AUT UNIVERSITY
NEW ZEALAND

COMP704 Research and Development Project

VN01 3D acupuncture healthcare data management and treatment system

Status Report

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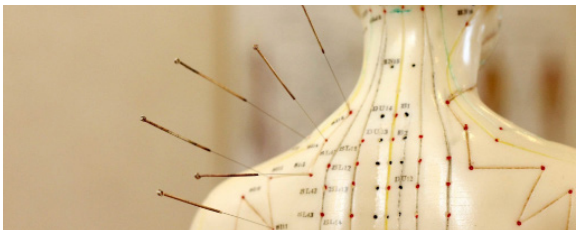

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Milestone: Midterm Review

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DOCUMENT VERSION CONTROL

1. DOCUMENT INFORMATION

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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)*

I. 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 1 - 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.	

II. 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:

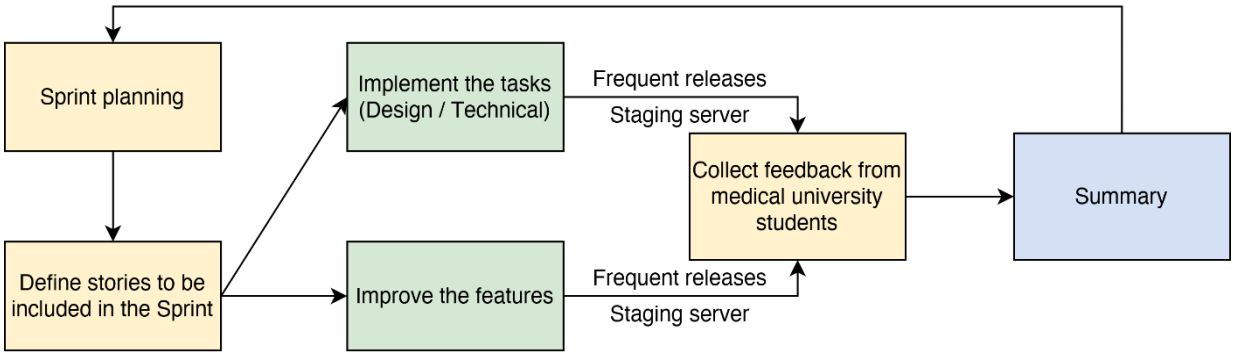


Figure 1 - Updated procedure for our team's development phase

- 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.

III. SPRINTS REPORT

III.1. TIMELINE

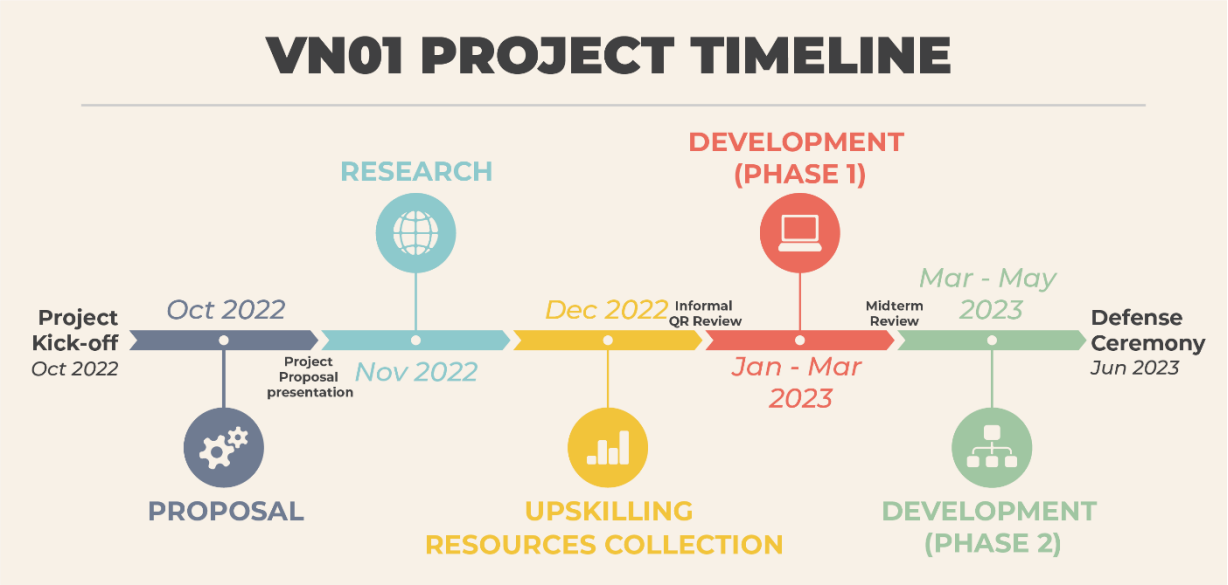


Figure 2 - Initial plan for the main phases of the project

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:

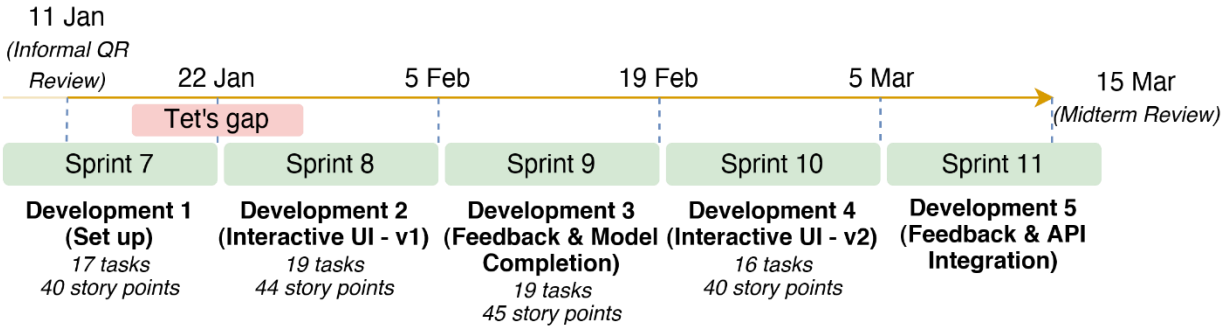


Figure 3 - Timeline of the Sprints

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.

III.2. SPRINT PLANNINGS

III.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 2 – 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 3 – Sprint 7 details

Task ID	Task name	Story points	Estimated effort (h)	Assignee
1	Set up project repositories	1	2	Nhan Nguyen Cao
2	Set up the code base for Front-end	2	5	
3	Set up code base (NestJS) for Back-end	2	5	Trang Ho Ngoc Thao
4	Set up MongoDB database	1	4	
5	Set up MySQL/PostgreSQL database	2	4	
6	Set up CircleCI for Front-end	2	4	Nhan Nguyen Cao
7	Set up CD for Front-end (Staging)	3	7	
8	Set up CircleCI for NestJS Back-end	3	7	
9	Draw to layout: LU meridian	3	6	Tan Le Tran Ba
10	Draw to layout: LI meridian	2	4	
11	Draw to layout: ST meridian	3	6	Chuong Pham Dinh
12	Draw to layout: SP meridian	3	6	
13	Draw to layout: HT meridian	2	5	
14	Write script to add data of 60 important acupuncture points to the database	3	7	Trang Ho Ngoc Thao
15	Write script to add data of 301 other acupuncture points to the database	3	7	
16	Write script to add data of 14 meridians to the database	2	5	Nhan Nguyen Cao
17	Create prototype - Version 1	3	12	Tan Le Tran Ba
Total	**17 tasks**	**40**	**96**	

III.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 4 – Sprint 8 timeline

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

Sprint Details:

Table 5 - Sprint 8 details

Task ID	Task name	Story points	Estimated effort (h)	Assignee
1	Validate and update data of 14 meridians in the MongoDB database.	2	3	Trang Ho Ngoc Thao
2	Validate and update data of 361 acupuncture points in the MongoDB database.	2	5	

3	Handle the interactive UI: Authentication pages (Sign Up and Log In)	2	4	Nhan Nguyen Cao
4	Handle the interactive UI: Profile pages (Edit Profile and Forgot Password)	2	4	
5	Handle the interactive UI: Home page	2	6	
6	Handle the interactive UI: Quiz page	3	7	
7	Handle the interactive UI: View details page	2	3	
8	UI Testing the first version of interactive UI (Part 1 – Authentication, Profile, Home, Quiz, and View details)	3	8	Chuong Pham Dinh
9	Draw to layout: SI meridian	2	4	Tan Le Tran Ba
10	Draw to layout: BL meridian	3	6	
11	Handle the interactive UI: Advanced Search page	3	7	Nhan Nguyen Cao
12	Handle the interactive UI: Data Management page	2	3	
13	Handle the interactive UI: Personal Records page	3	8	
14	Handle the interactive UI: About page	2	4	
15	UI Testing the first version of interactive UI (Part 2 – Advanced Search, Data Management, Personal Records, About)	3	8	Chuong Pham Dinh
16	Draw to layout: KI meridian	2	4	Tan Le Tran Ba
17	Draw to layout: PC meridian	2	4	
18	Research about integrating Firebase authentication into the system	2	3	Trang Ho Ngoc Thao
19	Integrate Firebase authentication into the system for 2 methods: Email or Google Provider	3	5	
Total	**19 tasks**	**44**	**96**	

III.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 6 - Sprint 9 timeline

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

		Handle the API endpoints for storing, retrieving, and updating information about the acupuncture points. Label acupuncture points of the second batch of 2 extraordinary meridians (Du, Ren) to the 3-D model. Optimize the interactions on the 3-D model and reduce lag. Implement feature test cases for Interactive Prototype – V1

Sprint Details:

Table 7 - Sprint 9 details

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

12	Create the second version for prototype V2 based on the feedback received from V1 (Stage 1)	2	6	
13	Draw to layout: Du meridian	2	4	Nhan Nguyen Cao
14	Draw to layout: Ren meridian + extra points	2	5	Chuong Pham Dinh
15	Set up API endpoint for getting acupuncture point information	3	6	Trang Ho Ngoc Thao
16	Set up API endpoint for updating acupuncture point information	3	6	
17	Implement feature test cases for Interactive Prototype – V1	3	6	Chuong Pham Dinh
18	Optimize interactions for the model in Three.js	3	6	Nhan Nguyen Cao
19	Reduce lag for the model integrated into the site using Three.js	2	4	
Total	**19 tasks**	**45**	**96**	

III.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 8 - 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.

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

Sprint Details:

Table 9 – Sprint 10 details

Task ID	Task name	Story points	Estimated effort (h)	Assignee
1	Create the second version for prototype V2 based on the feedback received from V1 (Stage 2)	2	5	Tan Le Tran Ba
2	Resolve pending UI and feature bugs that existed from interactive UI – V1	2	5	Nhan Nguyen Cao
3	Handle the API endpoints for storing and getting account information	2	5	Trang Ho Ngoc Thao
4	Handle the API endpoints for updating account information	3	7	
5	Integrate the hovering and clicking effects into the 3-D model	2	5	Nhan Nguyen Cao
6	Integrate the focus-to-item camera effect into the 3-D model	2	5	
7	Review and update descriptions for UI and feature test cases of Interactive prototype V1	2	5	Chuong Pham Dinh
8	Integrate interactive questions for quiz feature – prototype V2	3	7	Nhan Nguyen Cao
9	Update interactive prototype V2 – Home page + Landing page	3	7	

10	Update interactive prototype V2 – Quiz page	3	7	
11	Update interactive prototype V2 – Advanced search page + Details page	2	5	
12	Validate all the finished API endpoints and improve test coverage	3	7	Trang Ho Ngoc Thao
13	Design test cases for the new Quiz feature	3	7	Chuong Pham Dinh
14	Design test cases for new Model interaction on the home page	3	7	
15	UI testing the second version of Interactive UI.	2	5	
16	Create prototype - Responsive Design (Mobile – Stage 1)	3	7	Tan Le Tran Ba
Total	**16 tasks**	**40**	**96**	

III.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 10 – Sprint 11 timeline

Week	Timeline	Detail
1	6 Mar 2023 – 12 Mar 2023	Collect user feedback from the target users (medical university students) and supervisor about the Second version of the Interactive prototype.

		Fix reported UI bugs from Interactive Prototype – V2. Design feature test cases for Interactive Prototype – V2. Prepare documents, presentation slides, and presenting speech for the Midterm Review presentation.
2	13 Mar 2023 – 19 Mar 2023	Stage 1: Update the Interactive Prototype V2 from feedback collected from target users and supervisor. Continue with responsive design for Mobile and start with responsive design for Tablet. Improve unit test coverage for the Front-end side of the project. Deliver the Midterm Review presentation. Implement feature test cases for Interactive Prototype – V2. Handle the API endpoints for storing quizzes' results, and personal records.

Sprint Details:

Table 11 – Sprint 11 details

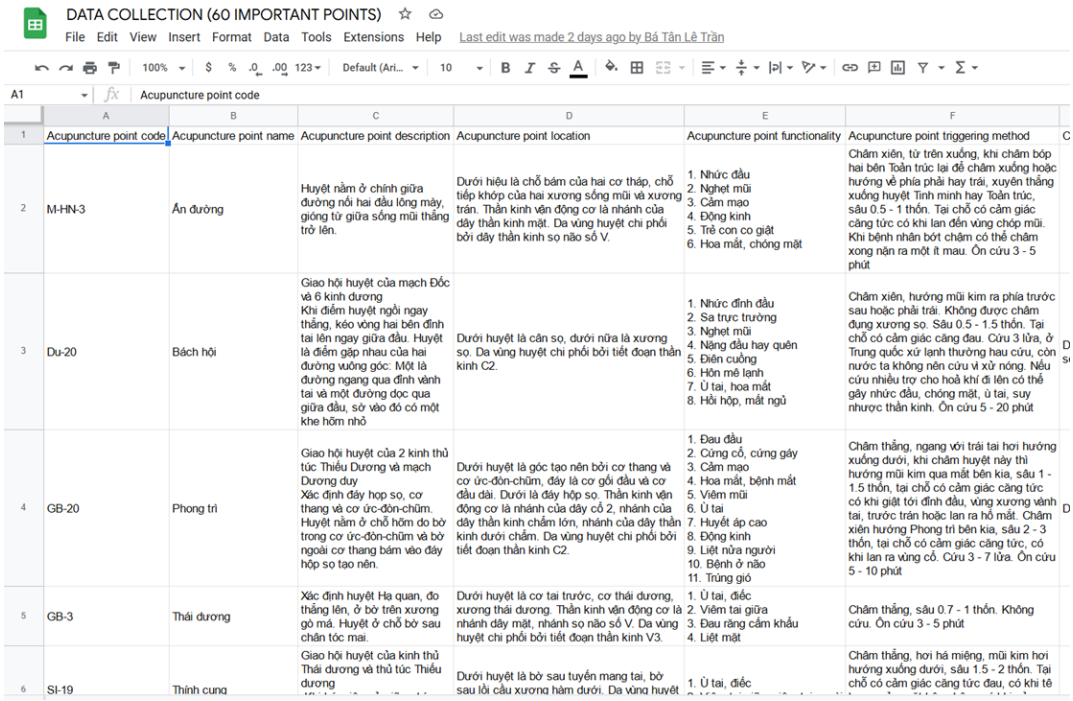
Task ID	Task name	Story points	Estimated effort (h)	Assignee
1	Send interactive UI V2 to the students to get feedback about the prototype	2	5	Tan Le Tran Ba
2	Prepare content for the Midterm Formal Review presentation	3	7	Chuong Pham Dinh
3	Prepare slide for the Midterm Formal Review presentation	3	7	Tan Le Tran Ba
4	Prepare Progress Report document for Midterm Review	3	7	Nhan Nguyen Cao
5	Resolve pending UI and feature bugs that existed from interactive UI – V2	2	5	
6	Design and document additional feature test cases for Quiz feature and new model interactions.	3	7	Chuong Pham Dinh

7	Prepare speech content for the Midterm Formal Review presentation	3	7	Trang Ho Ngoc Thao
8	Summary the feedback about interactive UI V2 from the medical students and supervisor	2	5	
9	Update Prototype V2 based on feedback collected from the medical students and supervisor	3	7	Tan Le Tran Ba
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	Trang Ho Ngoc Thao
12	Implement feature test cases for Interactive Prototype – V2	2	5	Chuong Pham Dinh
13	Improve unit tests coverage for the Front-end side of the project	2	5	Nhan Nguyen Cao
14	Create prototype – responsive design for Mobile (wrap-up)	2	5	Tan Le Tran Ba
15	Create prototype – responsive design for Tablet (stage 1)	3	7	
16	Wrap up for Midterm Review presentation and submission	1	3	Chuong Pham Dinh
Total	**16 tasks**	**40**	**96**	

IV. FINISHED WORKS & DEMO

IV.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.



DATA COLLECTION (60 IMPORTANT POINTS)

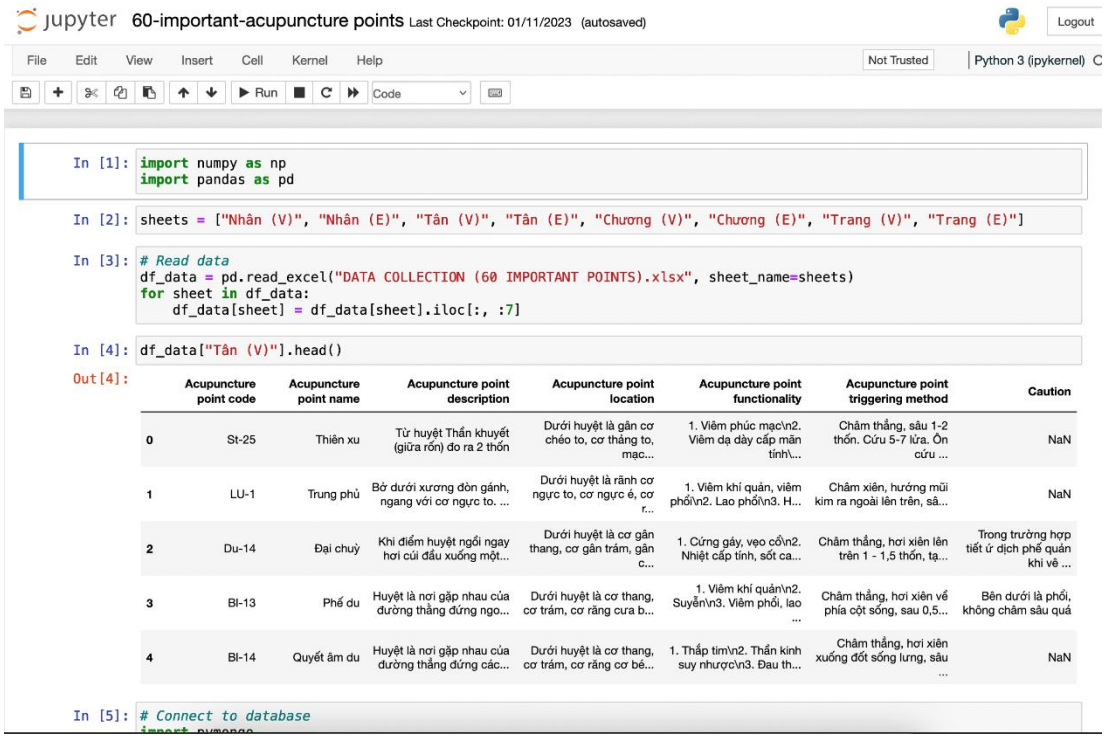
File Edit View Insert Format Data Tools Extensions Help Last edit was made 2 days ago by Bá Tân Lê Trần

A1 Acupuncture point code

	A	B	C	D	E	F
1	Acupuncture point code	Acupuncture point name	Acupuncture point description	Acupuncture point location	Acupuncture point functionality	Acupuncture point triggering method
2	M-HN-3	Ấn 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 tháp, 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 sọ não số V.	1. Nhức đầu 2. Nghẹt mũi 3. Cảm mạo 4. Động kinh 5. Trẻ con co giật 6. Hoa mắt, chóng mặt	Châm xiên, từ trên xuống, khi châm bóp hai bên Toàn trúc lại để châm xuống hoặc hướng về phía phải hay trái, xuyên thẳng xuống huyệt Tinh minh hay Toàn trúc, 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 mau. Ôn cứu 3 - 5 phút
3	Du-20	Bách hội	Giao hội huyệt của mạch Đốc và 6 kinh dương Khi điểm huyệt 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 cân sọ, dưới nữa là xương sọ. Da vùng huyệt chi phối bởi tiết đoạn thần kinh C2.	1. Nhức đỉnh đầu 2. Sa trực trường 3. Nghẹt mũi 4. Nặng đầu hay quên 5. Điên cuồng 6. Hôn mê lạnh 7. Ù tai, hoa mắt 8. Hồi hộp, mất ngủ	Châm xiên, hướng mũi kim ra phía trước sau hoặc phải trái. Không được châm đụng xương sọ. Sâu 0.5 - 1.5 thốn. Tại chỗ có cảm giác căng đau. Cứu 3 lửa, ở Trung quốc xứ lạnh thường hau cứu, còn nước ta không nên cứu vì xử nóng. Nếu cứu nhiều trợ cho hoả khí đi lên có thể gây nhức đầu, chóng mặt, ù tai, suy nhược thần kinh. Ôn cứu 5 - 20 phút
4	GB-20	Phong trì	Giao hội huyệt của 2 kinh thủ túc Thiếu Dương và mạch Dương duy Xác định dây hợp sọ, cơ thang và cơ ức-đòn-chũm. Huyệt nằm ở chỗ hõm do bờ trong cơ ức-đòn-chũm và bờ ngoài cơ thang bám vào đáy hộp sọ tạo nên.	Dưới huyệt là góc tạo nên bởi cơ thang và cơ ức-đòn-chũm, đáy là cơ gối đầu và cơ đầu dài. Dưới là đáy 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. Ù tai 7. Huyết áp cao 8. Động kinh 9. Liệt nửa người 10. Bệnh ở não 11. Trúng gió	Châm thẳng, ngang với trái tai hơi hướng xuống dưới, khi châm huyệt 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 hố 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 lửa. Ôn cứu 5 - 10 phút
5	GB-3	Thái dương	Xác định huyệt 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 sọ não số V. Da vùng huyệt chi phối bởi tiết đoạn thần kinh V3.	1. Ù tai, điếc 2. Viêm tai giữa 3. Đau răng cắm 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 huyệt của kinh thủ Thái dương và thủ túc Thiếu dương	Dưới huyệt là bờ sau tuyến mang tai, bờ sau lồi cầu xương hàm dưới. Da vùng huyệt	1. Ù 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 4 - 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.



jupyter 60-important-acupuncture points Last Checkpoint: 01/11/2023 (autosaved)

Logout

File Edit View Insert Cell Kernel Help Not Trusted Python 3 (ipykernel)

Run Code

```
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()
```

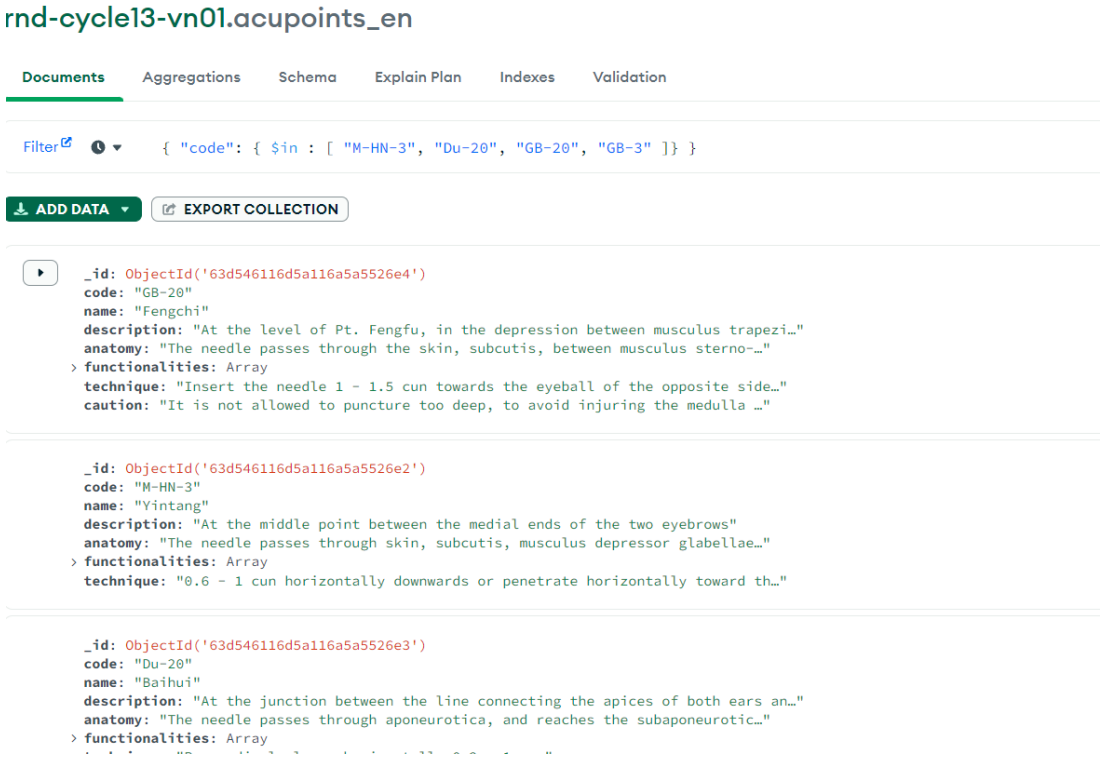
Out[4]:

	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	Từ huyệt Thần khuyết (giữa rốn) đo ra 2 thốn	Dưới huyệt là gân cơ chéo to, cơ thẳng to, mạc...	1. Viêm phúc mạc\n2. 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 gánh, ngang với cơ ngực to. ...	Dưới huyệt là rãnh cơ ngực to, cơ ngực é, cơ r...	1. Viêm khí quản, viêm phổi\n2. Lao phổi\n3. H...	Châm xiên, hướng mũi kim ra ngoài lên trên, sâ...	NaN
2	Du-14	Đại chuỳ	Khi điểm huyệt ngồi ngay hơi cúi đầu xuống một...	Dưới huyệt là cơ gân thang, cơ gân trám, gân c...	1. Cứng gáy, vẹo cổ\n2. 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 vê ...
3	BI-13	Phế du	Huyệt là nơi gặp nhau của đường thẳng đứng ngo...	Dưới huyệt là cơ thang, cơ trám, cơ răng cưa b...	1. Viêm khí quản\n2. Suyễn\n3. 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	Huyệt là nơi gặp nhau của đường thẳng đứng các...	Dưới huyệt là cơ thang, cơ trám, cơ răng cơ bé...	1. Thấp tim\n2. Thần kinh suy nhược\n3. Đau th...	Châm thẳng, hơi xiên xuống đốt sống lưng, sâu ...	NaN

```
In [5]: # Connect to database
```

Figure 5 - 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 6 - Ready-to-use documents in the MongoDB database

IV.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

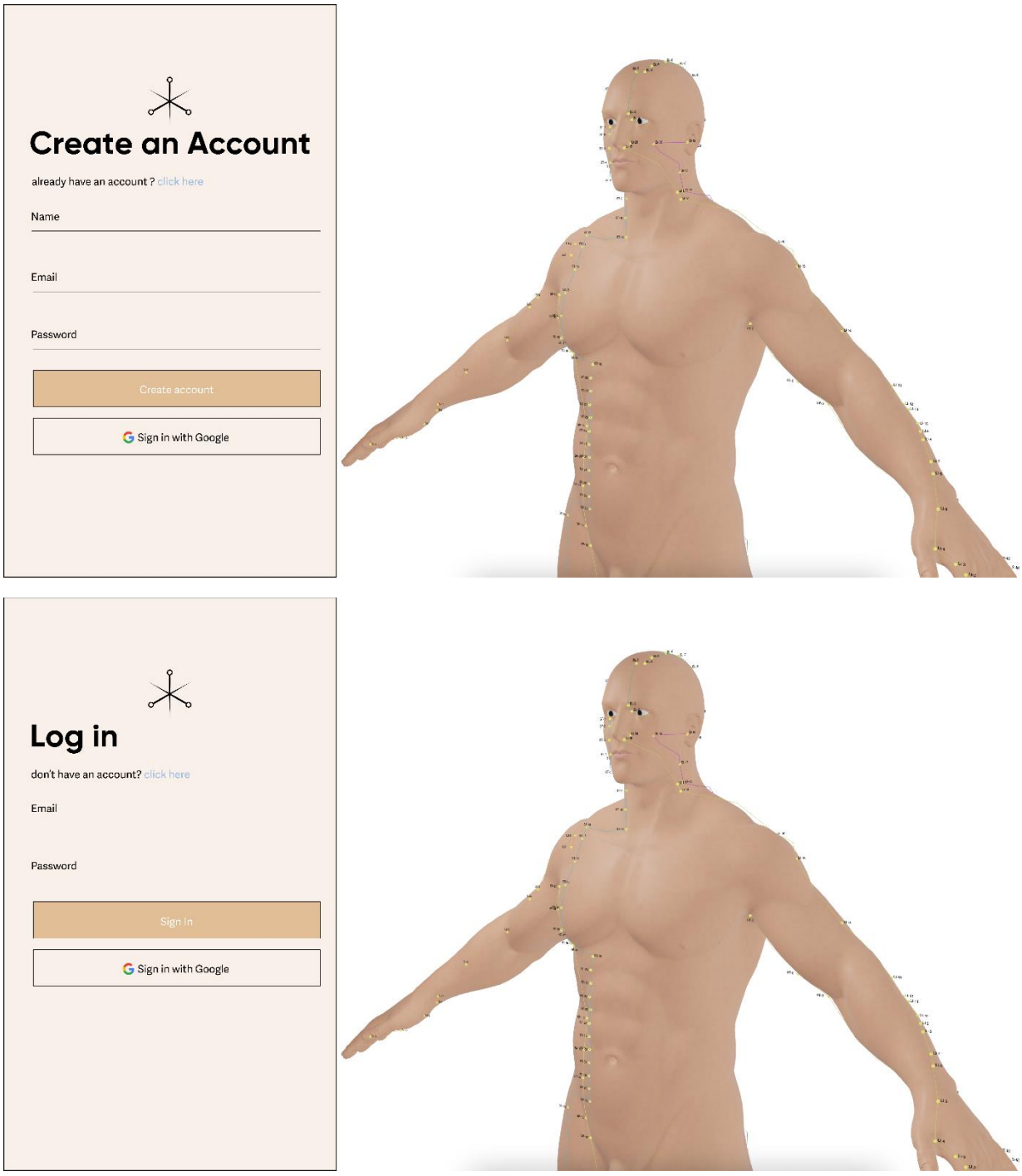


Figure 7 - Prototype V1: Authentication pages

- **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.

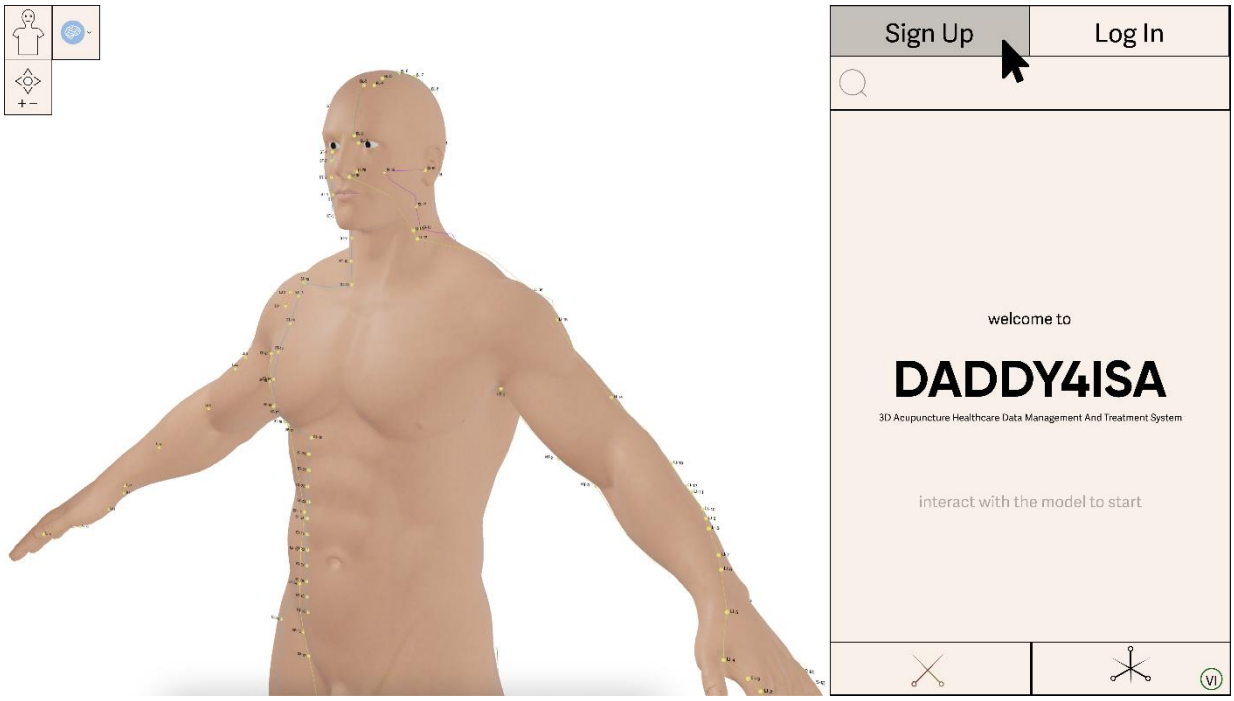


Figure 8 - Prototype V1: Home page

- **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.

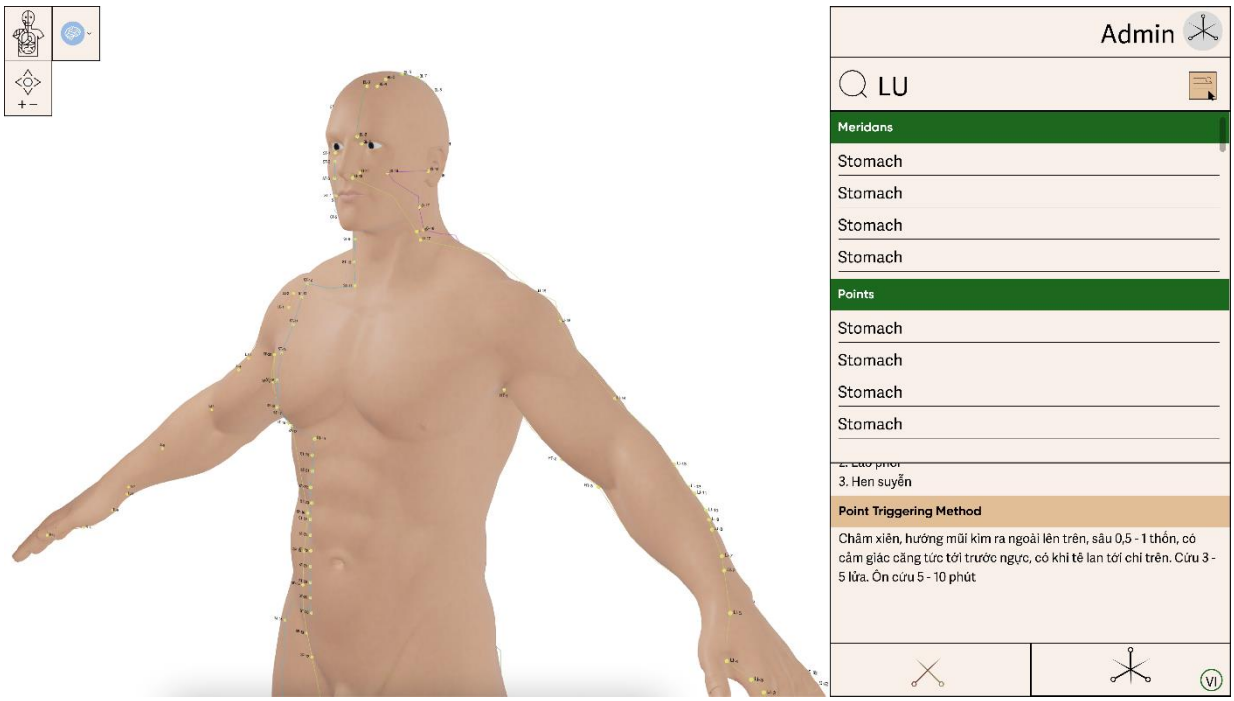


Figure 9 - Prototype V1: Quick Search feature

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

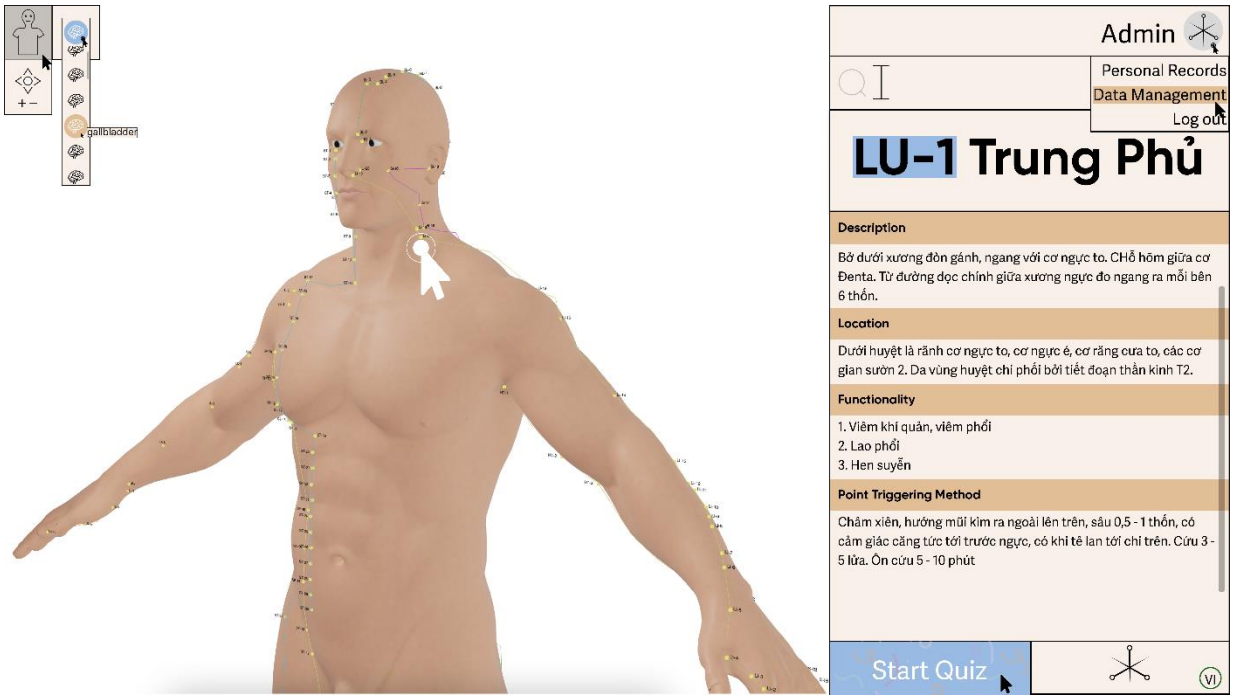
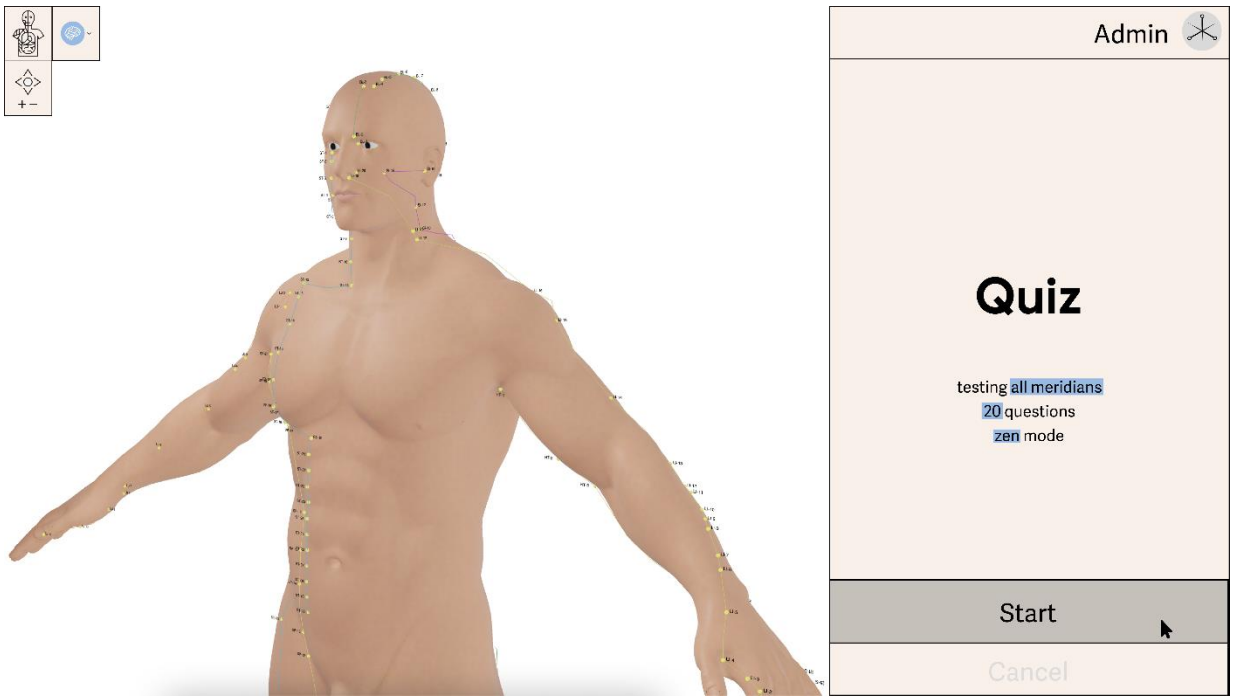


Figure 10 - Prototype V1: View Information feature

- **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



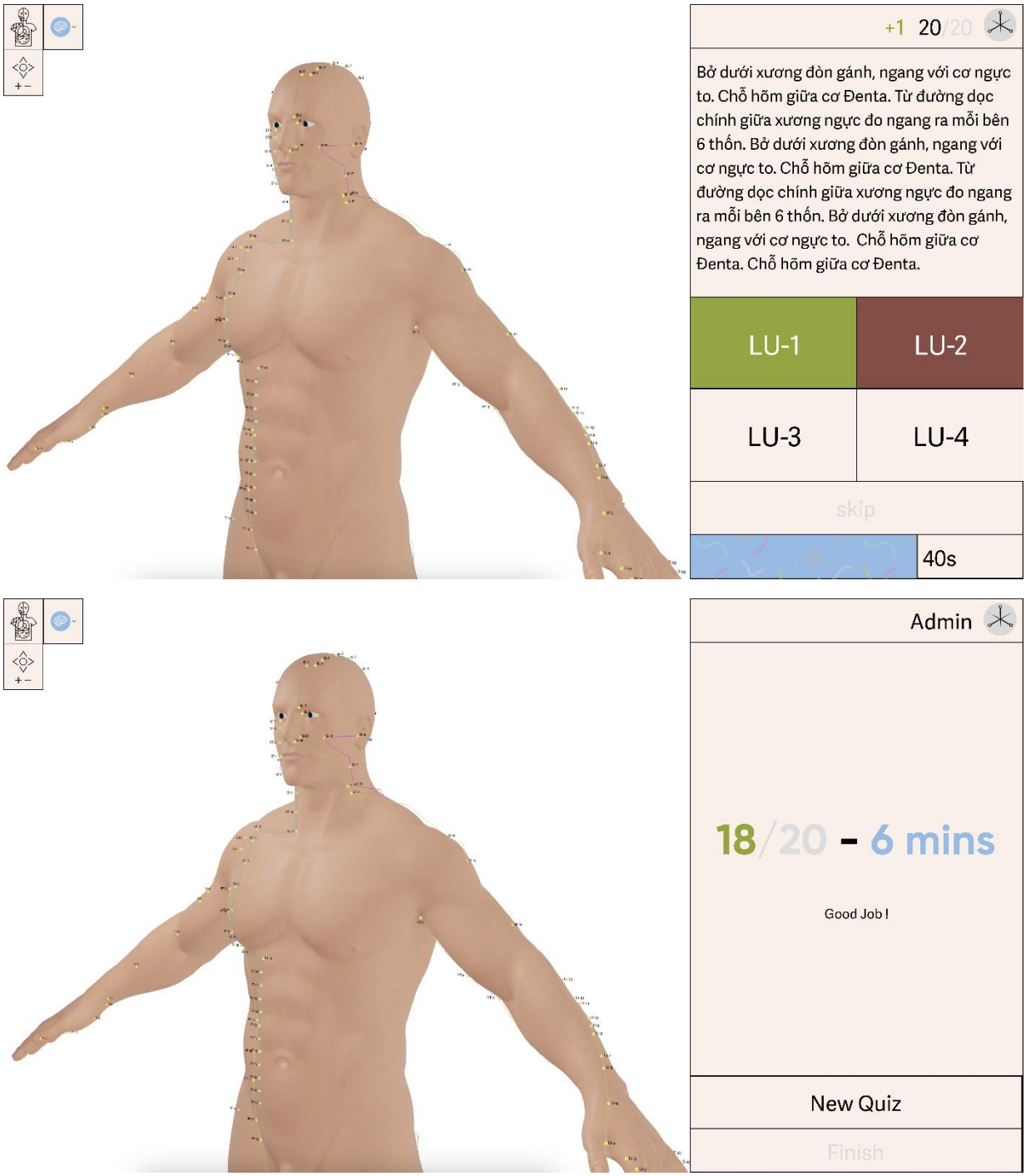


Figure 11 - Prototype V1: Quiz feature

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

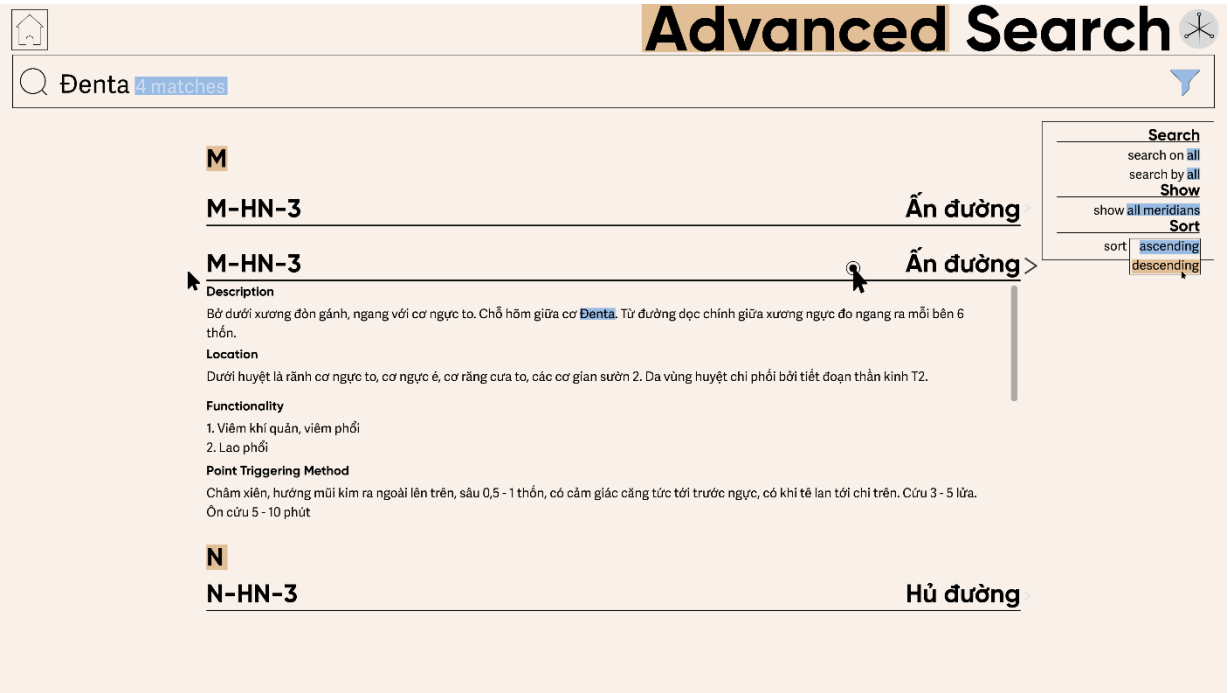


Figure 12 - Prototype V1: Advanced Search feature

- **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.

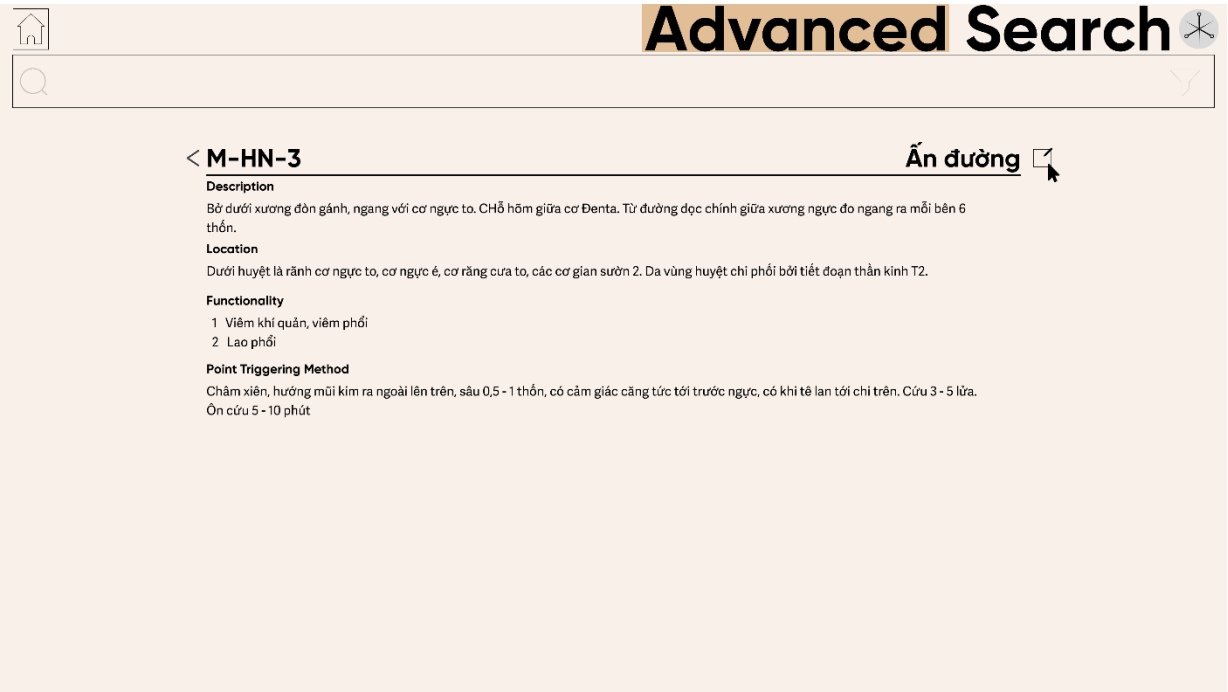


Figure 13 - Prototype V1: View item details (available for all users, including guests)

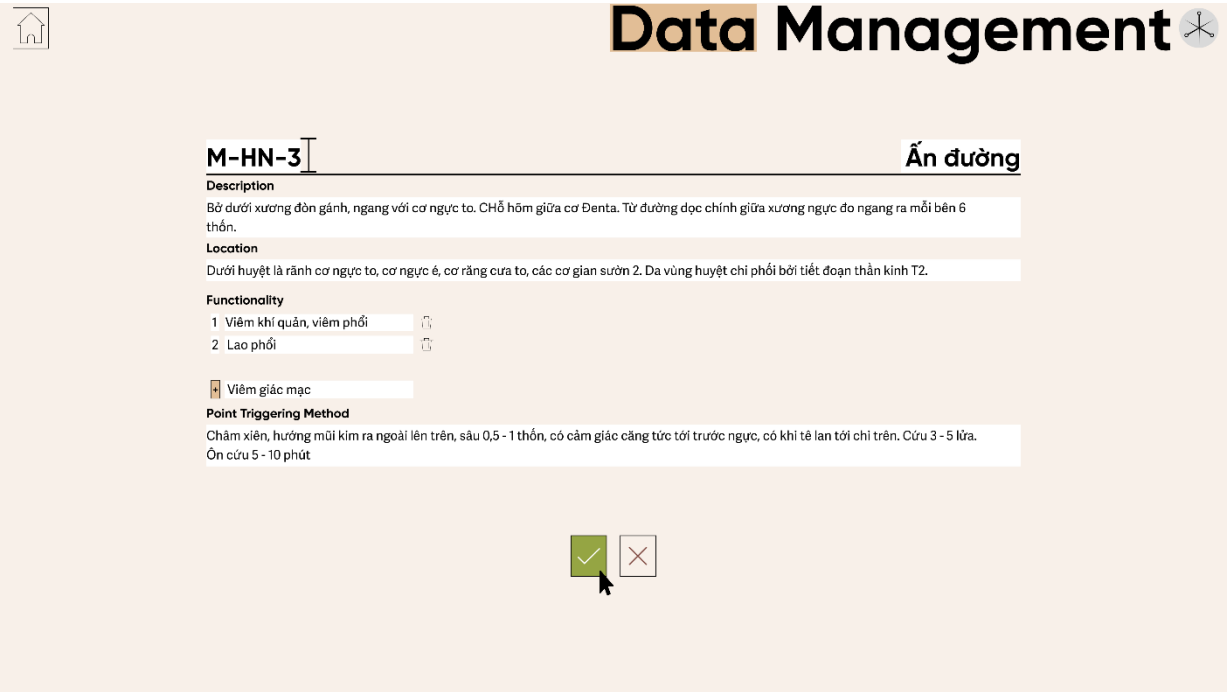


Figure 14 - Update Information feature (only available for Admin users)

IV.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.

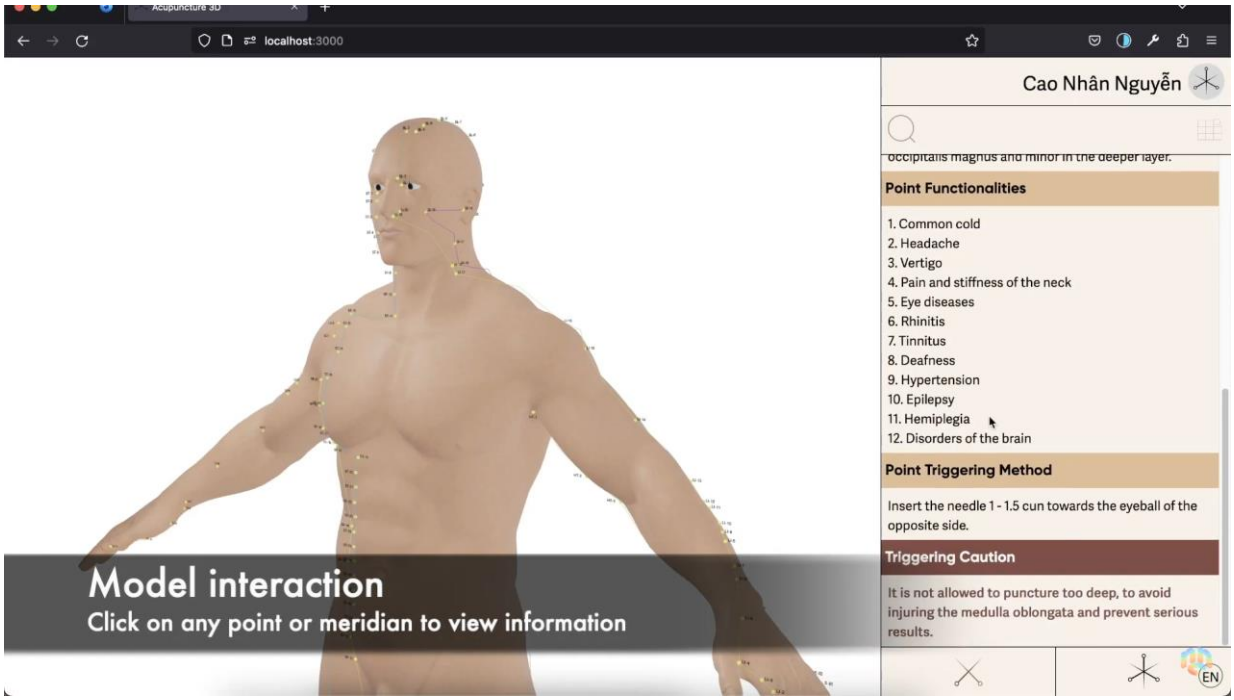


Figure 15 - Screenshot from our demo video for Interactive UI - Version 1

IV.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.

IV.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.

IV.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.

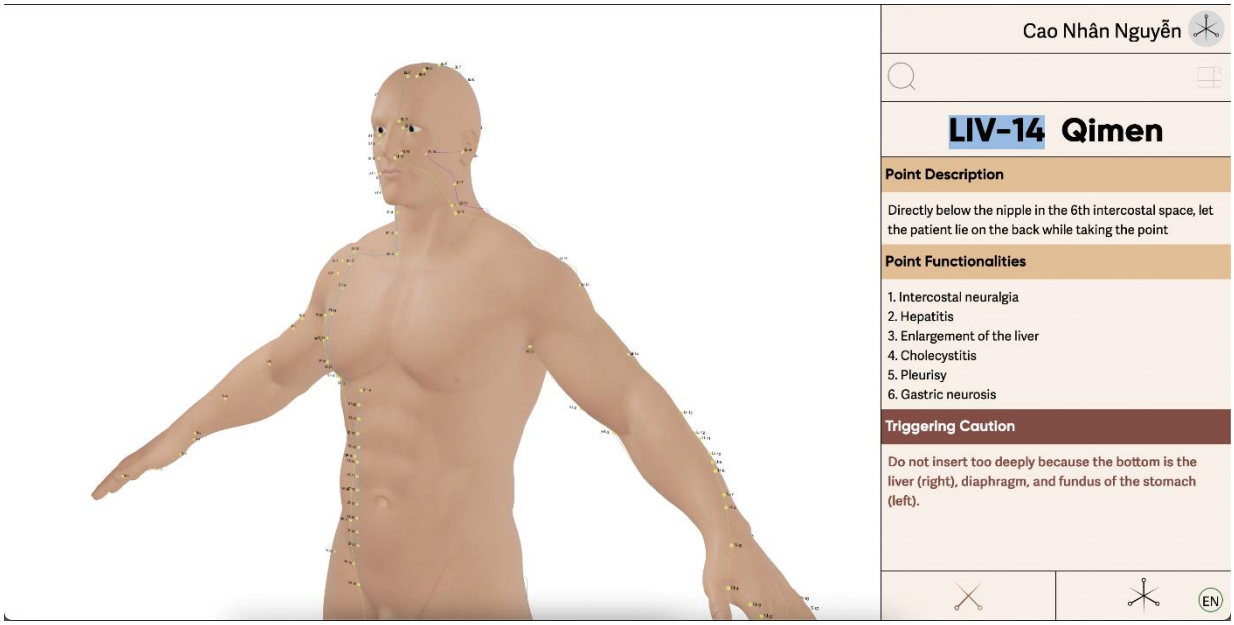


Figure 16 – The side panel covers up to 1/3 of the page is not very good

- 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.

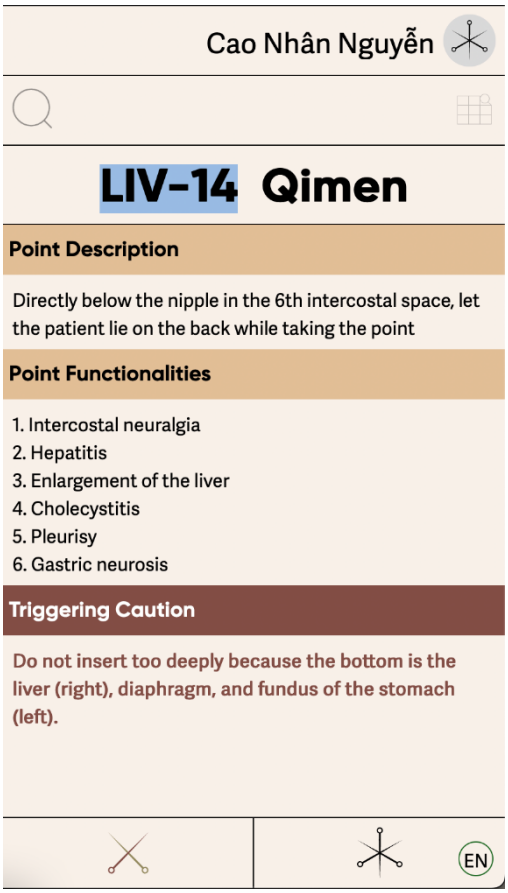


Figure 17 - Showing too much information on the home page is not a good idea

- 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.

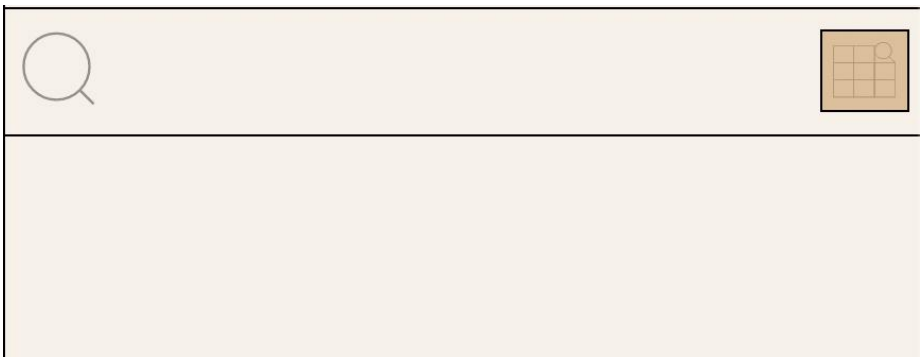


Figure 18 - Our use of the icon for reaching the Advanced Search feature confused two of the five students

IV.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.

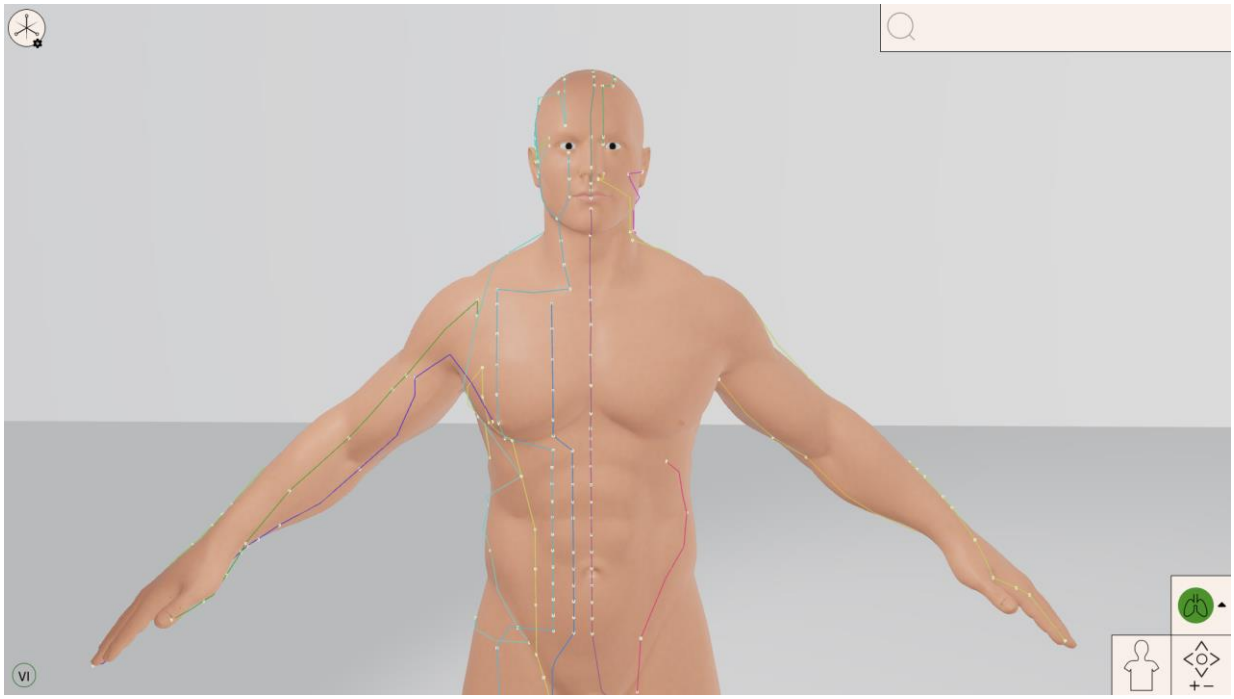


Figure 19 - Prototype V2: The 3D model is moved to the home page

- 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.

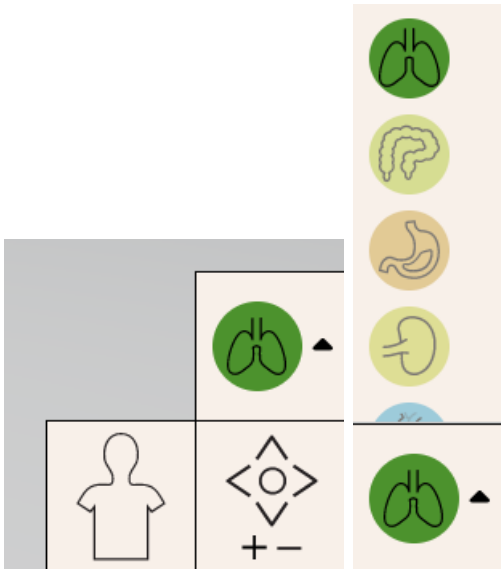


Figure 20 - Control Panel and Quick Meridian Select

- 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.

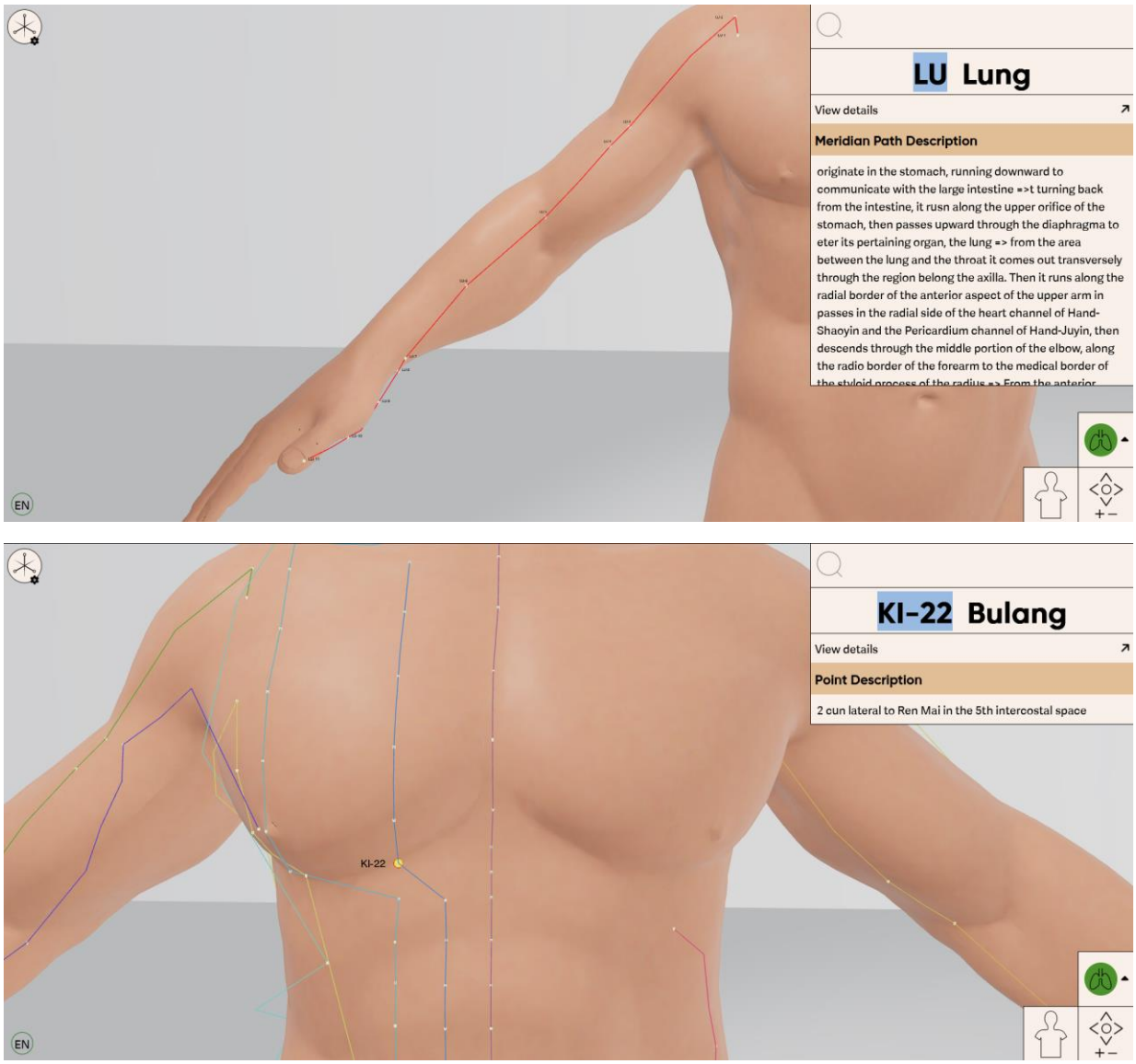


Figure 21 - Meridian and Acupuncture Point selection

- 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 22 - 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.

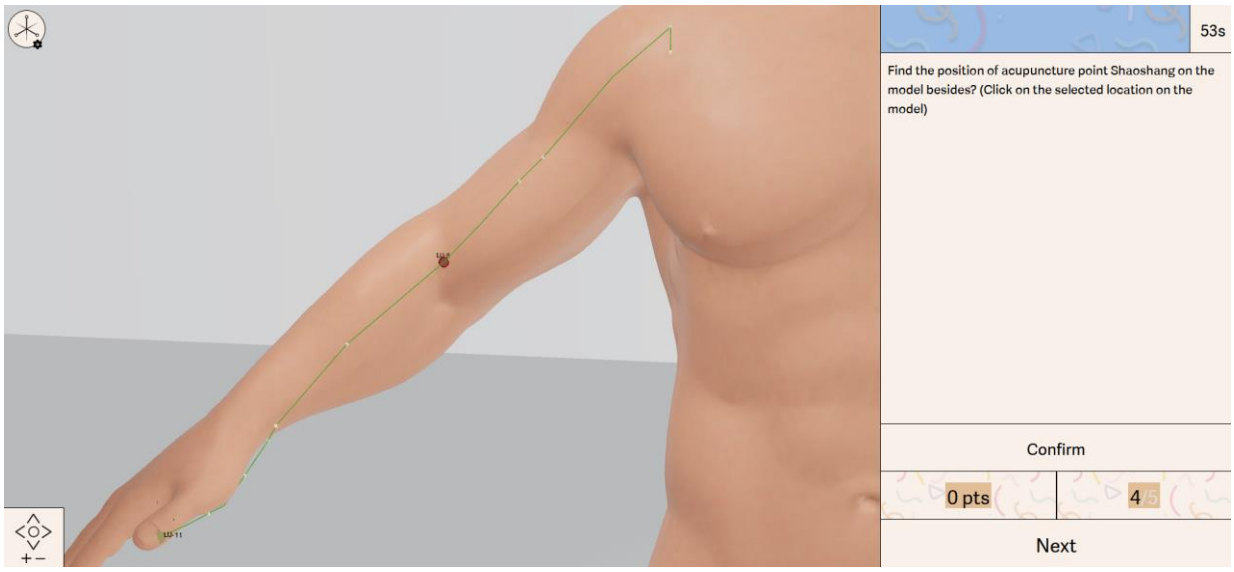


Figure 23 - An example of a Locating question, a unique quiz question type from our website

IV.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.

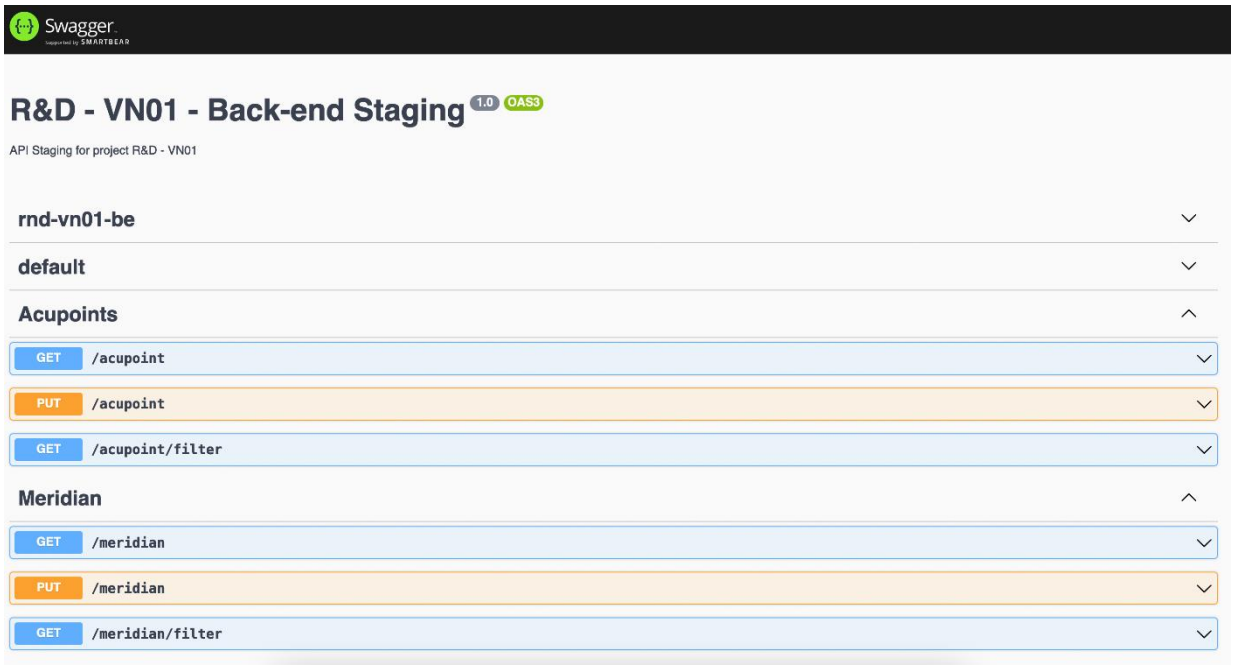
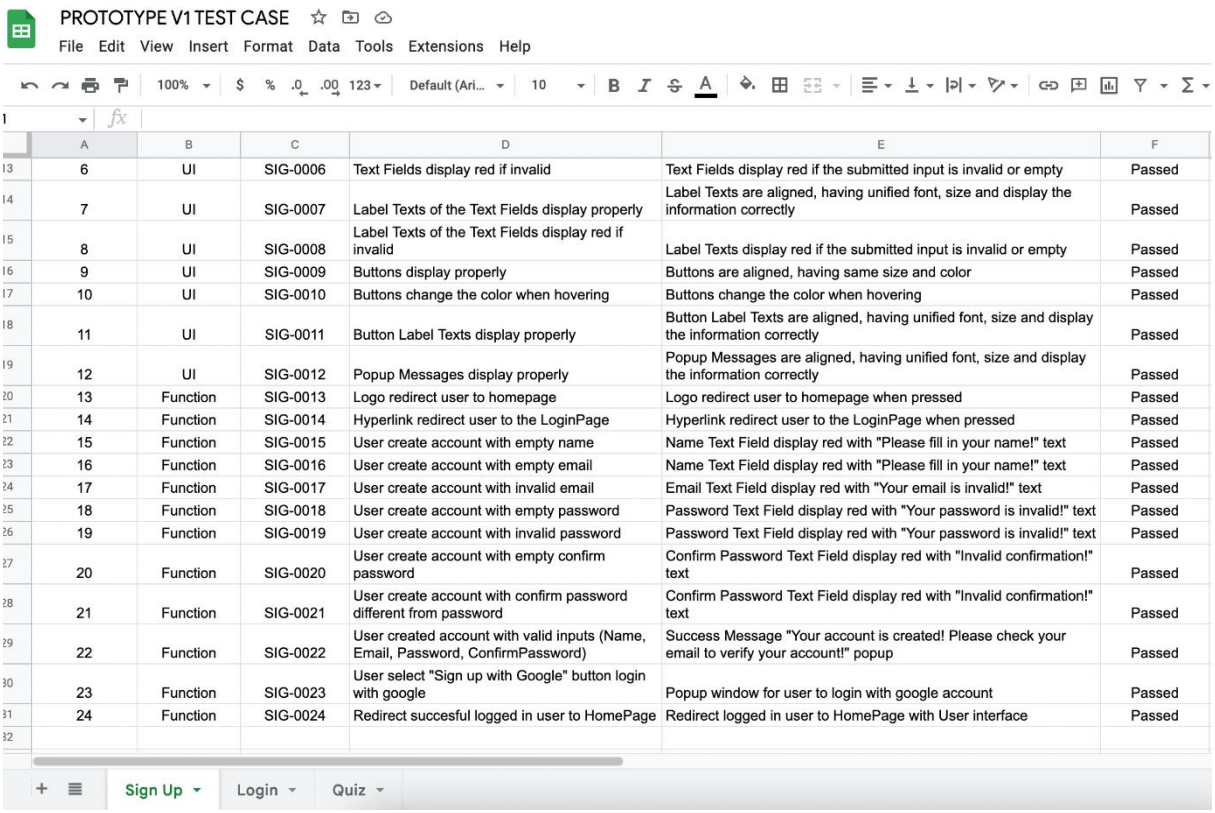


Figure 24 - API endpoints for acupuncture points and meridian, captured from the Swagger page of our Back-end server

IV.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

	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 properly	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 25 - Test cases for Interactive Prototype - V1

Figure 26 - An example of a bug reported to our Jira workspace for the project

IV.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.

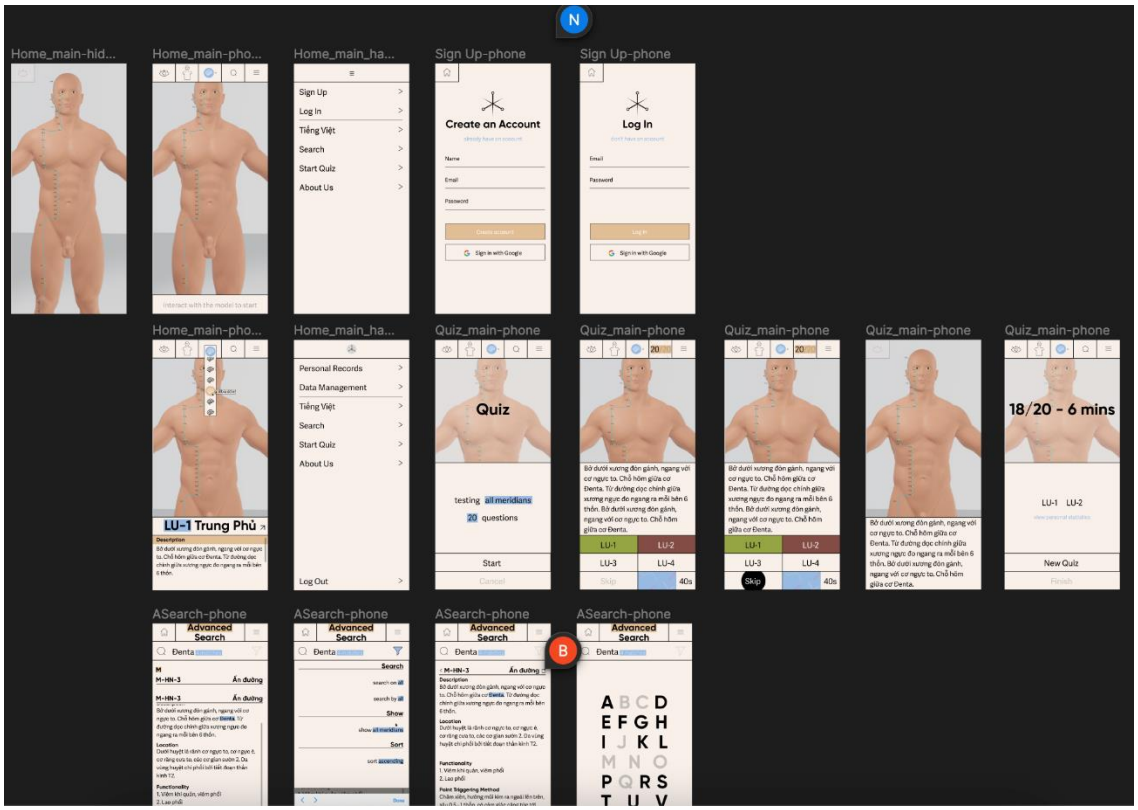


Figure 27 - Responsive Design for Mobile: In Progress

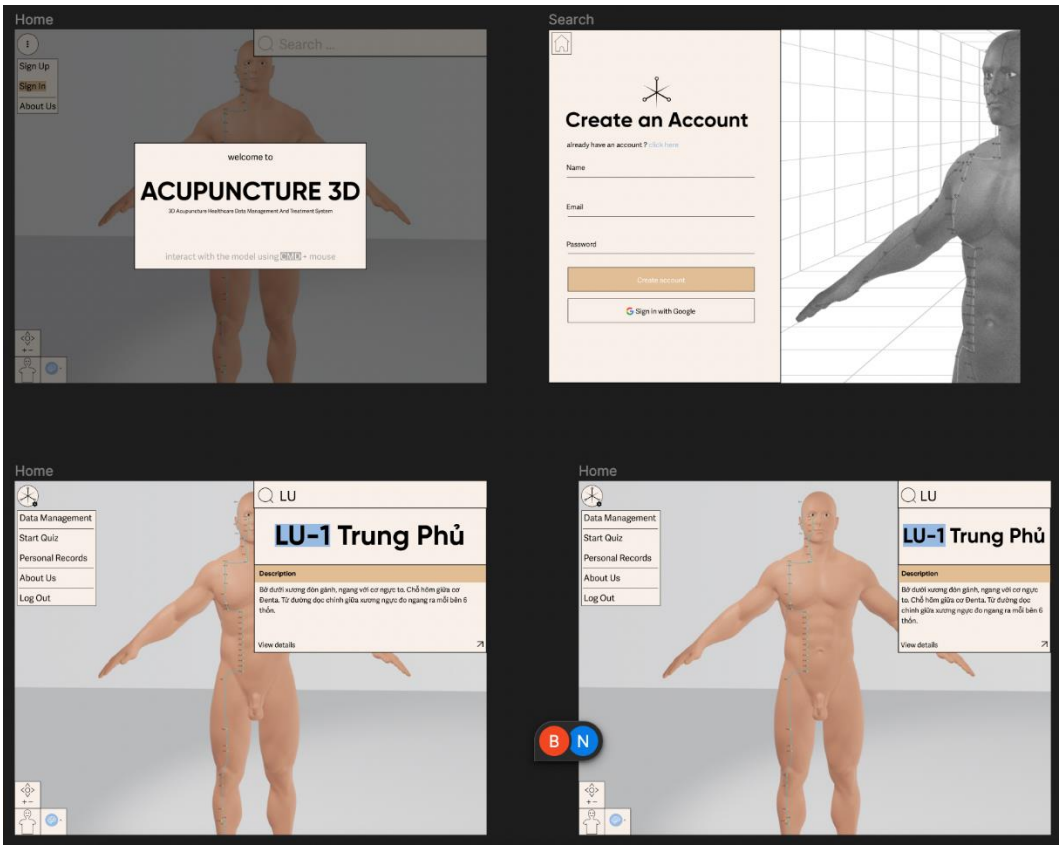


Figure 28 - Responsive Design for Tablet: In Progress

IV.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.

V. PLAN FOR THE NEXT PHASE

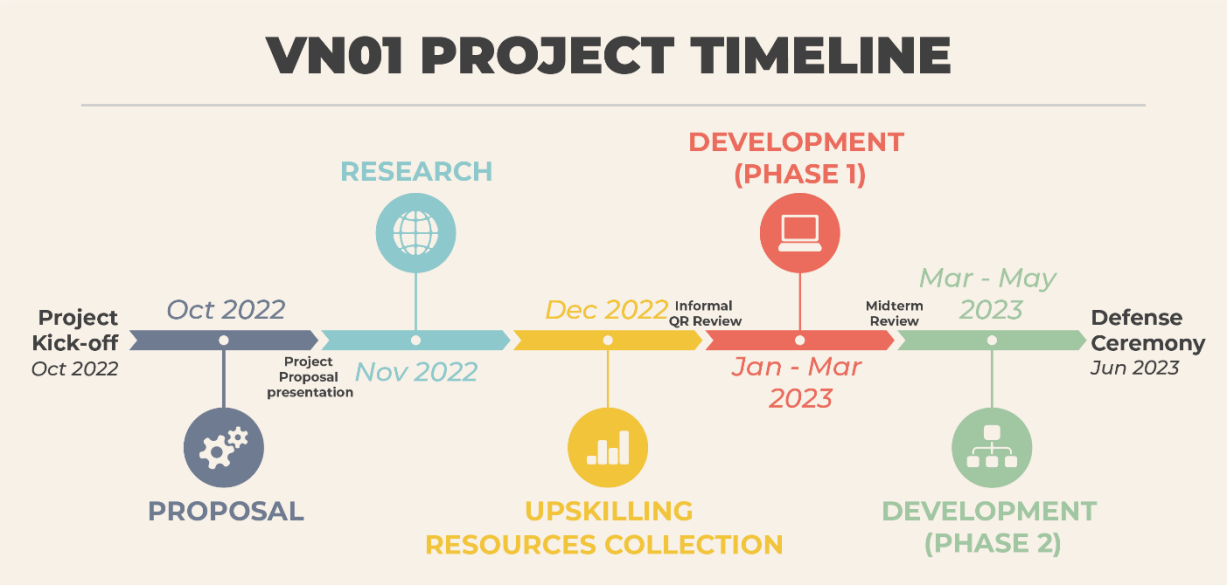


Figure 29 - Initial plan for the main phases of the project

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:

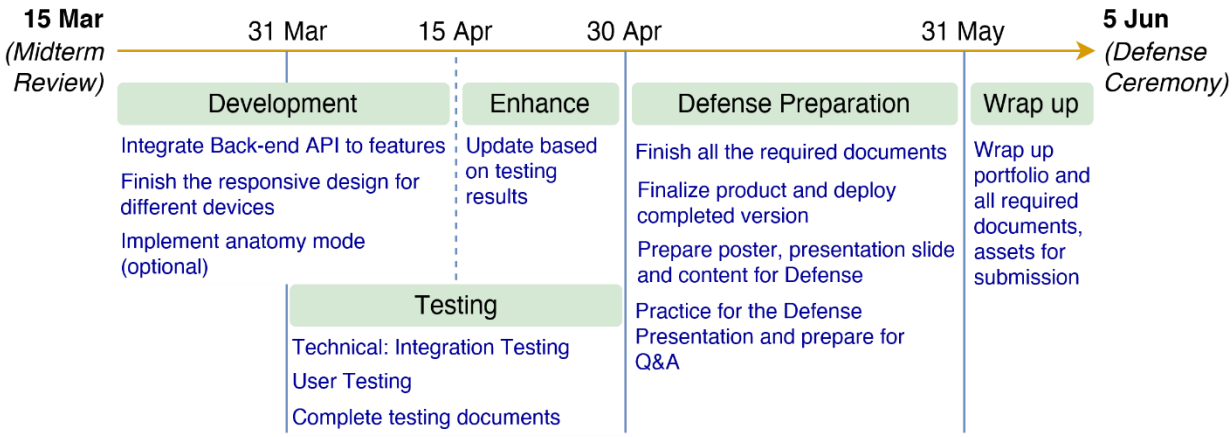


Figure 30 - Detailed plan for the next phase

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.

VI. 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.

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