



COMP704 Research and Development Project

VN01 3D acupuncture healthcare data management and treatment system

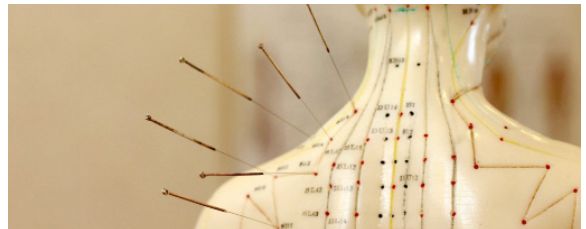
Status Report

Client: Dr William Liu

Supervisor: Dr Nhan Le Thi

Team Members:

21142643	Chuong Pham Dinh
21142377	Nhan Nguyen Cao
21142355	Tan Le Tran Ba
21142358	Trang Ho Ngoc Thao



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Milestone: Midterm Review

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DOCUMENT VERSION CONTROL

1. DOCUMENT INFORMATION

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Nhan Nguyen Cao**

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2. DOCUMENT SIGN-OFF

ID	Member	Role	Signature	Timestamp
21142355	Tan Le Tran Ba	Project Manager		12 Mar 2023 21:40

3. DOCUMENT VERSIONS

Version	Timestamp	Description	Responsible members
1.0	9 Mar 2023 13:45	Initial version of the document, with details corresponding to the content provided in the Presentation Slide for the Midterm Review Presentation.	Nhan Nguyen Cao (21142377) Trang Ho Ngoc Thao (21142358)
1.1	10 Mar 2023 21:50	Update the parts of the document to be matched with the requirements from R&D document – Including also the effort tracking of all members	Nhan Nguyen Cao (21142377)

I. EXECUTIVE SUMMARY

Acupuncture has always been one of the most intriguing therapy options available in modern medicine. The greatness of using simply needles, with some techniques applied, to trigger specific locations on the human body, can be the solution to curing and relieving pain or sickness, mark the miracle of one of the Chinese people's greatest discoveries after hundreds or even thousands of years of developing and conversing.

Initially conceived as a 3-D system to assist various user segments in learning, exploring, and being involved as a daily companion to support with their daily workflow, related to acupuncture, our Research & Development project has been more than halfway through, with some noteworthy deliverables produced.

After five months, the project has completed more than half of the original plan and is on track to deliver the final product that is prepared for manufacturing. Many adjustments have been made, which has resulted in a number of difficulties for our crew. If we look back on the first half of the project, the most significant thing is that, as a team, we overcame all of the challenges and watched as the final product was progressively created.

This document will provide an overview of some of our completed works, specifics, progress milestones, and team members' contributions throughout the course of the last five months for our R&D project. We are making every effort to complete the projected final product on schedule for the final delivery even though there are still more than two months left..

II. OVERVIEW

II.1. PROJECT DESCRIPTION

The project's goal is to offer a remedy for raising the efficiency and logistical standards of acupuncture treatments. The ultimate system output, called the 3-D acupuncture healthcare data management and treatment system, is a 3-D model website of the human body that shows the acupuncture points and meridian system and allows users to interact with it directly. The solution will be offered as a Web application with a responsive user interface and experience for desktop and mobile devices.

The data-based system with 3-D simulation aimed to provide acupuncture students with a platform to look for reliable knowledge and information related to their field of interest, as well as a good companion that makes it much easier for them to study the acupuncture points, meridians, and important acupuncture locating techniques, with relation to other fields of medicine, in a way that is efficient and simple.

II.2. PROJECT SCOPE & OBJECTIVES

Although many changes have been made from our initially received description and requirements for the project, we try to update the scope and objectives for the project to correspond with the updates continuously. Corresponding to the updates in Project Approach (which we discussed in the Informal Q&R Review presentation with the coordinators) and the change from Client side (which will be mentioned in section V of this document), our detailed goals and objectives for the project of the 3-D acupuncture healthcare data management and treatment system include:

- Acquire an understanding of acupuncture, the basic concept, and principles of the technique in healing pain and treating common diseases.
- Acquire an understanding of the findings of existing experiments on advanced technology to the scope of acupuncture, as an inspiration for the project.
- Being able to come up with proposals about applying advanced technology in acupuncture modeling, to better the functionalities and resolve the problems of some existing solutions in the market.
- Provide a 3-D model of a cut-off human body, with acupuncture points marked and related internal organs, and components included to guide and instruct the implementation of acupuncture treatment.
- Provide a data-based management and information system about acupuncture and knowledge involved within the field, such as the locations, functionalities, injection methods of the points, or the important meridians of human body.

II.3. PROJECT APPROACH

Compared to our initial plan for Project Approach in the Project Proposal document, we are still following the same method from the beginning until now. In terms of the team members and key responsibilities, we have:

Table 1 - Team members and roles

AUT Student ID	Fullname	Role	Responsibilities
21142643	Chuong Pham Dinh	Quality Engineer	Do the testing phases and ensure the working quality of the project's final product.
21142377	Nhan Nguyen Cao	Business Analyst & Front-end Developer	Communicate with the client to understand the requirements, lead in researching for knowledge and information applicable to the scope of the project, and handle developing the Front-end side of the final system.

21142355	Tan Le Tran Ba	Project Manager, Designer	Managing different phases and sections of the project, as well as supporting the design tasks involved within the project.
21142358	Trang Ho Ngoc Thao	Back-end Developer	Responsible mainly in the Back-end side for the completion of the final project.

About the working procedure that was selected from the common approaches for Software Development Life Cycle, our team has selected and still following the Scrum Framework in Agile methodologies. We would have another section to discuss about the detailed procedure applied for the Development phases of our project in Section V of the document. Briefly describing, we conducted 2-week Sprints for periods during the project that smaller updates are planned to be implemented, and 3-week Sprints for later phases of the project, when we would work on the more advanced features and tasks.

Normally, we would conduct a meeting within the team members after one or two weeks to discuss about any difficulties we would meet during the Sprint, and one meeting at the end of Sprint to discuss with our supervisor about finished work and what we plan to implement in the followign Sprint. Please be noted that this would not be true for all the past Sprints, since it depended also on the schedule of our supervisor. However, to ensure the involvement of our Supervisor in every milestone of our project, we agreed to send Weekly Report to our Supervisor via email, and would receive feedback from that.

II.4. PROJECT MAJOR MILESTONES AND DELIVERABLES

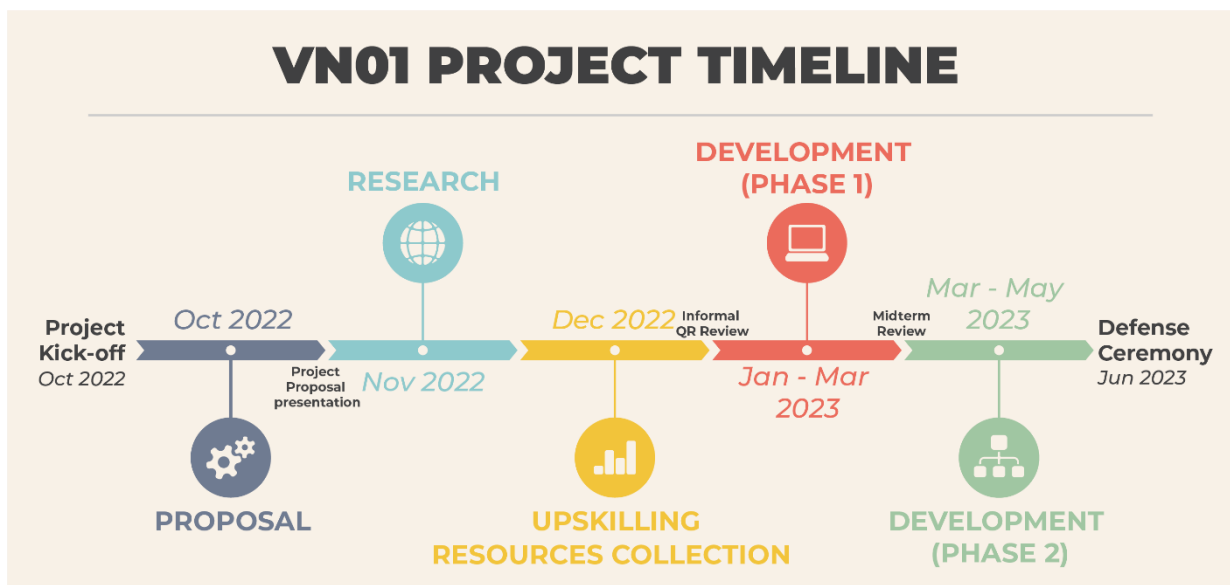


Figure 1 - Initial plan for the main phases of the project

We are still following the on schedule with the initial planned 5 main phases for the project. Up to the Informal Q&R Review presentation delivered in January 2023, we have successfully completed through the first 3 main phases: Proposal, Research and

Upskilling & Resources Collection, through which milestones and deliverables have been recorded.

Following that, the past 2 months have been spent for our first Development phase, while we plan to continue with the second Development phase and wrapping up everything in the remaining months after the Midterm Review presentation.

In basic, our planned deliverables for the project would be the same as in the Project Proposal document, except for one change in the deliverable for the two Development phases that was suggested by our Supervisor, to make the project easier to be released for collecting users' feedback. The list of project's deliverables are defined in the following table:

Table 2 - Project's key phases, milestones and deliverables

Phase	Milestone	Deliverables	Planned Schedule
Proposal	Project Proposal Presentation (early November 2022)	<ul style="list-style-type: none"> Project Proposal document with scope, objectives, approach and implementation plan defined. 	October 2022
Research	Report on the research result (at the end of November 2022)	<ul style="list-style-type: none"> Understanding about the approach methods for the next phases. Decision about the technical solution and data solution to follow. A list of requirements collected following the changes in target users. 	November 2022
Upskilling & Resources Collection	Report on skill improvement and data selected (at the end of December 2022) Informal QR Review (mid-January 2023)	<ul style="list-style-type: none"> Data collected from suggested trustful medical resources, to be used in the final product. 3-D model in ready-for-production state to be implemented to the final product. 	December 2022
Development (phase 1)	Formal Midterm Review (mid-March 2023)	<ul style="list-style-type: none"> Model integrated and in ready mode for using in the staging server Designed prototypes for the final product Interactive Front-end interface from the prototypes deployed in the staging server. 	January – early March 2023

Development (phase 2)	Defense Ceremony <i>(at the beginning of June 2023)</i>	<ul style="list-style-type: none"> • Testing document with results of user testing documented in details. • Final version of the product, deliverable with completed layouts and features, deployed into live server for production. 	late March – June 2023
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III. CHANGES

III.1. CHANGES IN TARGET USERS

From the beginning until now, our project has been through 2 major changes and updates. The first change was based on the feedback we received after the Project Proposal presentation, which is the change in Target Users for the final product.

Our team started collecting requirements from Dr. William Liu (our client) during the first month for Project Proposal preparation. However, due to the changes from Research-leaning approach for the project to Research & Development-leaning approach for the project, we were recommended by the coordinators to start finding real users for the final product, as Dr. William Liu would be the Client owning the product, but not the final target users.

In the first step, our team tried to approach some acupuncturists in Vietnam to ask for their demand in using a similar product to support with their everyday workflow (as planned in the first step, that the final product would be a companion for exploring about acupuncture in general and about some treatments using acupuncture). However, after discussing with the acupuncturists, from the specialized perspective, there were some recommendations with our approach:

- In the scope of Traditional Chinese Medicine, the combinations to cure specific diseases are considered unique to each doctor, their prior and experience and the school of Traditional Chinese Medicine that they are following. The acupuncturists suggested that adding the system for storing these, or recommending appropriate combinations of acupuncture points for curing specific diseases is a sensitive topic.
- In their everyday workflow, they do not need for a system like the one we are proposing. The reason is because in order to be a practitioner that can perform acupuncture treatment, normally, they all have remembered the important acupuncture points, their locations and their functionalities. Because of that, they suggested that the product should target the lower level rather than the experienced ones.

Based on the feedback and information received from the acupuncturists, our team has discussed, within the team and with our Supervisor, to decide that:

- We would change the group of target users for the final product from the acupuncturists or practitioners to Medical University Students studying about Acupuncture. Their level and the demand for a companion to support with their studying would be a better match for our proposed product.
- The acupuncturists would be involved into our project as the specialist consultants. They would support the project with providing trusted medical resources, validate the information of the website and also recommend some of their students to be the users for our project.

III.2. CHANGES FROM CLIENT SIDE

About halfway through the duration of our Research & Development project, we received some updates from AUT regarding the condition of Dr. William Liu, our first client.

Further information about the change from the client side to our Research & Development project, as well as our subsequent decisions and modifications to the project's implementation process, will be provided in section V of this document. Dr. William Liu would be the project's client, but our team has been given permission to be the owner of the finished product, which means we have full control over establishing the project's scope, goals, and requirements.

IV. QUICK RECAP

Up to the Informal Q&R Review Presentation in January, the project has been processed to the following milestones so far:

- We have split our team into two sub-teams for handling parallel tasks, to ensure that we can catch up with the schedule, including:
 - **Technical team:** Handling the tasks related to the Technical side of the project, as well as the Development phases of the project.
 - **Design team:** Handling the tasks related to the Design and Users side of the project, in specific, this team is responsible for communicating with the user side to get feedback, and improve the design from the recommendations received.
- The following table shows the tasks and milestones both teams have achieved so far up to the Informal Q&R Review Presentation:

Table 3 - Finished work of the Technical and Design team

Technical team	Design team
Collect specialized information about 14 meridians (including 12 main meridians and 2 extraordinary meridians) and 361 acupuncture points from the suggested trusted medical resources (books and personal slides). The data was stored in Google Spreadsheets for later usage.	
Selected the 3-D human body model to be added to the site, and realistic skin color was added as the texture of the model.	Started with the first step in designing the first version of the Prototype, including layouts for the important scenes.
Set up the code repositories, code bases, CI/CD, and Database instance for storage of the project.	Sent the exported images of basic layouts and stylings for the main scenes to the medical university students to ask for feedback.
Learned the basic skills and performed technical experiments to evaluate the feasibility of using the Three.js library for the project.	

V. CLIENT UPDATE

Through the past 2 months, from the Informal Q&R Review presentation until the Midterm Review presentation, there was one major update on our project's situation relating to the Client side.

Before the Informal Q&R Review presentation for about a few weeks, we lost contact with our client, Dr. William Liu. We tried to reach Dr. Liu through emails and messages on Microsoft Teams but none were responded to. Following that, we reported to ask for further support from the Academic Affairs of ITEC and finally received the updated status of Dr. William Liu on Microsoft Teams.

Unfortunately, as informed by Academic Affairs after discussing with Dr. William Liu, there was one change in our procedure for the project: Dr. Liu has requested to not directly guide the directions for our project in the remaining months. In specific, it means that Dr. William Liu would still be involved in our project as the main Client. However:

- Dr. Liu would not give guidelines or feedback on every phase or milestone of the project we report. Following that, he would still receive and read the updates from our team, but would not give any guidance for future steps.
- Nevertheless, Dr. Liu would still officially be the client of our project, meaning that he would still be involved in the project and would give a final evaluation of our product at the final stage.
- Corresponding to that, our teams are authorized to be the new owner of the product, and we would receive the rights to define the approach, scope, and requirements for the project.

From our team's side, we have discussed with our supervisor and within the team to come up with some decisions following that:

- The current set of requirements of the project has been agreed upon (with both Dr. Liu and our supervisor before the Informal Q&R Review) to be collected from our target users for the final product (the five medical university students). The change in our rights to define the requirements for the project would not make any change to the agreed set of requirements, meaning that they would remain the same as before.
- Similarly, the Scope and Objectives of the project, which have been agreed upon in the first step with Dr. Liu, through the change in approach for the project (from solely Research-leaning to Research & Development-leaning), would remain the same.

To sum up, from our decisions, no changes were made except for the change in our rights to define the project. We would continue the project with our current approach for the remaining months.

As we started the Development phase after the Informal Q&R Review presentation and to make sure that it is updated with the new situation, we have redefined our team's procedure for Development. The details are shown in the following diagram:

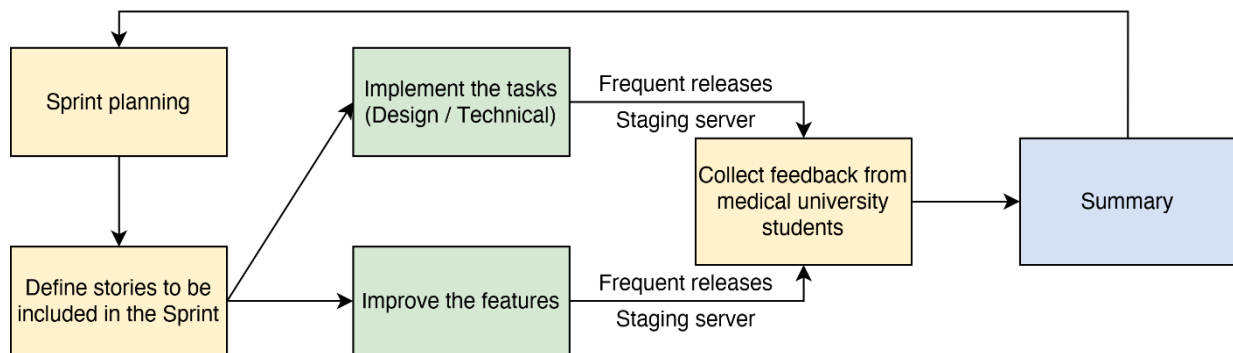


Figure 2 - Updated procedure for our team's development phase

- Every Sprint starts with **Sprint planning**, from which we **define the stories to be included** in the implementation of the Sprint. There would be two different types of stories:
 - **Implement the new tasks** from the list of unfinished ones (either Design or Technical tasks)
 - **Improve the features** that are containing bugs or are suggested to be improved.
- For the stories implemented, we **Collect feedback from the medical university students** through **Frequent releases** (set up through CD to our Staging server), without waiting for feedback and agreement from the Client (Dr. Liu) side.
- At the end of each Sprint, we would **summarize the progress** and define whether any of the unfinished stories is kept to the next Sprint.
- After all the procedure is completed, for one or two Sprints (depending on how much change has been implemented during the Sprints), we would **report once to Dr. Liu** and move forward with another Sprint, without waiting for a response.

VI. SPRINTS REPORT

VI.1. TIMELINE

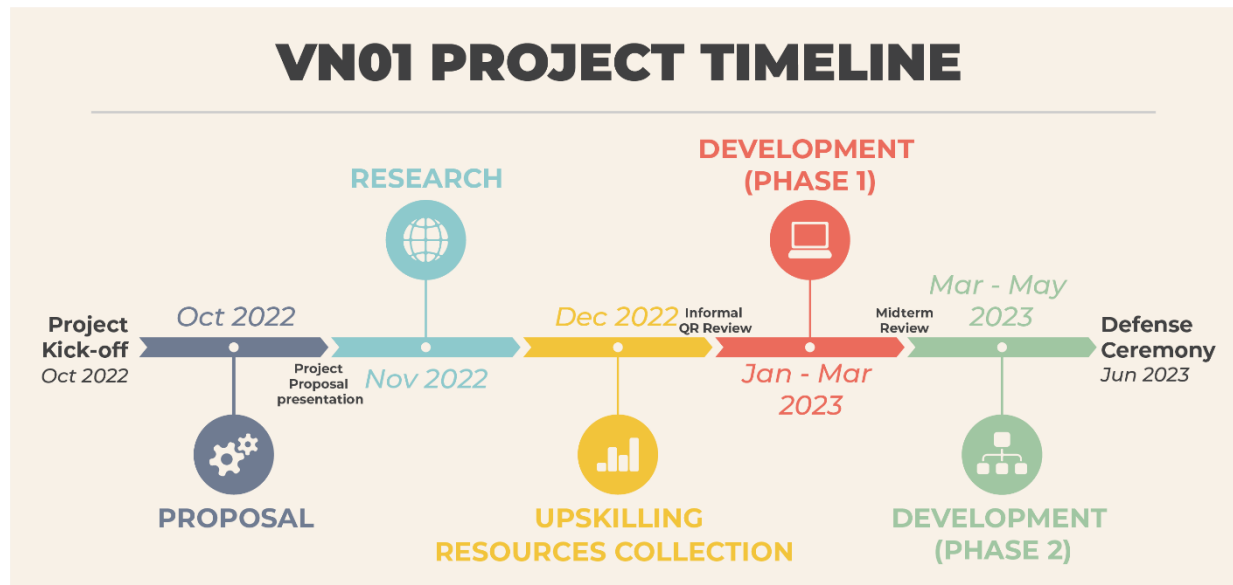


Figure 3 - Initial plan for the main phases of the project

Based on the initial plan for the project, the period between Informal Q&R Review and Midterm Review would be spent solely on Development (Phase 1). During the period, we have completed a total of 4 Sprints and are currently in the second half of the 5th Sprint, each lasting for exactly 2 weeks. The details of our Sprints during the last 2 months are as follows:

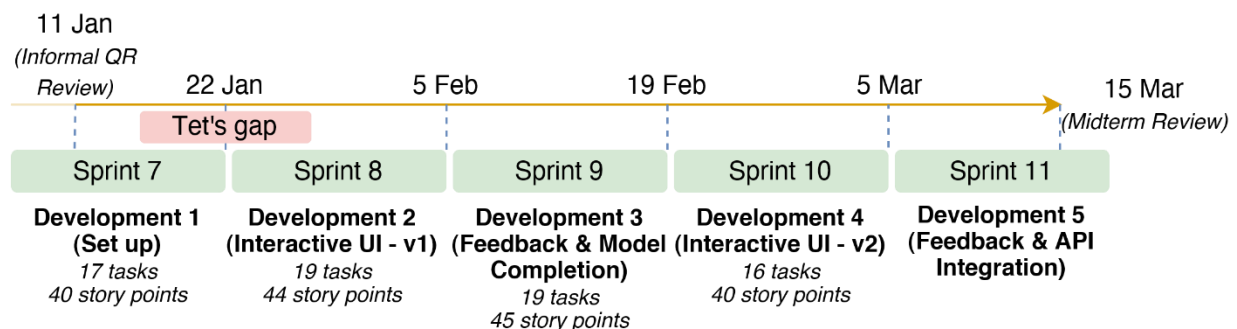


Figure 4 - Timeline of the Sprints

For the Sprints, we focused iteratively on building our two versions of the Interactive UI, with one following Sprint for collecting feedback, improving the UI, and completing the unfinished advanced items of the product.

Based on the schedule of ITEC, we initially plan to take 2 weeks off for the Tet holiday in Vietnam. However, after discussing with our supervisor, and within the team members, we agreed that the team members would take days off interleaved during the Tet holiday, to ensure that we are still keeping the project running during Tet. Because of that, there was no gap between Sprint 7 and Spring 8 in our timeline.

VI.2. SPRINT PLANNINGS

VI.2.1. SPRINT 7 – DEVELOPMENT 1 (SET UP)

Sprint Objectives:

- Set up the code repositories for the project (both Front-end and Back-end).
- Set up MongoDB database instance to be used in the project.
- Set up CI/CD pipeline for the project (CI for auto-running unit tests on code submission and CD for auto deployment to the staging server for frequent releases).
- Label acupuncture points of the first batch of 5 main meridians (LU – Lung, LI – Large Intestine, ST – Stomach, SP – Spleen, and HT – Heart) to the 3-D model.
- Write scripts to add data of acupuncture points and meridians to the Database.

Sprint Timeline:

Timeline: 9 Jan 2023 – 22 Jan 2023

Duration: 2 weeks

Table 4 – Sprint 7 timeline

Week	Timeline	Detail
1	9 Jan 2022 – 15 Jan 2023	Set up project repositories Set up code base (ReactJS) for Front-end Set up code base (NestJS) for Back-end Set up MongoDB + PostgreSQL database instances Draw acupuncture points for LU, LI meridian to layout Create prototype – Version 1 (Stage 2)
2	16 Jan 2023 – 22 Jan 2023	Set up CI/CD for Front-end Set up CI/CD for Back-end Draw acupuncture points for ST, SP, HT meridian to layout Create prototype – Version 1 (Stage 3) Write scripts to add meridians and acupuncture points data to the Database

Sprint Details:

Table 5 – Sprint 7 details

Task ID	Task name	Story points	Estimated effort (h)	Actual effort (h)	Assignee
1	Set up project repositories	1	2	35m	Nhan Nguyen Cao
2	Set up code base for Front-end	2	5	2h 18m	Nhan Nguyen Cao
3	Set up code base (NestJS) for Back-end	2	5	3h 48m	Trang Ho Ngoc Thao
4	Set up connection mechanism from Back-end server to MongoDB database	1	4	2h 57m	Trang Ho Ngoc Thao
5	Set up connection mechanism from Back-end server to PostgreSQL database	2	4	5h 25m	Trang Ho Ngoc Thao
6	Set up CircleCI for Front-end	2	4	1h 18m	Nhan Nguyen Cao
7	Set up CD for Front-end (Staging)	3	7	3h 25m	Nhan Nguyen Cao
8	Set up CircleCI for NestJS Back-end	3	7	4h 53m	Nhan Nguyen Cao
9	Draw to layout: LU meridian	3	6	5h 23m	Tan Le Tran Ba
10	Draw to layout: LI meridian	2	4	2h 48m	Tan Le Tran Ba
11	Draw to layout: ST meridian	3	6	4h 35m	Chuong Pham Dinh
12	Draw to layout: SP meridian	3	6	4h 11m	Chuong Pham Dinh
13	Draw to layout: HT meridian	2	5	3h 10m	Chuong Pham Dinh
14	Write script to add data of 60 important acupuncture points to database	3	7	4h 44m	Trang Ho Ngoc Thao
15	Write script to add data of 301 other acupuncture points to database	3	7	5h 28m	Trang Ho Ngoc Thao

16	Write script to add data of 14 meridians to database	2	5	2h 13m	Nhan Nguyen Cao
17	Create prototype - Version 1	3	12	13h 28m	Tan Le Tran Ba
Total	17 tasks	40	96		

VI.2.2. SPRINT 8 – DEVELOPMENT 2 (INTERACTIVE UI – V1)

Sprint Objectives:

- Validate the integrated data about 14 meridians and 361 acupuncture points in the project's MongoDB database instance.
- Handle the first version of Interactive UI, based on Prototype V1.
- UI testing the first version of Interactive UI.
- Label acupuncture points of the second batch of 4 main meridians (SI – Small Intestine, BL – Bladder, KI – Kidney, PC - Pericardium) to the 3-D model.
- Integrate the Authentication flow (using Google accounts) for the final product.

Sprint Timeline:

Timeline: 23 Jan 2023 – 5 Feb 2023

Duration: 2 weeks

Table 6 – Sprint 8 timeline

Week	Timeline	Detail
1	23 Jan 2023 – 29 Jan 2023	<p>Validate and update the integrated data about 14 meridians and 361 acupuncture points in the project's MongoDB database instance.</p> <p>Build the first version of interactive UI: Authentication pages, Edit profile page, Forgot password page, Home page, and Details page, Quiz page.</p> <p>UI Testing the completed scenes parallelly with the development.</p> <p>Label acupuncture points of the second batch of 2 main meridians (SI, BL) to the 3-D model.</p>
2	30 Jan 2023 – 5 Feb 2023	<p>Build the first version of interactive UI: Advanced search page, Data management page, Personal records page, and About page.</p> <p>UI Testing the completed scenes parallelly with the development.</p>

		<p>Label acupuncture points of the second batch of 2 main meridians (KI, PC) to the 3-D model.</p> <p>Research and integrate Authentication mechanism using a Google account or Email.</p>
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Sprint Details:

Table 7 - Sprint 8 details

Task ID	Task name	Story points	Estimated effort (h)	Actual effort (h)	Assignee
1	Validate and update data of 14 meridians in MongoDB database.	2	3	2h 35m	Trang Ho Ngoc Thao
2	Validate and update data of 361 acupuncture points in MongoDB database.	2	5	3h 18m	Trang Ho Ngoc Thao
3	Handle the interactive UI: Authentication pages (Sign Up and Log In)	2	4	45m	Nhan Nguyen Cao
4	Handle the interactive UI: Profile pages (Edit Profile and Forgot Password)	2	4	1h 30m	Nhan Nguyen Cao
5	Handle the interactive UI: Home page	2	6	2h 28m	Nhan Nguyen Cao
6	Handle the interactive UI: Quiz page	3	7	4h 57m	Nhan Nguyen Cao
7	Handle the interactive UI: View details page	2	3	2h 55m	Nhan Nguyen Cao
8	UI Testing the first version of interactive UI (Part 1 – Authentication, Profile, Home, Quiz and View details)	3	8	6h 33m	Chuong Pham Dinh
9	Draw to layout: SI meridian	2	4	3h 05m	Chuong Pham Dinh
10	Draw to layout: BL meridian	3	6	4h 50m	Chuong Pham Dinh
11	Handle the interactive UI: Advanced Search page	3	7	3h 18m	Nhan Nguyen Cao

12	Handle the interactive UI: Data Management page	2	3	1h 25m	Nhan Nguyen Cao
13	Handle the interactive UI: Personal Records page	3	8	4h 35m	Nhan Nguyen Cao
14	Handle the interactive UI: About page	2	4	3h 18m	Nhan Nguyen Cao
15	UI Testing the first version of interactive UI (Part 2 – Advanced Search, Data Management, Personal Records, About)	3	8	8h 14m	Chuong Pham Dinh
16	Draw to layout: KI meridian	2	4	2h 35m	Tan Le Tran Ba
17	Draw to layout: PC meridian	2	4	2h 27m	Tan Le Tran Ba
18	Research about integrating Firebase authentication into the system	2	3	1h 58m	Trang Ho Ngoc Thao
19	Integrate Firebase authentication into the system for 2 methods: Email or Google Provider	3	5	3h 44m	Trang Ho Ngoc Thao
Total	19 tasks	44	96	64h 30m	

VI.2.3. SPRINT 9 – DEVELOPMENT 3 (FEEDBACK & MODEL COMPLETION)

Sprint Objectives:

- Collect user feedback from the target users (medical university students) and supervisor about the First version of the Interactive prototype.
- Label acupuncture points of the final batch of 3 main meridians (TE – Triple Energizer, GB – Gallbladder, Liv – Liver) and 2 extraordinary meridians (Du and Ren) to the 3-D model.
- Design and implement feature test cases for Interactive Prototype – V1.
- Research advanced mouse effects (hovering and clicking) and camera effects (focusing on items) in the Three.js library.
- Handle the API endpoints for storing, retrieving, and updating information about the meridians and acupuncture points.
- Complete the model in ready-for-production status, by optimizing the interactions and reducing lags.

Sprint Timeline:

Timeline: 6 Feb 2023 – 19 Feb 2023

Duration: 2 weeks

Table 8 - Sprint 9 timeline

Week	Timeline	Detail
1	6 Feb 2023 – 12 Feb 2023	<p>Collect user feedback from the target users (medical university students) and supervisor about the First version of the Interactive prototype.</p> <p>Handle the API endpoints for storing, retrieving, and updating information about the meridians.</p> <p>Label acupuncture points of the second batch of 3 main meridians (TE, GB, Liv) to the 3-D model.</p> <p>Research and conduct technical experiments on advanced mouse effects (hovering and clicking) and camera effects (focusing on items) in the Three.js library.</p> <p>Design feature test cases for Interactive Prototype – V1.</p>
2	13 Feb 2023 – 19 Feb 2023	<p>Summary user feedback from target users and supervisor about the First version of the Interactive prototype.</p> <p>Discuss the changes based on the summarized feedback on the Interactive prototype – V1 for V2.</p> <p>Handle the API endpoints for storing, retrieving, and updating information about the acupuncture points.</p> <p>Label acupuncture points of the second batch of 2 extraordinary meridians (Du, Ren) to the 3-D model.</p> <p>Optimize the interactions on the 3-D model and reduce lag.</p> <p>Implement feature test cases for Interactive Prototype – V1</p>

Sprint Details:

Table 9 - Sprint 9 details

Task ID	Task name	Story points	Estimated effort (h)	Actual effort (h)	Assignee
1	Send interactive UI V1 to the students to get feedback about the prototype	2	4	6h 47m	Tan Le Tran Ba
2	Set up API endpoint for getting meridian information	1	3	3h 23m	Trang Ho Ngoc Thao
3	Set up API endpoint for updating meridian information	2	4	2h 58m	Trang Ho Ngoc Thao
4	Draw to layout: TE meridian	2	4	3h 45m	Tan Le Tran Ba
5	Draw to layout: GB meridian	3	6	7h 33m	Trang Ho Ngoc Thao
6	Draw to layout: Liv meridian	2	4	3h 41m	Chuong Pham Dinh
7	Research hovering and clicking the acupuncture points and meridians	2	4	2h 15m	Nhan Nguyen Cao
8	Research changing camera focus to the selected meridian or acupuncture points	2	4	1h 48m	Nhan Nguyen Cao
9	Technical experiments of mouse and camera effects on the 3-D model	3	6	5h 30m	Nhan Nguyen Cao
10	Design feature test cases for Interactive Prototype – V1	3	8	6h 45m	Chuong Pham Dinh
11	Summary the feedback about interactive UI V1 from the medical students and supervisor	3	6	4h 45m	Tan Le Tran Ba
12	Create the second version for prototype V2 based on the feedback received from V1 (Stage 1)	2	6	8h 25m	Tan Le Tran Ba
13	Draw to layout: Du meridian	2	4	2h 25m	Nhan Nguyen Cao

14	Draw to layout: Ren meridian + extra points	2	5	3h 50m	Chuong Pham Dinh
15	Set up API endpoint for getting acupuncture point information	3	6	2h 25m	Trang Ho Ngoc Thao
16	Set up API endpoint for updating acupuncture point information	3	6	3h 19m	Trang Ho Ngoc Thao
17	Implement feature test cases for Interactive Prototype – V1	3	6	6h 32m	Chuong Pham Dinh
18	Optimize interactions for the model in Three.js	3	6	2h 15m	Nhan Nguyen Cao
19	Reduce lag for the model integrated to the site using Three.js	2	4	3h 48m	Nhan Nguyen Cao
Total	19 tasks	45	96	82h 09m	

VI.2.4. SPRINT 10 – DEVELOPMENT 4 (INTERACTIVE UI – V2)

Sprint Objectives:

- Finalize the second version of Prototype, based on the feedback received from Prototype V1.
- Handle the second version of Interactive UI, based on Prototype V2.
- UI testing the second version of Interactive UI.
- Handle the API endpoints for authentication.
- Validate all the finished API endpoints and improve test coverage.
- Integrate the 3-D model with all acupuncture points and meridians labeled, and camera and mouse effects added.
- Handle the Quiz flow with different types of questions for reviewing learned knowledge (Front-end).

Sprint Timeline:

Timeline: 20 Feb 2023 – 5 Mar 2023

Duration: 2 weeks

Table 10 - Sprint 10 timeline

Week	Timeline	Detail
1	20 Feb 2023 – 26 Feb 2023	Finalize the second version of Prototype, based on the feedback received from Prototype V1.

		<p>Fix pending UI and feature bugs that existed from version 1 of Interactive UI.</p> <p>Integrate the hovering and clicking effects into the 3-D model.</p> <p>Integrate the focus-to-item camera effect into the 3-D model.</p> <p>Handle the API endpoints for authentication</p>
2	27 Feb 2023 – 5 Mar 2023	<p>Handle the second version of Interactive UI, based on Prototype V2.</p> <p>Integrate interactive questions for the quiz feature.</p> <p>UI testing the second version of Interactive UI.</p> <p>Validate all the finished API endpoints and improve test coverage.</p>

Sprint Details:

Table 11 – Sprint 10 details

Task ID	Task name	Story points	Estimated effort (h)	Actual effort (h)	Assignee
1	Create the second version for prototype V2 based on the feedback received from V1 (Stage 2)	2	5	7h 38m	Tan Le Tran Ba
2	Resolve pending UI and feature bugs existed from interactive UI – V1	2	5	2h 15m	Nhan Nguyen Cao
3	Handle the API endpoints for storing and getting account information	2	5	4h 25m	Trang Ho Ngoc Thao
4	Handle the API endpoints for updating account information	3	7	5h 22m	Trang Ho Ngoc Thao
5	Integrate the hovering and clicking effects to the 3-D model	2	5	3h 28m	Nhan Nguyen Cao
6	Integrate the focus-to-item camera effect to the 3-D model	2	5	2h 49m	Nhan Nguyen Cao

7	Review and update descriptions for UI and feature test cases of Interactive prototype V1	2	5	7h 51m	Chuong Pham Dinh
8	Integrate interactive questions for quiz feature – prototype V2	3	7	4h 18m	Nhan Nguyen Cao
9	Update interactive prototype V2 – Home page + Landing page	3	7	4h 22m	Nhan Nguyen Cao
10	Update interactive prototype V2 – Quiz page	3	7	2h 18m	Nhan Nguyen Cao
11	Update interactive prototype V2 – Advanced search page + Details page	2	5	1h 31m	Nhan Nguyen Cao
12	Validate all the finished API endpoints and improve test coverage	3	7	6h 29m	Trang Ho Ngoc Thao
13	Design test cases for new Quiz feature	3	7	5h 13m	Chuong Pham Dinh
14	Design test cases for new Model interaction on home page	3	7	6h 18m	Chuong Pham Dinh
15	UI testing the second version of Interactive UI	2	5	4h 55m	Chuong Pham Dinh
16	Create prototype - Responsive Design (Mobile – Stage 1)	3	7	8h 57m	Tan Le Tran Ba
Total	16 tasks	40	96	78h 09m	

VI.2.5. SPRINT 11 – DEVELOPMENT 5 (FEEDBACK & API INTEGRATION)

Sprint Objectives:

- Collect user feedback from the target users (medical university students) and supervisor about the Second version of the Interactive prototype.
- Design and implement feature test cases for Interactive Prototype – V2.
- Fix reported UI bugs from Interactive Prototype – V2.
- Stage 1: Update the Interactive Prototype V2 from feedback collected from target users and supervisor.
- Handle the API endpoints for storing quizzes' results, and personal records.

- Continue with responsive design for Mobile and start with responsive design for Tablet.
- Prepare for the Midterm Review presentation.
- Improve unit test coverage for the Front-end side of the project.

Sprint Timeline:

Timeline: 6 Mar 2023 – 19 Mar 2023

Duration: 2 weeks

Table 12 – Sprint 11 timeline

Week	Timeline	Detail
1	6 Mar 2023 – 12 Mar 2023	<p>Collect user feedback from the target users (medical university students) and supervisor about the Second version of the Interactive prototype.</p> <p>Fix reported UI bugs from Interactive Prototype – V2.</p> <p>Design feature test cases for Interactive Prototype – V2.</p> <p>Prepare documents, presentation slides, and presenting speech for the Midterm Review presentation.</p>
2	13 Mar 2023 – 19 Mar 2023	<p>Stage 1: Update the Interactive Prototype V2 from feedback collected from target users and supervisor.</p> <p>Continue with responsive design for Mobile and start with responsive design for Tablet.</p> <p>Improve unit test coverage for the Front-end side of the project.</p> <p>Deliver the Midterm Review presentation.</p> <p>Implement feature test cases for Interactive Prototype – V2.</p> <p>Handle the API endpoints for storing quizzes' results, and personal records.</p>

Sprint Details:

Table 13 – Sprint 11 details

Task ID	Task name	Story points	Estimated effort (h)	Actual effort (h)	Assignee
1	Send interactive UI V2 to the students to get feedback about the prototype	2	5	-	Tan Le Tran Ba
2	Prepare content for the Midterm Formal Review presentation	3	7	-	Nhan Nguyen Cao
3	Prepare slide for the Midterm Formal Review presentation	3	7	-	Trang Ho Ngoc Thao
4	Prepare Progress Report document for Midterm Review	3	7	-	Trang Ho Ngoc Thao
5	Resolve pending UI and feature bugs that existed from interactive UI – V2	2	5	-	Nhan Nguyen Cao
6	Design and document additional feature test cases for Quiz feature and new model interactions.	3	7	-	Nhan Nguyen Cao
7	Prepare speech content for the Midterm Formal Review presentation	3	7	-	Chuong Pham Dinh
8	Summary the feedback about interactive UI V2 from the medical students and supervisor	2	5	-	Nhan Nguyen Cao
9	Update Prototype V2 based on feedback collected from the medical students and supervisor	3	7	-	Nhan Nguyen Cao
10	Update the Interactive Prototype V2 from feedback collected from target users and supervisor (Stage 1 – Fix the pending UI and vision bugs)	3	7	-	Nhan Nguyen Cao

11	Handle the API endpoints for storing quizzes' results, personal records	3	7	-	Nhan Nguyen Cao
12	Implement feature test cases for Interactive Prototype – V2	2	5	-	Trang Ho Ngoc Thao
13	Improve unit tests coverage for the Front-end side of the project	2	5	-	Chuong Pham Dinh
14	Create prototype – responsive design for Mobile (wrap-up)	2	5	-	Chuong Pham Dinh
15	Create prototype – responsive design for Tablet (stage 1)	3	7	-	Chuong Pham Dinh
16	Wrap up for Midterm Review presentation and submission	1	3	-	Tan Le Tran Ba
Total	16 tasks	40	96	Pending	

VII. FINISHED WORKS & DEMO

VII.1. SPECIALIZED DATA INTEGRATION

Up to the Informal Q&R Review presentation, all four team members have successfully collected all the required information for display, relating to the selected 361 acupuncture points among the 14 meridians. We stored the data in Google Spreadsheets for easy access between the team members during the Data Collection Sprint.

A1	A	B	C	D	E	F
	Acupuncture point code	Acupuncture point name	Acupuncture point description	Acupuncture point location	Acupuncture point functionality	Acupuncture point triggering method
1	M-HN-3	Án đường	Huyệt nằm ở chính giữa đường nối hai đầu lông mày, giống từ giữa sống mũi thẳng trở lên.	Dưới hiệu là chỗ bám của hai cơ thấp, chỗ tiếp khớp của hai xương sống mũi và xương trán. Thần kinh vận động cơ là nhánh của dây thần kinh mặt. Da vùng huyệt chi phối bởi dây thần kinh số não số V.	1. Nhức đầu 2. Nghẹt mũi 3. Cảm mạo 4. Đau kinh 5. Trẻ con cơ giật 6. Hoa mắt, chóng mặt	Châm xiên, từ trên xuống, khi châm bóp hai bên Toàn trực tại để châm xuống hoặc hướng về phía phải hay trái, xuyên thẳng xuống huyệt Tinh minh hay Toàn trực, sâu 0.5 - 1 thốn. Tại chỗ có cảm giác căng tức có khi lan đến vùng chóp mũi. Khi bệnh nhân bớt châm có thể châm xong nặn ra một ít máu. Ôn cứu 3 - 5 phút
3	Du-20	Bách hội	Giao hội huyết của mạch Đốc và 8 kinh dương. Khi điểm huyết ngồi ngay thẳng, kéo vòng hai bên đỉnh tai lên ngay giữa đầu. Huyệt là điểm gặp nhau của hai đường vuông góc. Một là đường ngang qua đỉnh vành tai và một đường dọc qua giữa đầu, sờ vào đó có một khe hõm nhỏ.	Dưới huyệt là căn sọ, dưới nữa là xương sọ. Da vùng huyệt chi phối bởi tiết đoạn thần kinh C2.	1. Nhức đỉnh đầu 2. Sốt trường 3. Nghẹt mũi 4. Nặng đầu hay quên 5. Đau cổ 6. Hôn mê lạnh 7. Ú tai, hoa mắt 8. Hồi hộp, mất ngủ	Châm xiên, hướng mũi kim ra phía trước sau hoặc phải trái. Không được châm đứng xuống sọ. Sâu 0.5 - 1.5 thốn. Tại chỗ có cảm giác căng đau. Cứu 3 lần, ở Trung quốc xử lạnh thường hau cứu, còn nước ta không nên cứu vì xử nóng. Nếu cứu nhiều trợ cho hỏa khí đi lên có thể gây nhức đầu, chóng mặt, ú tai, suy nhược thần kinh. Ôn cứu 5 - 20 phút
4	GB-20	Phong trì	Giao hội huyết của 2 kinh thủ túc Thiếu Dương và mạch Dương duy. Xác định dây hộp sọ, cơ thang và cơ ức-dỡ-chũm. Huyệt nằm ở chỗ hõm do bờ trong cơ ức-dỡ-chũm và bờ ngoài cơ thang bám vào dây hộp sọ tạo nên.	Dưới huyệt là góc tạo nên bởi cơ thang và cơ ức-dỡ-chũm, đây là cơ gờ đầu và cơ đầu dài. Dưới là dây hộp sọ. Thần kinh vận động cơ là nhánh của dây cổ 2, nhánh của dây thần kinh chẩm lớn, nhánh của dây thần kinh dưới chẩm. Da vùng huyệt chi phối bởi tiết đoạn thần kinh C2.	1. Đau đầu 2. Cứng cổ, cứng gáy 3. Cảm mạo 4. Hoa mắt, bệnh mắt 5. Viêm mũi 6. Ú tai 7. Huyết áp cao 8. Đau kinh 9. Liệt nửa người 10. Bệnh ở não 11. Trúng gió	Châm thẳng, ngang với trái tai hơi hướng xuống dưới, khi châm huyết này thì hướng mũi kim qua mắt bên kia, sâu 1 - 1.5 thốn, tại chỗ có cảm giác căng tức có khi giật tới đỉnh đầu, vùng xương vành tai, trước trán hoặc lan ra hồ mắt. Châm xiên hướng Phong trì bên kia, sâu 2 - 3 thốn, tại chỗ có cảm giác căng tức, có khi lan ra vùng cổ. Cứu 3 - 7 lần. Ôn cứu 5 - 10 phút
5	GB-3	Thái dương	Xác định huyết Hạ quan, đo thẳng lên, ở bờ trên xương gò má. Huyệt ở chỗ bờ sau chân tóc mai.	Dưới huyệt là cơ tai trước, cơ thái dương, xương thái dương. Thần kinh vận động cơ là nhánh dây mặt, nhánh số não số V. Da vùng huyệt chi phối bởi tiết đoạn thần kinh V3.	1. Ú tai, điếc 2. Viêm tai giữa 3. Đau răng cảm khẩu 4. Liệt mặt	Châm thẳng, sâu 0.7 - 1 thốn. Không cứu. Ôn cứu 3 - 5 phút
6	SI-19	Thính cung	Giao hội huyết của kinh thủ Thái dương và thủ túc Thiếu dương	Dưới huyệt là bờ sau tuyến mang tai, bờ sau lỗ cầu xương hàm dưới. Da vùng huyệt	1. Ú tai, điếc	Châm thẳng, hơi há miệng, mũi kim hơi hướng xuống dưới, sâu 1.5 - 2 thốn. Tại chỗ có cảm giác căng tức đau, có khi tê

Figure 5 - Data during collection was stored in Google Spreadsheets

During the first Sprint for Development, focusing on Setting up, we also implemented writing some Python scripts (with the help of PyMongo library) to integrate the data from rows inside Spreadsheets into ready-to-use documents in our MongoDB Database instance.

```

In [1]: import numpy as np
import pandas as pd

In [2]: sheets = ["Nhân (V)", "Nhân (E)", "Tân (V)", "Tân (E)", "Chương (V)", "Chương (E)", "Trang (V)", "Trang (E)"]

In [3]: # Read data
df_data = pd.read_excel("DATA COLLECTION (60 IMPORTANT POINTS).xlsx", sheet_name=sheets)
for sheet in df_data:
    df_data[sheet] = df_data[sheet].iloc[:, :7]

In [4]: df_data["Tân (V)"].head()
Out[4]:

```

	Acupuncture point code	Acupuncture point name	Acupuncture point description	Acupuncture point location	Acupuncture point functionality	Acupuncture point triggering method	Caution
0	St-25	Thiên xu	Tử huyết Thần khuyết (giữa rốn) do ra 2 thốn	Dưới huyết là gần cơ chéo to, cơ thẳng to, mạc...	1. Viêm phúc mạc/vn2. Viêm dạ dày cấp mãn tính...	Châm thẳng, sâu 1-2 thốn. Cứu 5-7 lửa. Ôn cứu ...	NaN
1	LU-1	Trung phủ	Bờ dưới xương đòn gập, ngang với cơ ngực to. ...	Dưới huyết là rãnh cơ ngực to, cơ ngực ẻ, cơ ...	1. Viêm khí quản, viêm phổi/vn2. Lao phổi/vn3. H...	Châm xiên, hướng mũi kim ra ngoài lên trên, sả...	NaN
2	Du-14	Đại chủy	Khi điểm huyết ngồi ngay hơi cúi đầu xuống một...	Dưới huyết là cơ gần thang, cơ gần trâm, gần ...	1. Cứng gáy, vẹo cổ/vn2. Nhiệt cấp tính, sốt ca...	Châm thẳng, hơi xiên lên trên 1 - 1,5 thốn, tạ...	Trong trường hợp tiết ứ dịch phế quản khi về ...
3	BI-13	Phế du	Huyết là nơi gặp nhau của đường thẳng đứng ngo...	Dưới huyết là cơ thang, cơ trâm, cơ răng cưa b...	1. Viêm khí quản/vn2. Suyễn/vn3. Viêm phổi, lao ...	Châm thẳng, hơi xiên về phía cột sống, sau 0,5...	Bên dưới là phổi, không châm sâu quá
4	BI-14	Quyết âm du	Huyết là nơi gặp nhau của đường thẳng đứng các...	Dưới huyết là cơ thang, cơ trâm, cơ răng cưa b...	1. Thấp tim/vn2. Thần kinh suy nhược/vn3. Đau th...	Châm thẳng, hơi xiên xuống đốt sống lưng, sâu ...	NaN

```

In [5]: # Connect to database
import pymongo

```

Figure 6 - An example of one among the Jupyter notebooks used for integrating collected data into the Database

During the integration process, we also performed basic validation and format the data rows to ensure there were no incompatibilities between the documents (mostly due to different formats in the way each member of the team used to type the data into the Spreadsheets, although the skeleton about which piece of information to collect has been defined at the beginning). The final version of the data stored successfully in our MongoDB Database is as follows:

rnd-cycle13-vn01.acupoints_en

Documents Aggregations Schema Explain Plan Indexes Validation

Filter { "code": { \$in : ["M-HN-3", "Du-20", "GB-20", "GB-3"] } }

ADD DATA EXPORT COLLECTION

```

_id: ObjectId('63d546116d5a116a5a5526e4')
code: "GB-20"
name: "Fengchi"
description: "At the level of Pt. Fengfu, in the depression between musculus trapezi..."
anatomy: "The needle passes through the skin, subcutis, between musculus sterno-..."
> functionalities: Array
technique: "Insert the needle 1 - 1.5 cun towards the eyeball of the opposite side..."
caution: "It is not allowed to puncture too deep, to avoid injuring the medulla ..."

_id: ObjectId('63d546116d5a116a5a5526e2')
code: "M-HN-3"
name: "Yintang"
description: "At the middle point between the medial ends of the two eyebrows"
anatomy: "The needle passes through skin, subcutis, musculus depressor glabellae..."
> functionalities: Array
technique: "0.6 - 1 cun horizontally downwards or penetrate horizontally toward th..."

_id: ObjectId('63d546116d5a116a5a5526e3')
code: "Du-20"
name: "Baihui"
description: "At the junction between the line connecting the apices of both ears an..."
anatomy: "The needle passes through aponeurotica, and reaches the subaponeurotic..."
> functionalities: Array

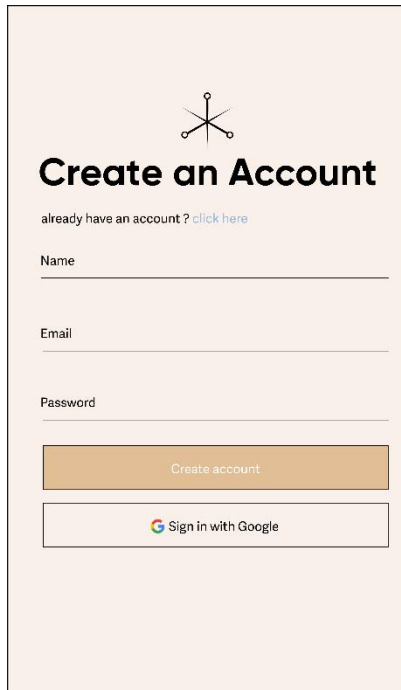
```

Figure 7 - Ready-to-use documents in the MongoDB database

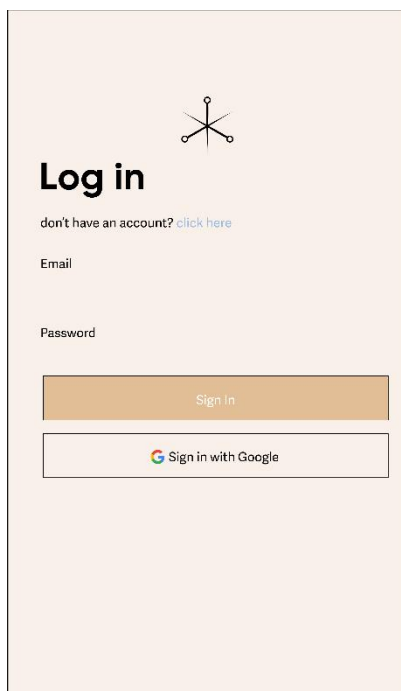
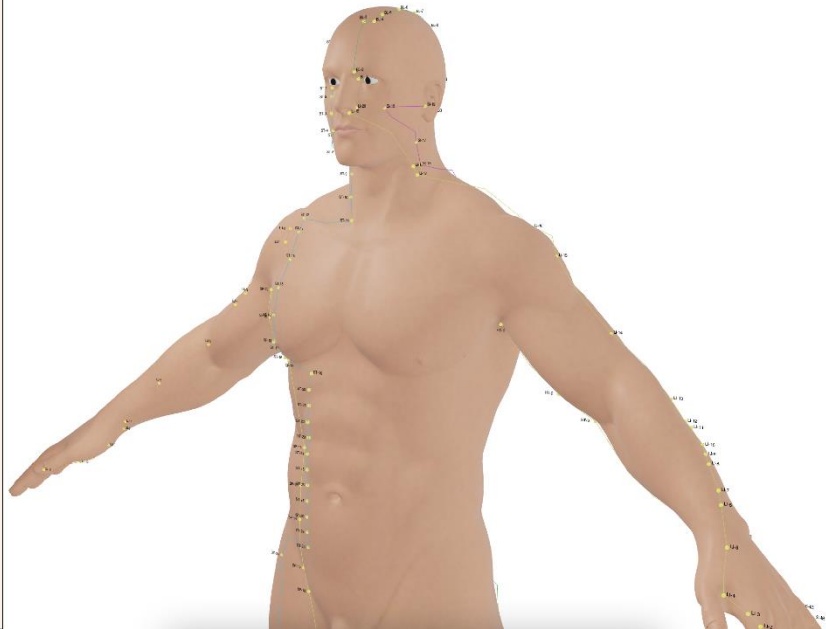
VII.2. PROTOTYPE FOR DESKTOP

Following the Informal Q&R Review presentation, the designs for all of the scenes involved within the final product have also been finished for Desktop devices. Here are the designs of our First version of Prototype for Desktop:

- **Authentication:** Sign Up and Log In pages



The 'Create an Account' form features a stylized logo at the top, followed by the title 'Create an Account'. Below the title is a link for users who already have an account. The form includes input fields for 'Name', 'Email', and 'Password'. At the bottom, there are two buttons: 'Create account' and 'Sign in with Google'.



The 'Log in' form features the same stylized logo at the top, followed by the title 'Log in'. Below the title is a link for users who don't have an account. The form includes input fields for 'Email' and 'Password'. At the bottom, there are two buttons: 'Sign in' and 'Sign in with Google'.

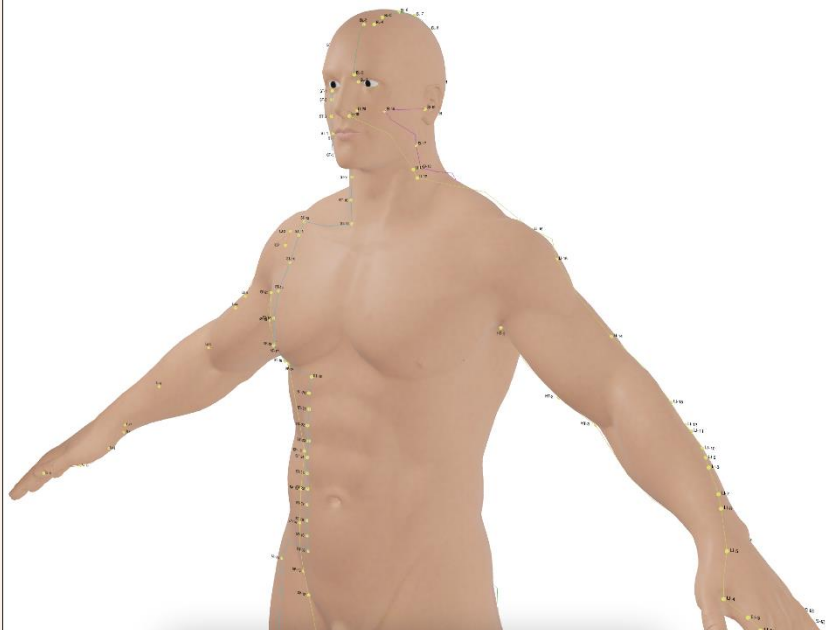


Figure 8 - Prototype V1: Authentication pages

- **Home page:** with basic information and controls added to the side panel. The white image is used to mark the region of the page where the model would be integrated during development.

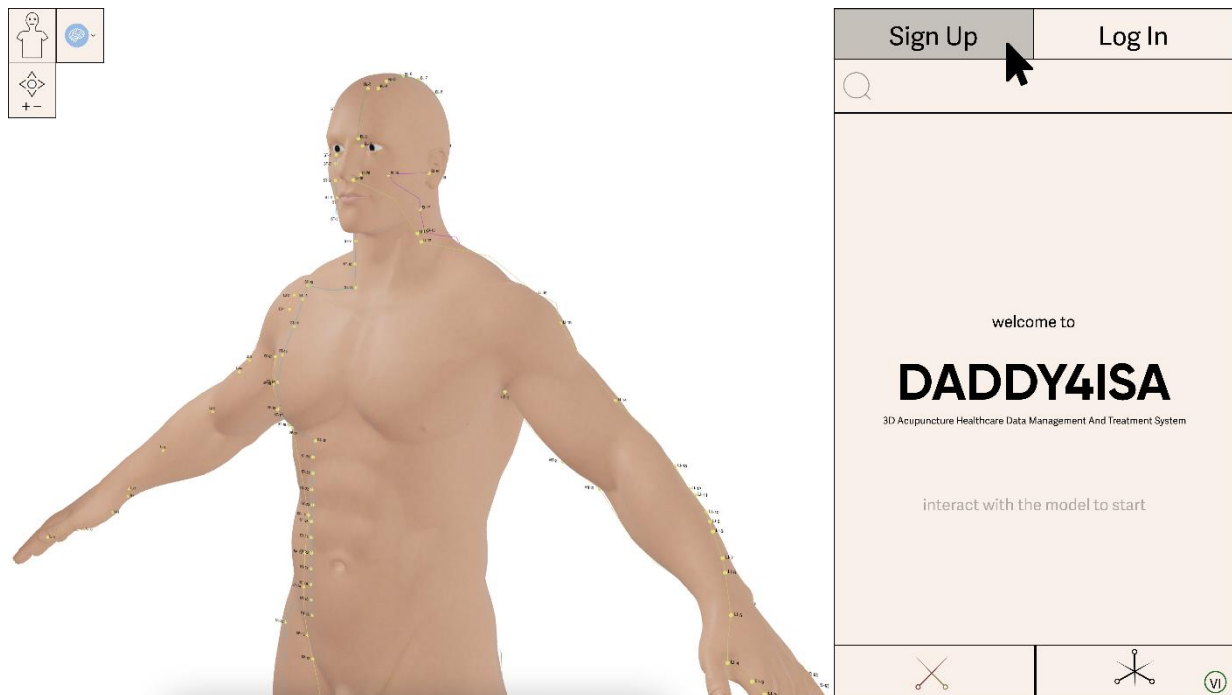


Figure 9 - Prototype V1: Home page

- **Quick Search feature:** integrated into the home page, for searching items based on their names or codes and directly selecting the results in the side panel.

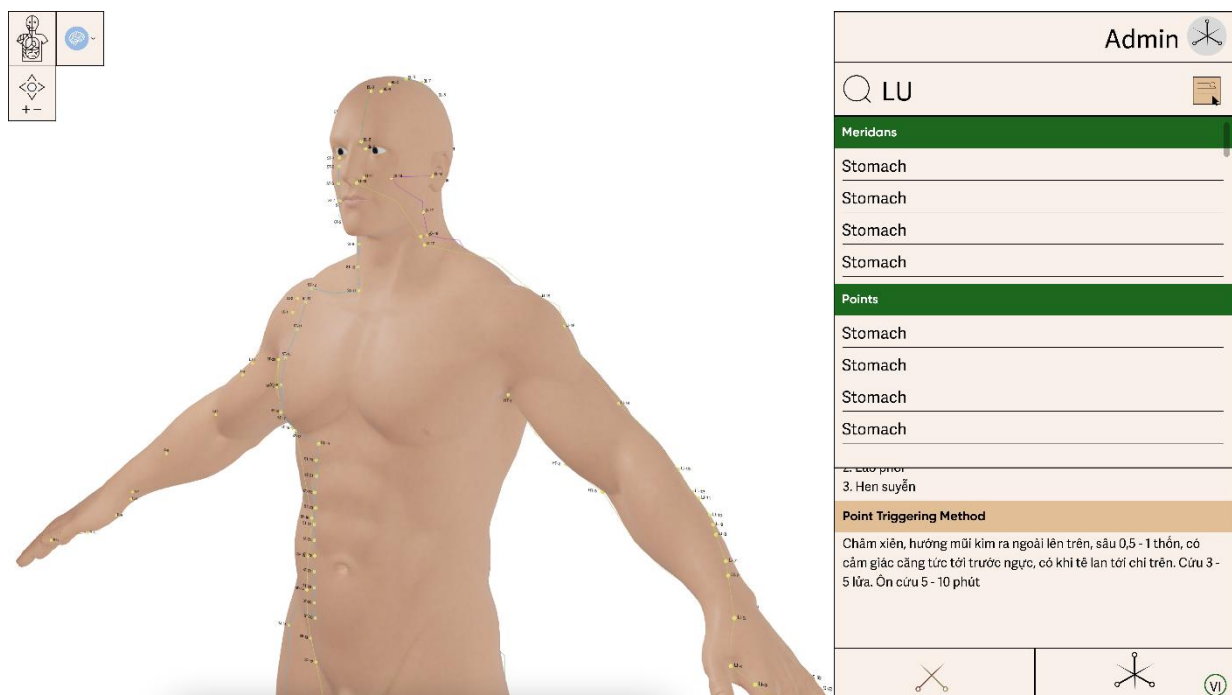


Figure 10 - Prototype V1: Quick Search feature

- **View Information feature:** upon selected on the model, the information stored about the meridian or acupuncture point would be displayed in the side panel.

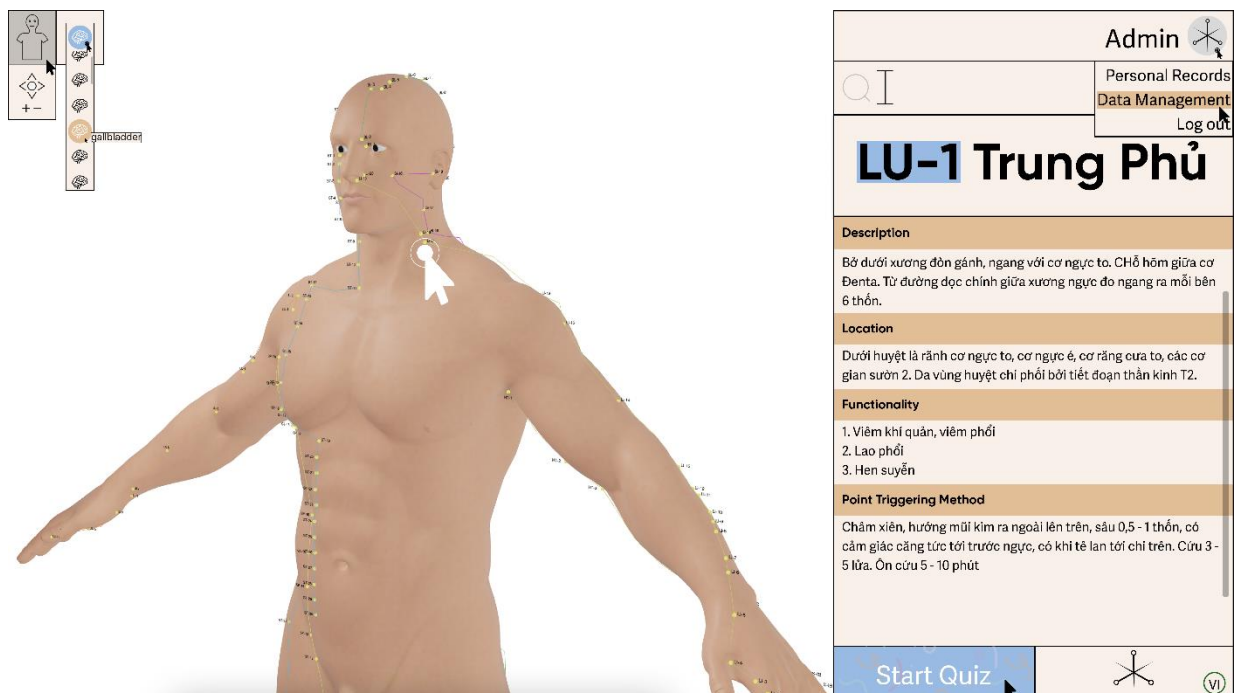
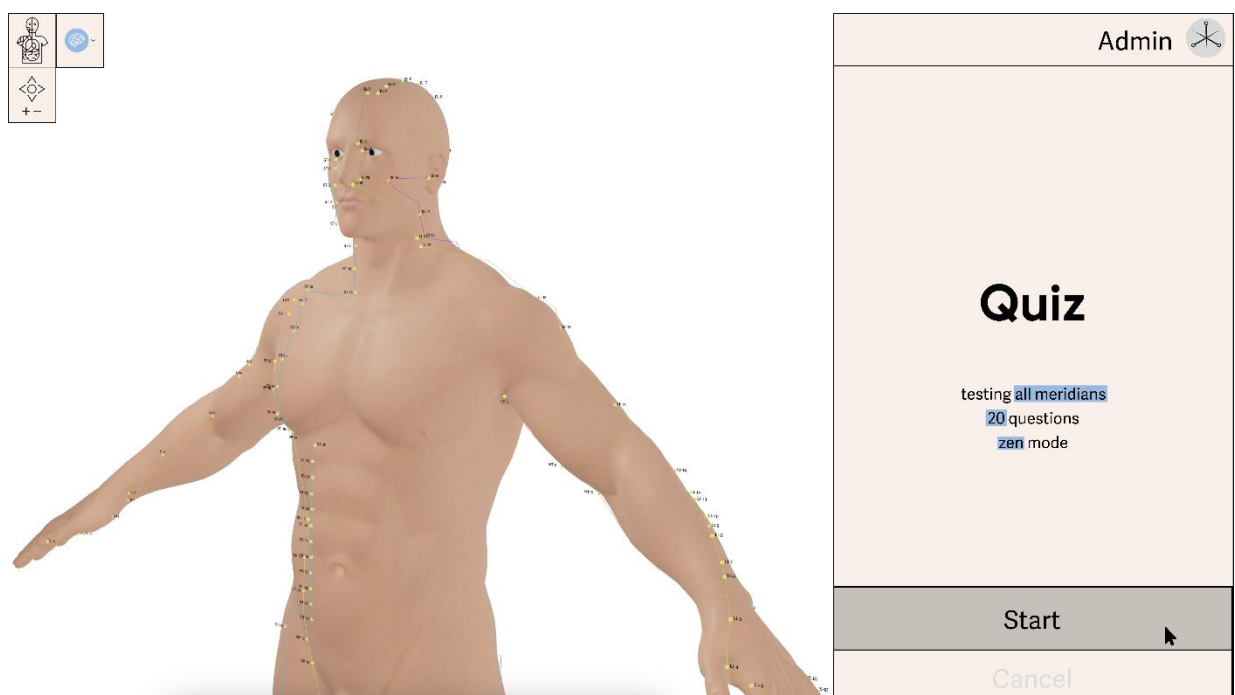


Figure 11 - Prototype V1: View Information feature

- **Quiz feature:** this feature is brainstormed by our team and agreed upon by the medical university students to be used for keeping track of the learning progress. We implement the Quiz feature also in the side panel, similar to the Home page



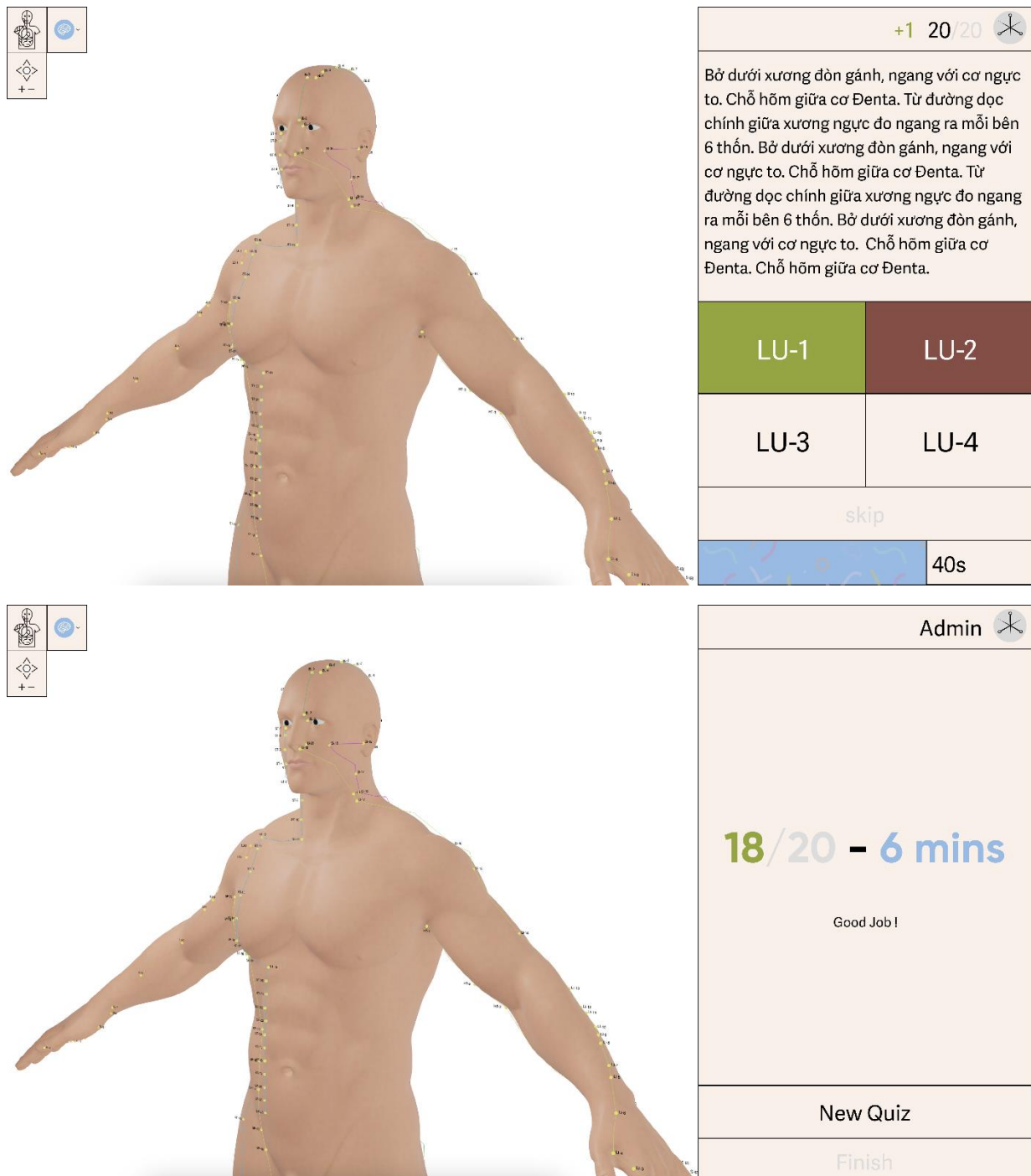


Figure 12 - Prototype V1: Quiz feature

- **Advanced Search:** For searching in advance, we designed a distinguished scene for that, with filtering in different criteria available.

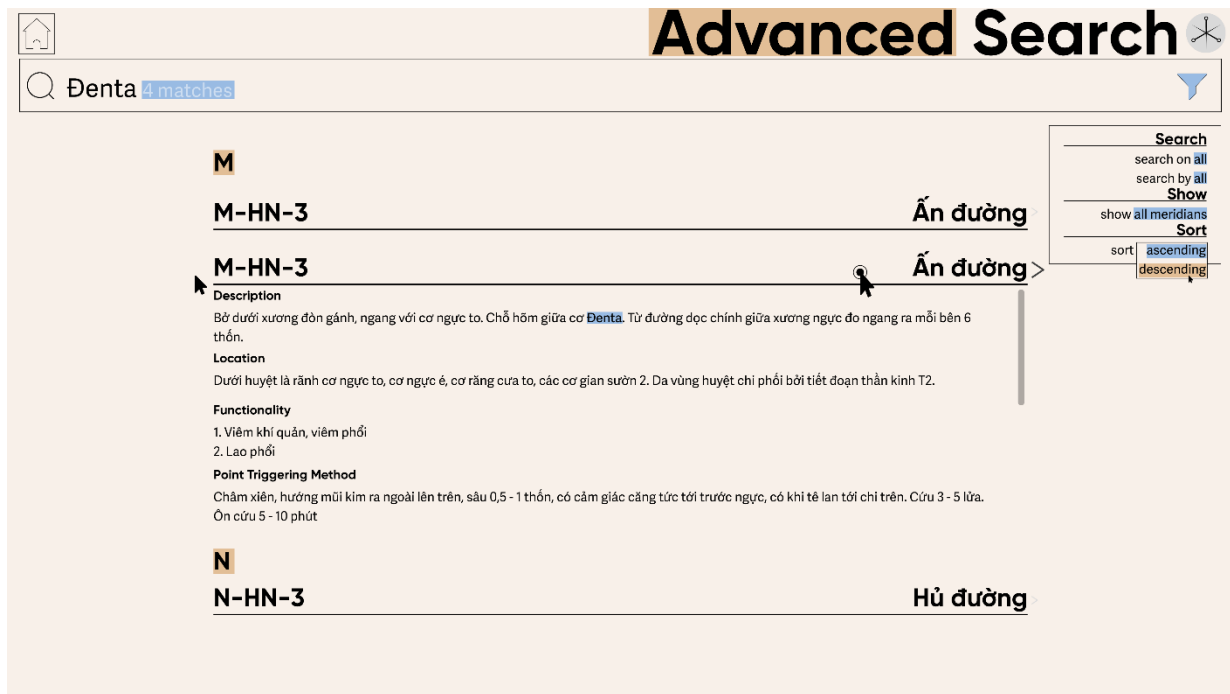


Figure 13 - Prototype V1: Advanced Search feature

- **Data Management:** For accounts with Admin right, we allow updating the information of the item (meridian or acupuncture point). To ensure correctness from the medical perspective, we would not allow any inserting or deleting of meridians and acupuncture points in the scope of the system.

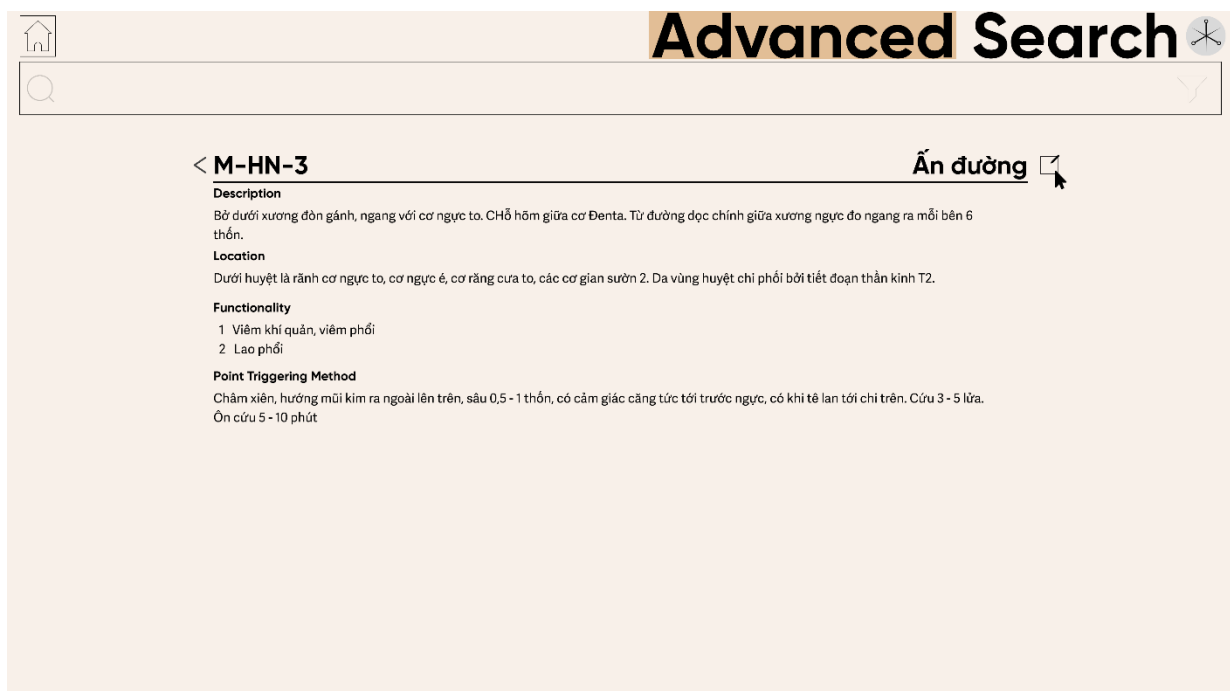
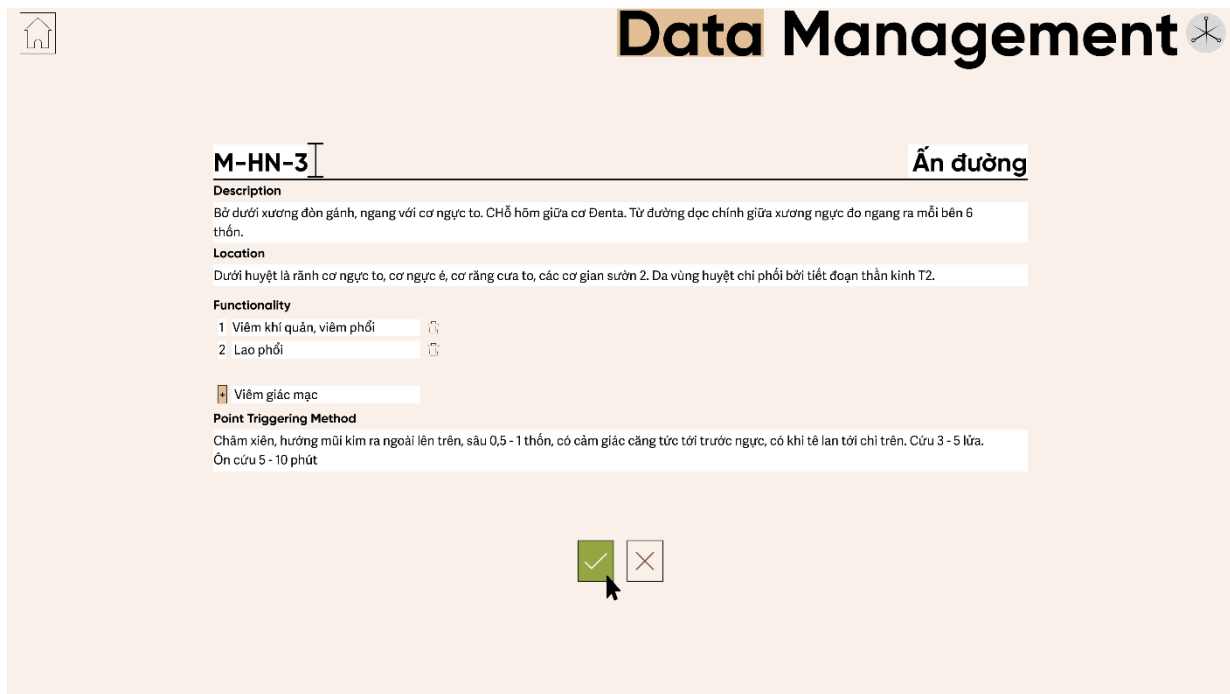


Figure 14 - Prototype V1: View item details (available for all users, including guests)



Data Management

M-HN-3 **Ấn đường**

Description
Bỏ dưới xương đòn gấn, ngang với cơ ngực to. CHỖ hõm giữa cơ Delta. Từ đường dọc chính giữa xương ngực đo ngang ra mỗi bên 6 thốn.

Location
Dưới huyết là rãnh cơ ngực to, cơ ngực ẻ, cơ rãnh cửa to, các cơ gian sườn 2. Da vùng huyết chỉ phớt bởi tiết đoạn thần kinh T2.

Functionality
1 Viêm khí quản, viêm phổi
2 Lao phổi
Viêm giác mạc

Point Triggering Method
Châm xiên, hướng mũi kim ra ngoài lên trên, sâu 0,5 - 1 thốn, có cảm giác căng tức tới trước ngực, có khi tê lan tới chi trên. Cứu 3 - 5 lửa. Ôn cứu 5 - 10 phút

✓ ✗

Figure 15 - Update Information feature (only available for Admin users)

VII.3. FRONT-END: INTERACTIVE UI – VERSION 1

As suggested by our Supervisor, rather than letting the users experience the design on static images, it is better if they could have an interface to interact with the scenes. The normal approach for that is to use some advanced Prototype design tool, however, it is very time-consuming.

Instead, Dr. Nhan, our supervisor, suggested that the team should start building the Front-end side of the website based on the static design finished. In that way, the staging site can be sent to the medical university students for interaction and give better feedback after trying to use the features. And by the way, our team can save up some time rather than having to build the Interactive Prototype and Front-end UI separately.

The demo video of our first version of the Interactive UI is presented in the Midterm Review presentation to the coordinators. The full video could be accessed from this link: https://youtu.be/9_Ar8sowa9M.

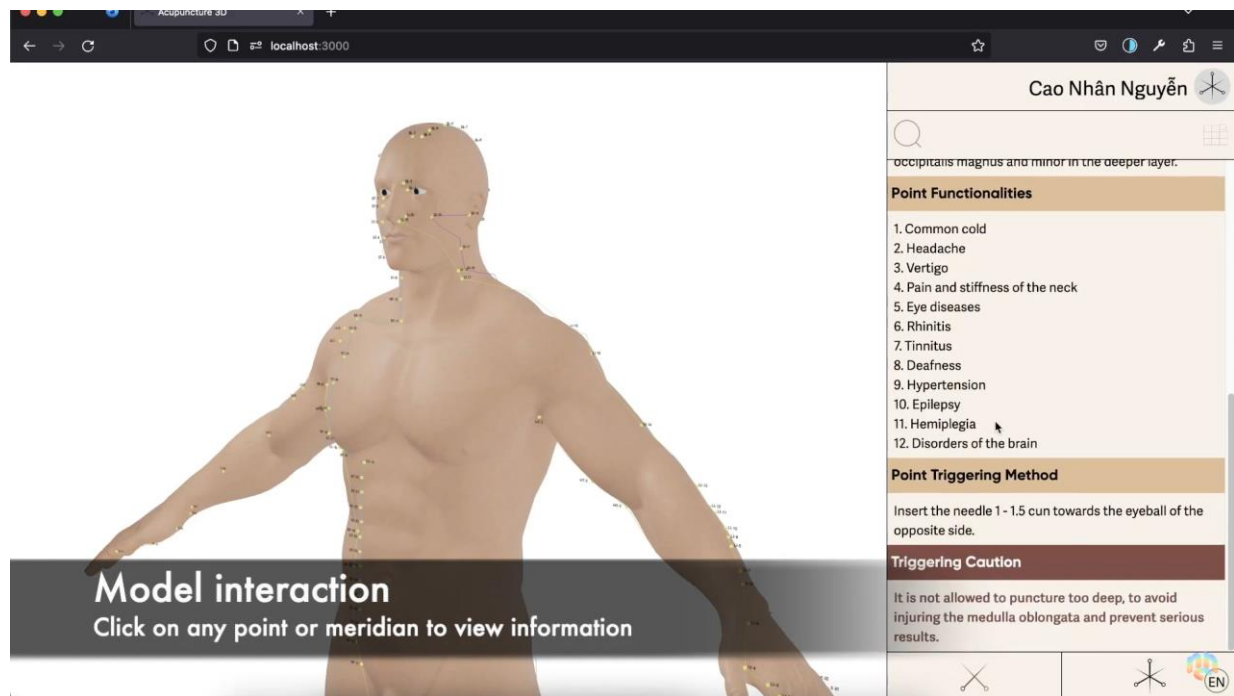


Figure 16 - Screenshot from our demo video for Interactive UI - Version 1

VII.4. USER TESTING: FEEDBACK ON INTERACTIVE UI – VERSION 1

We collected the feedback after interacting with the website on our first deployed Interactive UI and received mixed feedback, including both good points that interest the medical university students, as well as some points that were suggested for improvements in future versions.

VII.4.1. GOOD POINTS

The following are some of the points that were mentioned as great observations from the five students:

- The students had no difficulties registering for a valid account and signing in on our website. They agreed that integrating authentication using either Email or a Google account is up-to-date, and thus is very familiar and easy to use.
- Some of the features are stated to be very helpful for the students in using the website as a companion for learning, reviewing, and exploring acupuncture, including Search feature, Quiz feature, and Personal Records feature.
- While asked about whether the website's mock data (sampled a subset from the complete storing data about acupuncture points and meridians), the students agreed the amount of information our website provides for each item is up to their expectations. One small suggestion for future development from some students is that if it is possible, the site should provide further information about other techniques of acupuncture (besides the traditional method of using needles) for the points and meridians. However, as that information is considered advanced and out of the scope of a basic introduction to

acupuncture, we will leave them for future improvement after the project has been completed.

- The availability of the Vietnamese language is a plus point for the product. There are some similar products on the market, but having a product that provides English, as the general language to explore acupuncture, as well as Vietnamese, to target the medical university students from Vietnam, is a thing that helps our website stands out from some others.

VII.4.2. FEEDBACK FOR IMPROVEMENTS

We also received some feedback about some features or layouts that confused the users. Those include:

- When interacting with the home page, the students felt that having the side panel always in display and covering about one-third of the scene is not very necessary, since it limits the space available for the model. As the main focus of our website is the 3-D model, it should be the main thing on display whenever users reach the site.

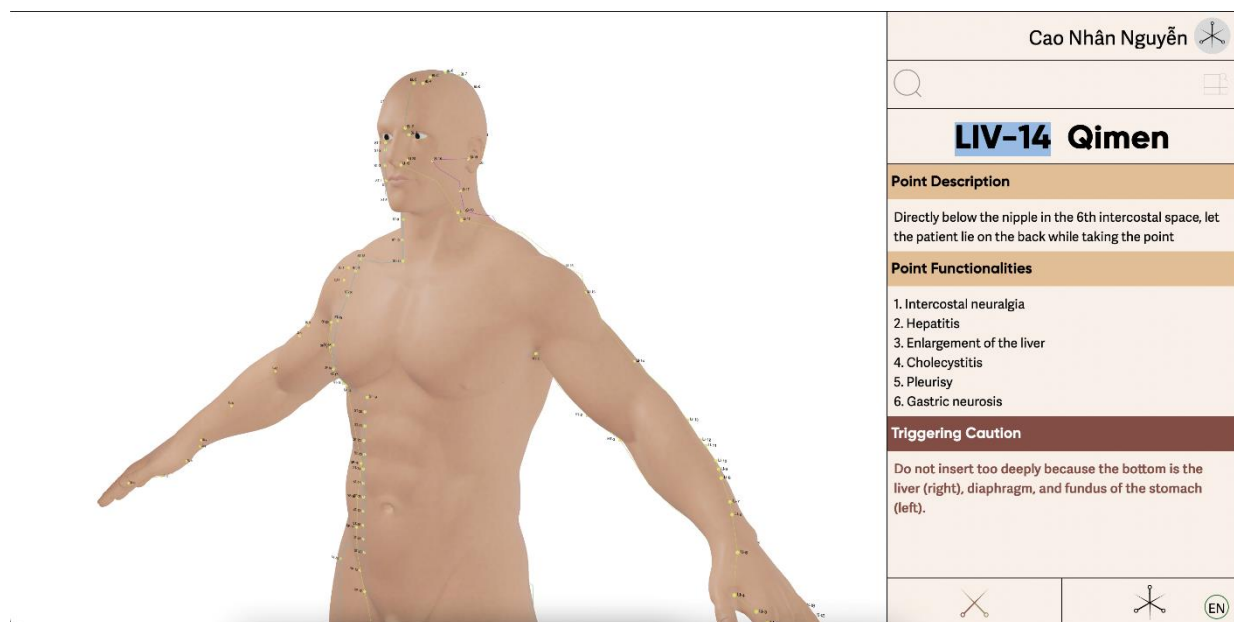


Figure 17 – The side panel covers up to 1/3 of the page is not very good

- Having much information provided for each item is considered informative and good for reviewing, as well as studying. However, having all information displayed on an acupuncture point or meridian selected feels too much. Especially if the user is aiming to just play around with the model and explore some items, showing all information is not very necessary. Since our website already had a page for showing details information about each point or meridian, the information shown on the home page should be limited to the description only. After that, users can choose to View in details if they want to learn more about the selected item.

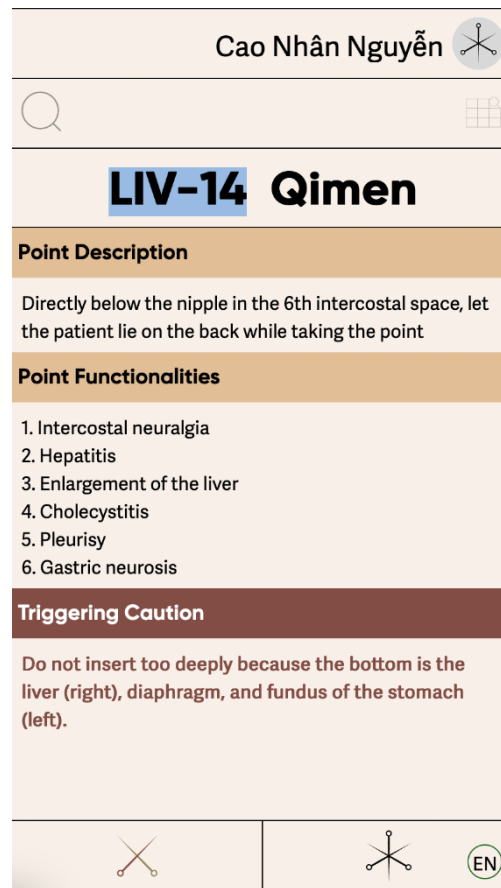


Figure 18 - Showing too much information on the home page is not a good idea

- Although the model has not been completed in our first version of Interactive UI, and therefore has not been integrated into the homepage, we did provide a demo path on our staging server for users to try to interact with the demo version of the 3-D model. They felt that it is not very difficult to interact with the model from their devices. However, there has been an incompatibility recorded by the students:
 - Using a mouse with a scroll wheel provides 3 different methods for 3 types of interaction: scrolling, panning, and zooming. However, if a user uses Magic Mouse (no scroll wheel available) or Trackpad / Touchpad, they have no way to pan on one side of the model.
 - To achieve the panning effects, users have to press an additional key, which is another incompatibility between Windows OS (using the Ctrl key) and MacOS (using the Command key).

From that, one recommendation we received from the students is that there should be one control panel available on a corner of the scene, so in case the input devices limit the number of interactions provided, the users can still have one manual method to trigger all possible interactions.

- Talking about the Quiz feature, the students believed they were not different from the same feature on other products. It is stated not to be different from reviewing the questions on paper, also. The way we implemented the Quiz

feature did not take good use of the interactiveness of our product, and thus, the students suggested interactive questions should be added. For example, we can consider adding some questions allowing users to navigate on the model and select the correct location of one acupuncture point.

- Finally, we received some feedback about the use of icons and how users can navigate through the features. Two of the five students struggled in accessing the Advanced Search feature. After being instructed about how to reach the feature (by clicking on the icon on the Quick Search bar), the students suggested that our use of the icon is not a common one for Advanced Search, making it very difficult to understand which steps to take.

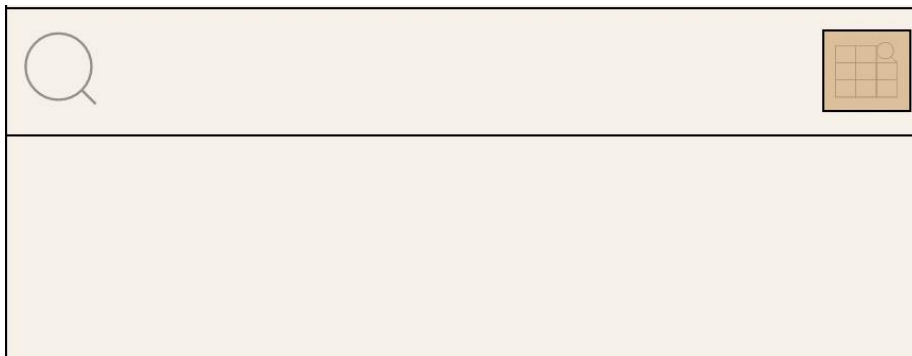


Figure 19 - Our use of the icon for reaching the Advanced Search feature confused two of the five students

VII.5. FRONT-END: INTERACTIVE UI – VERSION 2

From the feedback received from the medical university students and also from our supervisor, we made some modifications to our Prototype and first Interactive UI, to get the upgraded second Interactive UI ready for access.

A demo video for our second Interactive UI was also presented during our Midterm Review presentation, which can be accessed through this URL: <https://youtu.be/qz7kwW16g-w>.

To summarize, some of the changes we made to our first Interactive UI include:

- The 3-D model is moved to the home page, with all acupuncture points and meridians highlighted. Besides, we let the model to occupied full of screen space. The Quick Search feature, Menu, and Control Panel are provided as collapsable controls on the corners of the screen to save up space for the 3-D model.

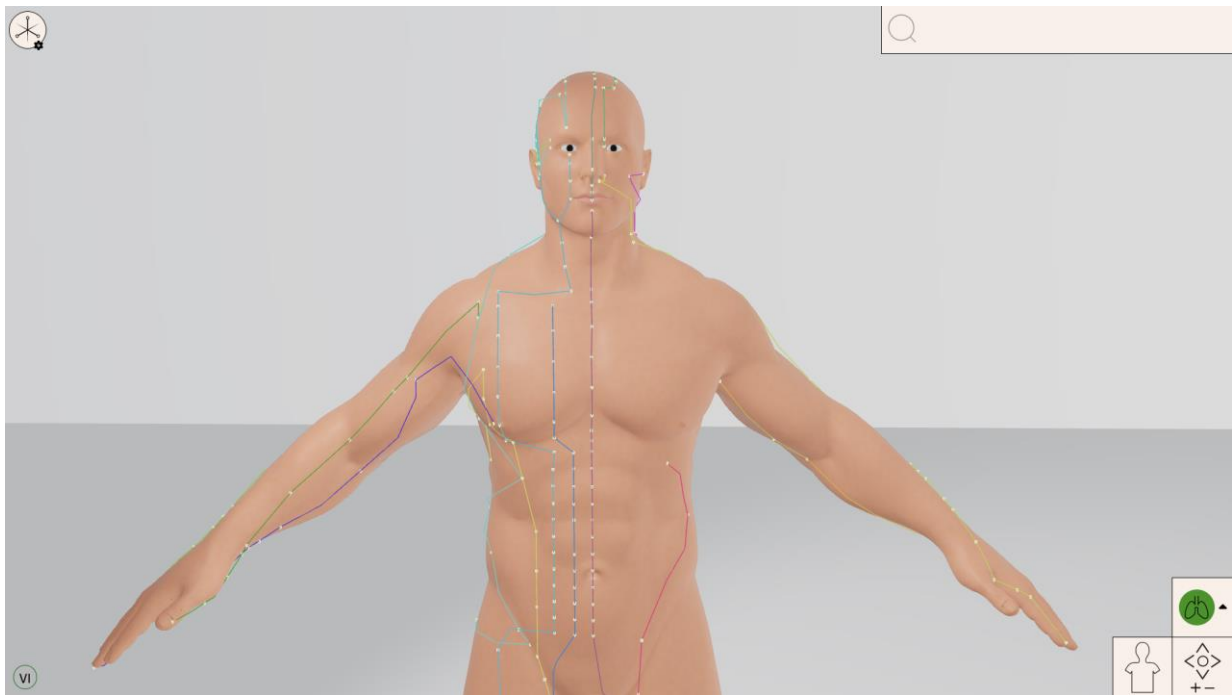


Figure 20 - Prototype V2: The 3D model is moved to the home page

- A Control Panel for manually triggering some interactions with the model is added to the right bottom corner of the screen, as suggested by the students. Besides, we added a Select for quick choosing a meridian among the 14 available ones for focus.

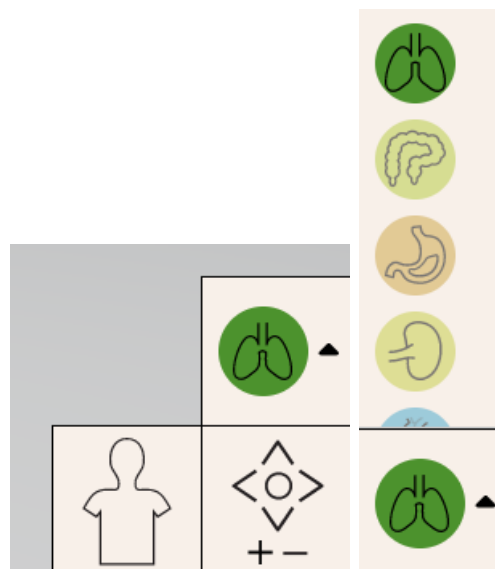


Figure 21 - Control Panel and Quick Meridian Select

- The acupuncture points and meridians on the model can be hovered or selected, simply by clicking. Once selected, the description of the point or meridian is displayed in the scene. To view full details, users can click on the “View details” button to be navigated to the Details page.

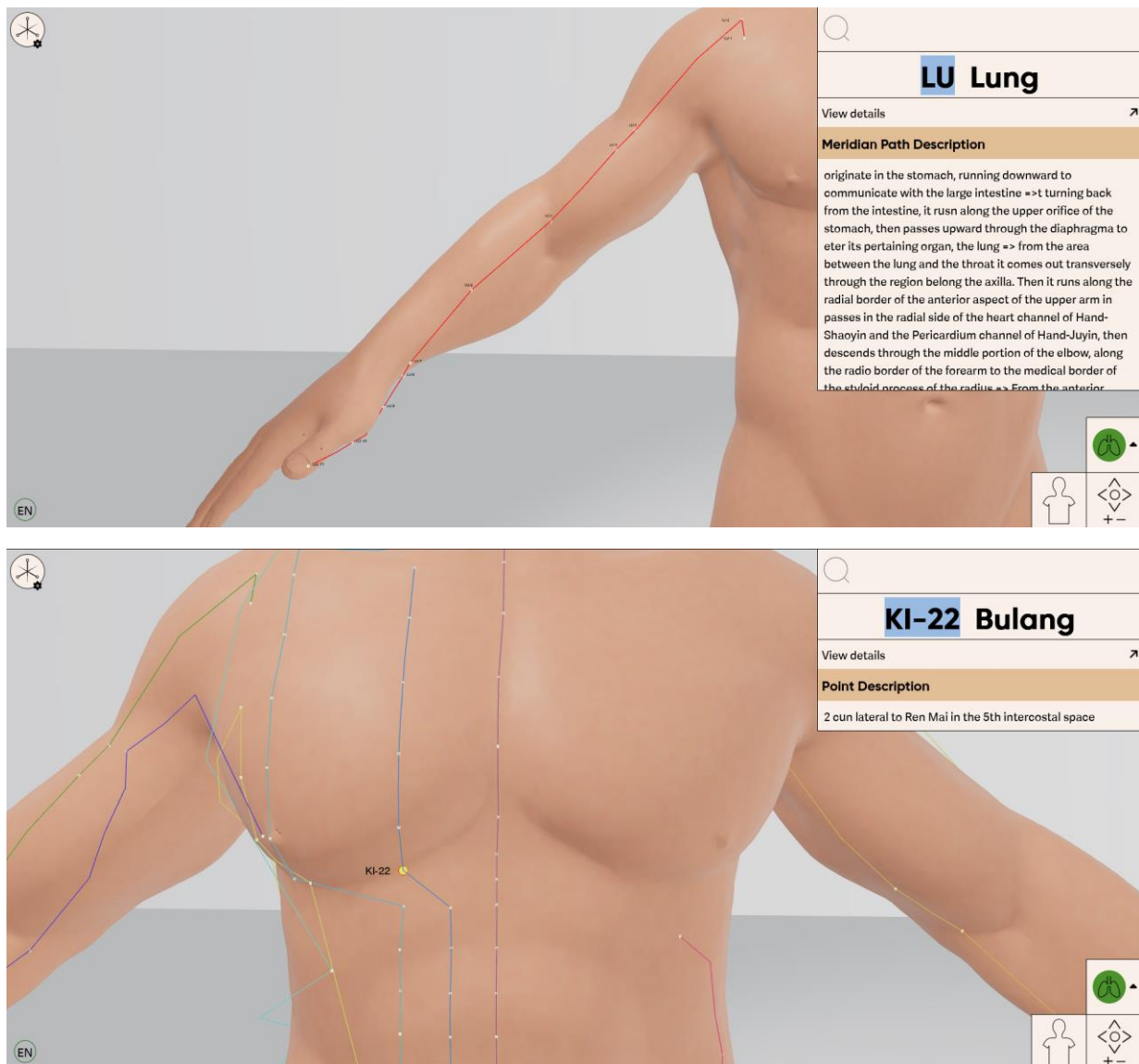


Figure 22 - Meridian and Acupuncture Point selection

- Quick Search results, Quick Meridian selection, or from the View details page, users can request to be redirected to the model with camera focus to the point or meridian selected.



Figure 23 - A meridian is focused into camera view angle after quick selected from the menu

- For the Quiz feature, besides the theory questions (available since Interactive UI – Version 1), three more types of interactive questions are added:
 - *Locating question*: A point's name or code is given in the question's content. The users can have full access to the 3-D model shown on the site and can choose the location they think is of the point asked.
 - *Matching question*: 4 locations are highlighted on the model, and one name or code of one point is given in the question content. The users should choose among four options which location is of the point asked in the question.
 - *Point identification question*: 1 location is highlighted on the model, and 4 different names or codes of 4 points are given as 4 options. The users would look at the model, have full access and interactiveness to examine, and choose among the points the highlighted location is of which of them.

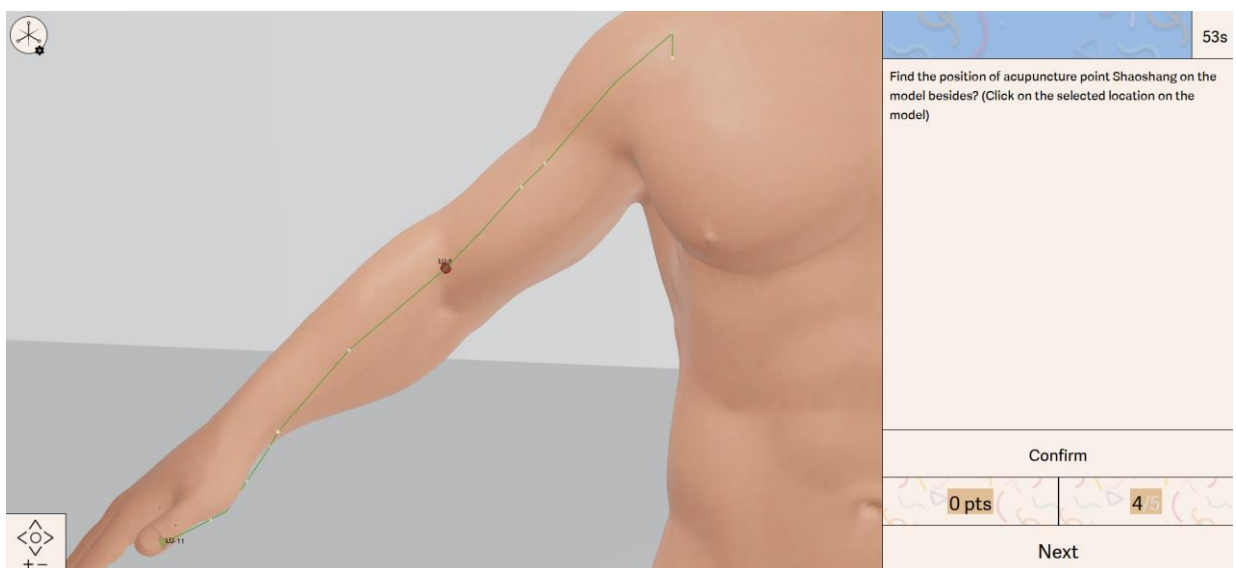


Figure 24 - An example of a Locating question, a unique quiz question type from our website

VII.6. BACK-END: API ENDPOINTS

From the Back-end side of the project, we have finished some API endpoints for retrieving and updating information about the acupuncture points and meridians. We are developing and testing other API endpoints to handle the Authentication or Profile flows, the Quizzes flow, and for storing Personal Records.

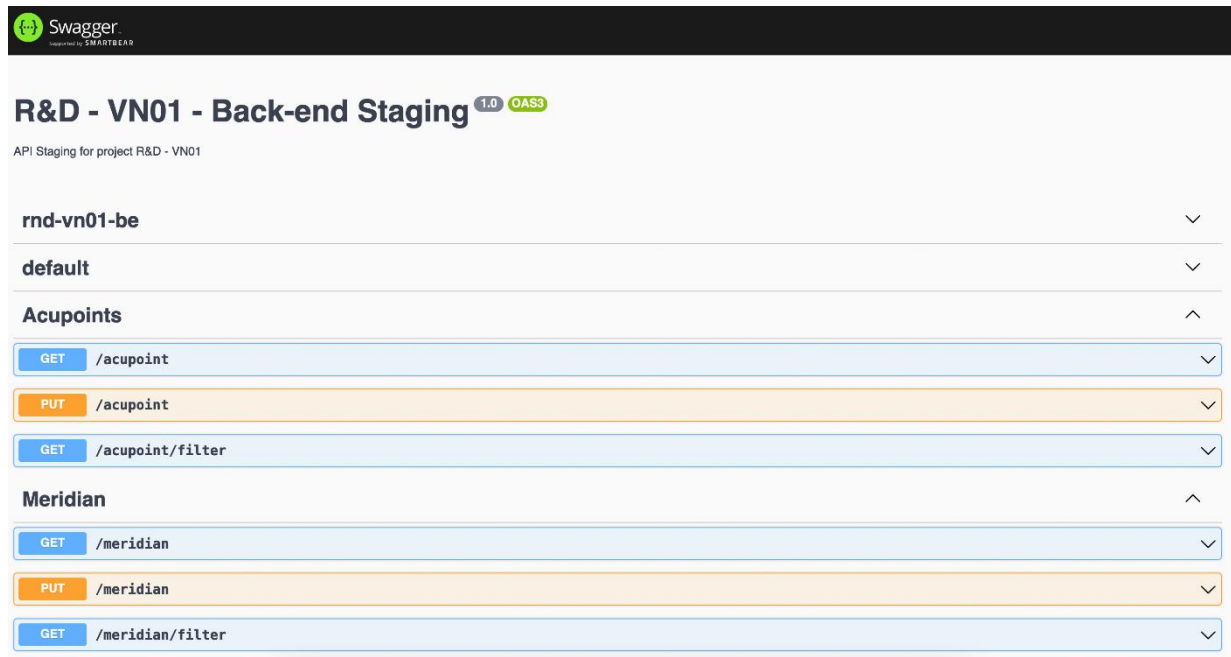


Figure 25 - API endpoints for acupuncture points and meridian, captured from the Swagger page of our Back-end server

VII.7. QUALITY: USER TESTING FOR UI & FEATURES OF INTERACTIVE UI – VERSION 1

Parallel to collecting feedback from the supervisor and the target users, the Quality Control member of our team also tested some UI and features with some designed test cases that could leak out some possible bugs. The test cases are designed to test all possible layouts and features of our first Interactive UI, and the bugs found are reported to our workspace for the project on the Jira Task Management platform.

PROTOTYPE V1 TEST CASE ☆ ☰ ☁

File Edit View Insert Format Data Tools Extensions Help

100% \$ % .0 .00 123 Default (Ari... 10 B I S A

	A	B	C	D	E	F
13	6	UI	SIG-0006	Text Fields display red if invalid	Text Fields display red if the submitted input is invalid or empty	Passed
14	7	UI	SIG-0007	Label Texts of the Text Fields display property	Label Texts are aligned, having unified font, size and display the information correctly	Passed
15	8	UI	SIG-0008	Label Texts of the Text Fields display red if invalid	Label Texts display red if the submitted input is invalid or empty	Passed
16	9	UI	SIG-0009	Buttons display properly	Buttons are aligned, having same size and color	Passed
17	10	UI	SIG-0010	Buttons change the color when hovering	Buttons change the color when hovering	Passed
18	11	UI	SIG-0011	Button Label Texts display properly	Button Label Texts are aligned, having unified font, size and display the information correctly	Passed
19	12	UI	SIG-0012	Popup Messages display properly	Popup Messages are aligned, having unified font, size and display the information correctly	Passed
20	13	Function	SIG-0013	Logo redirect user to homepage	Logo redirect user to homepage when pressed	Passed
21	14	Function	SIG-0014	Hyperlink redirect user to the LoginPage	Hyperlink redirect user to the LoginPage when pressed	Passed
22	15	Function	SIG-0015	User create account with empty name	Name Text Field display red with "Please fill in your name!" text	Passed
23	16	Function	SIG-0016	User create account with empty email	Name Text Field display red with "Please fill in your name!" text	Passed
24	17	Function	SIG-0017	User create account with invalid email	Email Text Field display red with "Your email is invalid!" text	Passed
25	18	Function	SIG-0018	User create account with empty password	Password Text Field display red with "Your password is invalid!" text	Passed
26	19	Function	SIG-0019	User create account with invalid password	Password Text Field display red with "Your password is invalid!" text	Passed
27	20	Function	SIG-0020	User create account with empty confirm password	Confirm Password Text Field display red with "Invalid confirmation!" text	Passed
28	21	Function	SIG-0021	User create account with confirm password different from password	Confirm Password Text Field display red with "Invalid confirmation!" text	Passed
29	22	Function	SIG-0022	User created account with valid inputs (Name, Email, Password, ConfirmPassword)	Success Message "Your account is created! Please check your email to verify your account!" popup	Passed
30	23	Function	SIG-0023	User select "Sign up with Google" button login with google	Popup window for user to login with google account	Passed
31	24	Function	SIG-0024	Redirect succesful logged in user to HomePage	Redirect logged in user to HomePage with User interface	Passed
32						

+ ☰ Sign Up Login Quiz

Figure 26 - Test cases for Interactive Prototype - V1

Projects / R&D-Cycle 13-VN01 / RC1V-267

Bug: Do not show 'No results found'

Attach Create subtask Link issue

Description
Search feature do not show No results found when no result returned

Environment
None

Details

Assignee: Nhân Nguyễn Cao

Reporter: Phạm Đình Chương

Labels: Bug

Done Done

Figure 27 - An example of a bug reported to our Jira workspace for the project

VII.8. RESPONSIVE PROTOTYPE: MOBILE & TABLET

We have also kicked off designing the responsive designs for Mobile and Tablet viewports to catch up with the schedule. The designs are currently unfinished yet but have completed the basic layouts and stylings for the important scenes. Here is a demo image captured from our Figma workspace for designing the Prototype of the project.

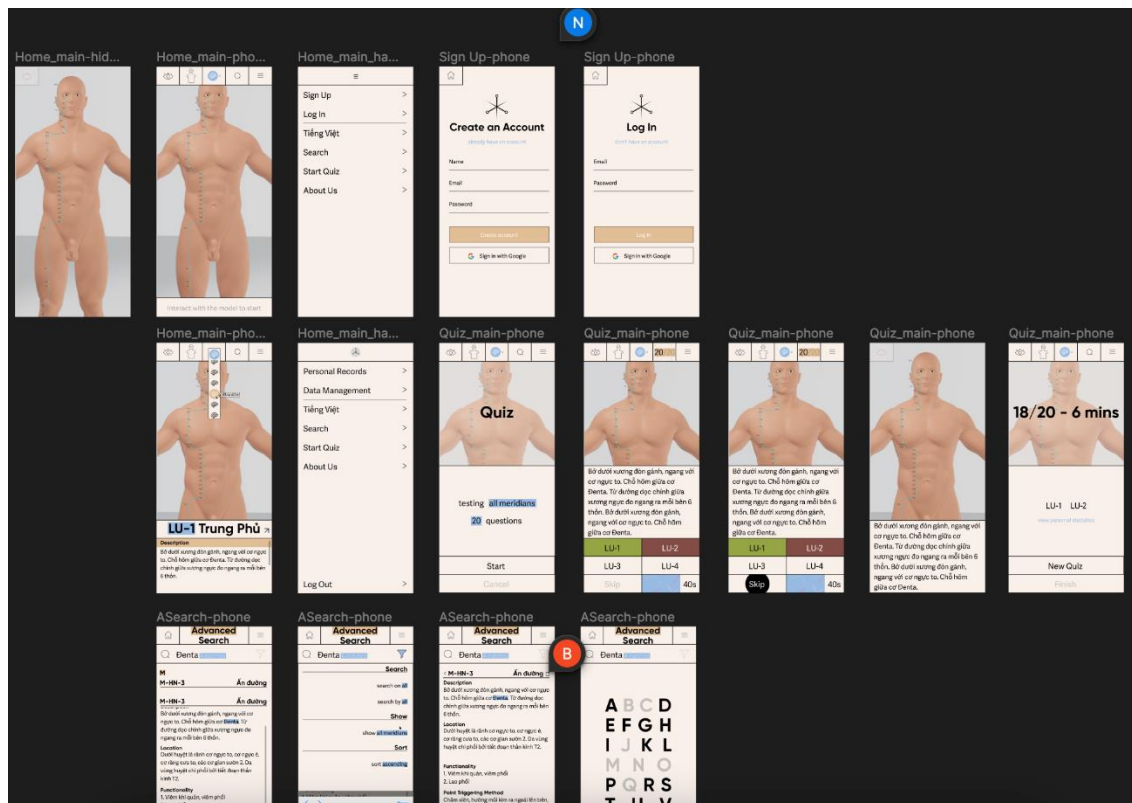


Figure 28 - Responsive Design for Mobile: In Progress

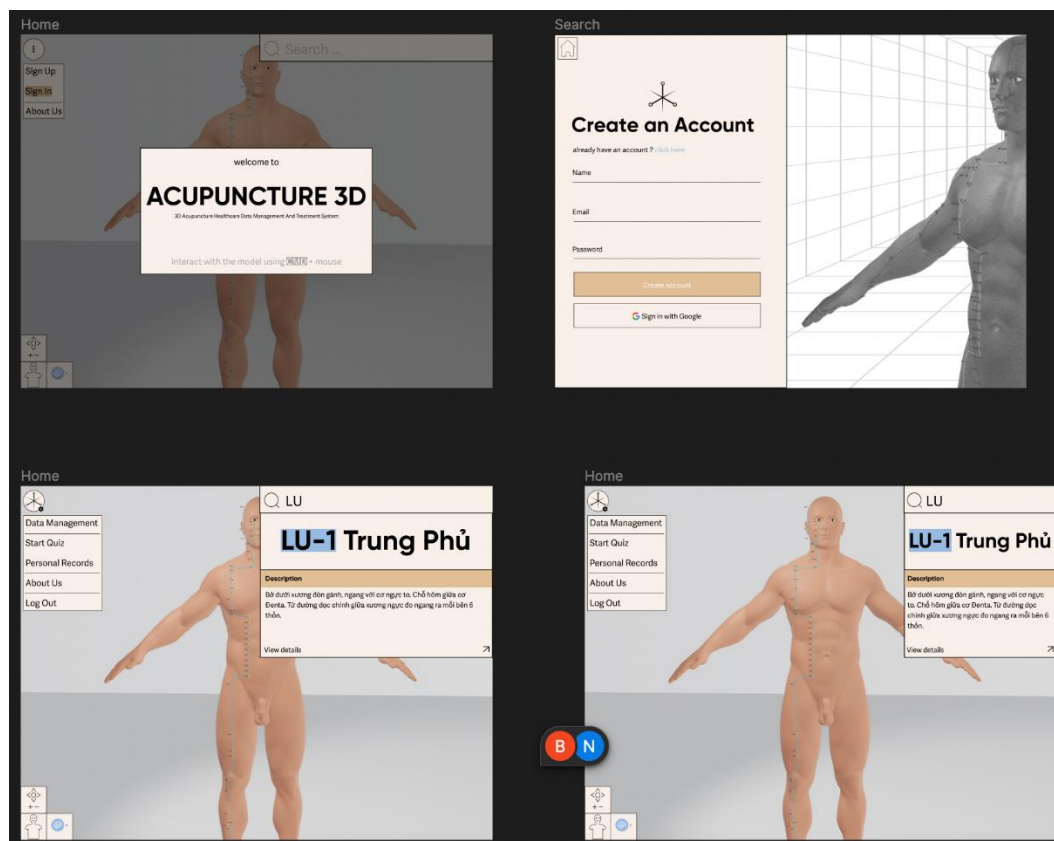


Figure 29 - Responsive Design for Tablet: In Progress

VII.9. PENDING WORKS

Up to the current moment, those are some of the pending works that we would continue to work on and plan to finish at the end of this Sprint or the following Sprint, including:

- We have sent the second interactive UI to the medical students and are waiting for their feedback. From the feedback, some more modifications and optimizations would be made to the second Interactive UI, before reaching a complete Front-end UI that is ready for integration.
- We are adding the remaining API endpoints for handling the remaining features, including Quiz, Profile, and Personal Records flow.
- We will integrate API calls to our Front-end side, allowing communication to the finished parts of the Back-end side.
- The team member responsible for Quality Control is also designing and implementing more user test cases on features and interactions to our model, which would be tested on our second version of Interactive UI.

VIII. PLAN FOR THE NEXT PHASE

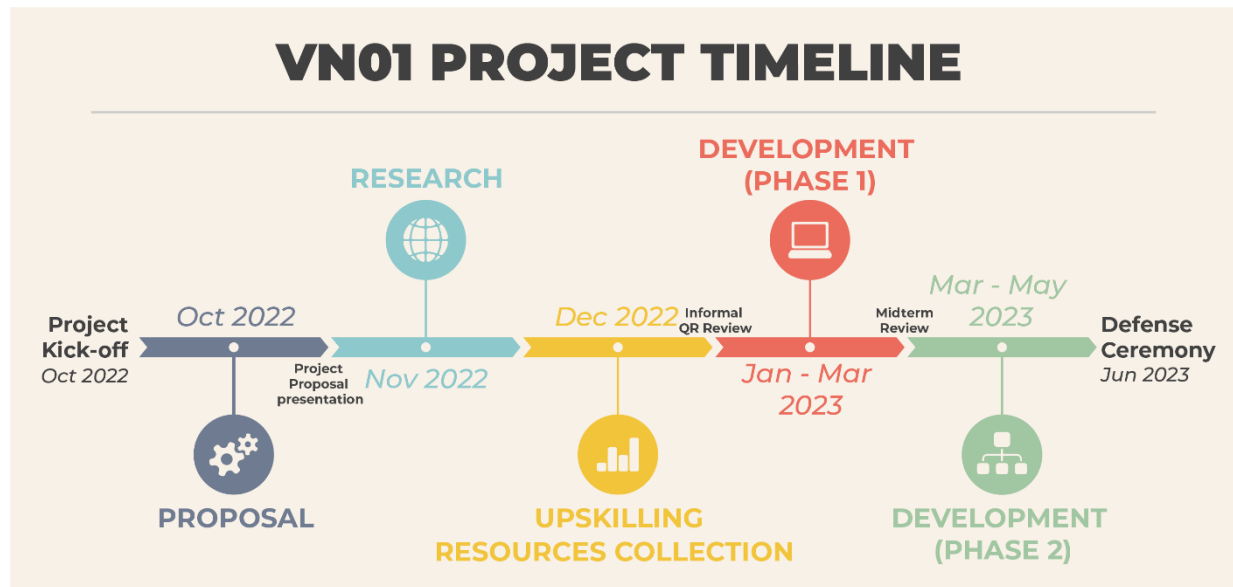


Figure 30 - Initial plan for the main phases of the project

Based on our initial plan for the five main phases of the project, the remaining time, after the Midterm Review until the Defense Ceremony in June 2023, would be spent on the second Development phase. The details for our plan to implement the project during these months are as follows:

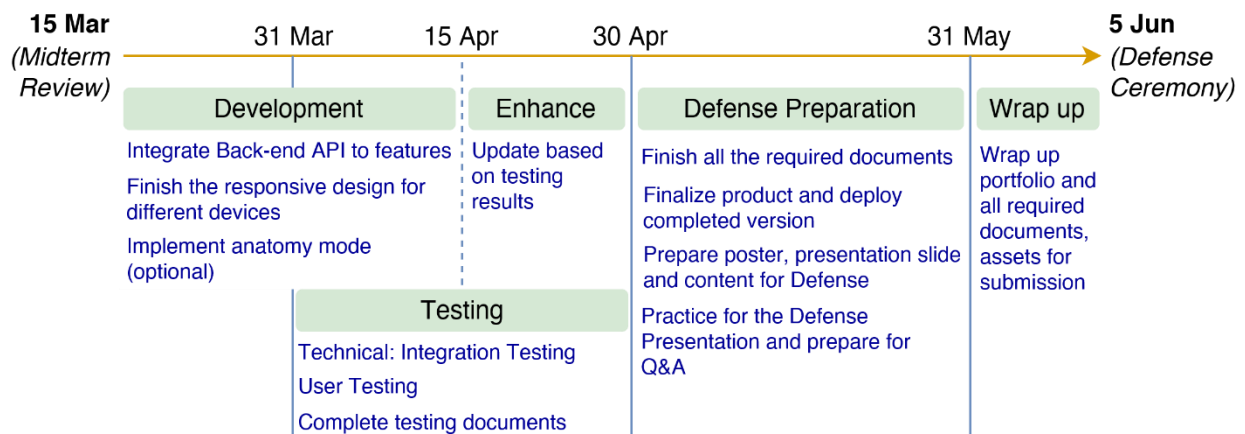


Figure 31 - Detailed plan for the next phase

In detail, from the Midterm Review (15 March) to the Defense Ceremony (5 June), we select the three end-of-month dates as the three main milestones for the phase:

- The Development is planned to be implemented until the middle of April, during which we would finish all the remaining unfinished tasks, including:
 - Integrating back-end API for all features.
 - Finish the responsive design and implement it into production (Front-end side) for different viewports.
 - And if we have enough time, we would also try to implement the anatomy view mode for the model, which is an optional feature proposed at the beginning,

the anatomy mode for the model. The decision as to whether this feature would be implemented or not is based on the time that remained at that moment and whether within the budget we could find a 3-D anatomy model of the human body that could be integrated into the system.

- Testing would be started from the beginning of April until the end of the month. This phase includes:
 - Integration testing from the technical side. Since unit testing is done continuously during the Development process, we would focus on integration testing only during that period.
 - Besides, specific user testing with the medical university students and the supervisor would be conducted during April. This would be a little bit more complete compared to the user testing conducted through the Interactive UI versions, since we would allow the users to use the complete server as a whole for some days (maybe about 2 weeks) and give their detailed feedback.
 - In addition to that, all required documents for testing would be completed by our team during the month of April.
- The second half of April would be spent on Enhance, during which we would update our final product based on feedback or bugs found from the Testing phase.
- Based on the plan, the final product would be finished by the beginning of May. If any of the work is not done at that moment, the first half of May would be spent backing-up extra time for Development. The remaining time of May would be spent on Preparing for the Defense Ceremony, including:
 - Finish all the required documents.
 - Finalize the product and deploy the completed version to the live server.
 - Prepare the poster, the presentation slide, and speech content for the Defense Ceremony.
 - Also, we would practice presenting for the event and prepare for the upcoming Q&A portion during the Defense Ceremony.
- The remaining first few days of June before the Defense Ceremony would be used for wrapping up all finished works, ready for submission.

IX. DIFFICULTIES

IX.1. DIFFICULTIES

Throughout the first five months of the Research & Development project, we faced numerous challenges. The following table details the challenges we faced, some of their consequences, and our solutions or improvement strategies:

ID	Difficulty	Description & Effects	Follow-up strategy
1	Communication: Lost contact with the Client, Dr. William Liu	Did not receive any feedback or reply from the regular Progress Report emails and messages. Team was confused not receiving the confirmation to feel assured moving forward with the project.	Discussed with the Supervisor to focus mainly on the feedback and information from the Target Users side, without delaying the project by waiting for the feedback from Client.
2	Estimation: The supervisor estimated team would need 2 weeks for building or making updates to each Interactive UI version.	Team failed to catch up with the estimation of the Supervisor due to some follow-up tasks. For example, the model needed to be added to the second Interactive UI version, which required the model to be in ready situation. However, labeling all 361 meridian points and 14 meridians into the correct locations on the model took much longer time than expected.	Team needed to re-discuss with the Supervisor and asked for a delay in report. Following that, team did have to rearrange some tasks for the Sprint and update for the following Sprint to catch up with the plan.
3	Estimation: Some of the tasks, especially in the first Sprints, were not well-estimated.	Some of the tasks are estimated with much more time compared to actual effort spent. In contrast, some of the tasks were estimated too strict compared to real time required for completion. The final statistics pointed out some imbalances in efforts of team members during the Sprints.	Team discussed more deeply about what could be the sub-tasks required for an original task, and whether it would be some risks that may cause a task to require much more time than estimated time. For the later Sprints, improvement and more evaluation would be conducted during the planning for tasks within the Sprints.
4	Members: Misunderstandings about working schedule caused some arguments	Before the Tet holiday, we agreed with our Supervisor to complete the first Interactive UI version the first week after Tet (without the model integrated). However, two team	Team members had to take days off during Tet holiday interleaved in order to be able to catch up with the schedule and agreement with our Supervisor

		members responsible for handling two roles (Designer and Front-end Developer) misunderstood the steps, causing the Front-end team cannot start since it is blocked by the Design tasks, while the Designer member of the team thought the deadline for after Tet holiday would be for the static Prototype.	
5	Costs: The price for purchasing a 3-D anatomy human body model costs up to more than 1000 USD, much higher than expected and out of our budget estimation.	We were able to find a good free 3-D model for external skin of human body (required some efforts for adding the skin texture), but none for the accurate internal anatomy model. A trusted one by Medical parties of the States costed up to nearly 1500 USD, out of our ability to pay.	We discussed with our supervisor and the clients, re-assessing the demand for adding anatomy mode and agreed it would be listed as an optional future development. If we would be able to find a model for free or with good price, we would implement that feature. Otherwise, we would add another feature (also in the optional list defined from the beginning) as a replacement.
6	Technical: Implementing the model with all acupuncture points marked cause much lag to the display.	Having a large amount of items rendered to the display at one time (the model, 361 points, 361 labels, lines for 14 meridians, and the controls for the page, etc.) caused much lag to the website.	We tried to research more and find ways to improve the situation, following two approaches: - Technical: Try to reduce the size of the model and apply some advanced mechanisms to optimize the way items are rendered into display. - Configuration: We tried to discussed with our Supervisor and agreed that it would not be the default state for displaying all items at once, which cause the home page to be very laggy right after accessing the page. Instead, only important items are displayed by default, and rendering the other items would be on demand of the user.

IX.2. RECOMMENDATIONS

Some of those are deemed emergency cases based on the problems mentioned above and can only be handled by certain follow-up techniques. But some of the issues were brought on by the fact that our team lacked effective communication, estimating,

and implementation strategies. Throughout the upcoming project months, some of the suggestions from our team that we look for ways to improve for greater quality include:

- **Improved communication:** During the first five months of the project, there were numerous misunderstandings, including those between the customer and our team, our team and our supervisor, and our team members themselves. Our team's situation would be improved and the likelihood of dangers in the project's later months would be reduced, we believe, if we tried to increase our ability to communicate, particularly in comprehending some concepts or agreements prior to implementation.
- **Better evaluation of task and effort estimation:** Throughout the course of the Sprints, we gradually increased our capacity to estimate task and effort estimates. There are, however, ways to make things better still. In accordance with our team's consensus, we think that enlisting the assistance of certain consultants—either from team members with more expertise in particular sectors or by conducting online research—would help us better comprehend and estimate the work required to complete the task.
- **Increased project focus and awareness of personal accountability:** Disagreements are inevitable in any team environment, and our team was no exception. We all agreed that the project would be much more successfully completed if each team member made an effort to think more about the other team members, particularly by being conscious of the equal obligations between all team members in contributing to the completion of the project. Throughout the upcoming project months, our team will work to improve this one area.

X. SUMMARY OF CONTRIBUTION

X.1. SPRINTS' EFFORTS

To better estimate the schedule and efforts for each Sprint, our team defined a Team's Velocity plan for each Sprint at the beginning, ensuring the maximum efforts available for each week exceeded the requested for Research & Development project. This would serve as the guidelines for estimating the efforts and division of the tasks within each Sprint, as well as to better track the focus time of team members through the Sprints.

Table 14 - Maximum Sprint Velocity Plan

Day of week	Nhan Nguyen Cao (21142377)	Tan Le Tran Ba (21142355)	Trang Ho Ngoc Thao (21142358)	Chuong Pham Dinh (21142643)	Total
Mon	2	0	1	1.5	4.5
Tue	2	1.5	0	2	5.5
Wed	2	2	1	1.5	6.5

Thu	2	3	1	1.5	7.5
Fri	2	1	1	1.5	5.5
Sat	0	3	4	2	9
Sun	2	1.5	4	2	9.5
Total	12	12	12	12	48

Since the maximum velocity available for each week is 48 hours for the whole team, the Sprint plannings would estimate the total of 96 hours for 2-week Sprint and 144 hours for 3-week Sprint. In all of the Sprints, the actual efforts spent was under this value, which is rational due to the Sprint are planned and tasks are estimated based on the maximum velocity rather than the average one. The estimations for the tasks are mostly made based on the estimated actual time for completion, plus a little extra time for further research, further evaluation after completion or saved as back-up time for emergency cases.

The following tables show our team's Sprints total efforts spent for the past 10 Sprints:

Table 15 - Sprints total efforts

Sprint	Length	Tasks	Story points	Estimated effort	Actual effort
Project Proposal	3 weeks	20	36	144h	86h 21m
Research 1	2 weeks	17	46	96h	84h 31m
Research 2		17	33		74h 32m
Data Collection		24	60		84h 33m
Upskilling 1		17	33		60h 24m
Upskilling 2		17	34		75h 50m
Development 1		17	40		70h 39m
Development 2		19	45		64h 30m
Development 3		19	45		82h 09m
Development 4		16	40		78h 09m
	21 weeks	188	412	1008h	761h 38m

X.2. MEMBERS' EFFORTS

Table 16 - Members efforts during the Sprints

Member	Sprint	Tasks Summary	Total effort
Chuong Pham Dinh (21142643)	1	Support completing the raw content for Project Proposal presentation. Define the main phases for the project.	8h 21m
	2	Scan and collect data from scientific and research papers. Attend interviews with acupuncturists and analyze the interview results.	23h 41m
	3	Redefine functional requirements for the project. Define sources for collecting trusted medical data from recommendations of the acupuncturists. Join Market Research for similar products. Collect data about the meridians.	16h 41m
	4	Collect data about the important acupuncture points and additional acupuncture points. Create Persona representing the shared characteristics from the group of target users.	28h 57m
	5	Review about Git and define Git flow for development. Support research about using Three.js library for 3-D rendering. Set up the relational PostgreSQL database for the project.	11h 03m
	6	Load the finished 3D model into display and set up the basic environment, floor for the viewspace. Used the research result from previous Sprint to load the loading scene to the viewspace. Examine drawing a line connecting the demo acupuncture points into the model.	12h 16m
	7	Support drawing acupuncture points into the model.	11h 56m
	8	Continuously perform UI testing for the first version of Interactive and report bugs to Front-end team. Continue drawing acupuncture points of meridians to the 3D model.	22h 42m
	9	Support drawing acupuncture points of meridians to the 3D model. Design feature test cases for Interactive UI – version 1 and implement the tests, report the bugs to Front-end side for fixing in the next Sprint.	20h 48m

	10	Review and update documentation for finished test cases for Interactive UI – version 1. Design feature test cases for new flows of updated features, including Model interactivities and updated Quiz feature. Continuously perform UI testing for the second version of Interactive UI.	24h 17m
			180h 42m
Nhan Nguyen Cao (21142377)	1	Support completing the raw content for Project Proposal presentation. First step try to contact with client (Dr. William Liu). Draft content for Project Proposal presentation. Define detailed plan for the project (Gantt chart)	19h 53m
	2	Scan and collect data from scientific and research papers. Prepare questions for interviews with acupuncturists. Attend interviews with acupuncturists and analyze the interview results. Define new plans for collecting requirements from new target users.	20h 59m
	3	Modify the Project Proposal document and follow-up items that need to be updated. Discuss with Client about new approach for the project (leaning Research and Development). Join Market Research for similar products and sum up Market Research results to report to supervisor.	20h 14m
	4	Collect data about the important acupuncture points and additional acupuncture points. Create Value Proposition Canvas from the empathy interview results with the target users. First step research and find the appropriate 3-D model from the market.	20h 51m
	5	Review about React.js (for Front-end development of the project) with Three.js integrated. Research and report about creating texture in Blender. Add the completed texture to the selected 3D mesh to have the complete model for integration. Do demo projects using Three.js and report to understand techniques for implementation.	20h 55m
	6	Add and modify camera and control effects to the model after loaded into viewspace. Examine drawing acupuncture points of one demo meridian (BL) to the model to understand coordination in Three.js viewspace. Discuss with Dr. Liu and prepare for content to be presented in Informal QR Review presentation.	21h 49m

	7	Set up repositories for the project. Set up Front-end code base for the project. Support setting up deploy server and CI/CD pipeline for both Front-end and Back-end code base of the project. Write script to add data of 14 meridians from spreadsheets to MongoDB database.	14h 42m
	8	Handle the first version of Interactive UI from the Prototype version 1: Authentication pages, Profile pages, Home page, Quiz page, Details page, Advanced search page, Data management page, Personal records page, About page.	25h 11m
	9	Research and perform technical experiments about advanced technique in Three.js, including hovering and clicking effects, camera focus effects and test on the 3D model. Support drawing acupuncture points of meridians to the 3D model. Optimize the rendering of 3D model and items and reduce lag.	18h 01m
	10	Integrate advanced effects to the 3D model: hovering, clicking and camera focus effects. Resolve pending UI bugs reported from Interactive UI – version 1. Implement updates for second version of Interactive UI (all pages and updated features).	21h 01m
			203h 36m
Tan Le Tran Ba (21142355)	1	Support completing the raw content for Project Proposal presentation. Design document's cover template. Create and style the presentation slide for Project Proposal.	29h 27m
	2	Scan and collect data from scientific and research papers. Contact with acupuncturists suggested by Academic Affairs to appoint for meetings. Attend interviews with acupuncturists and analyze the interview results.	22h 20m
	3	Report interview results to supervisor. Contact groups of recommended target users from the acupuncturists. Seek for more target users (from acupuncture community). Collect data about the meridians.	24h 24m
	4	Collect data about the important acupuncture points and additional acupuncture points. Sum up the list of requirements for the project based on feedback from supervisor and updates from the Medical University students.	14h 18m

	5	Research for realistic human color tones for skin, and create a skin texture to be added to the 3D mesh. Experiment adding loading scene in Three.js while waiting for the complete model to be loaded.	10h 38m
	6	Start with designing the layout sketch of the screens of the final product. Complete the layout and styling of the presentation slide for the Informal QR Review presentation.	20h 48m
	7	Continue styling detailed design for first version of Prototype, getting feedback from team members and make modifications. Support drawing acupuncture points of some meridians into the 3D model.	21h 39m
	8	Draw acupuncture points of meridians to the 3D model.	5h 02m
	9	Contact the university students to send Interactive UI – version 1 and responsible for managing the feedback. Support drawing acupuncture points of meridians to the 3D model. Summary the feedback for Interactive UI – version 1 and start creating second version of Prototype based on the feedback and updates.	23h 42m
	10	Finalize the second version of Prototype from the feedback and agreed upgrades. Start the first step in setting up and designing the basic layouts for responsive design – mobile devices devices.	16h 35m
			188h 53m
Trang Ho Ngoc Thao (21142358)	1	Verify the Project Proposal document. Create the script for presenting Project Proposal. Perform initial technical research about libraries for 3-D rendering into browser.	28h 40m
	2	Scan and collect data from scientific and research papers. Attend interviews with acupuncturists and analyze the interview results. Support with preparation for interviews with the acupuncturists.	17h 31m
	3	Research and seek for medical sources from authors suggested by acupuncturists from Medical University bookstores. Prepare survey form to collect requirements from the new group of target users. Join Market Research for similar products	13h 13m

	4	Collect data about the important acupuncture points and additional acupuncture points.	20h 27m
	5	Review about NestJS framework (for Back-end development). Support research and report about Three.js library. Do demo projects using Three.js and report to understand techniques for implementation. Set up MongoDB database for the project.	17h 48m
	6	Research and create demo test to review connecting from NestJS server to MongoDB and PostgreSQL database instances. Support recording demo video for Front-end side. Draft slide content for Informal QR Review presentation.	20h 57m
	7	Set up Back-end code base for the project, with connection mechanism to connect from server to both MongoDB and PostgreSQL databases. Write scripts to integrate data of the collected acupuncture points from spreadsheets to MongoDB database.	22h 22m
	8	Validate the integrated data of meridians and acupuncture points, make modifications to format the documents in storage. Research and integrate authentication flow for the website using Firebase Authentication.	11h 35m
	9	Set up API endpoints for getting information and updating information about the acupuncture points and meridians. Support drawing acupuncture points of meridians to the 3D model.	19h 38m
	10	Set up API endpoints for authentication flow and getting, updating account information. Manual testing all the finished API endpoints.	16h 16m
			188h 27m

APPENDICES

Auckland University of Technology Bachelor of Computer & Information Sciences

Research & Development Project

Disclaimer:

Clients should note the general basis upon which the Auckland University of Technology undertakes its student projects on behalf of external sponsors:

While all due care and diligence will be expected to be taken by the students, (acting in software development, research, or other IT professional capacities), and the Auckland University of Technology, and student efforts will be supervised by experienced AUT lecturers, it must be recognized that these projects are undertaken in the course of student instruction. There is therefore no guarantee that students will succeed in their efforts.

This inherently means that the client assumes a degree of risk. This is part of an arrangement, which is intended to be of mutual benefit. On completion of the project it is hoped that the client will receive a professionally documented and soundly constructed working software application, some part thereof, or other appropriate sets of IT artifacts, while the students are exposed to live external environments and problems, in a realistic project and customer context.

In consequence of the above, the students, acting in their assigned professional capacities and the Auckland University of Technology, disclaim responsibility and offer no warranty in respect of the “technology solution” or services delivered, (e.g. a “software application” and its associated documentation), both in relation to their use and results from their use.

LINKS FOR REFERENCING

- Portfolio (for Midterm Review assessment):
https://drive.google.com/drive/folders/1vpfLDHFZVyFoNQ6R2QJScLluO2k8dx-p?usp=share_link
- Demo video – Interactive UI (version 1): https://youtu.be/9_Ar8sowa9M
- Demo video – Interactive UI (version 2): <https://youtu.be/qz7kwW16g-w>
- Staging server: <https://vn01-staging.web.app/> (unfinished, currently fixing bugs from Interactive UI – version 2)

CONTACT INFORMATION

Development team:

ID	Full name	Role	Phone number	Email
21142643	Chuong Pham Dinh	Quality Engineer	+84 842 231 056	rdz6635@autuni.ac.nz
21142377	Nhan Nguyen Cao	Business Analyst & Front-end Developer	+84 704 448 681	mmr6179@autuni.ac.nz
21142355	Tan Le Tran Ba	Project Manager & Designer	+84 915 592 659	xkk1463@autuni.ac.nz
21142358	Trang Ho Ngoc Thao	Back-end Developer	+84 708 083 600	yzn9799@autuni.ac.nz

Client:

Title	Full name	Role	Phone number	Email
Dr.	William Liu	Client	-	wliu@unitec.ac.nz

Supervisor:

Title	Full name	Role	Phone number	Email
Dr.	Nhan Le Thi	Supervisor	-	ltnhan@fit.hcmus.edu.vn