing evaluation step, comparing generated outputs with ground truth data, achieving more than **90 percent accuracy** in relevant document retrieval and page-level matching.
- Developed an interactive truck route visualization system using **Folium and TimestampedGeoJson**, mapping real-time optimized vehicle paths on a geographic interface.
- Automated data parsing from SUMO-based output and visualized it in HTML using customized layer controls, timestamps, and dynamic routing.
- Helped the scheduling team compare various sequencing strategies and reduce average task delays by **20 percent**.

Business Analyst | ***Leadership skill*** **Dec 2024 – Jan 2025**
Himawari Hotel Apartments *Cambodia*

- Worked under NTU PEAK ASEAN Program to analyse brand's hotel.
- Used SWOT analysis, competitor's comparisons, and several different analysis to evaluate and give suggestions for hotel's brand.

Student Assistant | ***Python, Excel, Tableau*** **June 2023 – Present**
NIE library- Project Analyzing Book Collection Patterns *Singapore*

- Cleaned data and analyzed trends and patterns from book transactions from each two-month period using Excel and Python, focusing on checkouts, returns, and user demographics.

Projects

TicketBuddy Version 1.0 | *JavaScript, Typescript, HTML/CSS, Angular, MySQL, Firebase, Git, Node.js* **January 2024 – May 2024**

- Designed and implemented the full-stack web application using JavaScript, HTML/CSS, and Node.js, enabling users to organize and plan group outings to TicketMaster events.
- Applied SDLC phases including requirements gathering, system design, coding, testing, and deployment to ensure a structured development process.
- Utilized Angular framework, TicketMaster API, Firebase Authentication, and Firestore database to deliver a robust and scalable application.

Camp Management NTU | *Java, Command Line Interface (CLI), Git, UML Diagrams, OOP* **July 2023 – December 2023**

- Developed a Command Line Interface application that centralized camp management for staff and students within NTU, and designed and implemented a secure user authentication system focusing on NTU network user IDs for all users.
- Developed functionalities enabling staff to efficiently manage camps (creating, editing, deleting camps, and generating reports) and enabling students to view, register, and manage camp registrations, ensuring smooth camp participation for the entire student body.

Exploring Factors Influencing Obesity | *EDA, Logistic Regression, kNN Classification* **December 2022**

- Exploratory Data Analysis (EDA): Collected, cleaned, and checked dataset for missing values, separated variables into numerical and categorical. Visualized distributions and computed descriptive statistics to analyze relationships between variables.
- Applied logistic regression to predict obesity levels based on eating habits.
- Implemented kNN classification and concluded that diet alone is insufficient to predict obesity; factors like lifestyle and physical conditions play crucial roles.

Technical Skills

Languages:JavaScript, Python, Java, HTML/CSS, Typescript, SQL, C++, C
Developer Tools: Vscode, Eclipse, AWS, Github, VSCode, Figma
Technologies/Frameworks: Linux, GitHub, Angular, Nodejs, React, Express

Leadership / Extracurricular

Machine Learning and Data Analytics (MLDA) Lab **July 2023 – Present**
Academic Member *NTU EEE*

- Conducted weekly machine learning workshops and lesson preparation for undergraduate students at NTU, consistently attracting 20+ participants every Wednesday.

IdeasJam Competition by Garage@EEE **June 2023**
Finalist *NTU EEE*

- Conceptualized a winning idea, securing a spot in the competition finals, ranking 6th out of 23 teams.
- Created Figma design prototypes and delivered innovative front-end mockups and wireframes for mobile platforms.
- Enhanced user experiences by refactoring site structures, navigation, page optimization, graphics integration.

Tran Son Viet

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Education

Nanyang Technological University *Singapore*
Bachelor of Computer Science Aug 2023 – May 2027

- **Relevant Coursework:** Software Engineering, Computer Network, Databases, Algorithms and Data Structures, ...

Experience

Facenet High Technology and Software Services Joint Stock Company *Vietnam*
Software Engineer Intern Jan 2023 – Jun 2023

- Built a responsive web app enabling clients to interact with smart-home cameras in real time, handling 20 concurrent video streams with smaller than 100 ms end-to-end latency.
- Implemented a backend event pipeline that listens for AI detections, looks up the corresponding user mapping, and issues control commands to IoT devices.
- Developed low-latency RESTful APIs and WebSocket (Socket.IO) channels to coordinate video frames, gesture events, and device commands.
- Tech Stack: React, Node.js, Python, OC-SORT, Docker, Telegram Bot API

Nanyang Technological University Students' Union *Singapore*
Front-End Developer Subcommittee Sep 2024 – April 2025

- Develop a responsive web app that lets NTU students upload personal items and browse/request loans from peers.
- Experience with Figma.
- Collaborated in an Agile team: participated in sprint planning, daily stand-ups, and GitHub-based code reviews to maintain high code quality and rapid iteration.
- Tech Stack: React.js, Node.js, Docker, Tailwind CSS, Figma

Projects

Personal Project: Cryto Trading & Informing Bot
Tech Stack: Python, asyncio, websockets, Binance API, Docker, AWS EC2, Telegram API Feb 2021 – Present

- Developed a modular Python bot with built-in strategies (volatility, funding-rate arbitrage, order-book imbalance) and adjustable weight parameters so clients can tailor risk profiles.
- Ingests live market data via REST/WebSocket and automatically executes trades through the Binance API for 10+ active clients.
- Sends real-time Telegram notifications for every executed trade—detailing buy/sell actions, quantities, prices, and P&L—and supports on-demand market queries, manual overrides, and strategy tuning via JSON configs.
- Deployed on AWS EC2, with auto-restart to guarantee 24/7 uptime.

Personal Project: Job Application System (Spring Boot)
Feb 2025 – Present

- Built REST endpoints for job postings and applications (CRUD) with JPA repositories.
- Applied DTO mapping and validation for clean API contracts.
- Added health/metrics via Actuator + Micrometer; request tracing with Zipkin.
- Used H2 for fast local testing; deployed with PostgreSQL in Docker
- Centralized config through Cloud Config; service-to-service calls via OpenFeign.
- Tech Stack: Java, Spring Boot (Web, JPA), DTO pattern, H2, PostgreSQL, Actuator, Micrometer metrics, Zipkin tracing, Service registry, REST communication (RestTemplate), OpenFeign clients, Cloud Config Server, Postman, Docker

Achievements

- Ranked 12nd/186 in The 2022 ICPC Asia Ho Chi Minh City Regional Contest.
- Ranked 15th/402 in The 2022 ICPC Vietnam National Programming Contest.
- Ranked 7th/572 in The 2022 ICPC Vietnam Northern Provincial Programming Contest.
- Ranked 9th/557 in The 2022 ICPC Vietnam Southern Provincial Programming Contest.
- Ranked 6th/416 in The 2021 ICPC Vietnam National Programming Contest
- Second prize in VietNam National Olympiad in Informatics 2022.
- Second prize in VietNam National Olympiad in Informatics 2021.

Skills

- **Programming Languages:** Python, Java, JavaScript/TypeScript, C++, SQL, Flutter
- **Frameworks & Libraries:** React, Node.js, Flask, JavaFX/Swing, TensorFlow, OpenCV, Django, FastAPI, Tailwind CSS
- **Others:** Docker, AWS (EC2), Firebase, PostgreSQL, Figma, SQLite, Git/GitHub, RESTful APIs, WebSockets, Microservices, OOP & SOLID, CI/CD, Agile, Software Architecture, Pattern Design, Object Design, Software Diagrams,...