Virtual Consultant: Project Proposal

Aditya Chandrasekhar (U1923951A) : Project Manager / Lead Developer
Aratrika Pal (U1922069F) : Backend Developer
Shruthi Srinivas (U1923611G) : Backend Developer / Release Engineer
Chong Zhe Ming (U1920757K) : Frontend Developer
Khush Kothari (U1922279J) : Frontend Developer
Kushal Sai Gunturi (U1923232F) : QA Engineer / Manager

Team Name: 404Found
School of Computer Science and Engineering, Nanyang Technological University

Submitted to—
Yu Han
School of Computer Science and Engineering, Nanyang Technological University

Contents

Executive Summary

With the rise of global pandemic Covid 19 cases, people are seeking to reduce the number of physical interactions and move to virtual interactions whenever possible, in the interest of health and safety. Hence, virtual platforms have become the preferred option. The growth of healthcare services is also a beneficiary for this phenomenon. This convenience for users, in turn, brings about an easy and convenient way for people to seek medical assistance at the comfort of their own home.

Moreover, according to a new report from the World Bank and WHO [1], at least half of the world's population cannot obtain access to essential health services. Our application aims to solve this urgent problem. With our application, those who do not have access to healthcare will be able to seek medical consultations with professional doctors.

Virtual Consultant is envisioned with this in mind, to integrate and provide a convenient online platform where patients can seek consultation from doctors without physical interactions. Virtual Consultant aims to provide a safe space where doctors can be segregated from the patients such that they can reduce their exposure to the symptoms of their patients especially in the Covid-19 world we live in today.

Our product also provides a simplified version of a social media platform with the theme of medical health and wellbeing. It allows doctors to create posts to share experiences, provide information, and improve the patients' knowledge of diseases, symptoms and recovery. Patients can follow the doctors and engage with their posts through likes and comments, with the final goal of improving their medical literacy.

Statement of Problem

Teleconsultation has transformed the landscape of the world in the way things are done on a global scale. It provides opportunities to make healthcare more convenient, better coordinated, and closer to home. Patients can have consultations with doctors, nurses and allied health professionals in the comfort of their homes or at a location where privacy is assured. These virtual appointments enable patients to receive ongoing care where in-person clinic consultations are not necessary or possible.

The COVID-19 pandemic has dramatically changed how outpatient care is delivered in health care practices [2]. To decrease the risk of transmitting the virus to either patients or health care workers within their practice, providers are deferring elective and preventive visits, such as annual physicals. Our product has the potential to reduce the unnecessary visits by patients to hospitals by virtually connecting patients with available doctors.

People who have limited access to healthcare will also make use of our application to seek help from the doctors, allowing the professionals to access the medical condition of the patient and advise them accordingly.

Presently, there exists no such application in Singapore that allows both patients and doctors to have direct interactions with an intermediary organisation that acts like a middleman which may incur additional processing time to link up patients and doctors.

Similar applications existed in the form of TeleConsult by NUH [3] and Teleconsult by RafflesMedicalGroup, where users can download the application for virtual consultations to seek medical assistance. However, there are limitations such as:

- Virtual Consultation is limited to residents of Singapore
- Only the doctors attached to these hospitals are available on their respective apps, which may cause longer waiting times for patient's to get a consultation
- Lack of a feed for doctors to create posts and share healthcare tips with patients

We believe that our idea could be developed further and better integrated to bring greater convenience to the users by allowing them to seek virtual medical assistance and gain healthcare insights via our application.

Objectives

This document proposes a web application that connects patients with doctors. The main objectives are-

1. To virtually connect patients with available doctors
2. To raise awareness about health and diseases.

For (1), A patient who is unable to physically meet a doctor and get medical help can be connected to doctors via a virtual telecommunication channel. As people are encouraged to stay home during the Covid-19 pandemic, the app allows them to connect with doctors without increasing the risk of infection for both the patients and doctors. The app also helps people with no access to developed healthcare facilities to connect with doctors and consult them regarding medical issues.

For (2), Doctors can post content on diseases such as symptoms to look out for, home remedies that can be followed, precautions to take post-recovery etc. on the app. This creates awareness among users who can follow the doctors, and view their posts.

Technical Approach

After thorough assessment of our customers' needs, we defined the key specifications of our application and the suitable technology and system architecture to develop it.

Customer Needs

The customers of the application would be people who are required to follow safe-distancing measures amidst the Covid-19 pandemic. A web application that can virtually connect users/patients with doctors enables the people to observe safe management measures better by minimising the risk of spreading the infection through direct contact.

The app also targets customers without access to developed healthcare facilities as it allows users and doctors from different parts of the world to connect virtually.

Currently existing applications like Doctor Anywhere only facilitate online consultations with doctors whereas Virtual Consultant allows users to maintain their health records and medical history for doctors to go through before consulting the patients which helps doctors provide a more accurate diagnosis. Virtual Consultant**,** unlike other existing apps, also allows doctors to post health related content, users to follow doctors, and like and comment on posts, much like a social media platform.

Furthermore, this app is to be developed as a web application as it can be accessed via the internet browser and will adapt to whichever device it is being viewed on, unlike a mobile app which is native to a specific platform. This feature could prove to be extremely useful in the case of emergencies where you don't need a specific application to be already downloaded or installed into a device to be able to reach a doctor.

Target Specifications

The following application specifications target the needs of our customers:

1. <u>Users can connect with available doctors virtually</u>

   The primary feature of the application is to connect patients with doctors via a telecommunication channel in cases when a patient is unable to reach a doctor physically. The patient can make consultation requests to doctors with text, image attachments and the severity level. The app then notifies available doctors and assigns the patient to the first one to respond. The user can then choose to communicate with the doctor through chat, voice, or a video call.

2. Users can maintain health records and medical history in their profile

   Users are asked to key in details of their medical history during registration. Doctors can then view profiles of patients to better understand their symptoms and make an accurate diagnosis. Users can also edit the details of their medical history to keep their profiles updated.

3. Doctors can post health related content for users to view

   Doctors are allowed to post health related content to create awareness about various diseases such as Covid-19, the symptoms to look out for, precautions to take to avoid being affected by it, home remedies to follow and so on.

4. Users can follow doctors, and view, like, and comment on their posts

   Users can follow doctors and view their posts on their feed to stay updated on diseases such as Covid-19 etc. It is similar to a social media platform but is strictly limited to medical and health related matters. The like and comment features on the posts allow users to engage with the doctors and get their questions answered by licensed doctors.

Technology Consideration

We chose our technologies in a way that they would satisfy two main goals:

1. A smooth user experience so that our users are benefitted the most and can be properly engaged when they use the app
2. Seamless integration within the tech stack, so that the development process would be convenient, and would lead to less bugs

The following table lists the technologies we plan to use, and gives a summary for each of them:

Technology	Summary
React.js	A free, open-source, Javascript library developed and maintained by Facebook, which is used for making the frontend in web applications. Its working is based on small, isolated code-pieces called components which can be combined to form larger, complex UIs.
Node.js	An asynchronous, event-driven Javascript run-time that enables fast backend development of web servers in Javascript. It is used for executing

	server-side code.
Express.js	A Javascript web applications framework based on Node.js which provides a simple and convenient API for developing web apps without having to worry about protocols and other low level details.
MongoDB	An open-source, cross platform NoSQL database system that stores data in the format of key-value pairs. Data storage is based on the concept of documents and collections. It is suited to provide high scalability, high performance and high availability.

System Architecture/Platform

a) Platforms and Tools

Platforms and development tools to be used for the project:

Platform/Tool	Summary
Git	Free and open-source Distributed Version Control System, used to manage source code, track changes in a set of files, and manage version histories
GitHub	Code hosting platform for version control and collaborative software development which is integrated with Git
Visual Studio Code	Integrated Development Environment made by Microsoft for Windows, MacOS and Linux
Figma	Vector graphics editor that can be used to make UI prototypes or mockups
Notion	An online workspace for task management, work division, idea documentation and to keep track of

	our progress
Google Drive	File storage and synchronization platform which will contain a backup of all files related to the project

b) System Architecture:

The overall proposed architecture is a **Client-Server Architecture** as shown in the image below:

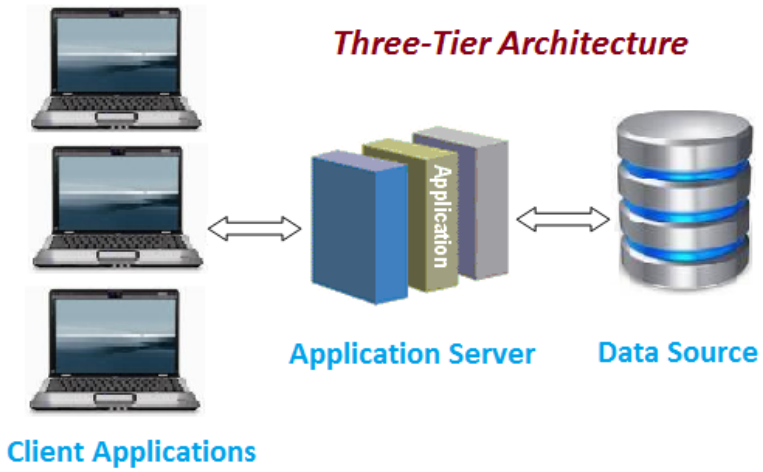


Fig : Three-Tier Client Server Architecture

The front-end client interacts with our Application Server, which in turn accesses the MongoDB Database for the required data. The communication between the clients and the server takes place through the usage of requests and responses that follow the HTTP protocol.

Benefits of the client-server architecture:

1. This architecture allows modularity and supports modifiability since it decouples the logic of the clients and the servers.
2. It supports future scalability since more clients can be added into this architecture in the future.
3. It makes it easy to divide work in the software development process to support independent development of these independent components and then their integration once they're ready. Such a work division, also facilitates focussed debugging, error fixing and maintenance.

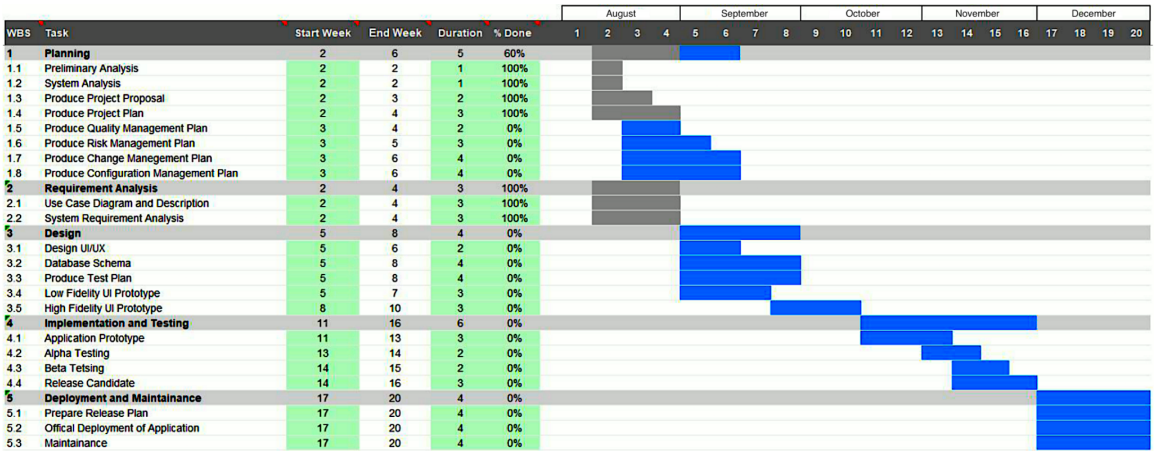
Within the Client-Server Architecture we will follow the Model-View-Controller approach. The main goal of MVC is to separate functionality, logic, and the interface of an application. Moreover, isolation of domain logic from user interface permits independent development, testing and maintenance thus allowing

separation of concerns. It allows multiple developers in our team to work on different parts of the same project.

In the backend, there are models which define the database schema and deal with the data. The models interact with our MongoDB database. There are also controllers which handle the business logic. Lastly, in the frontend, we create views using React.js. Views are the user interface which displays the data to the user and the user can interact with it.

Project Management

We have adopted the Waterfall model for our software development life cycle. In this model, all activities are carried out sequentially and are dependent upon the previous activities. Firstly, project planning is solicited along with a clear definition of the project scope. Secondly, to further iron out the requirements, a use-case model and description is generated during the requirement analysis phase. Thirdly, we design the system along with the user interface and database schema during the design phase. Fourthly, we implement and develop our application using a test driven development approach to ensure reliability and stability of our product. Finally, the release team engages in publishing a release plan, followed by the QA team to perform necessary testing.



WBS	Task	Start Week	End Week	Duration	% Done
1	**Planning**	2	6	5	60%
1.1	Preliminary Analysis	2	2	1	100%
1.2	System Analysis	2	2	1	100%
1.3	Produce Project Proposal	2	3	2	100%
1.4	Produce Project Plan	2	4	3	100%
1.5	Produce Quality Management Plan	3	4	2	0%
1.6	Produce Risk Management Plan	3	5	3	0%
1.7	Produce Change Management Plan	3	6	4	0%
1.8	Produce Configuration Management Plan	3	6	4	0%
2	**Requirement Analysis**	2	4	3	100%
2.1	Use Case Diagram and Description	2	4	3	100%
2.2	System Requirement Analysis	2	4	3	100%
3	**Design**	5	8	4	0%
3.1	Design UI/UX	5	6	2	0%
3.2	Database Schema	5	8	4	0%
3.3	Produce Test Plan	5	8	4	0%
3.4	Low Fidelity UI Prototype	5	7	3	0%
3.5	High Fidelity UI Prototype	8	10	3	0%
4	**Implementation and Testing**	11	16	6	0%
4.1	Application Prototype	11	13	3	0%
4.2	Alpha Testing	13	14	2	0%
4.3	Beta Tetsing	14	15	2	0%
4.4	Release Candidate	14	16	3	0%
5	**Deployment and Maintainance**	17	20	4	0%
5.1	Prepare Release Plan	17	20	4	0%
5.2	Offical Deployment of Application	17	20	4	0%
5.3	Maintainance	17	20	4	0%

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

Deliverables

The main deliverable is a fully functioning adaptive web application that works across multiple devices (mobile and desktop), along with user-guides and customer service support. In the future, regular updates will be released to improve functionality and enhance the user experience. Here is a detailed breakdown of our deliverables:

- System requirement specifications – Use-case model and use-case descriptions, functional and non-functional requirements.
- Technical Prototype: Web application created using the MERN Stack.
- Database (Back-End) – Cloud configured database on MongoDB Atlas.
- Configuration – Configuration, Changes, and Release plans of our software.
- Test Procedures – Description of test plan, test cases covered.
- Documentation – Complete documentation including documentation related to QA System on MediaWiki.

Budget

Team 404Found has allocated a budget of $57,000.00 for the prototyping and development of Virtual Consultant. In order to determine the total costs, we split the line items into various categories such as the employees working on the project. Project Manager, Developers, etc., infrastructure costs such as equipment and costs relating to the development of the software application itself such as licenses and hosting.

Table 1: Requested items and funds for initial design.

Item	Supplier	Quantity	Unit Price	Total
Project manager		1	$10,000.00	**$6,000.00**
Project team members		6	$3,000.00	**$18,000.00**
Computers	Dell	7	$1,000.00	**$7,000.00**
Product Research	A*	1	$3,000.00	**$3,000.00**
Hosting	AWS	1	$2,000.00	**$2,000.00**
Database	AWS	1	$15,000.00	**$15,000.00**
Office rental	NTU	1	$6,000.00	**$6,000.00**
			TOTAL	**$57,000**

Communication and Coordination with Sponsor

The Project Manager will liaise with the multiple parties: sponsors and the development team. He/she ensures the project deadlines are met with the necessary features implemented, and that quality is also maintained.

There will be weekly meetings between the project manager and the development team to ensure the timeline is being adhered to, and to address any concerns with the development process.

Quarterly meetings are held between the development team, project manager and the sponsor team to ensure the project follows the vision of the sponsors.

Team Qualifications

Kushal Sai Gunturi: Third Year student in NTU pursuing a major in Computer Science. Experienced in Computer Vision tasks, with a keen interest in Software Engineering. Experienced in Python, Java, Javascript, React.

Khush Kothari: Third Year student in NTU pursuing a major in Computer Science. Experienced in Software Engineering, with a keen interest in machine learning. Experienced in Python, Java, Flutter.

Aratrika Pal: Third Year student in NTU pursuing Computer Science with a second major in Business. Experienced in Software Engineering, along with a keen interest in data science and AI. Proficient in Python, Java, React, Node.js and Flutter.

Aditya Chandrasekhar: Third year student in NTU pursuing a major in Computer Science specialising in Data Science. He has experience building robust software systems and data warehousing.

Chong Zhe Ming: Third Year student in NTU pursuing a major in Computer Science. Experienced in Software Engineering, with a keen interest in Front-End Development. Proficient in Python, Java, Flutter, Firebase, React.

Shruthi Srinivas: Third Year student in NTU pursuing a major in Computer Science. Experienced in Software Engineering with a keen interest in Data Science and AI. Proficient in Python, C++, Java, Flutter.

References

[1] World Health Organization. *World bank And WHO: Half the world lacks access to essential health services, 100 million still pushed into extreme poverty because of health expenses*. World Health Organization. Retrieved from: https://www.who.int/news/item/13-12-2017-world-bank-and-who-half-the-world-lacks-access-to-essential-health-services-100-million-still-pushed-into-extreme-poverty-because-of-health-expenses

[2] *What impact has covid-19 had on outpatient visits?* Commonwealth Fund. https://www.commonwealthfund.org/publications/2020/apr/impact-covid-19-outpatient-visits

[3] *TeleConsult - NUH: National University Hospital*. For Patients & Visitors. https://www.nuh.com.sg/patients-visitors/Pages/Teleconsult.aspx

Appendix A: Résumés of Team Members

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

KUSHAL SAI GUNTURI
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https://www.linkedin.com/in/kushal-gunturi/ | https://github.com/kush0511

EDUCATION

Nanyang Technological University (NTU), Singapore **Aug 2019 – Jun 2023 (Expected)**
Bachelor of Engineering (Computer Science) with a Minor in Math

- Current CGPA (Cumulative GPA): 4.69/5.00
- Relevant Coursework: Software Engineering, Software Systems Analysis and Design, Information Retrieval, Machine Learning, Data Structures, Algorithms, Discrete Math, Linear Algebra

Global Indian International School, Singapore **Aug 2019 – Jun 2023 (Expected)**
International Baccalaureate Diploma Program (IBDP)

- Score: 43/45
- Full Scholarship for 2 years

WORK EXPERIENCE

Deep Learning Research Internship, Panasonic **May 2021 – Jul 2021**

- Modifying the HigherHRNet pose-detection to work with fish-eye images without manual annotations.
- Created pipeline to generate automatic annotations through augmentations, improve mAP by 13%.

NTU Research Internship| Reinforcement Learning to control dam output **May 2020 – Aug 2020**

- Improved Reinforcement Learning algorithm and optimized simulator, increasing performance by 35%.
- Integrated additional variables such as rainfall and downstream flow into water-flow simulator to improve accuracy, almost halving the mean squared error.
- Followed Agile Workflow to brainstorm solutions to bottlenecks, work on integrating solutions, evaluate progress and update deadlines.

PART TIME EMPLOYMENT

Food-Waste Classification with Deep Learning at NCS Corporate Labs, SCALE **Sep 2020 – May 2021**
Undergraduate Research Excellence Award program (URECA)

- Developed a solution to detect food wastage in NTU canteens using Computer Vision.
- Performed hyperparameter optimization, adjusting learning rate, epochs and decay to improve training.
- Achieved 83% mean Average Precision, where the model predicted location and type of food (100 classes).
- Built a dashboard to visualize results with Vue + Express, and wrote a research paper summarizing results.

PROJECTS

World Sentiment on US Elections project for 'Information Retrieval' course **Jan 2021 – Apr 2021**

- Worked with teammates to create a website that shows twitter reactions (Pro-Trump or Pro-Biden) and polarity to the 2020 US Presidential Elections for 14 different countries.
- Scraped tweets and labelled them to create an election-dataset, ensuring reliability with the Kappa metric.
- Fine-Tuned a pre-trained BERT model with the train-data, achieving, an F1 Score of 0.745.
- Utilized Solr to build an information retrieval backend for a website, with support for features such as ranked retrieval (tf-idf), geographical search and temporal search.
- Working with professor to build a generalized pipeline for political events, publish in the International Conference of Data Mining (ICDM) Workshop.

Quiz Platform project for 'Software Systems Analysis and Design' course **Jan 2021 – Apr 2021**

- Worked with 9 other members to build a gamified-teaching platform for students and teachers.
- Created the web-component backend with Express and Mongo DB to support features such as Creating Assignments, Adding Questions and Viewing Statistics, with support for concurrent user access.
- Designed System Architecture, Test Cases and wrote System Requirements Specification for project.

Course Planning project for 'Software Engineering' course **Jan 2021 – Apr 2021**

- Collaborated with 5 other members to build a course-planning website for NTU students.
- Implemented search algorithms to find timetable plans, where features such as blocking timeslots and allowing clash (Constraint Satisfaction Problems) were implemented.
- Worked on Discussion Forum and Course Review features in Express, with a Mongo DB server.

Stock Price Predictor with Deep Learning **Sep 2020**

- Scraped data from the web for the daily opening and closing stock prices for the last 10 years, cleaned data to a more processable form and visualized it. Completed project in Python.
- Built a ML model with Long Short Term Memory (LSTM) to forecast the price of a stock over a time-horizon.

Data Science project for 'Introduction to Data Science' course | Airbnb Price Predictor **Feb 2020 – Apr 2020**

- Cleaned Kaggle data set, ran some exploratory data analysis and visualization with skcit-learn.
- Ran XGBoost to predict price and identify most important price-determining factors.
- Used 'NLTK Vader' to perform sentiment analysis on reviews to use as input for neural network model.
- Achieved a root mean square value of 32.3, where Airbnb majority prices ranged from $80-$400.

SKILLS

Programming proficiency: Python, C, Java, Javascript, SQL, C++, Keras, PyTorch, Bash (Basic), React, Express
External Courses and Certifications: Stanford Machine Learning, UMich Computer Vision, Stanford Algorithms
Hobbies and Interests: Running, Taekwondo, Travelling, Table Tennis, Reading, Chess and Board Games
Languages: English, Hindi, Spanish (Basic) and Telugu

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KHUSH MILAN KOTHARI

LinkedIn: www.linkedin.com/in/khush-kothari-a2778995 | **GitHub:** https://github.com/khushk21

Email:khushkothari19@gmail.com | **HP:** +65 84239607

1. EDUCATIONAL CREDENTIALS:

Nanyang Technological University, Singapore **Aug 2019-Jul 2023(expected)**

- **Bachelor of Engineering(Computer Science)**
- **CGPA-** 4.50

Jamnabai Narsee School (ISC), India **Jun 2017- May 2019**

- **Subjects-** English, Mathematics, Physics, Chemistry and Computer Science.
- **Grade XII Board**- 98%

2. ACADEMIC RESEARCH AND PROJECTS:

Software Engineering Project (Flutter, Dart and Firebase) **Jan 2021-Apr 2021**
Title: Wastetastic

- Designed a waste management mobile application for Singapore that kept track of waste disposed, displayed live availability of carparks near the waste disposal location and provided visual analytics of users' past records.
- Executed viewing of location of waste disposal points on a map with the help of Google Maps API Key. Displayed the top 5 nearest locations from user's current location as well.
- Implemented all the principles of Software Development Life Cycle in the creation and documentation of this application and employed the Layered Architecture style.

Software Systems Analysis and Design Project (Flutter, Dart, ReactJS and NodeJS) **Jan 2021-Apr 2021**
Title: Intellect

- Created two separate systems- Intellect Game and Intellect Web App- for students and teachers respectively to fulfil the gamified learning approach for students and allow teachers to monitor their progress.
- Designed the game in the form of a mobile application with the help of Flutter and employed the three layered architecture for the same. Created the server for the web app in NodeJS and displayed analysis of the students' performance using ReactJS. Integrated both the game as well as the web app together and performed load tests, unit tests and integration testing on the same.
- Provided appropriate documentation and analysis models for the game as well as the web app.

Intuition Hackathon (Python, JavaScript) **Feb 2021**
Title: Gain Perspective Extension

- Crafted a Google Chrome Extension for checking toxicity of textual content in various social media platforms. Designed a sentiment analysis model in Python which determined the toxicity level of the textual content.
- Displayed relevant articles from the internet based on the content for which the toxicity is checked for further information of the user.

Data Science Project (Python) **Mar 2020-Apr 2020**
Title: Seattle Airbnb

- Performed data analysis on the price and availability per month of each Airbnb using the Seattle dataset in Kaggle and made inferences on the same.

ARATRIKA PAL
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GitHub: https://github.com/aratrika-15 | LinkedIn: https://www.linkedin.com/in/aratrika-pal-6b51a2197/

EDUCATION

Nanyang Technological University, Singapore **Aug 2019 – Jul 2023 (Expected)**

- **Bachelor of Engineering - Computer Science with a second major in Business**
- CGPA: 4.92/5.00
- Relevant Modules: Software Engineering, Object Oriented Design and Programming, Data Structures, Algorithms, Introduction to Databases, Financial Management, Financial Accounting

WORK EXPERIENCE

Learning and Vision Intern | *Panasonic R&D Centre* **May 2021 – Jul 2021**

- Worked on pedestrian attribute recognition, performed data analysis and visualisation, and implemented SOTA models for object detection and attribute prediction using PyTorch in Python.

PROJECTS

Bibliophile | *MLH Online Hackathon* **Jul 2021 – Jul 2021**

- Developed a book recommendation website to recommend books based on previously read books, and books read by similar users. Users can make wish lists and currently reading lists. For each book, it summarises user reviews into a word cloud to show the general sentiment about it.
- Created using React.js, Node.js, Python and Firebase within 48 hours only. The recommendations had a low error rate of around 2-3%.

Softvengers | *Academic Project, Software Systems Analysis and Design* **Jan 2021 – Apr 2021**

- Led the development of a website using MERN stack which allows teachers to keep track of student's performance in an educational game by providing an assignment management system and smart data analytics.
- Complimented for performing extensive testing such as unit, integration, load and performance testing to judge and improve the system's performance and awarded A+ grade for it.

Dengue Safe App | *Academic Project, Software Engineering* **Aug 2020 – Nov 2020**

- Headed the development of a mobile app used to report dengue cases in NTU, display reported cases using Google Maps API, provide alerts and analyse Singapore Dengue Cases data pulled from a government API.
- Created class diagrams, sequence diagrams for proper documentation, coded the app in Dart and carried out extensive black box and white box testing.
- Complimented on the socially beneficial idea and awarded an A+ grade for project quality.

NTU-AI4IMPACT Datathon | *Contestant* **Jun 2020 – Jul 2020**

- Performed data analysis, data cleaning using Python and created time series forecasting models using difference neural networks for energy prediction on the Schneider Electric Energy dataset.
- Co-authored a Medium article explaining the project in detail: https://medium.com/@mypatronusisacheetah7/schneider-electric-energy-consumption-time-series-forecasting-6e140eb169a8

Shopee Product Detection Challenge | *Contestant* **Jun 2020 – Jun 2020**

- Designed a product classification system that classified images into 42 classes, using transfer learning, ensembling and data augmentation.
- Tested pre-trained models such as Densenet169 and Densenet201 using fastai and PyTorch and crossed the 80% accuracy mark
- Ranked 85 out of 823 participating teams.

SKILLS/INTERESTS

Languages: Python, Java, C, HTML/CSS/JavaScript, Dart, MySQL, NoSQL(MongoDB)
Tools and Frameworks: ReactJS, Express.js, Node.js, Pandas, NumPy, PyTorch, Keras
Online Courses: Machine Learning, Neural Networks and Deep Learning, Convolutional Neural Networks

LEADERSHIP & CO-CURRICULAR ACTIVITIES

Events Vice Chair | *IEEE NTU Student Branch* **Aug 2021 – Present**
Tech Officer | *IEEE NTU Student Branch* **Aug 2020 – Jul 2021**

- Created an Avatar-based virtual platform for the flagship Hackathon- iNTUition v7.0 using the MIT open-source code, using Go and Javascript.
- Created content and cleared doubts from participants in workshops on topics such as image captioning with machine learning, REST APIs and front-end programming with React.

Aditya Chandrasekhar

+65 90552302• aditya021@e.ntu.edu.sg.com • GitHub • LinkedIn • Singapore

EDUCATION

Nanyang Technological University, Singapore — Anticipated Grad date: **May 2023**
Bachelor of Engineering in Computer Science — GPA: 4.1 / 5.0
Specialization: Data Science & Analytics, High Performance Computing
Coursework: Information Retrieval, Network Science, Software Engineering, Database System Principles, Software System Analysis and Design, Computer Networks

EXPERIENCE

Canopy Power, Singapore — **May 2021 – Aug 2021**
Software Engineer (Internship)
- Developed a multi-objective optimization algorithm combining Particle Swarm & NSGA-II for an Energy Management System reducing costs by 1.6%
- Designed a traversing algorithm on Battery's state of charge to detect Battery cycles which was used to calculating battery efficiency and battery capacity
- Worked within an agile team and helped prioritize feature requests to ensure that the biggest impact features were worked on first

United Bank of Switzerland, Singapore — **Feb 2021 – Apr 2021**
NTU Edge Program (Part Time)
- Collaborated with a team of 5 to develop a data spider to crawl SQL based databases to extract and analyze meta-data
- Created a self-cataloguing data repository to automatically categorize and organize available datasets based on cosine similarity

Air Traffic Management Research Institute, Singapore — **Oct 2020 – Jan 2021**
Research Assistant (under Prof. Low kin Huat)
- Integrated the DJI SDK with an Android add to automate the DJI Product (Drone)
- Developed a data collection and monitoring pipeline from 9 types of drones using an android application for the research: Urban Aerial Transport Management & System

Bitez, Singapore — **Aug 2020 – Jan 2021**
Software Engineer (part-time)
- Built a cross platform mobile application to connect bruxism patients with dentists
- Created an ETL pipeline to extract data from an Arduino based pressure sensor using Bluetooth connectivity

Whizz Mobility, Singapore — **May 2020 – Jun 2020**
Data Scientist (intern)
- Implemented a convolutional neural network using an architecture inspired by ResNet50 in PyTorch to classify an autonomous robot's environment with an F1-score of 81%
- Created a new dataset of 1000 images using a custom annotation tool built using PyGame which was used for fine-tuning the model's performance
- Constructed dashboard using React and Mapbox for displaying robots speed and location

ACADEMIC PROJECTS

Open-Source Contributions: data science interviews (GitHub), DJI Android SDK (GitHub)

Information Retrieval System (Skills: **Python, Java, HTML5 + CSS3, Flask, PyTorch, Apache Solr**) — **Jan – Apr 2021**
- Built a website that shows Twitter reacts (Pro Trump or Pro Biden) and its polarity to the 2020 US Presedential elections for 14 different countries
- Prepared web-scraping scripts using snscrape and annotated the dataset, ensuring reliability with a 91% kappa score
- Fine-tuned a pretrained BERT model using PyTorch achieving a F1 score of 74.5%
- Utilized Solr for indexing and querying data, with support for features such as ranked retrieval (tf-idf), geographical search and weighted sentiment analysis incorporating popularity of tweets

Gain Perspective | Intuition Hackathon 2021 — **Feb 2021**
- Developed a chrome extension to tackle Misinformation and Hate comments in social media platforms
- Implemented a LSTM based sentiment analysis model using Keras to categorize toxicity with an accuracy of 89%
- Utilized Google Language API and NewsAPI from retrieving relevant news articles to increase awareness among users about current affairs

GalaxSE (Skills: **React, Unity, Express, MongoDB**) **Aug – Nov 2020**

- Designed UI using React and Unity for a gamified learning management system
- Built Express.js based REST API to serve data stored in MongoDB database and performed database scripting
- Performed unit and system level testing of the software to fix bugs and manage requirements with respect to the software requirements specification

House Matchers (Skills: **React, Redux, Express, MongoDB**) **Aug – Nov 2020**

- Designed Ui using React or a property search application with Redux for state management
- Created a Express.js Rest API for CRUD operations
- Utilized MVC architecture and observer pattern to enable parallel development and extensibility

AWARDS AND HONORS

- **Singapore Nationally Certified** for First Aid (PCR + AED) **2021**
- **Vice-Captain**, NTU Varsity Cricket Team – Nanyang Technological University **2020**
- Selected for the **Undergraduate Research Excellence award program** – Nanyang Technological University **2020**
- **Cultural Secretary & Sports Captain** – P. S. Senior Secondary School **2018**

TECHNICAL SKILLS

Languages:	Python, JavaScript, SQL, C, Java, Dart
Frameworks and Tools:	Kafka, AWS, OpenCV, NLTK, Scikit-learn, TensorFlow, PyTorch, Pandas
Development:	HTML5+CSS3, React.js, Redux, Node.js, Express.js, MongoDB, Flutter, Git, Unix
Certifications:	Machine Learning (Stanford University), AWS Builders, Algorithms (MIT)

Chong Zhe Ming

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EDUCATION

Nanyang Technological University (NTU) **August 2019 – Current**
Bachelor of Computer Science (Distinction)
- CAP: 4.34/5.0

Anderson Junior College **January 2015 – November 2016**
GCE 'A' Levels

WORK EXPERIENCE

SkillsFuture Singapore – *Government Administration* **May 2021 – July 2021**
Software Developer Intern
- Developed an API Testing Application using Python for external providers to learn about handling API calls.
- Designed the frontend of the application using Tkinter and integrated the frontend with the backend logic which utilises Restful API calls.
- Contributed to the documentation of the application with User Guides and Video Guides.
- Conducted Integration testing to validate and verify the application

PRISM+ - *Gaming Monitor and TV brand* **June 2020 – July 2020**
Technical Support Specialist Intern
- Handled electronic display hardware and PC install and configured electronic display software and drivers.
- Maintained and repaired technological equipment.
- Performed repairing and diagnosing of monitors for customers.
- Maintained existing stocks list (which include Return Merchandise Authorization, spare parts and etc)
- Offered timely technical support and teach customers how to utilize monitors/TVs correctly.
- Kept records of repairs and fixes for future references.

Teelogist Pte Ltd – *Shirt Procurement company* **February 2019 – July 2019**
Sales Consultant Intern
- Provided relevant information and suggestions regarding the purchases of customized apparel.
- Utilized my skills and knowledge of designing tools to design and create mock-ups for clients.
- Helped to increase customer return rates by always providing excellent customer service.

ACHIEVEMENTS, LEADERSHIP EXPERIENCE & CO-CURRICULAR ACTIVITIES

NTU Hall 3 Darts Team and Chinese Chess Team **August 2019 – July 2021**
Captain
- Developed training schedule and executed lesson plans for team members to improve their proficiency.
- Inter Hall recreational games 2019 Champions (Darts).
- Inter Hall recreational games 2020 Champions (Chinese Chess).

COURSES

Coursera – Introduction to Accounting Data Analytics and Visualizations **August 2020**
- Data Analysis, Predictive Analytics, Data Visualization, Data Architecture

ACADEMIC PROJECTS

Object-Oriented Programming Project – MySTARS Console Application
- Tasked to design and develop a Console-based application (non-Graphical UI) for My Student Automated Registration System (MySTARS).
- Applied concepts such as data encapsulation, SOLID design principles, loose coupling, and high cohesion, with consideration for extensibility, reusability, and maintainability.

Software Systems Analysis and Design Project – Social Game Application
- Tasked to design and develop a social game to gamify and socialize teaching and learning of academic courses.
- Implement the game algorithms using Flutter, React and Firebase; evaluate and analyze project tasks.

SKILLS

- Programming Languages: Python, Java, C, mySQL
- Familiar with Flutter, Firebase, Git, PyCharm

Shruthi Srinivas

Education

B.Eng Computer Science, Nanyang Technological University, Singapore

AUGUST 2019 – PRESENT

High School, PSBB Senior Sec. School, Chennai

MAY 2019

97.6% in AISSCE 2019 (CBSE Board Exam)

Courses – Physics, Chemistry, Mathematics, English, Computer Science

Extra Curriculars

Business Director, IEEE NTU Student Branch, Singapore

AUGUST 2021 – PRESENT

Member of the Main Committee of the IEEE NTU Student Branch.

In-charge of procuring sponsors for events such as the Intuition Hackathon.

Achievements

Xilinx All Women Hackathon, Singapore

24 hour Hackathon conducted by Xilinx to design a monitoring system for elderly people using Python. Our team of 4 won the 3rd place among 37 teams.

Internships

Business Analyst, Crayon Data Pte. Ltd., Singapore

JUNE 2020 – AUGUST 2020

Worked well independently and in a team to come up with the best business strategies and ideas for clients based on their needs. Researched on data analytics models and tools for demand forecasting.

Content Specialist, ItGeek Asia Pte. Ltd., Singapore

MAY 2021 – AUGUST 2021

Designed products and enhanced their visual look to make them more appealing for customers on online platforms.

Projects

URECA – Undergraduate Research Experience on Campus

Developed an Augmented Reality app using Unity 3D and Vuforia that helps view recipes in the kitchen using images of dishes.

Sofware Engineering - Mobile App Development

Developed a mobile application using Android Studio and Flutter as a group project to help users find HDBs to buy and rent out in Singapore.

Contact

Mobile: 96941513

Email: shrus.311@gmail.com

Skills

SQL
Java
C++
Python
C
Microsoft Office
Android Studio
Flutter

Courses

Data Science and AI, Data Structures, Algorithms, Operating Systems, Databases, Software Engineering, Software System Design and Architecture, Computer Graphics and Visualisation

Accounting, Fundamentals of Management, Management Decision Tools, Business Finance

- Hobbies

Interested and trained in Music. Have performed on stage in Concerts for
- Charity.

Sketching and Painting.