Ujaan Das

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Education

Northwestern University **January 2024 – April 2024**
Exchange Semester *Evanston, Illinois*

Hong Kong University of Science and Technology **September 2021 – May 2025**
Bachelor of Engineering in Computer Engineering *Hong Kong SAR*

Relevant Coursework

- Software Engineering
- Internet Computing
- Data Structures
- Computer Architecture
- Operating Systems
- Embedded Systems
- Machine Learning
- Programming Languages

Experience

Stellerus Technology **April 2024 – September 2024**
Software Engineering Intern *Hong Kong SAR*

- Tasked with delivering backend service to provide real-time geospatial services from live satellite data, capable of handling 10,000+ requests/day and performing relevant CRUD tasks and authentication using FastAPI and MongoDB.
- Enhanced GIS task efficiency by implementing Celery/Redis-powered multi-processing and task queue for complex satellite geometry calculations, leading to a significant 74% boost in task completion time/efficiency.
- Implemented a distributed caching system using Redis with a Cache-Aside (Lazy Loading) pattern, reducing database query load by 60% and improving response times by 50%.

Pydrox **December 2023 – April 2024**
Full-Stack Development Intern *Hong Kong SAR*

- Assigned both front and back-end development of an online freelance marketplace using Sveltekit, Node.js, and Prisma.
- Implemented a dynamic feedback loop between customers and entrepreneurs, enhancing product quality verification and ensuring timely payments, reducing the likelihood of disputes by 25%.
- Developed and integrated a real-time notification system using Server Sent Events (SSE), improving user response time by 40% and increasing user retention by 15%.

Publications

HKUST, Dept. of CSE **September 2023 – Present**
Exploring the Efficacy of LLMs in Assertion Generation for Java *Hong Kong SAR*

- Currently contributing to a research project investigating the efficacy of LLMs in dynamically generating assertions across various Java versions for test case generation, addressing a critical gap in multi-shot automated testing.
- Researched existing test-case generation techniques and developed a Github project scraper that successfully mined over 29,000 repositories meeting specific conditions and extracted relevant data from 'pom.xml' files.
- Performed baseline testing and approach efficacy comparison by recreating neural machine translation approaches (RNN encoder-decoder based on seq2seq) locally, to train on pre-existing/new Junit4 focal/test classes.
- Utilized static analysis tools such as SPOON and AST constructors to generate and locate tests in large Java projects. Further implemented a filtering mechanism based on several assertion levels post-compilation, as well as focal-test method/class pairing, enhancing the precision of test case generation.

HKUST, HCI Initiative **December 2022 – October 2023**
FARPLS: Eliciting Preference Feedback for Robot Trajectories from Human Users *Hong Kong SAR*

- Led front-end development of a robot trajectory preference feedback system using React.js and Python Flask, investigating the efficacy of current user preference collection methods.
- Translated Python Streamlit prototypes into production-ready solutions using React.js, enhancing user experience and reducing loading time by 25% leading to faster/better testing.
- Engineered a robust RestAPI integration layer using Axios, React Query, and advanced caching mechanisms, ensuring efficient and secure (media-heavy) data transactions between front and back-end, reducing data retrieval time by 20%.
- Played a pivotal role in user testing and sampling, and eventually co-authored published papers published in prestigious conferences such as IUI and AAAI under the mentorship of Professor Ma.

Technical Skills

Languages: Python, Java, C/C++, JavaScript/Typescript
Frameworks: FastAPI, Flask, Maven, Next.js, React.js, Node.js
Technologies: Linux/*Unix, Azure, AWS, Docker, (No)SQL, Git(hub)

Projects

oojlang | *Racket/PLAI, gc2* **February 2024**

- Created custom functional programming language following PLAI scheme using Racket, implementing manual parsing, interpretation, compilation (+constant folding), two-space coyping garbage collection and basic runtime type-checking.
- Used deferred substitution to store/manage state and complex continuations across program runs using an explicit stack, handling namespace lookups, recursion (via currying), and throwing relevant exceptions.
- Implemented two-space copying garbage collector via BFS to recursively search roots and apply custom defined 'malloc' to each datatype - capable of handling infinitely running programs without memory leaks or space-allocation errors.

Farm-2-Flight | *Python, Scikit-Learn, React.js* **October 2023**

- Developed a machine-learning-based hybrid-recommendation engine for Cathay Hackathon 2023, combining collaborative and content-based filtering, which analyzed past user interactions to provide personalized recommendations.
- Deployed the engine on FastAPI, connecting it to a React.js front-end for dynamic user interactions and integration with the Cathay flight API to calculate optimal routes for delivering fresh goods.
- Achieved finalist status among 64 teams and won the 'Best in Lifestyle' category in the Cathay Hackathon.

ujaandas.io | *Next.js 14, TailwindCSS* **September 2023**

- Designed a sample portfolio website using Next.js to practice and learn front-end development.
- Implemented dynamic server-side compile-time (SSG) data fetcher to read/look for existing MDX files and update accordingly - completely modular in that adding new posts is as simple as creating a new MDX file and nothing else.
- Complemented with custom Github action and workflow to compile on push and update in real time.

Soccer Robot Team/Controller | *C++, Java, AndroidStudio* **November 2022**

- Developed a sophisticated Android application using Java and Android Studio to provide comprehensive control over a custom team of soccer robots through seamless integration with the HC-05 Bluetooth module integrated with Arduino.
- Implemented intricate movement protocols in C++ to accurately intercept/interpret signals received the Bluetooth module, enabling precise and agile omni-wheel movement for the robots.
- Created translation layer mapping joystick inputs from the app to power ratios for individual wheels of the robot.

Involvement

RedBird Racing Team **December 2023 – Present**

Software Engineering Team *HKUST*

- Actively participating as a member of the Red Bird Racing Team, currently undergoing training in the development of a data pipeline and real-time driver display system.
- Collaborated closely with a diverse team of engineers, data analysts, and designers to gather requirements and contribute to the development of the project.
- Engaged in collaborative problem-solving, fostering effective communication and teamwork to ensure the successful integration of the data pipeline and driver display system.

USThing Team **November 2022 – Present**

Web-developer *HKUST*

- Spearheaded web development for university student apps, using Next.js to create dynamic and performant web pages.
- Leveraged advanced Next.js techniques such as server-side rendering (SSR) and the pages router to optimize the loading speed and enhance user experience.
- Employed SASS modules to efficiently manage CSS, ensuring modular and maintainable codebase.
- Utilized Git and GitHub extensively as part of the development process, following best practices such as creating new branches for each new feature, making pull requests, and conducting code reviews to ensure a streamlined and collaborative development workflow.
- Implemented advanced React techniques, including state management, component lifecycle methods, and hooks, to deliver seamless interactivity and enhanced functionality for the websites.

Student Ambassador Team **April 2021 – Present**

Deputy-Head SA *HKUST*

- Conducted engaging and informative campus tours for prospective students, parents, and career counselors, providing personalized insights into campus life, academic programs, and extracurricular opportunities.
- Represented the institution by visiting schools and delivering captivating talks on various academic and career-related topics, effectively communicating the benefits and unique aspects of the educational experience.
- Collaborated closely with a diverse team of fellow student ambassadors, coordinating events, sharing responsibilities, and fostering a welcoming and inclusive environment for visitors.