

SpiceStream

Press, Cook, Enjoy: Perfect Flavor Every Time!



Group 13

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USER RESEARCH, WHO & WHY

The problem (WHY?)

- 45% of the current sample students reported limited (or non-existent) cooking ability.
- A low cooking frequency was associated with poorer diet quality and a higher prevalence of moderate abdominal obesity.
- Only 50% of students consumed three meals per day.



Key insight

Most students find meal preparation time-consuming, especially those making Asian cuisine, as it has a higher demand for ingredients, seasoning skills and cooking techniques, especially during busy periods.



Persona (WHO?)

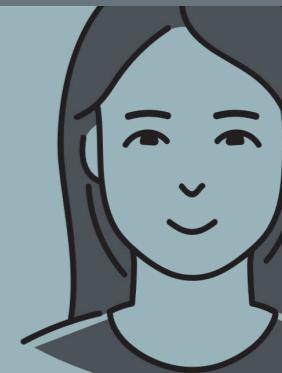
Pain points

Limited seasoning skills

Limited time

Limited storage space for many

Key insight



Target user (WHO?)

Age 18-25 Busy schedule Cooking >3days/week
 Limited seasoning skills Limited kitchen storage space
 Often troubled by seasoning Picky taste



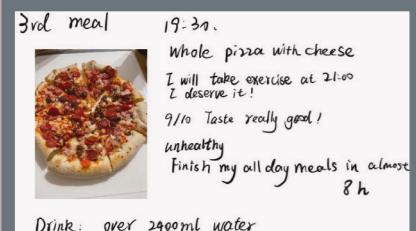
USER RESEARCH

Why is it important?

How might we create a system that simplifies cooking for students with busy schedules and limited cooking skills, thereby supporting a healthier diet and better dining experience?

General Research

DIARY STUDY



Q: "Why do you choose to order pizza even if you know its **unhealthy**?"

A: "Because I **cannot think of what to cook**, and order a pizza delivery is the **fastest option**."

Students also often choose to eat fast food because they don't know what to cook, and even when they go searching for recipes online, it's hard to find easy and tasty options quickly.

INTERVIEW

“Prepping ingredients, like chopping garlic, curing meat, and cleaning up take up the most time in cooking so sometimes I'd rather order takeaways.”

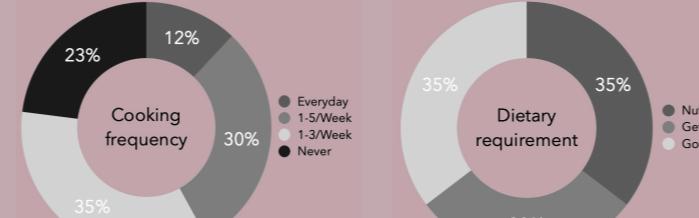
----Meepoh

"I eat instant noodles almost every day though it may not be healthy, because it's hard for me to cook complicated meals in my dorm, and instant noodles at least taste not bad."

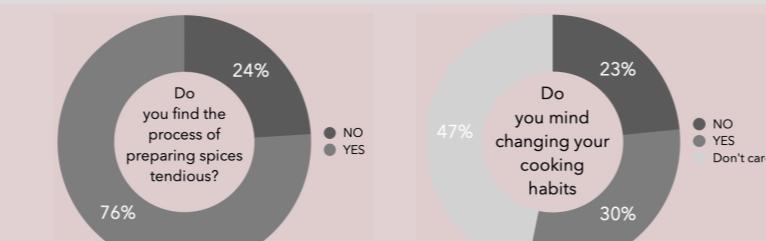
----Warren

Even though most students have demands for balanced nutrition and taste, **technical and time constraints** prevent their needs from being met

USER QUESTIONNAIRE



Most of the students has the requirement of cooking but the actual cooking frequency is limited.



Most students don't like the process of seasoning in cooking and most of them don't mind changing their cooking habits, so we can improve the user experience by improving their cooking process.

Specific Research

OBSERVATION

“

I have too many seasonings, and sometimes they are screwed on very tightly. Even just opening them one by one is tiring."



It can be seen that the students have a lot of spices and **take up what little storage space** there is, it takes a **lot of time** to **take them out** each time and **organize them** after cooking.

INTERVIEW

“

Cooking involves too many seasonings, and it's usually **time-consuming to search online** for how to season and then mix them according to recipes."

----Carol

"I really **can't control the amount of seasoning** well; a slight shake of my hand might cause me to **add too much**, and then I have to figure out how to fix it."

----Jennie

If it improves the user's troubles with flavouring, or even makes it a fun thing to do, it can make the user more willing to cook and therefore improve their diet.

PRODUCT DEVELOPMENT OUTLINE

User Journey Map WTHOUT Spicestream:



Preparation

Gather all seasonings needed for the recipe.

Recipe Creation

Search for a recipe on the internet.

Cooking

Measure out each seasonings per the recipe instructions, or just add randomly.

Finishing

Taste the food and adjust the seasoning.

Cleaning up

Clean up multiple spice jars, measuring spoons, and any spills.

Initial Ideations

Criteria were developed and prioritised, and group and user ratings were conducted to select the most appropriate concepts

SpiceStream is a modular spice dispenser that provides precise mix of spices and sauces. It encourages culinary exploration with ease, suited for all skill levels.



Designer's Opinion:

"SpiceStream simplifies and speeds up cooking with its customizable seasoning and space-efficient mounting."

User's Feedback:

Feasibility: 4/5

"Its digital scale could be a game-changer for my recipes, no more guesswork, just perfectly flavored dishes every time."

Meeting Requirements

Generated from key insights

The device should be space-efficient, lightweight, and mechanically reliable.

Users should be able to align the spout easily to prevent spillage of spices.

Users need the ability to customize the amount of spices according to their individual portion sizes and flavor preferences.

Developed Prototype

Before any prototype design, first we did some **user surveys** and **market research**, which is to clarify the purpose and core user requirements of the design, as well as some **design constraints**, and then we defined the overall design processes.

We find that the commercial-ready design (see below) enhances aesthetic appeal and space utilization, balancing functionality and attractiveness, making it ideal for further development.

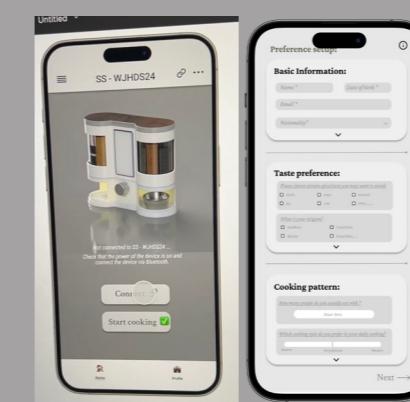


PHYSICAL

DIGITAL

Users need to understand their spice and sauce usage patterns to minimize waste and gradually incorporate new recipes into their cooking routines.

Users should be able to operate the device without smudging the screen during cooking.



We used figma to design the User interface, and used an app prototype to simulate the actual app workflow to validate user experience.

Concept Verification

First, we introduced them to the SpiceStream device and its digital interface, explaining the workflow and interaction.

Users then completed tasks using the product, providing feedback and answering questions related to the requirements.



Users shared their experiences with the **modular design**, the ease of accessing and refilling spices, and the effectiveness of the digital interface. This valuable feedback helped us identify specific areas for improvement, ensuring that the final product would better meet the diverse needs and preferences of our users.

User Journey Map WITH Spicestream:



Preparation

No preparation anymore with Spicestream!

Recipe Creation

Select and adjust the recipe **use a single button** on a display, the system will also give you lovely suggestions.

Cooking

Follow the recipe and cook with the sauce provided by spicestream.

Finishing

If you still want to adjust the flavour, the spicestream gives you the **exact amount**.

Cleaning up

Minimal cleanup with only the SpiceStream device to wipe down.

PHYSICAL PROTOTYPE: Research

Before any prototype design, first we did some **user surveys** and **market research**, which is to clarify the purpose and core user requirements of the design, as well as some design constraints, and then we defined the overall design processes.

2 Questionnaire - setting limitations

To determine how many containers should be used for

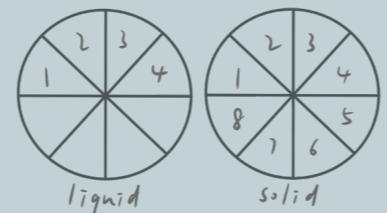
we conducted an **survey** to collect the types of seasonings most commonly used by our users, as well as the percentage of liquid seasonings and solid powdered seasonings, as a means of determining the amount of seasoning storage we use. (see the result of questionnaire in the supplementary page).



Powder Spices:
Salt
Black Pepper
Garlic Powder
Onion Powder
Chili Powder
Sugar
ginger powder
basil
cumin



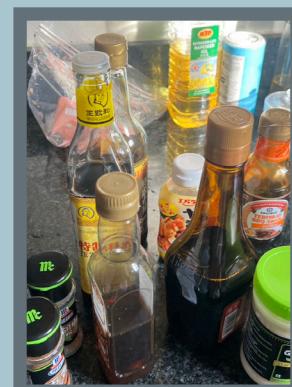
Liquid Sauces:
Soy Sauce
Oyster Sauce
Vinegar
Sesame Oil



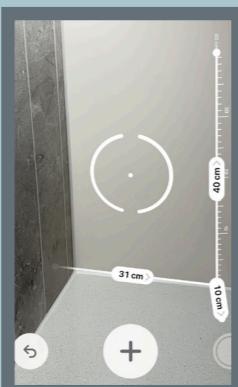
we received 25 responds and we collect the spices and sauces that are mentioned more than 3 times (2 list on the left), so we decided to use 4 liquid container and 8 solid container.

3 Observation - setting limitations

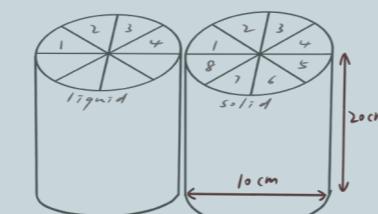
To determine how big should the containers and device be.



We measured the dimension of all the spices containers in the common kitchen and lay them out on the countertop and measure the total area they occupy.



The total area occupied by the spicestream cannot exceed the area occupied by the 12 bottles of spices, which is about 40 * 30 * 10 cm.



The volume of the seasoning storage container must not be less than the volume of a common seasoning bottle (just measured). and the dimension should fix the dimension of the device.

4 Interview - Product specification

Presenting our initial concepts to users and then generate insights based on their attitudes

"Storage of seasonings requires attention, such as whether the seasonings are used up or spoiled..."

----Tony from UCL

"We will also need cooking assistance, usually spices is not the main challenge but the entire process"

----Sam from UCL

"It should not be too big as I don't have much space for it"

----Justin from Oxford

"For each step in cooking, we would require mixes of spices"

----Carol from UCL

"Cleaning and replace is seasonngs is always a problem."

----Warren from IC

Specifications generate from step 1,2,3 & the interview results.

12 Seasoning storages with visible capacity.

An interactive system that allows users to control seasoning

A fast seasoning output system

1 Purpose & requirements

Purpose

- Time saving
- Give user the right amount of seasoning they need.
- the should like the taste of food they cook using Spicestream

requirements

- **Fast:** simple UI interface, minimum amount of buttons.
- **Easy to replace&clean:** easy to take the storage bottle in&out
- **Personalised** menus and tastes.
- **minimum the space** it takes.
- **Easy to use:** new equipment should not make cooking more complicated.

5 Plan

Based on the user research and initial co-design sessions, we identified key functional requirements SpiceStream, and all the key elements (the ones that will directly interact with our users) that should be included in the design:

- **12 Seasoning storages with visible capacity.**
- **An interactive system that allows users to control seasoning**
- **A fast seasoning output system**

Then we will proceed with **lo-fi prototyping** to explore various design possibilities, followed by two **co-design** sessions to evaluate and refine these prototypes with user feedback, ensuring the final design meets all user needs effectively.

1. Lo-fi Prototyping

Lo-fi Prototype: Initial Iteration

Objective: Focus on completely different solutions, interactions and appearances.

Actions:

- Design 3 different lo-fi paper prototypes.
- Ensure each design meet the requirement and includes the 3 basic functionalities mentioned above.

Step-by-step Unit Component Design

Objective: Refine prototypes based on user feedback from previous step.

Actions:

- Incorporate feedback to redesign prototypes.
- Propose three implementation options for each proposed component (e.g., opening method for the lid, arrangement for spice/sauce tubes, screen styles).

Lo-fi Prototype: Final Iteration

Actions:

- Integrate the best features into one cohesive design.
- Ensure the final model meets all user needs.
- Finalize appearance and functionalities.
- Prepare detailed documentation and sketches for further development.

2. Co-design Sessions:

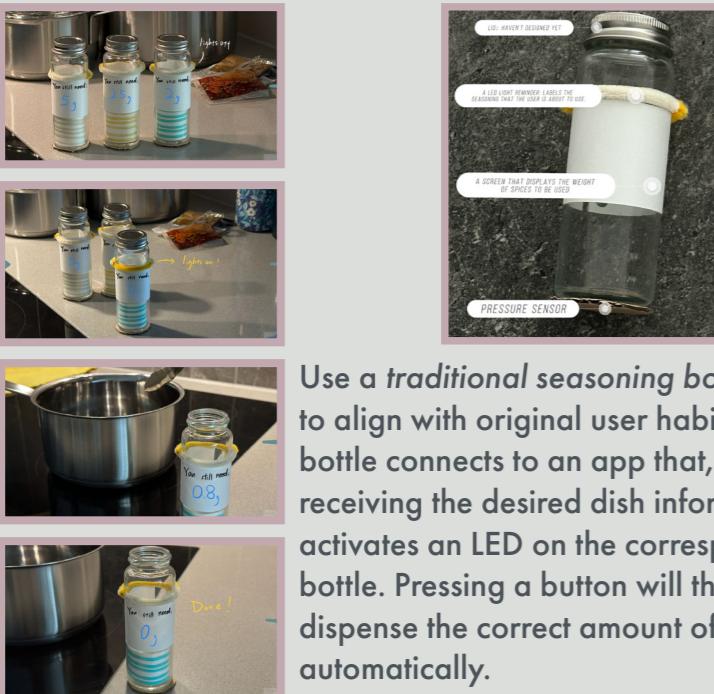
We aim to gain user feedback for the first iteration of lo-fi prototyping and unit component design, and compare the user experiences on each component to finalize the optimal one.

Requirements:

- Precise Dispensing: Accurate measurement and dispensing of both solid powders and liquid sauces.
- Recipe Integration: Display spice/sauce combo recipes and tutor cooking processes.
- Intuitive Interface: Ensure the screen and controls are easy to navigate.
- Minimal Cleanup: Design for easy cleaning and maintenance.

PHYSICAL PROTOTYPE: Divergent ideation

Prototype 1



Use a *traditional seasoning bottle design* to align with original user habits. The bottle connects to an app that, upon receiving the desired dish information, activates an LED on the corresponding bottle. Pressing a button will then dispense the correct amount of seasoning automatically.

Prototype 2



A combined seasoning dispenser where various seasonings are poured into dedicated containers. The dispenser will automatically **rotate** and dispense the correct amount of seasoning based on the desired dish.

Prototype 3



Similar in functionality to Prototype 2, this model includes an additional control panel on the dispenser itself, allowing for on-device settings. However, it emphasizes aesthetic design, sacrificing some capacity for a more visually appealing appearance.

Co-design session 1 User feedback for 3 prototypes

In this Co-design session, we analyzed the advantages and disadvantages of three automatic seasoning dispenser designs, select the best design, and deduce the additional features needed based on usage scenarios.

“Very cute product but it seems can not know how much food i prepared and adjust the seasoning. and i can only know how much i put when i hold the bottle horizontal.”
---- a student in codesign session

We find that users will require multiple types of flavourings, thus leading to the use of a large number of bottles taking up a lot of space and increasing costs. This design, while practical, presents challenges in terms of hygiene and efficiency. When you have more than 10 of this product, it becomes instantly complicated to use.

“It's relatively easy to use, but the round casing doesn't seem to be a great space saver, and it might not be very fast if you rotate the spices out one by one.”
---- a student in codesign session

we find that the design offers customizable seasoning options, and offers large storage volume. however it is not smart enough and occupies too much space. Additionally, it requires multiple motors for rotation, resulting in an increased weight, and It could lead to some unforeseen mechanical failures as the kitchen is a messy place, especially a communal kitchen for students.

“I wish I could have one of these in my kitchen, it replaces almost all of the work associated with spices, although I would like the screen operation to be as simple as possible.”
---- a student in codesign session

we find that the appearance is close to a commercial product, enhancing aesthetic appeal. Additionally, the design improves space utilization. This design strikes a balance between functionality and aesthetics, making it more appealing for users and practical for kitchen environments. Its efficient use of space and commercial-ready appearance make it the best choice for further development.

Final Lofi-prototype



The next page presents the development of the final lofi-prototype, focusing on the iterative design of some of the key user-interaction components. This is followed by a user-centred validation process and the final development of the hifi-prototype.

Improvement from the feedback

- The combination of round and square shapes at the back of the dispenser prevents it from fitting perfectly against the wall, leading to wasted space.
- The buttons could be designed as **touch-sensitive** to prevent dirt accumulation.
- The machine should allow for **personalized settings** to adjust seasoning quantities based on individual tastes.

The prototype 3 is the optimal choice

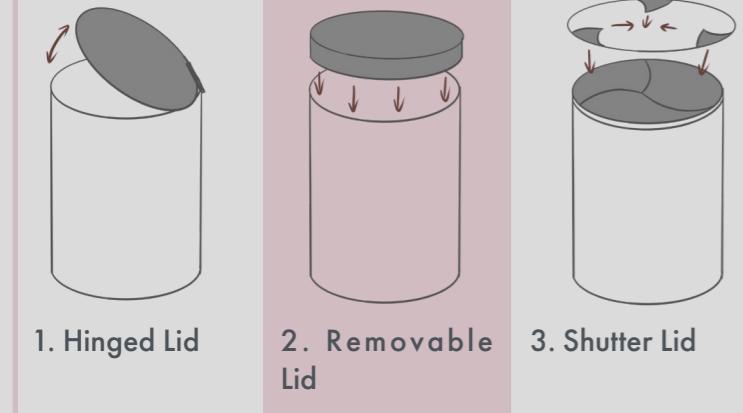
due to its balance between precision, user-friendliness, and cost. It suits both advanced home cooks and small-scale professional kitchens.

PHYSICAL PROTOTYPE: STAGE 2

1 Unit Structure Design

& Codesign Session 2

Lid for : Replacing and cleaning



We offered 3 design options for each of the 3 components that users will focus on generating interactions with. During Co-design, we analyzed the pros and cons of 3 designs, select the best design, and deduce the additional features needed based on usage scenarios.

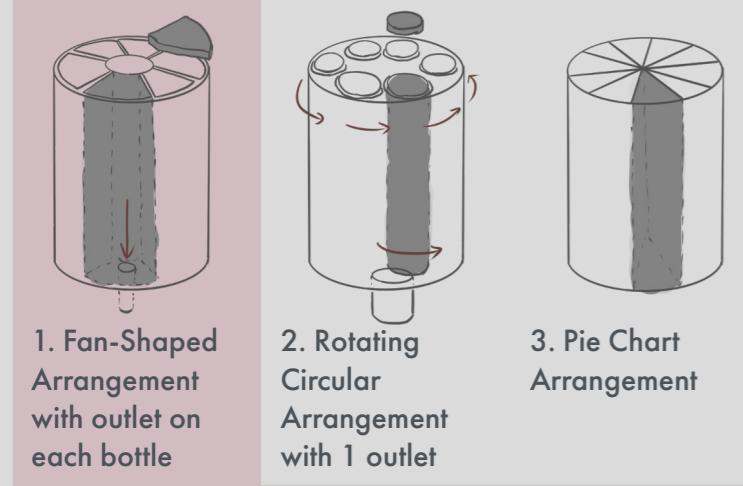


"Convenient for quick access to bottles, but you may **hit the cap** when removing it"

"the structure is very **simple** as well as the operation."

"it is pretty cool but it is **overfunctioning** in this case"

Condiment tubes: Seasoning access

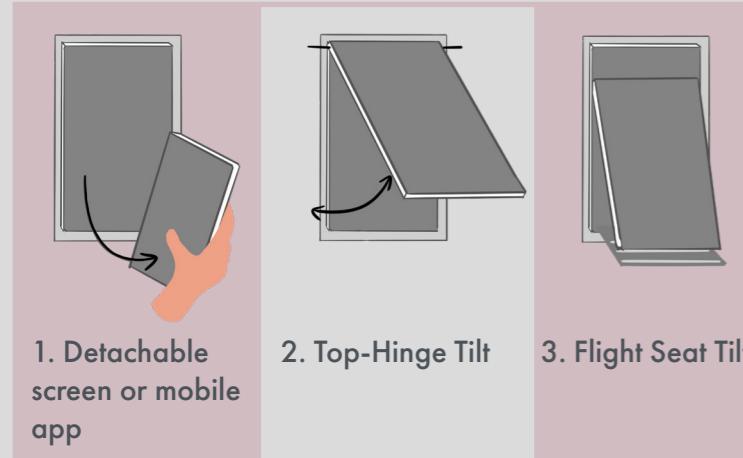


"The fan layout **cleans up better** in comparison and the structure in the centre holds the bottles better"

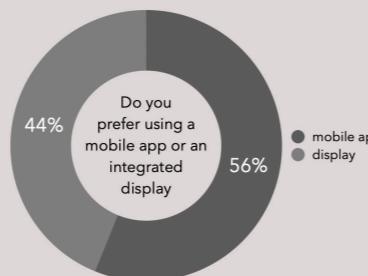
"The rotation mechanism could add to the **complexity** and maintenance."

"This design doesn't easily accommodate the placement of a motor"

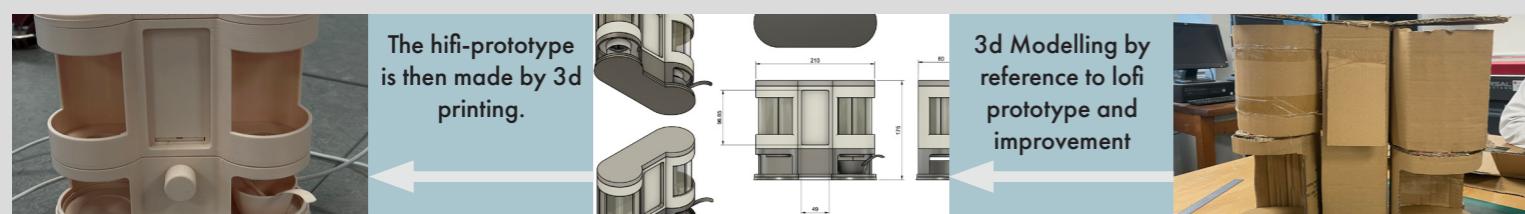
Touch Screen: Control the machine



There are almost as many users who favour the display as the mobile app, so we decided to make our device support **both control pathways**.



"It's super easy to use --- you just tilt the screen forward, and it stays in place"



2 Wizard of Oz Method

Used in Codesign Session 3 to finalise the user experience.



Purpose:

The Wizard of Oz method simulates undeveloped technologies to collect real user feedback. Named after the deceptive wizard in the famous story, it involves a hidden operator who controls the system, allowing designers to observe genuine user responses early in development.

Process:

we required the user to first **add spices to the storage tank** of the Spicestream as an initial step.

The user then **selects a recipe** from the list in the mobile app prototype.

Then we **manually feed the seasonings** from the top of the device into the user's bowl below the outlet. just like the way the device would work ideally.

Problem raised:

We invited 3 students to join the co-design workshop and they all raised some problems after 'using' the Spicestream:

- Users have found that if they touch the screen with dirty hands while cooking, **the stains may block the content on the screen**.
- Users need to spend extra effort trying to **align the spout** to ensure that the spices running down don't spill.
- Users found that the fixed amount of spices provided did not cater to their **varying portion sizes and flavor preferences**, leading to dissatisfaction.



Improvement:

Based on the sights gain from the co-design session, we made some improvement to our design:

- Choosing to control the display with a **single knob** minimises operation without smudging the screen.
- Add specialised small bowls to the device to suit the size of the spice outlet and a shallow groove at the bottom to enable quick and accurate placement of the bowls in the device.
- Integrate a **customizable seasoning system** that adjusts spice quantities based on user input for portion size and flavor intensity.

DIGITAL PROTOTYPE

The main goals of designing this UI system is to:

1. Directly link to the machine in order to operate the stream flow smoothly.
2. It allows users to have constant access to the latest recipes from the Internet.
3. Inspiring and involving users in preparing their own meals.

Main requirements & Functions

Product Log-in & User Onboarding

Clear and simple steps of product related information log-in. Effectively gather principal information.

Link to the user's specific preference, simplified the process of cooking.

Main page & Detailed recipes

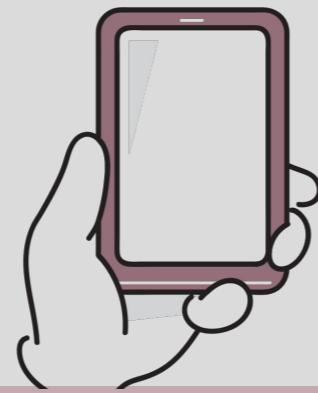
Key information of recipes push and searching engine should be showed clearly on the main page.

The user should be able to see the recipes push according to big data. And the usage of spices in the machine.

Communications & Further help

Individual difference could be very big, through personalised feedback we can help improve user experience.

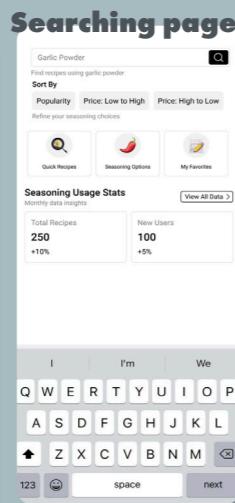
The user can comments and communicate in the system and know where to get supplements for spices.



Main page & Searching engine (big data push)



where recipes are pushed to the user according to personal preference analysis. User can choose what they want to cook here.



User can search recipes they want by entering key words in this page.

What we want to know:

How user will use this pages in their logic. What's their real needs.

User feedback:

"This design style is very cute, I really like it, but I think add a toolbar which can show where we currently at will be a clear looking."



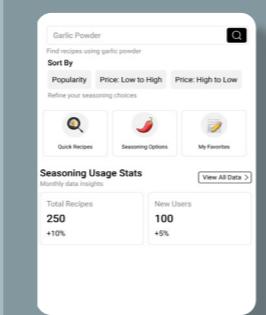
Parallel toolbar is added which enable users to see where their current position are.

What we want to know:

Is the searching engine detailed and clear enough for users to get information they wanted.

User feedback:

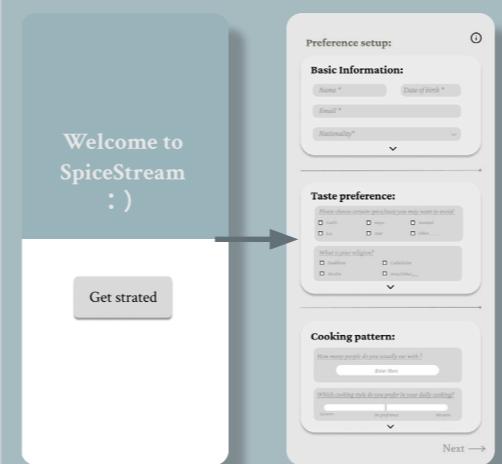
"I would like to see how much spice left in the machine to avoid emergency happens and make future planning."



Those kinds of spices which are below 40% will be shown here, also the detailed percentage of each column will be clearly shown.

UI Development

Log-in & Device connection



User feedback:

"I think adding the religion or current position of the user will be better in order to analyse user preference more accurately."

"A device connection page with machine can be added to fulfilled this UI."

This UI can link to the machine through bluetooth. User can start using the system after successfully connected.

Nationality & Religions concern is also added.

Detailed recipes & Customization

Recipe page: Spice ratio change

detailed recipe of the chosen one will be shown in this page. User will know the specific amounts of the ingredients.

Individual difference exist, so we design this page for individuals to alter the recipes freely according to their own taste preference.

Community system is added for further feedback and communications. Also, a local map showing where can find the missing spice quickly.

What we want to know:

Whether the recipe details help the user during their cooking experience.

User feedback:

"The ratio of the spice and the ingredient is important to notice, due to it may effects the performance of recipet."

What we want to know:

Is the amount of spice appropriate for everyone, how can we change to fit everyone's needs.

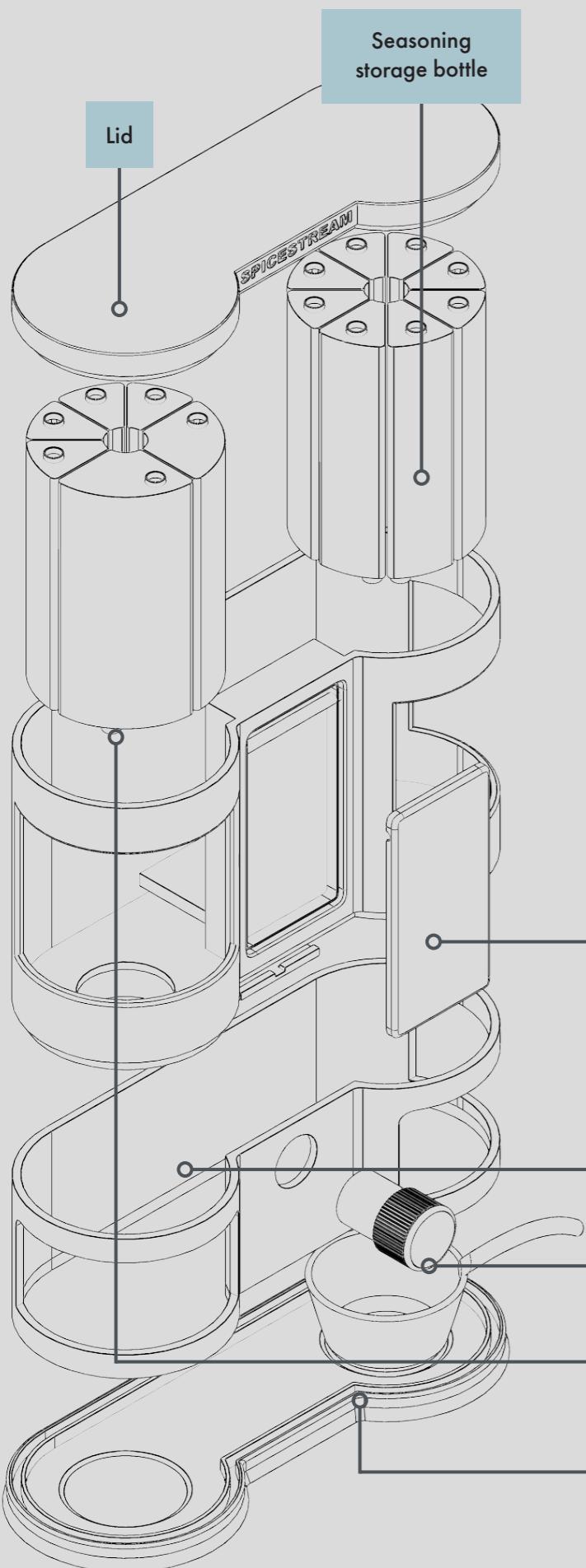
User feedback:

"Some physical button can be added to make me feel more involved in the preparing process and make me feel more controlled"

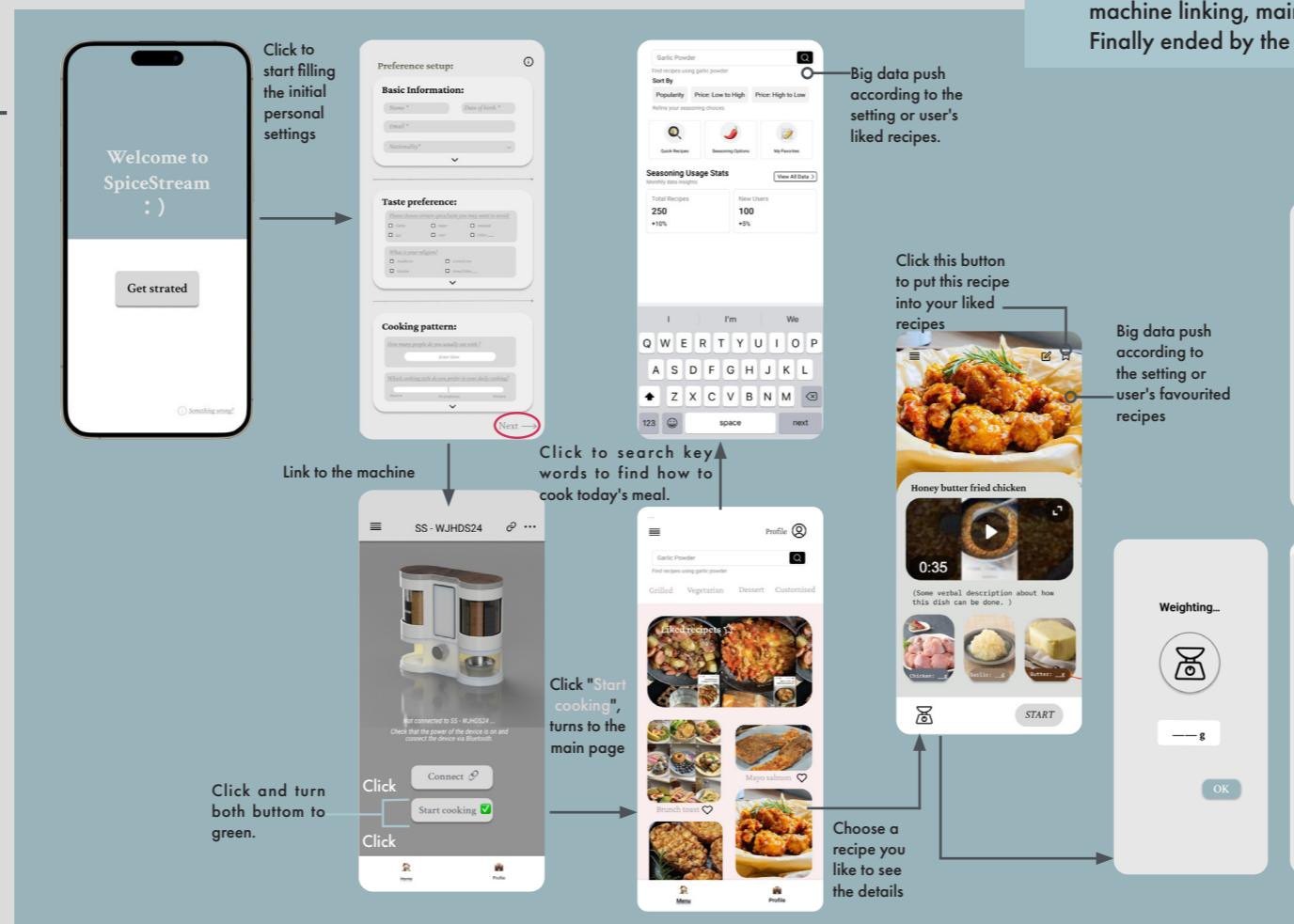
Some physical attachment pages are added to increase the sense of participation of user

7

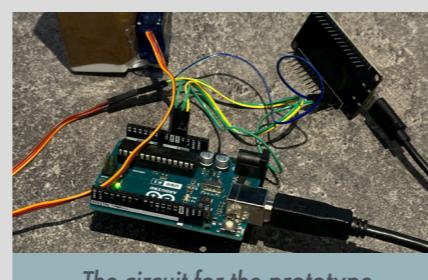
FINAL CONCEPT: PHYSICAL DEVICE + USER INTERFACE



User Interface: APP work flow



A workslike-prototype for spices outlet mechanism.



The circuit for the prototype.

```
pinMode(13, INPUT); // Get button state
if (pinValue == 1) {
    rotateServo(0, 1000); // Rotate 90 degrees and hold for 1 seconds
}

// Function called when the button 3 control state changes
void write(3) {
    if (pinValue == 1) {
        rotateServo(0, 1000);
    } else {
        rotateServo(0, 2000);
    }
}

// Function that rotate servo
void rotateServo(int angle, int duration) {
    myServo.write(angle);
    delay(duration);
    myServo.write(0); // Rotate back to the original position
}

void loop() {
    // Handling Blank communication
    blank();
}
```

See the full code in the appendix.

• Arduino & ESP32

In the prototype we made, we didn't quite achieve the desired functionality, but we simulated as much as possible the working mechanism of selecting a menu and working according to it.

• The Knob

The knob used to control the integrated display.

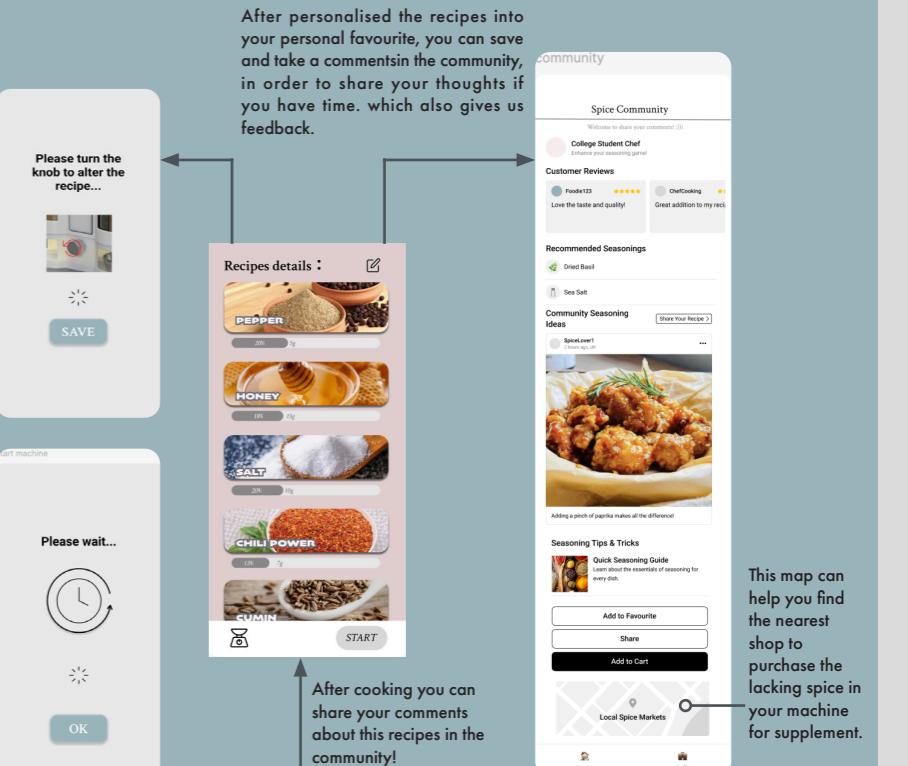
• The Seasoning outlet

The knob used to control the integrated display.

• The Small Bowl

The dedicated small bowl is used to contain the seasonings without spilling out, and enables quick and accurate placement.

Here is the flow chart of our SpiceStream App, from the initial personal information setting page, machine linking, main page to detailed recipes (including weighting system) and the personalised page. Finally ended by the community (comments) where we can gather the feedback again from our user.



How SpiceStream Works

Users can control the device in two ways, by using the knob to control the display, or by using the mobile app.



After user selects and starts the recipe, the mobile app will send the data to the device via WLAN.



If User weights one of the ingredient and the device will adjust the recipe based on the weight.



The motor then controls the switch, which then controls the weight of the spice by how long the switch is on.



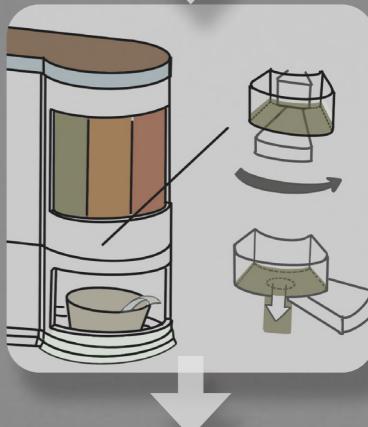
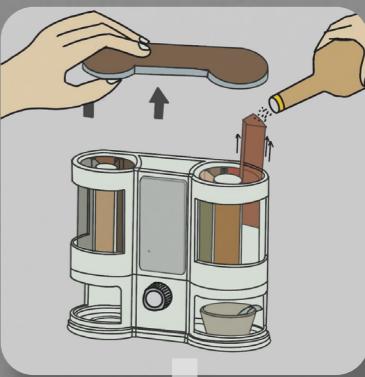
Provides real-time feedback on the state of the device's feed.



SpiceStream

Press, Cook, Enjoy: Perfect Flavor Every Time!

Instructions for product use

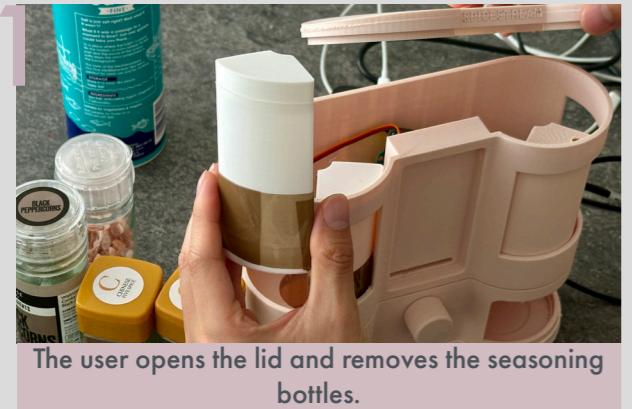


- Quick access to the most suitable recipe based on your habits and preference.
- Automatic extrusion of precisely mixed spices, no more uncertainty and debugging.
- You can always adjust the recipe to your taste.
- Integrate all your spices, say goodbye to mess and cleaning.

PRODUCT VALIDATION: STAGE 1

User Verification

First, we introduced them to the SpiceStream device and its digital interface, explaining the workflow and interaction. Users then completed tasks using the product, providing feedback and answering questions related to the requirements.



The user opens the lid and removes the seasoning bottles.



The user pours the spices into the storage bottle.



The user puts the bottles filled with spices back into the body in order.



User places the small bowl in the groove underneath the device.



User selects a recipe from the app (they may also use integrated display).



User finishes selection and presses the start button and the device is ready to work.



(The device is exporting the seasoning according to the user's choice)



User picks up the mixed seasonings.

USABILITY

4.8 / 5

"The knob control is very intuitive and prevents screen smudging."

"The modular design makes it easy to refill and access spices."

"The specialized bowls fit perfectly, preventing any spillage during use."

CUSTOMIZATION

4.5 / 5

"The ability to customize spice quantities based on my preferences is fantastic."

"I appreciate how I can adjust the seasoning to fit different portion sizes."

"I can set different levels of spice intensity, which is great when cooking for family members with varying taste preferences."

OTHER QUOTES

"The design of SpiceStream is sleek and modern, fitting well with my kitchen decor."

"I love the minimalist aesthetic; it looks great on my countertop."

RECIPE INTEGRATION

4.2 / 5

"I enjoy trying new dishes recommended by the app."

"The personalized recipe suggestions are very helpful."

"I found the initial setup straightforward, but clearer instructions would be helpful."

COMMUNITY INTERACTION

4.6 / 5

"I would love more interactive features like forums or live chats."

"Sharing recipes and feedback with others would be a great addition."

"The community features are a good start but could be expanded."

OTHER QUOTES

"The interface is mostly clear, but some advanced features need better explanations."

User's feedback for Physical Device

User's feedback for Digital Device

PRODUCT VALIDATION: STAGE 2

Requirement

Users need to understand their spice and sauce **usage patterns** to minimize waste and gradually **incorporate new recipes** into their cooking routines.

Users need the ability to **customize** the amount of spices according to their individual portion sizes and flavor preferences.

The device should be space-efficient, lightweight, and mechanically reliable.

Users should be able to operate the device **without smudging the screen** during cooking.

Users need to **share their recipes** and learn advice from users who have similar tastes to better customize their own cooking.

Specification

The digital interface should display **usage metrics** and **suggest new recipes** based on user habits.

The device should incorporate a **customizable seasoning system** that adjusts the amount of spices based on user input for **portion size and flavor intensity**.

The device should be designed to be thinner and lighter, with an option to **adhere to the wall** to save counter space and reduce mechanical complexity.

Incorporate a **single knob control** to minimize screen interaction and prevent smudging.

The app should include interactive features such as **forums**, real-time chat, and social sharing options to enhance user interaction and community building.

Validation

Validated

UI: We enhanced the clarity and accessibility of these suggestions, resulting in users finding it easier to manage their seasoning consumption and try new recipes. The improved interface encouraged users to **experiment with a variety of dishes**.

Validated

Device: Initially, users were dissatisfied with the fixed amount of spices, then we integrated a **customizable seasoning system** to adjust spice quantities based on ingredient weight and flavor preferences. This enhancement led to greater flexibility.

UI: The digital interface was updated to allow users to input portion size and flavor intensity, providing real-time adjustments. Users found this feature highly beneficial for personalizing their cooking experience. real-time adjustments and feedback, making it easy for users to customize their seasoning. Users found this update very useful, as it allowed them to personalize their cooking experience and achieve better culinary results.

Validated

Device: Initially, users found the design with bottles in a rotating drum too bulky, heavy, and prone to mechanical failure. To address these concerns, we redesigned the device to be **thinner and lighter** while maintaining functionality. This new design improved space efficiency and **reduced the chance of mechanical issues**, leading to positive feedback from users.

UI: The UI was adapted to match the new physical design, ensuring that all digital features remained easily accessible. Users appreciated the lighter and more compact device, finding it more practical for everyday use in their kitchens.

Validated

Device: Users found that touching the screen with dirty hands blocked the content and made the screen messy. We introduced a **single knob control** to minimize screen interaction. This change was well-received, as users found it easier to operate the device without smudging the screen.

UI: The UI was adjusted to work seamlessly with the knob control, ensuring that all functions could be accessed without touching the screen. Users appreciated this feature, which kept the interface clean and legible during cooking.

Validated

UI: Initially, the app lacked sufficient interactive features. We added **community forums** for recipe discussions, real-time chat for user support, and social sharing options to connect with other users. These enhancements were well-received, as users appreciated the ability to engage with a community, share experiences, and get real-time feedback. The new features significantly improved user satisfaction and engagement, making SpiceStream not just a tool for cooking but also a platform for culinary social interaction.

Potential Improvement

Enhanced Rewards System:

Users suggest implementing more engaging and gamified rewards for trying new recipes.

Enhanced hands-free operation:

Users need a hands-free to enhance convenience and efficiency while cooking, especially when their hands are occupied or dirty.

Future exploration

Gamified Rewards: Develop a more engaging rewards system, including points or badges for trying new recipes, unlocking badges, and participating in challenges.

Voice Control Integration: Integrate with voice assistants like Alexa or Google Home to enable hands-free operation. This allows users to control the dispensing of spices and sauces via voice commands.



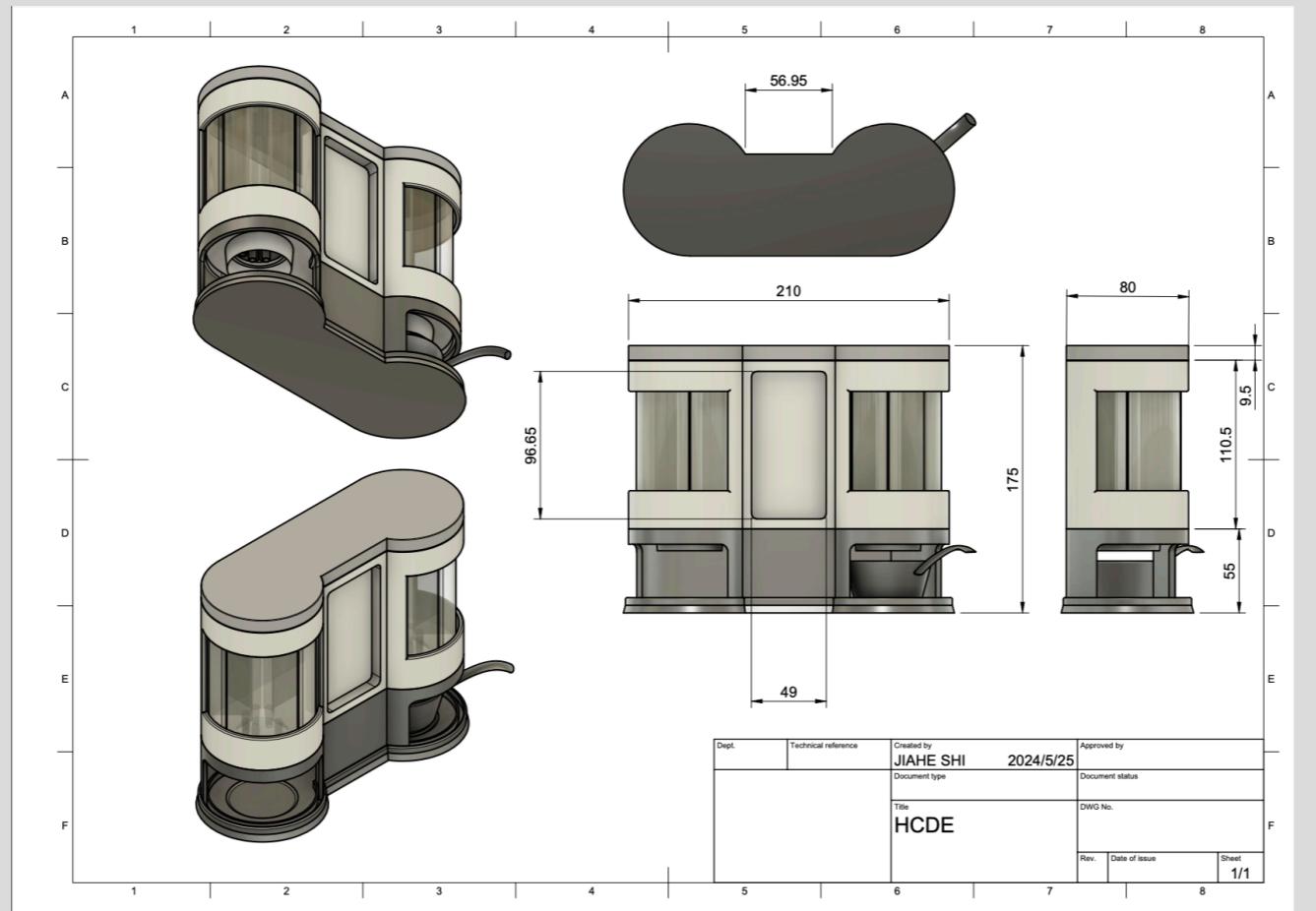
SUPPLEMENTARY PAGE: APPENDIX

Complete code for workslike prototype

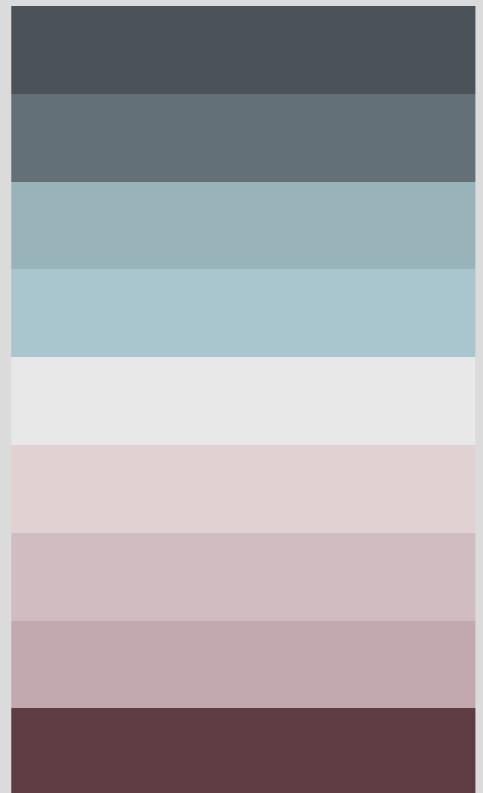
```

52 // Function called when the button 2 control state changes
53 BLYNK_WRITE(V2) {
54     int pinValue = param.asInt(); // Get button status
55     if (pinValue == 1) {
56         rotateServo(0, 1000); // Rotate 90 degrees and hold for 1 seconds
57     }
58 }
59
60 // Function called when the button 3 control state changes
61 BLYNK_WRITE(V3) {
62     int pinValue = param.asInt(); // Get button status
63     if (pinValue == 1) {
64         rotateServo(0, 1500); // Rotate 90 degrees and hold for 1.5 seconds
65     }
66 }
67
68 // function that rotate servo
69 void rotateServo(int angle, int duration) {
70     myservo.write(angle); // Rotate to a specified angle
71     delay(duration); // Keep the specified time
72     myservo.write(90); // Rotate back to the original position
73 }
74
75
76 void loop()
77 {
78     // Handling Blynk communication
79     Blynk.run();
80 }
81
82
83 // Set the LED pin as output
84 pinMode(ledPin, OUTPUT);
85 // Initialize the servo
86 myservo.attach(servopin);
87 myservo.write(90); // initial position
88 }
89
90
91 // Function called when the button 1 control state changes
92 BLYNK_WRITE(V1) {
93     int pinValue = param.asInt(); // Get button status
94     if (pinValue == 1) {
95         rotateServo(0, 500); // Rotate 90 degrees and hold for 0.5 seconds
96     }
97 }
98
99 // Function called when the button 2 control state changes
100 BLYNK_WRITE(V2) {
101     int pinValue = param.asInt(); // Get button status
102     if (pinValue == 1) {
103         rotateServo(0, 1000); // Rotate 90 degrees and hold for 1 seconds
104     }
105 }
106
107 // Function called when the button 3 control state changes
108 BLYNK_WRITE(V3) {
109     int pinValue = param.asInt(); // Get button status
110     if (pinValue == 1) {
111         rotateServo(0, 1500); // Rotate 90 degrees and hold for 1.5 seconds
112     }
113 }
114
115 // Pin that control LED
116 const int ledPin = 2;
117
118 // Servo Pin
119 const int servopin = 15;
120 Servo myservo;
121
122 // Function called when the button 0 control changes state
123 BLYNK_WRITE(V0)
124 {
125     int pinValue = param.asInt(); // Get button status
126     digitalWrite(ledPin, pinValue); // Control LED
127 }
128
129 void setup()
130 {
131     // Initialize serial communication
132     Serial.begin(9600);
133
134     // Initialize Blynk
135     Blynk.begin(BLYNK_AUTH_TOKEN, ssid, pass);
136 }
```

Five views of the CAD model



Color template



References

- <https://spiceology.com/recipes/10-spices-to-keep-in-your-kitchen/>
- <https://loosedrawing.com/illust/585/>
- <https://dribbble.com/shots/21710791-Iphone-14-Mockup>
- Jacobson, R. (no date) 'College Students and Eating Disorders', Child Mind Institute. Available at: <https://childmind.org/article/eating-disorders-and-college/> (Accessed: 19 March 2024).
- BBC (2022) 'Do students really eat that badly?', BBC Future. Available at: <https://www.bbc.com/future/article/20221128-do-students-really-eat-that-badly> (Accessed: 19 March 2024).
- Health Knowledge (no date) 'Social and behavioural determinants of health', Public Health Textbook. Available at: <https://www.healthknowledge.org.uk/public-health-textbook/disease-causation-diagnostic/2e-health-social-behaviour/social-behavioural-determinants> (Accessed: 19 March 2024).

Meeting minutes link

<https://ring-headline-85e.notion.site/HCDE-Group-13-ac812d807a894fb936b3d5c1a3d7140?pvs=4>

Gantt chart link

<https://app.asana.com/0/1207256834137925/1207256847094597>

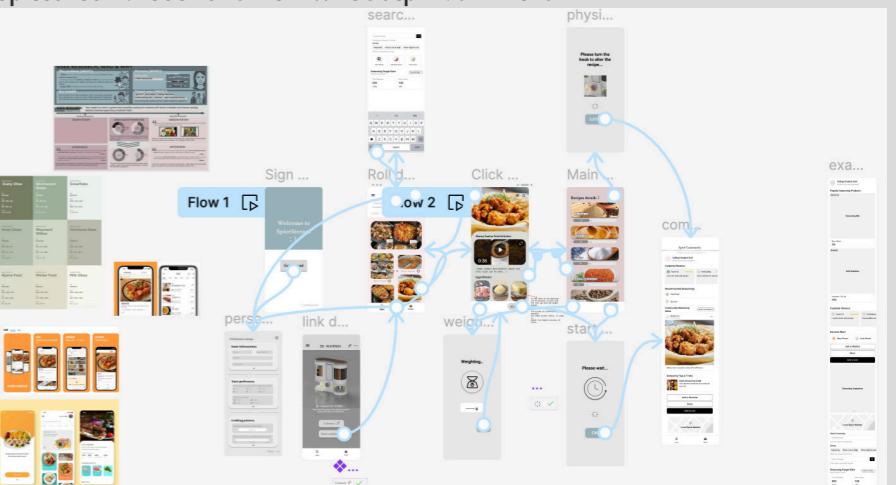
App prototype link

<https://www.figma.com/proto/HDWoyf7FMATZLubLIUFrVB/Spicestream?page-id=0%3A1&node-id=2-105&viewport=516%2C44%2C1.31&t=8ZRDgOSBF6N2rQfV-1&scaling=scale-down&starting-point-node-id=2%3A105>



Figma link

<https://www.figma.com/design/HDWoyf7FMATZLubLIUFrVB/Spicestream?node-id=0-1&t=WfiU5ucpFnv0DmPe-0>



Miro board link

https://miro.com/app/board/uXjVKIGXWtY/?share_link_id=17542062350

