

PROJECT PROPOSAL FOR SMARTLIB, AN INTELLIGENT LIBRARY SEAT MANAGEMENT SYSTEM

*Version 2.0
05/4/2021*

Team Xeon

Document Number: SL-01

REVISION HISTORY

[illegible]

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Executive Summary

Have you ever experienced walking around the library aimlessly looking for an empty seat just to discover that most are either taken or hogged by the belongings of others? Do you wish that there was a way for you to grab those seats before even finding them? Fret not, our team wishes to address this issue with our newest product, SmartLib.

SmartLib is an intelligent All-in-one system aimed to improve your experience across the libraries in Nanyang Technological University(NTU). We understand that locating empty seats/booths in the library can be time-consuming and can sometimes be a waste of effort when you realize no seats are vacant after exploring every level of the library. With SmartLib, we want to create a system that enables library users to be able to check the library capacity in advance and be able to view the occupancy status of individual seats in the library. Students can then make an informed decision to locate places where they have a higher chance of getting a seat. In addition, SmartLib aims to allow students to reserve a seat in advance for a given short period so as to give them time to walk over to their empty seats comfortably without any unnecessary disappointment.

To mitigate seat hogging, any seats that are being hogged will be flagged out to the on-duty library staff, if users are away for a set period of time. Appropriate actions can then be taken, such as issuing warnings or confiscation of belongings to free up the seat to other students.

Focusing on user experience and ease of use, SmartLib will be designed with the end users in mind. It will provide a convenient way for students to check the capacity of the library, and also a fuzz free method of reserving the seat when on the way to the library. With a click of a button, students will be able to have an overview of the current capacity, as well as a user-friendly map interface of the library.

SmartLib is a versatile system with a Web interface, which can be deployed at many locations. Some of the examples are personal mobile devices and computers of the users, strategically placed kiosks at the library, as well as workstations of the library staff.

Here at Team Xeon, we are eager to present this innovative solution to you. We are a team of developers dedicated to working on this project. The team, consisting of various management and development roles, will work together with a common goal - To deliver the project within the planned timeline and budget, with utmost quality in mind.

Statement of Problem

In Singapore, public libraries have been developed to steer away book repositories and quiet sanctuaries to become a crucial common space in society, said S. Iswaran, Minister for Communications and Information, in 2020. [1] Common spaces such as seats and booths in the library accommodates to the people from all walks of life, such as students studying, the elderly reading the newspaper or parents bringing their kids to encourage reading.

With an increasing percentage of the population now going to universities, it only meant that there will be a decreasing amount of common space available to students at the university. Especially in the libraries, study and reading spaces such as common seats and tables and individual booths are getting crowded, and it is becoming a norm that people are fighting to get the best seats as soon as the library opens . [2]

Especially during examination period, a trip to the library is likely to elevate the students' stress, as they face difficulties in searching for a vacant seat to do their revision for the examinations. Moreover, they will be wasting time looking for a vacant seat, instead of using the time for studying. [2]

Without a proper seat management system in place, the libraries at Nanyang Technological University have been plagued with many issues such as seat hogging, as well as the uncertainties and frustrations faced when looking for a vacant seat.

A survey conducted with over 500 students who frequent the libraries at NTU revealed that over 85% of them often have difficulties locating vacant seats in the library, with around 80% stating that they often spend more than 5 minutes in the library to locate a vacant seat.

In addition, seat hogging is a prevalent issue in the library, where students leave their belongings at the seat and leave for a long period of time, thus depriving other students of vacant seats. The conducted survey also revealed that over 70% of them have witnessed seat hogging in the library, and the top reason for doing so is to have their meals and to attend classes.

Objectives

The document proposes a library seat reservation system using object detection system. This system will be an Internet Of Things system with a web interface. Cameras will be placed around the library to detect if the seats are occupied and send the information to the database through the internet.

The target audience for this system will be mainly students and the librarians. The students will interact with the web interface to obtain the latest information about the occupancy of library seats and reserve seats. The web interface will alert the librarian if the seat is left unattended.

The design objective are listed as:

- (1) Seat occupancy detection using camera
- (2) Check availability of seats
- (3) Reserve a seat, and
- (4) Seat management
- (5) Alert the librarian
- (6) Data analysis

The system must be able to read the camera image with a resolution of 1280 x 720 pixels. The system must be able to detect humans from the camera image with an accuracy of 90%. The system will use human detection to determine if a seat is currently occupied.

The system must be able to connect up to 20 cameras, the cameras must be able to transfer information to the system through the internet.

The student or librarian must be able to identify all the available seats in the library within 10 seconds of seeing the graphic interface. The available seats will be marked in green while the occupied seat will be marked in red.

First time students must be able to reserve a seat within 30 seconds. The student must be able to reserve a seat by clicking on the available seat.

The system must be able to identify seats that are left unattended for more than 60 minutes by the student from the camera image with an accuracy of 90%. The system will alert the librarian to clear the seat for other students.

Technical Approach

To achieve the objective as stated, the approach is broken down into customer needs, target specifications, technology consideration and system architecture/platform.

Customer Needs

1. Students need a way to view the number of available slots and book the slots in the library using either a website or an application. It will save time for students looking for empty seats in the library and can view and compare the numbers of available slots in different libraries so that they do not need to travel from one library to another.

2. Students need a platform to show the state of each seat and its location clearly. Once students enter the website, they will be able to quickly view all available seats and their locations clearly so that they can easily locate their preferred seat and for seat booking. The seat location should also be designated on a map so that students can choose their preferred seat location.

3. Many students are reported to be complaining about the seat hogging issue in the library. A system is needed to alert the librarians to take necessary actions against the seat hoggers.

4. The librarians need an admin account which has more functionalities than the student account. The admin account is able to modify seats, receive alerts and generate occupancy reports for the library. When there is a seat left unattended for more than 60 minutes, the system will alert the librarian to take necessary action. Besides, librarians need to add, remove and temporarily grey out seats in the library. Lastly, the librarians need to generate an occupancy report for the library every month.

5. Need to ensure librarians and students are able to log-in to admin and student accounts respectively. The website also needs to prevent one user from booking multiple seats.

6. Users need the website to be accessible from any devices including smartphones, tablets, laptops, kiosks and workstations. Users of the product consist of students who are looking for empty seats and librarians who manage the system. Students mainly bring their phones, tablets, and laptops to the university, and they may also use kiosks in the library to make their booking. Besides, librarians use workstations to control and manage the system.

Target Specifications

1. The website should allow students to book their desired seat in the library in advance.
2. The seats' state and locations should be easily accessible by users, and the locations of the seats on a map should be shown on the website. The seats should be marked in different colours for different availability states so that students can choose their desired seats. The total number of available seats in the library should be shown.
3. To solve the issue of seat hogging, the system should remind the librarians to take necessary actions to free up the seat for others.
4. Admin account has to be created for the librarian. For the admin account, there should be functions such as alerts for seats which have been hogged for more than 60 minutes, and functions to add, remove and temporarily grey out seats in the library. Librarians should also be able to generate seat occupancy reports for the library.
5. A user login system should be used on the website. Students and librarians should be able to sign in into students and admin accounts respectively.
6. To make the web page accessible from browsers on smartphones, tablets, laptops, and workstations, the website should be designed separately for mobile devices and PCs, or the website should be able to automatically adjust the page width by detecting the browsing device.

Technology Consideration

To ensure an effective system, a number of applicable technology is required, The technologies are Firebase, Internet Of Things, React JS, Machine learning and WiFi Camera

Technology	Remarks
Firebase	Realtime database in a cloud-hosted NoSQL to store different seat information
Internet Of Things	System of interrelated camera devices with the ability to transfer information over a network
React JS	JavaScript library for building the user interfaces for the system
Machine Learning	Using deep learning model to determine if a person is present in a particular environment
WiFi Camera	Camera with the ability to transmit its video feed over a network

System Architecture/Platform

Development tools are used to aid in the project development consistency and effectiveness. GitHub is a code hosting platform used for version control, this will allow development to happen simultaneously and to manage changes in the software code. Visual Studio Code is a code editor to the development operations such as debugging or task running.

The system uses the client and server architecture, the client consists of the camera detection system and web interface. Both of the interfaces will connect to the same server and database. This will allow the data to be shared among all the clients and be consistent. This allows for extensibility by allowing us to add more cameras without affecting the system. The web interface client uses a Model-View-Controller MVC architecture, this architecture is used as it provides separation of concern, this ensures that the system will not be affected despite adding or modifying the system. Models correspond to all data related logic, the view component is used for all the UI and the controller acts as an interface between the model and view.

Project Management

Team Xeon will be implementing Agile methodology in this project. The team will review and revise the requirement and make necessary changes if required once every 2 weeks. Meetings will be carried out every week and tasks and progresses will be updated on trello. After the project scope is defined, the work will be broken down into different phases which are Planning, Concept Development, System-Level Design, Detailed Design, Testing and Refinement and Production. From there, the team estimates the project size of the project and plans out the schedule as shown in the gantt chart below. Project Manager will make sure all team members stick to the plan. Proper project management will reduce the risk of the team of failing to deliver the project before the short deadline. The duration of this project will last for 3 months starting from 19th of January 2021 to 30th April 2021.

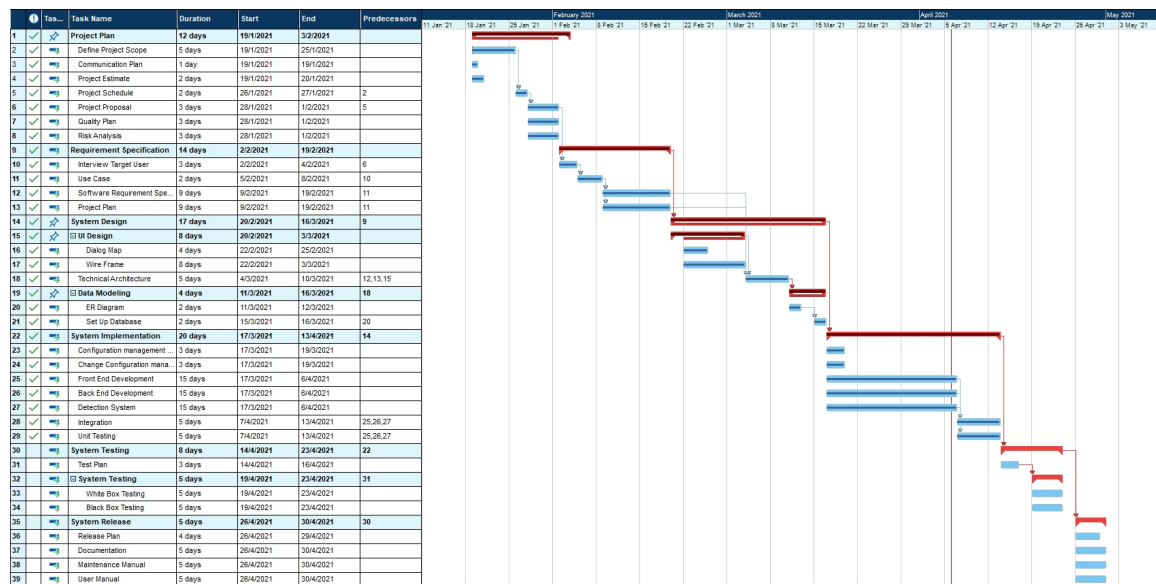


Figure 1: Gantt chart for the project. The solid bars indicate the portions of the tasks that we have accomplished.

Each person in Team Xeon will take up 1 to 2 roles and their job scope of each role is well defined before the team begins the project. The team also agreed on several communication platforms for the discussion of the project.

Team Structure

The following is the list of executive roles.

- Project Manager - Kenny Voo Tze Rung
- Lead Developer - Tai Wei Shen Wilson
- Front End - Muhammad Irsyad Bin Redzuan, Kong Hou Jing
- Back End - Zhou Zeyu
- QA Manager - Teo Boon Shuan
- QA Engineer - Tai Wei Shen Wilson
- Release Engineer - Kong Hou Jing

Roles and Responsibilities

Project Manager: Kenny Voo Tze Rung

- Oversees project progress
- Approves and executes project plan
- Assigns tasks and reports status of project to team members
- Manages and motivates team members

- Represents the team to the outside world

Lead Developer: Tai Wei Shen Wilson

- Overall Technical Lead
- Responsible for Product Release
- Coordinate team's schedule
- Ensure Effective Communication between team members

Front End Developer: Muhammad Irsyad Bin Redzuan, Kong Hou Jing

- Implement the visual elements of the final product
- Ensure the technical feasibility of the UI/UX designs
- Optimize application for maximum speed and scalability
- Assure all user input is validated before sending it to the backend

Back-End Developer: Zhou Zeyu

- Responsible for Server-side application logic
- Integrate their work with the front-end side
- Design and implementation of data storage solution

QA Manager: Teo Boon Shuan

- Oversee the overall product and process quality
- Recording, analysing and distributing statistical information
- Supervising QA engineer

QA Engineer: Tai Wei Shen Wilson

- Reviewing quality specifications and technical design documents to provide timely and meaningful feedback
- Create detailed and comprehensive test-cases
- Coordinating quality test activities

Release Engineer: Kong Hou Jing

- Create baselines, build and integrate changes for delivery
- Manage release of product
- Maintain and monitor software builds

Team Communication

Team Xeon communication channels are as followed:

- Weekly online meetings (Zoom)
- Whatsapp group
- Collaborative workspace (Trello)

Deliverables

Deliverables	Estimated Completion Date	Final Dateline
Project Proposal	30th January 2021	2nd February 2021
Use Case Model	30th January 2021	2nd February 2021
System Requirement Specification	13th February 2021	16th February 2021
Quality Plan	14th February 2021	16th February 2021
Project Plan	27th February 2021	2nd March 2021
Risk Management	27th February 2021	2nd March 2021
Prototype Demo	27th February 2021	2nd March 2021
Prototype related items; Code, documents, Powerpoint Slides or Video Clips	27th February 2021	2nd March 2021
Design Report on Software Maintainability	4th April 2021	6th April 2021
Configuration Management Plan	4th April 2021	6th April 2021
Change Management Plan	4th April 2021	6th April 2021
Release Plan	4th April 2021	6th April 2021
Presentation Slides (Project Introduction and Summary)	4th April 2021	6th April 2021
Test Plan	4th April 2021	6th April 2021
Test Cases and Requirements Test Coverage Report	4th April 2021	6th April 2021
CMMI Level 2 Definition	4th April 2021	6th April 2021

Requirement Specifications

WiFi/Surveillance Camera

- It must be able to capture an image every 3 seconds and send it to the SmartLib for post-processing.
- Each camera has to be able to cover about 10m square foot area positioned to cover different sections of the seating area at each level of the library.

Backend System

- The system must be able to receive the images from the wifi surveillance camera via Wifi signal.
- The human detection system must detect any human form occupying each seat from the images and update the database accordingly(On which seats are occupied and which aren't)
- The human detection system must be able to differentiate between human forms and other objects.
- The system must send an alert to the librarian interface if an object is occupying a seat/table for more than 1 hour.
- The system must be able to communicate with the application database and provide the necessary feedback mentioned earlier.
- The system must be able to manage user bookings and modify the individual seat occupancy status accordingly.

Student/Librarian Interface (Web Application)

- It must allow users to log-in to 2 types of user account (Student/Librarian Access) via the user input.
- It must allow users to enter their account details to log into their accounts.
- It must allow the user to be able to view the occupancy status of each seat at every level of the library.
- It must be able to display the different levels of occupancy status of each seat; Orange for Occupied, Blue for reserved and Green for Available, Grey for Unavailable, Red for Hogged according to the feedback received from the backend system.
- The user must be able to view the seats in its original layout in real life and toggle through the different levels of the library.
- It must be able to provide live updates of the occupancy status of each seat.
- The application must allow the user to book an unoccupied seat.
- The application must be able to cancel a booked seat automatically if the seat was left unoccupied for more than 15 mins.
- In the librarian interface, the librarian must be allowed to overwrite the occupancy status of each seat in the library (Eg. As part of Covid-19 rules of safe distancing)

Non-Functional Requirements

Performance Requirements

- a. System must be able to refresh the live occupancy status of each seat at a rate of 1s.
- b. System must accept user seat bookings within 10ms.
- c. System must be able to handle 200 user requests per second.
- d. System must not crash or return errors during the use of the application

Safety/Security Requirements

- a. System must not allow students to create/have access to a librarian account and its user interface.
- b. System must be able to keep different user account separate (No cross booking)

Usability

- a. System must be intuitive. Users should be able to navigate through the interface with a minimal number of steps.
- b. The user interface has to be bold and informative so users can pick up easily when using it.

Reliability

- a. The system should display data accurately.
- b. The system should be fully functional after the application has been restarted (During maintenance session for an instance).

Availability

- a. The system should be responsive at all times except for scheduled maintenance periods which would happen when the library is closed..

Supportability

- a. The application should be able to run on all platforms via a website so users can access it via a mobile device or a computer capable of connecting to the internet.

Scalability

- a. The servers and backend system must be scalable to allow future expansion of this system in other libraries/food courts.

Test Procedures

- Black Box Testing
 - Equivalence Testing (Testing the boundary values of the human detection system to make sure it detects the seat area only and nothing else)
- White Box Testing
 - Control-Flow Testing

Budget

In this section, we have collated the necessary cost that will be incurred by this project. In order to deliver a high quality project, we have carefully selected a range of both hardware and software to meet our functional requirements. It is also important to keep the people working on this project feeling motivated and provide a conducive environment for them to meet the project schedules.

The total estimated cost of the whole project is amounted to **\$68,690** with the breakdown given below:

Item	Supplier	Quantity	Unit Price	Monthly Cost	Cost through whole project lifespan (3 months)
Hardware					
Computers	Dell	6	\$1,000.00		\$6,000.00
WiFi Camera	D-Link	10	\$119.00		\$1190.00
Software					
Database	FireBase	1	\$250	\$250	\$1,500.00
Human Resource					
Project Manager	-	1	\$5,000.00	\$5,000.00	\$15,000.00
Project Team Member	-	5	\$3,000.00	\$15,000.00	\$45,000.00
Total Cost				\$20,250.00	\$68,690.00

Communication and Coordination with Sponsor

Main communications and coordination with our sponsor will be done through email, using corporate emails, as it will be the most formal type of communication and it also acts as a formal record of all communicated information and coordination.

There will also be online teleconference meetings with our sponsor once every month for progress updates and discussion of any issues that may arise during the span of the project. At the later stages of the project, the meetings also act as a channel for us to showcase the project prototype and demonstrations.

Team Qualifications

Team Xeon is a dedicated team of professionals with adequate skill sets to successfully develop this project with quality. You may refer to the resume of each team member located at Appendix A of this document.

Kenny has 3 years of experience in leading projects in several hackathons and overseas competitions. Besides, he was in charge of the vision subsystem of a project during his internship at ROS-I in ARTC. He completed the past projects on time and in good quality. He is chosen by the team to oversee the project to ensure the desired outcome is accomplished.

Wilson participated in a lot of hackathons and he is a founder of “ Help Lah Solutions ”. He is currently involved in completing a project for a company. Moreover, he will explore different technologies and take up different projects during free time. He has a lot of hard skills which he can guide the team to solve the problem with technology.

Hou Jing has interned in various companies such as A*Star. He was the full stack developer at SEA group for 6 months and received good feedback from his supervisor. His supervisor described him as a meticulous and responsible individual. He also has experience in software releases during his internship.

Irsyad has experienced a lot during his time as a research assistant at the Data Storage institute. During his time there, he was commended by his supervisor for delivering high quality research material and was well documented. His persistence in gathering data and experimenting with new technological material will aid in bringing this project forward.

Zeyu has a strong interest in Cloud and databases since secondary school. He took the extra steps to learn the knowledge. In the end, he managed to land his dream internship as a backend developer for Amazon. During that time, he developed his skills about databases and completed his work in high quality. With his experience, he will manage to solve any database problem in this project.

Boon Shuan has interned at multiple companies and experienced different roles, and went for hackathons. His exposure to multiple aspects will be valuable and essential in the role of a QA manager and engineer.

Conclusion

With the booming increase in the usage of intelligent systems and digital interconnectivity in our lives, SmartLib is an essential addition to the many services available within the university, which will alleviate the existing seat management issues in the library.

References

- [1] O. Ho, "Libraries becoming critical common spaces: Iswaran," TheStraitsTimes, 13 January 2020. [Online]. Available: <https://www.straitstimes.com/singapore/libraries-becoming-critical-common-spaces-iswaran>. [Accessed 25 January 2021].

- [2] C. Lane, "Why is There Never Any Space in the University Library?," TopUniversities, 3 January 2020. [Online]. Available: <https://www.topuniversities.com/student-info/university-news/why-there-never-any-space-university-library>. [Accessed 25 January 2021].

Appendix A: Résumés of Team Members

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

KENNY VOO TZE RUNG

Singapore | +65 83150504 | kennyvoo@gmail.com | linkedin.com/in/Kenny-Voo-Tze-Rung

EDUCATION

Nanyang Technological University, Singapore

JUL 2019 – DEC 2022

BSc in Computer Science

ASEAN scholar

CGPA: 4.68

Singapore Polytechnic, Singapore

APR 2016 – APR 2019

Diploma in Electrical Electronic & Engineering, Majored in Power Engineering

Cumulative GPA : 3.972

Graduated with Merit and Gold with Honour in CCA.

EXPERIENCE

Robocup@Work Participant & Organizing Committee

DEC 2018 – PRESENT

- Plan an annually international robotic competition
- Add/update new challenge every year
- Trained a Deep Learning model (Tensorflow + tiny yolo v2) to detect 13 different industrial part
- Improved the efficiency and speed of the robot by 57%

Intern, ROS-Industrial Asia Pacific at ARTC, A*STAR

JUN 2020 – JUL 2020

- Developed a ROS2 perception package(c++) for a project
- Trained MaskRCNN model for custom objects
- Converted training framework model into deployment model (Onnx model)

Panasonic R&D Intern, Singapore

MAR 2018 – APR 2018

- Involved in a object detection project using Tensorflow
- Designed and 3d print parts for a project
- Converted dataset to TFRecords
- Received 1-month contract job after internship ended

LEADERSHIP & ACHIEVEMENTS

2020	3 rd place - Escendo Mackathon NTU Chairperson for NTU Institution of Engineers (IES) Engineering Fest External Outreach & Publicity Director for ICMS
2019	3 rd place - RoboCup Sydney 2019
2018	Top 7 Finalist – Make for the planet Borneo
2017	Top 10 - NUS-ASME with MOHH The Assisted Bathing Challenge 2017

SKILLS & INTERESTS

Languages	Fluent in English, Mandarin, Malay
Coding Languages	C, C++, Python, Java, Dart (Flutter), SQL
Others	Computer Vision, ROS, TensorFlow, AutoCAD, Inventor, Arduino, Adobe Illustrator, OpenCV

Kong Hou Jing

Singapore | +65 9891 6992 | houjing1k@gmail.com | linkedin.com/in/kong-hou-jing/

Education

NANYANG TECHNOLOGICAL UNIVERSITY, SINGAPORE

2019-2022

Bachelor of Engineering (Computer Science)

NGEE ANN POLYTECHNIC, SINGAPORE

2014-2017

Diploma in Engineering Science

Diploma Plus in Advanced Engineering Mathematics

Gold Certificate of Achievement in Co-Curricular Activities

Skills & Abilities

PROGRAMMING LANGUAGES

- C, C++, C#, Java, Python, HTML, JavaScript

FRAMEWORKS & TOOLKITS

- Flutter, Firebase, React, NodeJS

OTHER ABILITIES

- Web Development, Mobile Application Development, Product Release and Management

Experience

FULL-STACK DEVELOPER | SEA GROUP | 2020 - 2021

- Front-end development for Web and mobile application (iOS and Android)
- Back-end development using MYSQL and firebase

INTERNSHIP | A*STAR | 2016 - 2017

- Development of obstacle avoidance package for ROS
- Aided in software and product release

Tai Wei Shen Wilson

Singapore | +65 97377450 | taiwilson5@gmail.com | <https://www.linkedin.com/in/wilson-tai-04659b98>

Education

NANYANG TECHNOLOGICAL UNIVERSITY, SINGAPORE

2019-2022

Bachelor of Engineering (Computer Science)

SINGAPORE POLYTECHNIC, SINGAPORE

2014-2017

Diploma in Electrical and Electronic Engineering

Diploma with merit

Global foundries award

A*STAR Science Award

Skills & Abilities

PROGRAMMING LANGUAGES

- C, C++, Java, Python, HTML, JavaScript

FRAMEWORKS & TOOLKITS

- Flutter, Firebase, React, NodeJS, GitHub, ROS

OTHER ABILITIES

- Web Development, Mobile Application Development, Product Release and Management, Robotics development

Experience

TECH LEAD | SELF-DRIVING ROBOT | 2021 - 2021

- Supervised the work of 3 other software engineer and assist them in any technical support
- Designed the system framework with ROS
- Establish the Agile development methodology

RESEARCH ASSISTANT | NCS | 2020 - 2021

- Assist in the research for multi-robot path planning
- Used node graph and dijkstra algorithm to find the shortest path
- Research on different methodology to solve path conflict

INTERNSHIP | A*STAR | 2016 - 2017

- Development of auto docking system for A*STAR social robot
- Used QR code technology to aid in the alignment of docking

Muhammad Irsyad Bin Redzuan

Singapore | +65 9738 9144 | irsyadredzuan@gmail.com

Education

NANYANG TECHNOLOGICAL UNIVERSITY, SINGAPORE

2019-2022

Bachelor of Engineering (Computer Science)

NGEE ANN POLYTECHNIC, SINGAPORE

2014-2017

Diploma in Electronic and Computer Engineering with Minor in Business Management

Skills & Abilities

PROGRAMMING LANGUAGES

- C, C++, Java, Python, HTML

FRAMEWORKS & TOOLKITS

- Spring Boot

OTHER ABILITIES

- Web Development

Experience

INTERNSHIP | A*STAR | 2016 - 2017

- Development of a simulation of a Multi-Tiered Cloud Storage System
- Analyzed research data to improve the reliability and scalability.

Zhou Zeyu

E-mail: ZHOU0342@e.ntu.edu.sg

Phone number: 90386219

EDUCATION

Bachelor of Computer Science and Engineering

Nanyang Technological University

Aug 2019 - Present

- Expected graduation in 2023 with Honours (Highest Distinction); CGPA 4.81/5.00
- Full undergraduate scholarship awarded by the Singapore Ministry of Education to top 10 percent students of prestigious high schools in China.
- Relevant Coursework: Data Structures; Introduction to Computational Thinking; Digital Logic; Computer Organization & Architecture; Introduction to Data Science & Artificial Intelligence.

ACADEMIC PROJECTS

Project Participant

Course Mini Project, Introduction to Computational Thinking

Oct 2019 – Dec

- 2019 Wrote a graphical interface for Canteen using Tkinter in python.

Git hub link: <https://github.com/xX-Conan-Xx/114514>.

Google hash code competition project

Feb 2020

- Developed an algorithm which calculated the maximum capacity will be used in a container when the limit capacity of the container and volumes of different objects were given

Git hub link: <https://github.com/xX-Conan-Xx/yarimasune>

INTERNSHIP EXPERIENCE

Amazon Intern, Singapore

Jun 2020 -Aug

Developed his skills about database and completed the work in high quality.

Recommended by his supervisor.

CO-CURRICULUM ACTIVITIES

Member, Logistics of NTU Chinese Drama

Jun 2019 – Present

- Logistics of NTU Chinese drama, in charge of making and purchasing stage props.
- Preparing props for drama 'Mangqun' 2019.

COMMUNITY SERVICE & SOCIAL VOLUNTEERISM

Sub-committee Member, Tanjong Pagar CC Youth Executive Committee

Aug 2018 – Present

- Organized 2019 Tanjong Pagar CC Youth Sports Interest Group Team Bonding which had 120 participants

SKILLS

Languages: Fluent in English (spoken and written) and Mandarin (native)

Programming: Python, C language, Java, MATLAB

Software: Microsoft Office suite (Word, PowerPoint, Excel).

TEO BOON SHUAN

Computer Science undergraduate at Nanyang Technological University
(+65) 81618983 | teoboonsluan@gmail.com

EDUCATION

Nanyang Technological University
Degree in Computer Science (B.Eng)
Expected Graduation: May 2022

Yishun Junior College
GCE Advanced Levels
Graduated: 2015

Anglo-Chinese School (Independent)
GCE Ordinary Levels
Graduated: 2013

EXPERIENCE / PROJECTS

CredID.io - Project Management Intern

June 2020 to Aug 2020

- Worked with e-kyc solutions team in the fintech startup, to deliver software requirements for CredID mobile app
- Experienced frameworks in software development for mobile app development: Kotlin for Android and Swift for iOS
- Merged code with CredID repository for beta-version of mobile app, contributed in front-end development and UI
- Finalized code for beta version with test engineer, as a Release Manager

FitFlops - Software Developer

Jan 2020 to May 2020

- Team Leader for university project, worked closely with group mates to develop android app in Fitness
- Experienced AGILE work method in small group setting, and seen app through its software development life cycle
- Explored developer tools like Android Studio for android UI, Google Maps API for map feature and Firebase for database

YTL PowerSeraya - Sales Intern

May 2018 to July 2018

- Acquired 20% of target 1000 customers within the first month of launch in the Jurong residential area
- Worked with Head of Sales to come up with a sales campaign, including planning publicity roadshows at strategic locations
- Collaborated with various stakeholders: including Citibank and Poseidon in pushing sales and promotions

CO-CURRICULAR ACTIVITIES, LEADERSHIP AND ACHIEVEMENTS

NTU Vibrations - President

Aug 2020 to Present

Started a new club in NTU for DJing and Turntablism.

- DJ Head and instructor, leading the design of the lesson plan and teaching the DJ classes itself
- Alongside my two trusted and passionate friends, we garnered publicity and recruitment for the new club: 40 sign-ups
- Spontaneously adapted to new initiation requirements asked of us, given COVID-19; financial proposal and constitution

School of Computer Science and Engineering (SCSE) Club - Assistant Chief Group Leader (ACGL)

Aug 2019

Ambassadors of SCSE host events like Freshman Orientations, NTU Hackathons and Open Source Workshops

- Worked closely with main committee and programmers, as well as other OGs, appreciating the importance of efficient communication to smooth execution on the ground
- Alongside 7GLs and my CGL, I was in-charge of delegating the roles and freshman for each to take charge, in order to handle the sheer number of participants of 80 freshmen in 1 of 8 Orientation Groups (OGs) in the Freshmen Orientation.

Hackathon at NTU Innovation Challenge (Certificate of Excellence) - 1st Place

Dec 2015

3D2N event hosted by NTU Electrical and Electronics Engineering (EEE) Faculty for prospective students

- Explored 2 prediction modelling techniques: Random Forest Classifier and Support Vector Machine (SVM), to determine food cuisines based on their ingredients with an 80% accuracy on SVM
- Used Python libraries: Pandas and Matplotlib for EDA and Visualization

Water Polo - 1st Place in National Inter-School C Division Games

2010-2013

- Represented school in Water Polo for 4 years, learning that teamwork; individual competency and trust in teammates are key to success

SKILLS

Coding Languages: Python, C, C++, Java, SQL

Developer Tools: Android Studio, Firebase

Python Libraries: Pandas, Scikit-Learn

Skills: Microsoft Office, MacOS Office, Adobe Lightroom, Adobe Premiere Pro

Interests: DJ, Cross Country, Photography, Videography, Outdoors