

Ryan Pek

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Professional Summary

Computer Science and Design undergraduate at SUTD with strong interest in systems programming, backend engineering, networking, distributed systems, and self-hosted infrastructure. Builds projects from scratch across C, Go, Python, Java, Linux tooling, and homelab operations. Particularly interested in Unix systems, protocol design, graph/pathfinding problems, automation, and infrastructure built from first principles.

Education

Bachelor of Engineering, Computer Science and Design

Expected 2027

Singapore University of Technology and Design
Singapore

- CGPA: 4.00/5.00 as of Apr 2026.
- Selected coursework: Algorithms, Computer System Engineering, Elements of Software Construction, Database Systems, and Computation Structures.
- Awarded Singtel ISP Award 1st Prize in AY 2025.

Exchange Semester

Jan 2026 – May 2026

Reykjavik University
Reykjavik, Iceland

- Modules taken: T-215-STY1 Operating Systems; T-419-CADP Concurrent and Distributed Programming; T-445-GRTH Graph Theory; T-637-GEDE Game Engine Architecture; L-601-ENLA Legal English.
- Technically demanding exchange semester with several non-trivial modules taken concurrently.

Experience

Teaching Assistant, 50.004 Algorithms

Jan 2026 – Present

Singapore University of Technology and Design
Singapore

- Supported the delivery of 50.004 Algorithms as a part-time teaching assistant.
- Graded assignments and assessed student work.
- Answered student questions on EdStem regarding course concepts and assignment-related queries.

Platform Engineering Intern

Sep 2025 – Dec 2025

CTC Global Pte Ltd
Singapore

- Completed a fall internship in platform engineering in an on-site enterprise environment.
- Observed and assisted with automation and operational workflows involving Ansible and platform administration tasks.
- Worked with software documentation and gained exposure to enterprise infrastructure operations.
- Completed RHCSA and RHCE training coursework during the internship period.

Core Developer

Dec 2024 – Mar 2025

SAFMC 2025
Singapore

- Planned and implemented drone operation controls, state-machine logic, and ROS2 integration for custom drones.
- Refactored legacy control code to improve modularity and support more decentralized behaviour.
- Tested and iterated on drone control logic in containerized environments.

Teaching Assistant, 10.014 Computational Thinking for Design Oct 2024 – Dec 2024
Singapore University of Technology and Design
Singapore

- Supported teaching activities for 10.014 Computational Thinking for Design.
- Answered student questions on course concepts, assignments, and Python-related queries.

Teaching Assistant, Fabrication Lab Onboarding Programme Sep 2024 – Oct 2024
Singapore University of Technology and Design
Singapore

- Facilitated in-class explanations of workshop tools and onboarding procedures.
- Guided participants on equipment best practices based on prior hands-on experience.
- Provided safety guidance for equipment handling in the fabrication environment.

Aircrew Specialist Aug 2021 – Feb 2023
Republic of Singapore Air Force
Singapore

- Served in a full-time operational role in the Republic of Singapore Air Force.
- Worked in high-pressure environments requiring procedural discipline, coordination, and reliability.
- Built strong habits in checklisting, communication, and calm execution under operational constraints.

Research and Leadership

Undergraduate Research Opportunities Programme (UROP) Aug 2024 – Jul 2025
Singapore University of Technology and Design
Singapore

- Led a pathfinding optimization project focused on navigation and efficient route planning.
- Integrated hardware and software for real-world data collection and navigation use cases.
- Built a custom surveyor's wheel with laser rangefinders and a compass for precise field data collection.
- Precomputed Dijkstra-based pathfinding for rapid route retrieval.
- Hosted the solution on a Raspberry Pi and exposed navigation functionality through a Telegram bot.

Vice President, Executive Committee Mar 2024 – Feb 2025
SUTD Chess Club
Singapore

- Supported club operations across planning, logistics, accounting, claims, and procurement.
- Helped organize events, coordinate club activities, and support inter-tertiary participation.
- Served in an executive leadership role for the club during the term.

Projects

Singapore Bus Route Project (link) 2019 – Present
Stack: Python, C++, route analysis, transport data

Long-running personal project exploring route optimization and the idea of visiting every bus stop in Singapore using real-world transit data.

- Built and maintained a multi-year project using Python and C++ for route analysis and backend calculations.
- Used real-world public transport data as the basis for graph and routing experiments.
- Treated the project as an entry point into algorithms, optimization, and large real-world problem modelling.

Custom C Shell (link) 2025
Stack: C, Unix, terminal I/O, signals, Makefile
Unix shell project written in C with custom utilities and terminal interaction features.

- Implemented a custom shell with its own executable set and supporting tools.
- Added raw-terminal input handling, command history, cursor movement, and Bash-style tab completion.
- Worked with signal-aware command handling and low-level terminal behaviour.
- Built extra utilities and daemon-style supporting programs as part of the shell ecosystem.

dplant 2025 – Present

Stack: C, daemons, file locking, state persistence, systems programming

Daemon-style terminal care simulator written in C to explore long-running processes, state persistence, and systems-level design.

- Initially part of the Custom C Shell as an additional program implementation.
- Designed a background process model where each plant instance maintains persistent state over time.
- Implemented locking and single-instance enforcement to prevent duplicate daemons for the same plant.
- Stored plant state using binary structs and planned future distributed extensions for cross-machine communication.

Miniraft (link) 2026

Stack: Go, Raft, distributed systems, client-server protocols

Distributed consensus project implementing core Raft ideas in Go.

- Implemented client and server logic for leader election, message handling, and replicated-log behaviour (Sections 5 in the Ongario Raft paper).
- Structured the implementation around server roles such as follower, candidate, and leader.
- Built local multi-node test setup scripts to experiment with cluster behaviour.

SUTD Pathfinding / Mapping Project (link) 2024 – 2025

Stack: Python, pathfinding, data collection, mapping

Campus pathfinding and mapping project aimed at improving navigation across SUTD.

- Led planning and data collection for a pathfinding-oriented campus software project.
- Extended earlier optimization and graph-style thinking into a practical navigation use case.
- Developed the project through multiple iterations over a substantial commit history.

Wandr Spring Boot Backend (link) 2025

Stack: Java, Spring Boot, backend APIs, SQL

Backend work for a travelling itinerary planning application.

- Contributed backend implementation and database-oriented work for the project.
- Helped build and structure the API and supporting application logic.
- Project received first place in the Singtel Information Systems and Programming Awards 2025.

Homelab DNS Ansible (link) 2025

Stack: Ansible, Jinja2, Bind9, AdGuard Home, Unbound

Infrastructure automation for a homelab DNS stack spanning authoritative and recursive services.

- Wrote Ansible playbooks and templates for deploying DNS-focused virtual machines in the homelab.
- Automated configuration for authoritative DNS with Bind9 and recursive/ad-blocking DNS with AdGuard Home and Unbound.
- Structured the repository for reuse across different inventory and subnet layouts.

Homelab Infrastructure (link) Ongoing

Stack: Linux, Docker, MikroTik, VLANs, WireGuard, DNS, reverse proxy

Personal self-hosted lab used for learning infrastructure, networking, storage, and service operations.

- Built and operated a segmented homelab with multiple VLANs for servers, management, NAS, compute, WAN access, and remote access.

- Used MikroTik routing, firewalling, tagged switching, and WireGuard to control inter-network access.
- Deployed self-hosted services for media, version control, backups, DNS, monitoring, reverse proxying, and security tooling.
- Used the environment as a live platform for infrastructure automation and operational experimentation.

Technical Skills

Languages: C, Python, Java, Go, C++, Shell/Bash

Systems and Platforms: Linux, Debian, Ubuntu, Windows, TrueNAS, RouterOS

Infrastructure and Ops: Docker, WireGuard, VLANs, DNS, reverse proxies, self-hosting, homelab operations, service deployment

Networking: TCP/IP fundamentals, routing, switching, VLAN segmentation, firewalling, DNS architecture, remote access design

Tools: Git, Vim, tmux, SSH, Make, GitHub Actions, Ansible, Terraform

Backend and Data: Spring Boot, REST-style APIs, SQL, PostgreSQL, MySQL

Hardware: Raspberry Pi, ESP32, Arduino, MikroTik hardware, PC/server assembly

Fabrication: 3D printing, Fusion 360, SolidWorks, laser cutting, CNC operation

Certifications and Training

- RHCSA training coursework completed during internship period.
- RHCE training coursework completed during internship period.
- First Aid (BCLS).
- UA Basic Training.

Awards and Recognition

- Singtel ISP Award 1st Prize, AY 2025.
- Outstanding Student Org Award, Student Achievement Awards 2025, Freshmen Orientation Committee 2024.

Activities and Service

Creative & Media Executive, Freshmen Orientation 2024

Feb 2024 – Sep 2024

Student Government, Singapore University of Technology and Design
Singapore

- Contributed to the production of a major 2024 orientation showpiece across planning, design, procurement, production, assembly, programming, and wiring.
- Implemented wireless communication between satellite control units and receiving units in the main superstructure.
- Contributed wiring for power, electronics, and lighting systems.
- Designed and built the rotating mechanism used in the top showpiece structure.
- Assisted in superstructure construction and related workshop tasks.

Freshmore Asian Cross-curricular Trip

Jan 2025

King Mongkut's University of Technology Thonburi
Thailand

- Participated in an overseas immersion programme focused on cross-cultural and interdisciplinary learning.
- Installed solar panels in local primary schools for safer transit at night.

Links

- Website: ryanpek.com
- GitHub: github.com/rpeky
- LinkedIn: linkedin.com/in/ryan-pek