▲ Inspiration Image for Project 4: Global Student Plates - Fostering Healthier Eating Habits Across Cultures

Human-computer Interaction Researcher Portfolio

Selected works by Dongho Shin

Dongho Shin

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" I aim to create affordable, easy-to-use technology to address wealth and education gaps, giving every child a fair chance to learn and succeed. "

Dongho Shin
Human-computer Interaction researcher

Dongho Shin

EDUCATION

University of California, Berkeley
Master of Design, Human-computer Interaction

Hongik Unversity
Bachelor of Fine Art
Visual Communication Design and
Painting

RESEARCH EXPERIENCE

Visiting Researcher
MIT Media Lab, Massachusetts Institute of
Technology, Massachusetts, the United States,
Jun 2023 – Sep 2023 (3m)

Store Concept Designer and Visual Merchandiser
Samsung Corporation Shilla Duty Free, Seoul,
South Korea
Jan. 2020 - Aug. 2022 (2.8Y)

Store Designer and Visual Merchandiser
Chanel, Seoul,South Korea
Jul. 2017 - Dec. 2019 (2.6Y)

SKILL

#Interaction Design
#Fabrication
#AR/VR
#Industrial Design
#Engineering
#Wearble Computing
#User Experience

INTEREST

#Human Computer Interaction
#Learning Technologies
#Tangible Interface
#Sensing Technologies
#Digital Fabrication
#Industrial Design

Dongho Shin
Human-computer Interaction researcher

Background

This project introduces "MnemoMaker," an AI tool for creating effective mnemonics in language learning. Mnemonics improve memory through creative techniques like visualization and word association. MnemoMaker aims to make mnemonic creation easier and more personalized. It addresses the challenge of creating relevant mnemonics and explores user interactions with AI for this purpose, benefiting language learners and educators.

Project Year : 2023
Team : Samantha Chan, Olivia Seow, Dongho Shin, Elena Sajno
My Role : Prototyping, Survey, UI Design

mit media lab

fluid interfaces
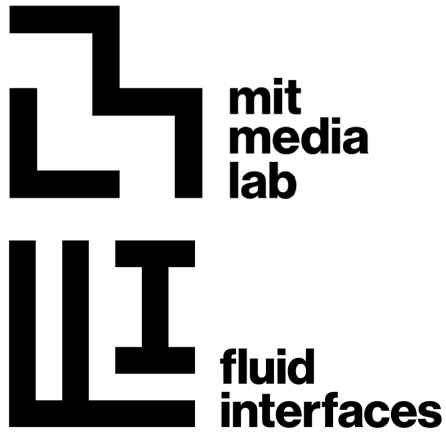
Method

MnemoMaker is a dynamic language learning tool that empowers users to choose their language (Spanish or English) and explore various word categories. Each category presents word cards with definitions and three generated verbal mnemonics to aid memorization.

Users can select, create, or customize mnemonics to suit their learning style. Visual mnemonics are also available for customization or retry.

The system offers useful features like shuffling, hiding/showing definitions, and instructional videos, all aimed at making language learning engaging and effective through mnemonics.
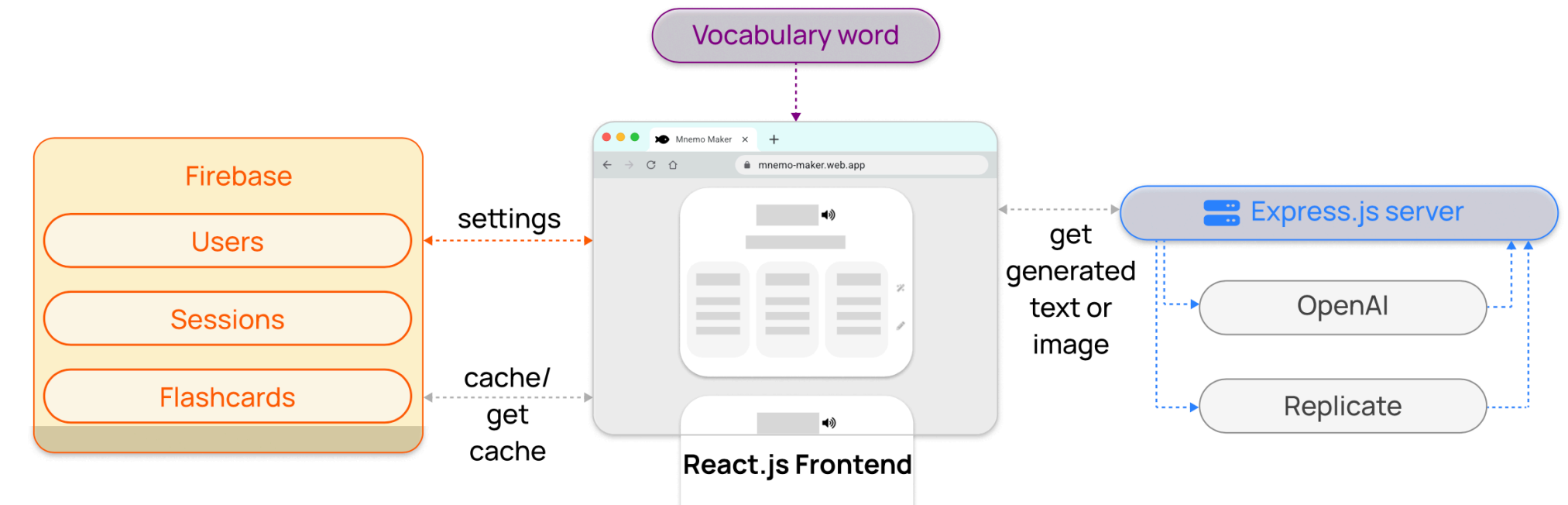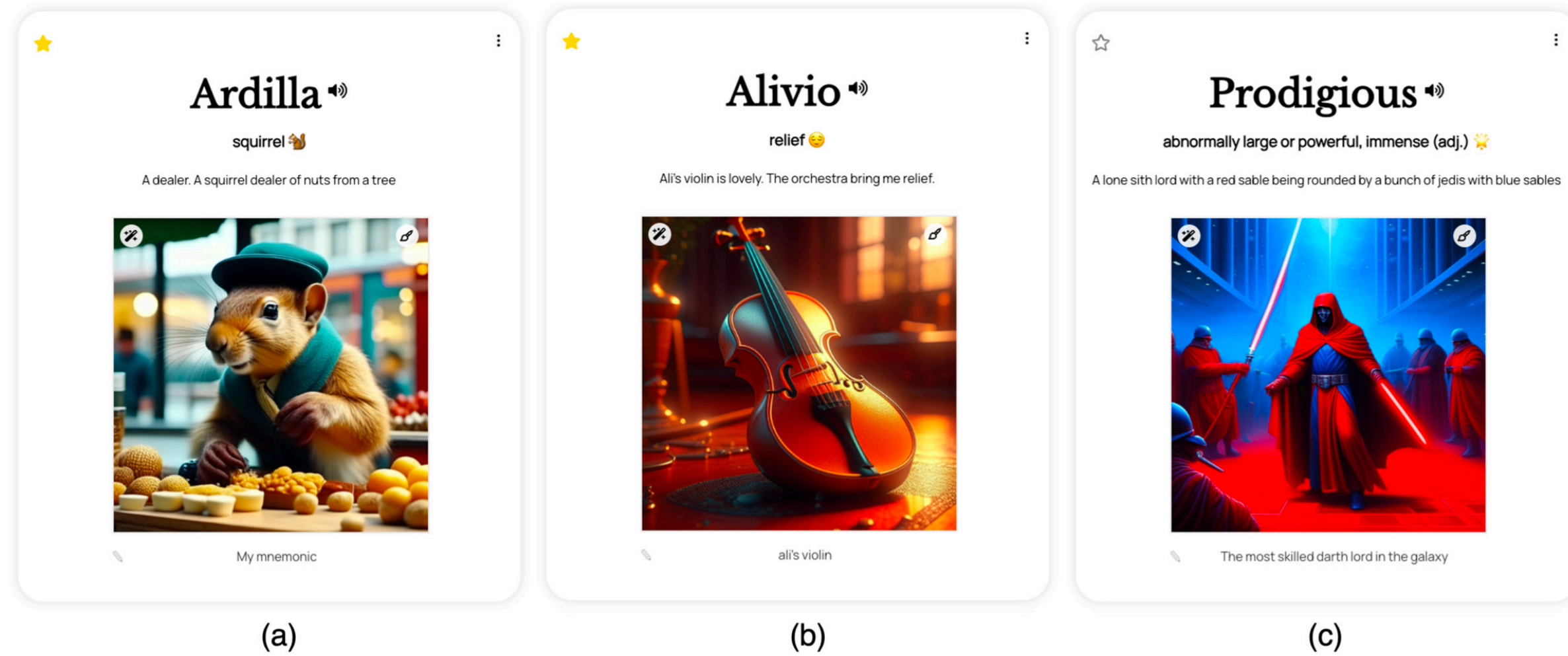

▲ System overview of MnemoMaker.
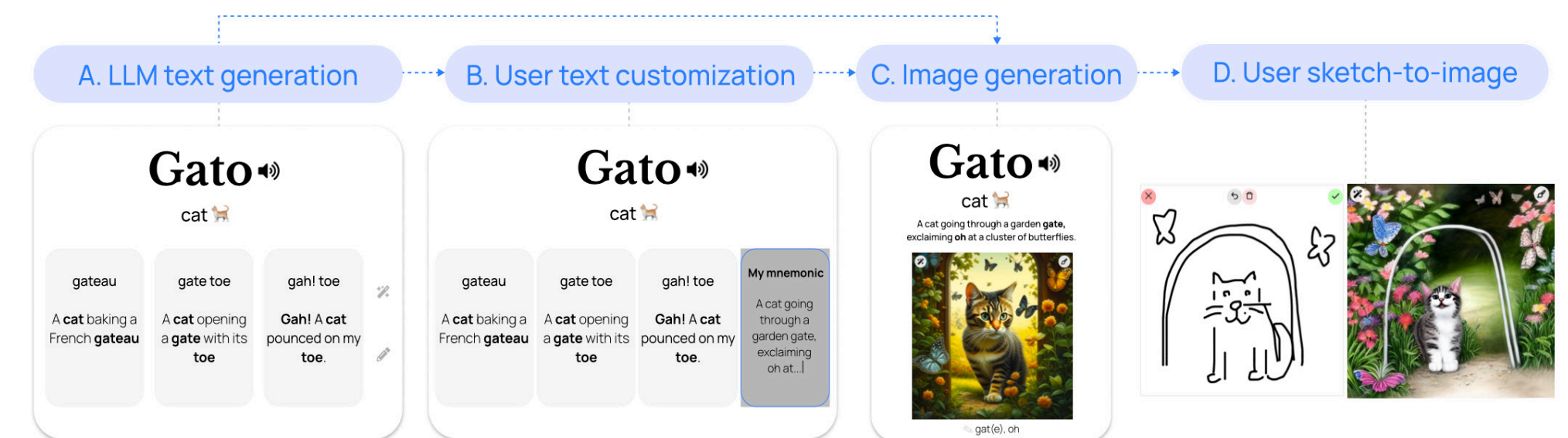
▲ User interface flow of MnemoMaker, an AI-assisted system to create verbal and visual mnemonics for supporting vocabulary learning.
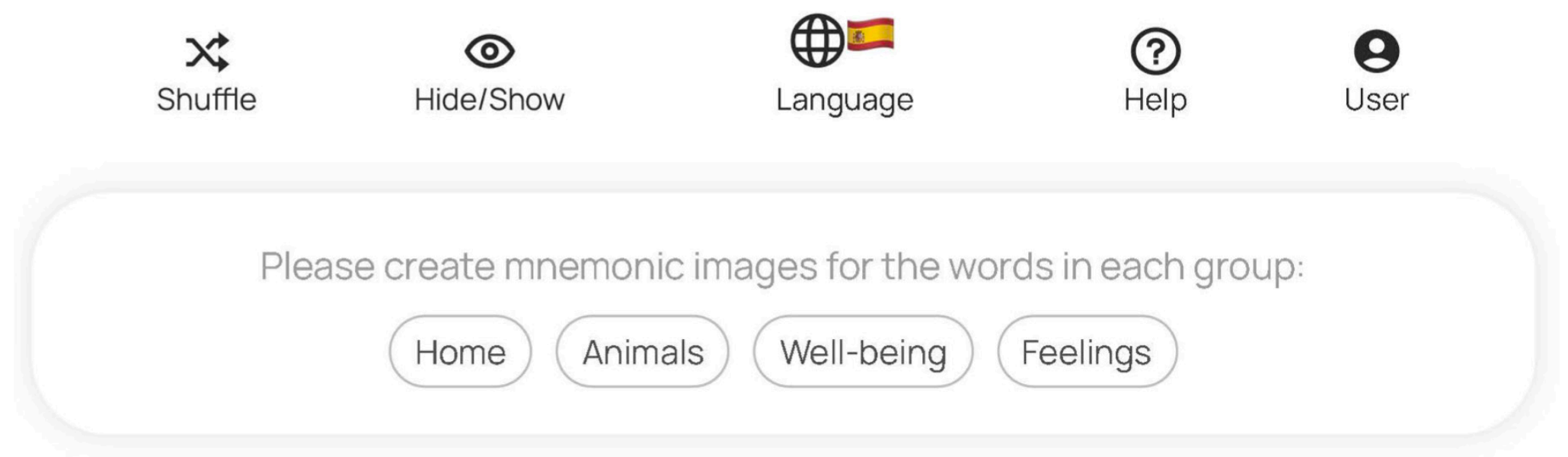
▲ Header interface for the MnemoMaker web app.mnemonics for the English word "Prodigious".

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Ardilla 🔊

squirrel 🐿️

A dealer. A squirrel dealer of nuts from a tree

My mnemonic

(a)

Alivio 🔊

relief 😌

Ali's violin is lovely. The orchestra bring me relief.

ali's violin

(b)

Prodigious 🔊

abnormally large or powerful, immense (adj.) 💥

A lone sith lord with a red sable being rounded by a bunch of jedis with blue sables

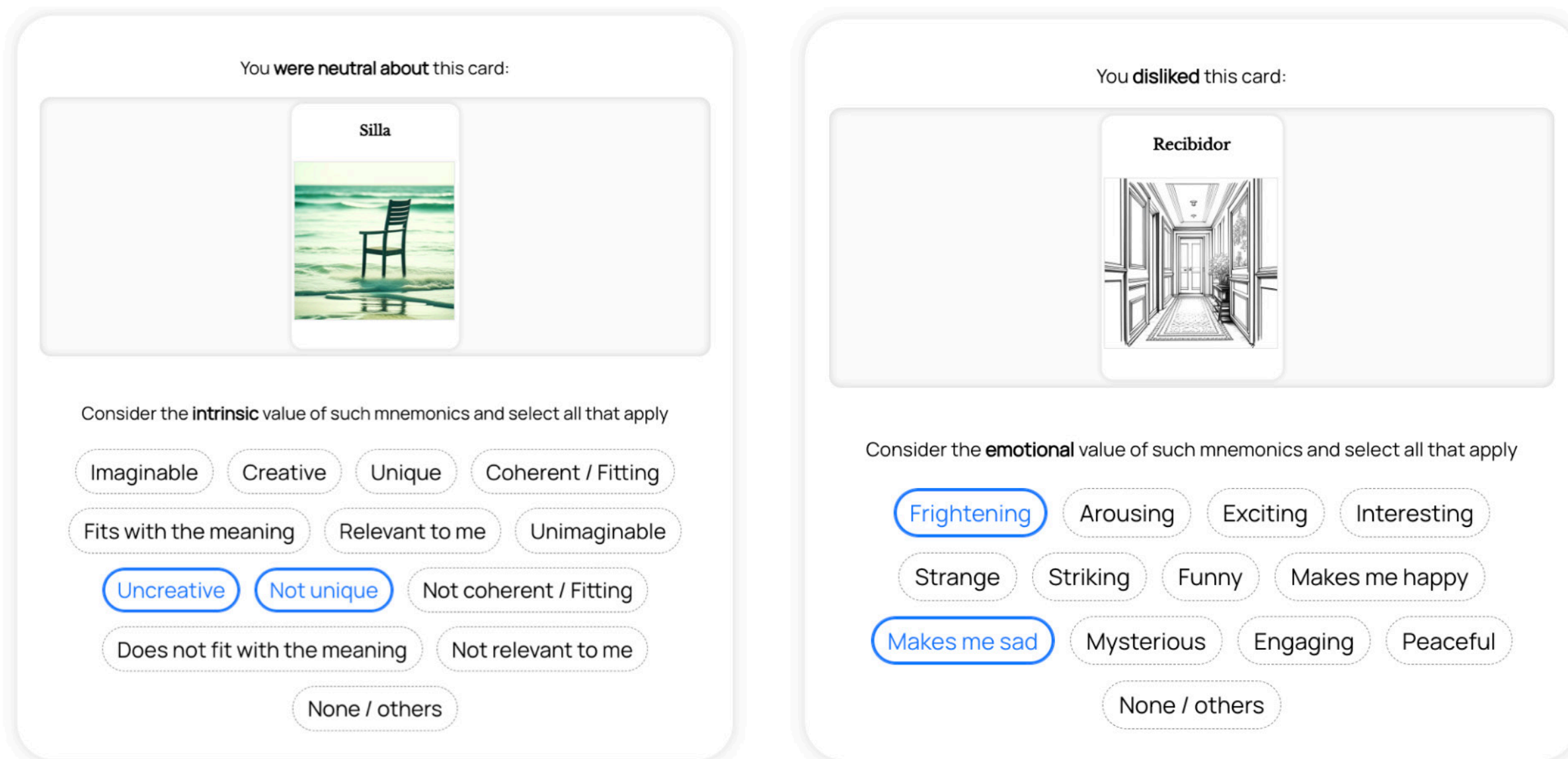The most skilled darth lord in the galaxy

(c)

▲ Customized cards with verbal and visual mnemonics to remember the word-definition pairs: (a) example of a custom mnemonics created for the Spanish word "Ardilla", (b) example of a custom mnemonics for the Spanish word "Alivio", and (c) example of a custom mnemonics for the English word "Prodigious".

You **were neutral about** this card:

Silla

Consider the **intrinsic** value of such mnemonics and select all that apply

Imaginable　Creative　Unique　Coherent / Fitting

Fits with the meaning　Relevant to me　Unimaginable

Uncreative　Not unique　Not coherent / Fitting

Does not fit with the meaning　Not relevant to me

None / others

You **disliked** this card:

Recibidor

Consider the **emotional** value of such mnemonics and select all that apply

Frightening　Arousing　Exciting　Interesting

Strange　Striking　Funny　Makes me happy

Makes me sad　Mysterious　Engaging　Peaceful

None / others

▲ Survey elements for capturing user attitudes towards individual cards and groups of cards.

Evaluation

To evaluate user-created mnemonics in the MnemoMaker system, we employed a comprehensive set of methods, including data logging, user ratings on likability and memorability, clustering cards into liked, neutral, or disliked groups, and assessing intrinsic, emotional, and aesthetic attributes of these cards. Users' input provided valuable insights into their preferences and memory retention effectiveness.

Additionally, users shared qualitative feedback, offering a holistic understanding of how they co-created and customized mnemonics, shedding light on usage patterns and the characteristics that influence their choices in the MnemoMaker system.

Result

In the MnemoMaker study, participants spent about 27 minutes creating mnemonic flashcards, customizing them with AI-suggested keywords. Liked cards were more memorable, with a strong correlation between likability and memorability. Emotional attributes like "Interesting" and intrinsic qualities like "Creative" were common in liked cards.

Disliked cards were often considered "Strange" and lacked aesthetic appeal. Users generally found MnemoMaker useful and engaging but suggested improvements in image-mnemonic alignment and overall user experience. Overall, participants had a positive impression of the system and its potential for language learning.
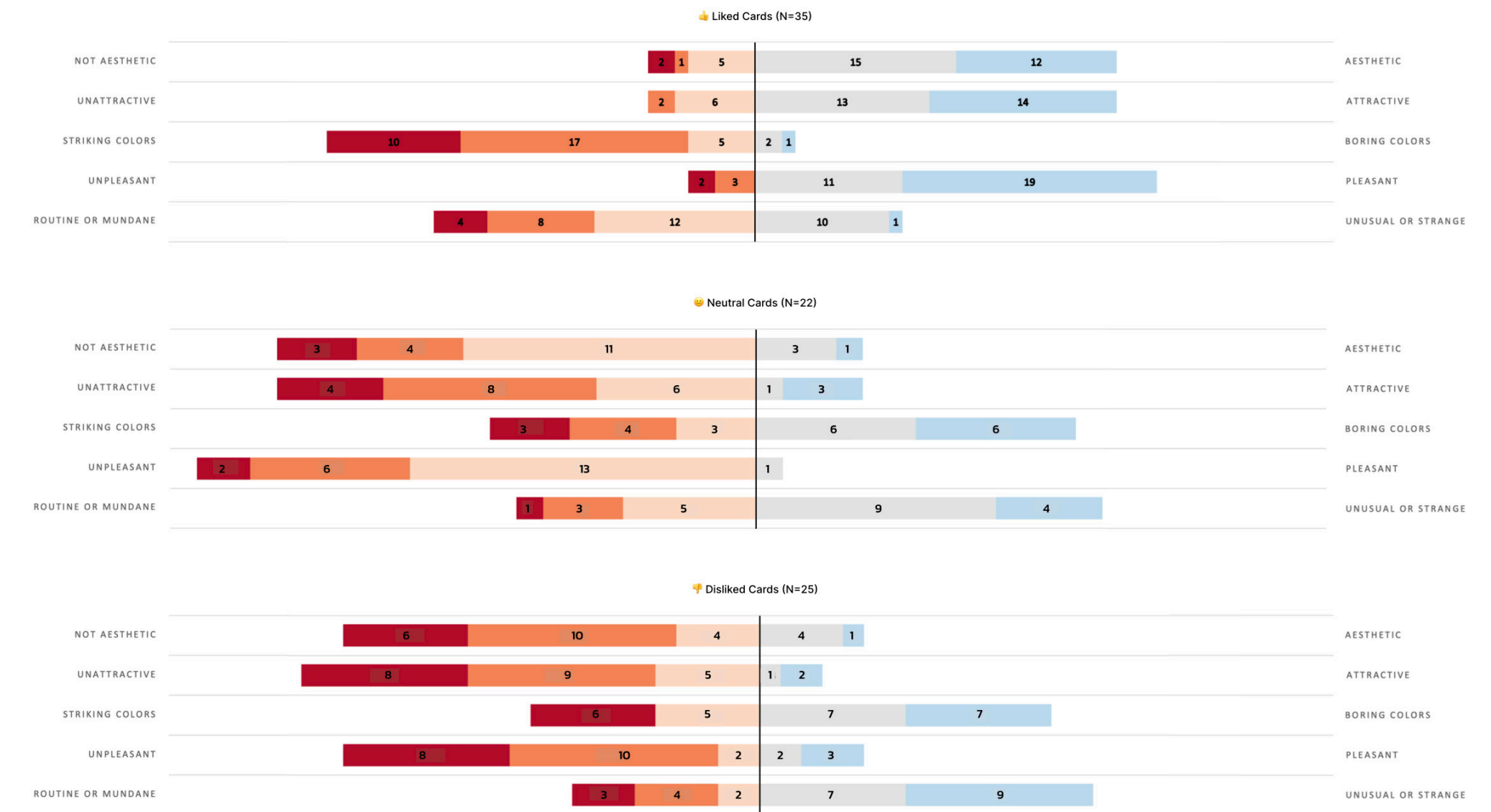
▲ 5-point Likert scale evaluation of aesthetic attributes of the liked, neutral and disliked cards.
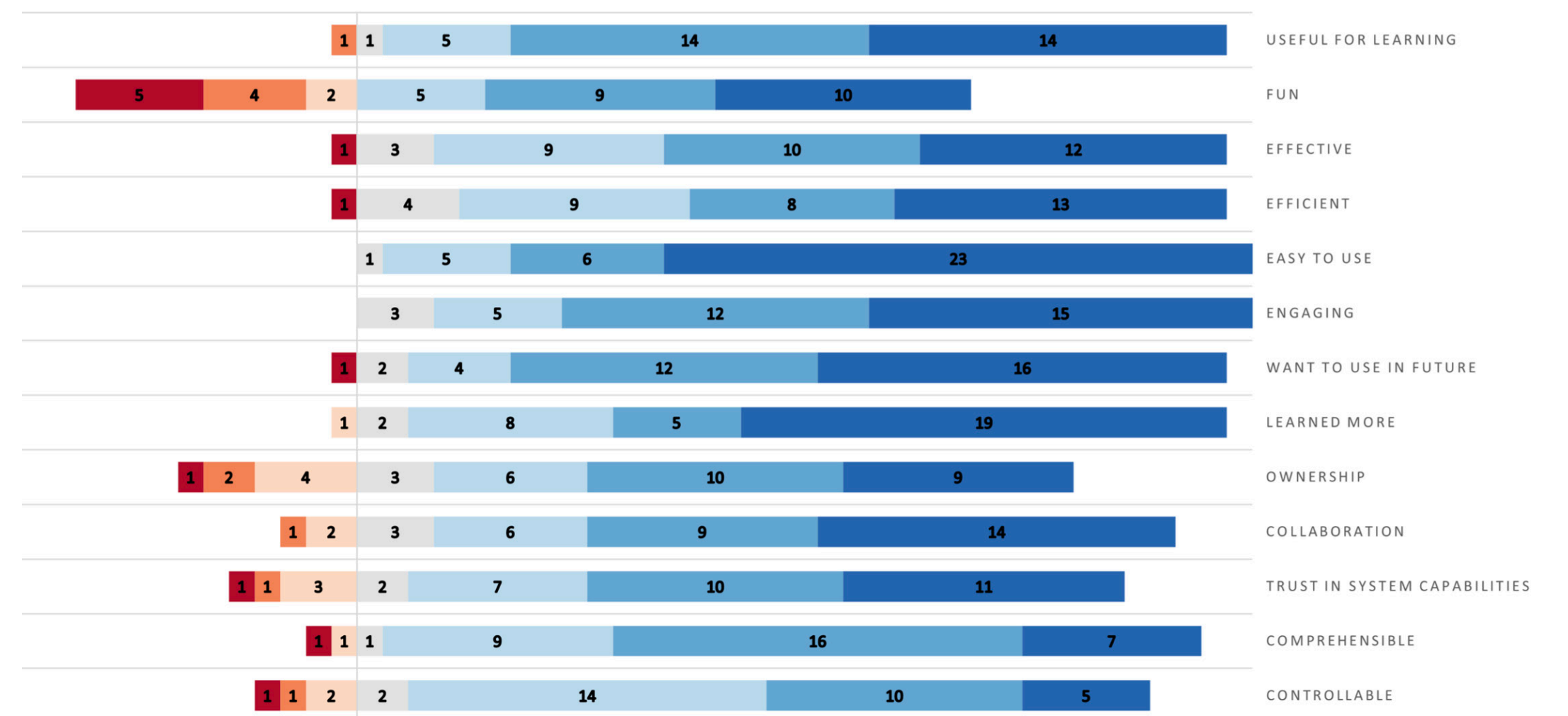
▲ 7-point Likert scale evaluation for the use of MnemoMaker

Background

With 7.888 billion people relying on rice as a primary food source, mainly from lowland rice production, ensuring its sustainability is vital. Traditional rice farming practices, including fertilizer use, can lead to issues like heavy metal absorption, monoculture farming, and soil degradation. To address these challenges, imp

roving Nitrogen Use Efficiency (NUE) in lowland rice systems is essential. Enhancing NUE can be achieved by developing products that deliver nitrogen precisely to the roots and leaves of rice plants through smaller, more frequent applications, reducing nutrient losses and benefiting rice production.

Project Year : 2023
Team : Dongho Shin, Carmela Wilkins, Siming Jin, Lingke Song
**My Role** : Prototyping, 3D Modeling, Graphic

Method

We propose a futuristic fertilization system to help farmers fertilize their land effortlessly with precision.

Our product navigates in the irrigated rice paddy to apply fertilizer at or near the root during critical growth stages. By doing this, we can increase Nitrogen Use Efficiency and improve crop yields with little or no manual labor.
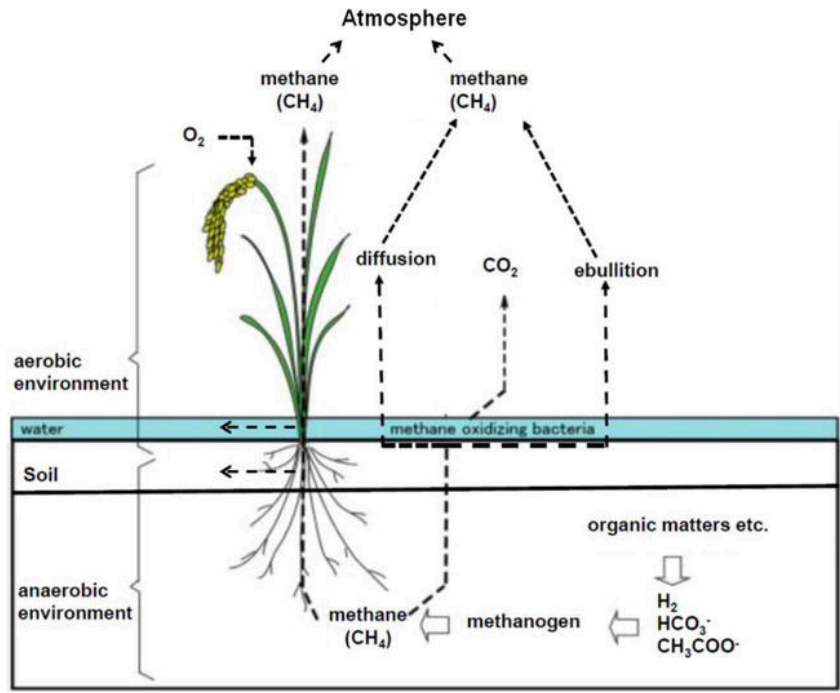
▲ The process of nitrogen absorption by rice, along with Nitrogen Use Efficiency (NUE)
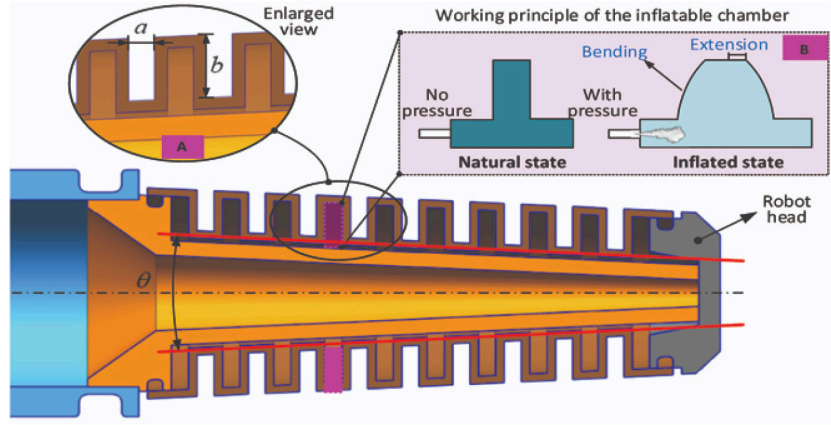
▲ Working principle of the inflatable chamber

Elevation View

▲ Small-scale farmers who spread fertilizer by hand
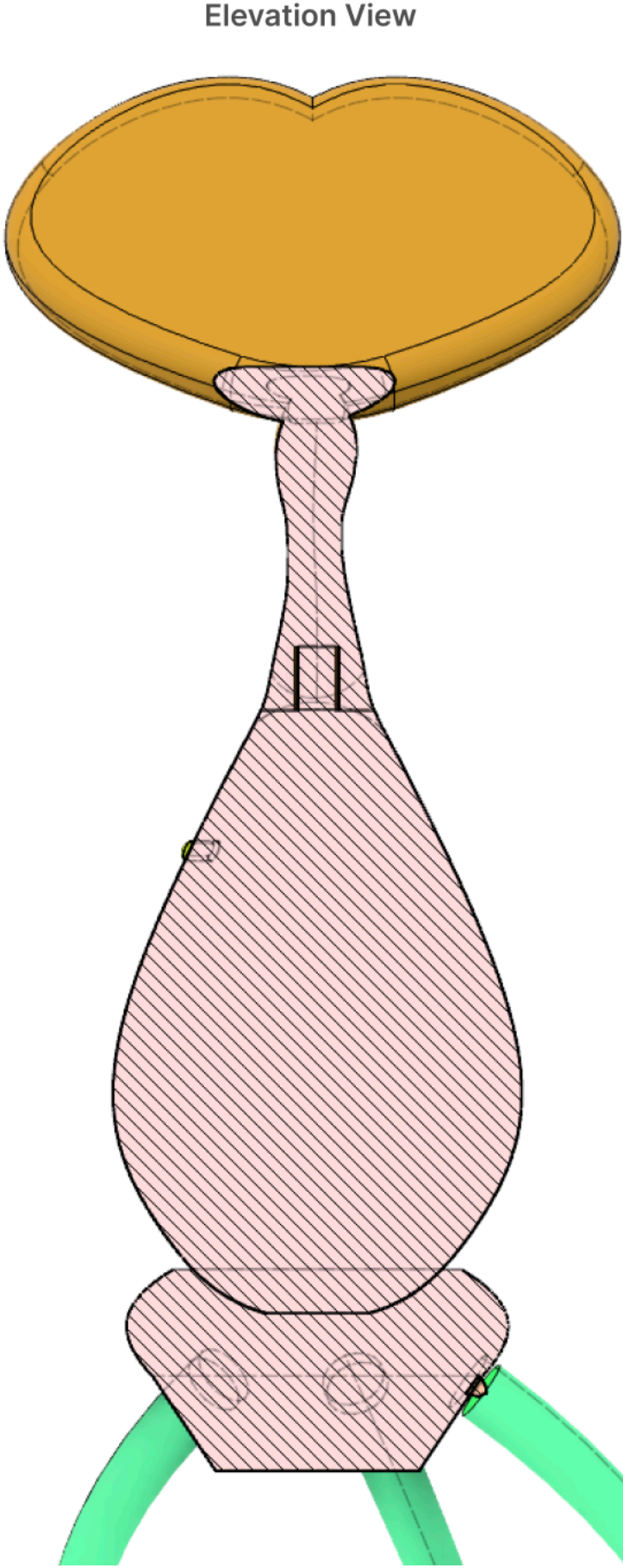
Top view

▲ Top view of 3D modeling

▲ Elevation view of 3D modeling

Making Process

To achieve our product's precision in grabbing rice roots during inflation, we encountered initial challenges with the soft root prototype. It exhibited uneven bending and struggled to grip rice roots effectively.

We identified a modeling error, rectified it by ensuring equal gaps, and increased the number of gaps to promote uniform bending. To further improve performance, we're adding a "single-helical fiber wrapping combined with a strain-limiting layer" for precise motion when grabbing rice roots.

Photographed
By Dongho Shin

▲ Second Prototype

Photographed
By Dongho Shin
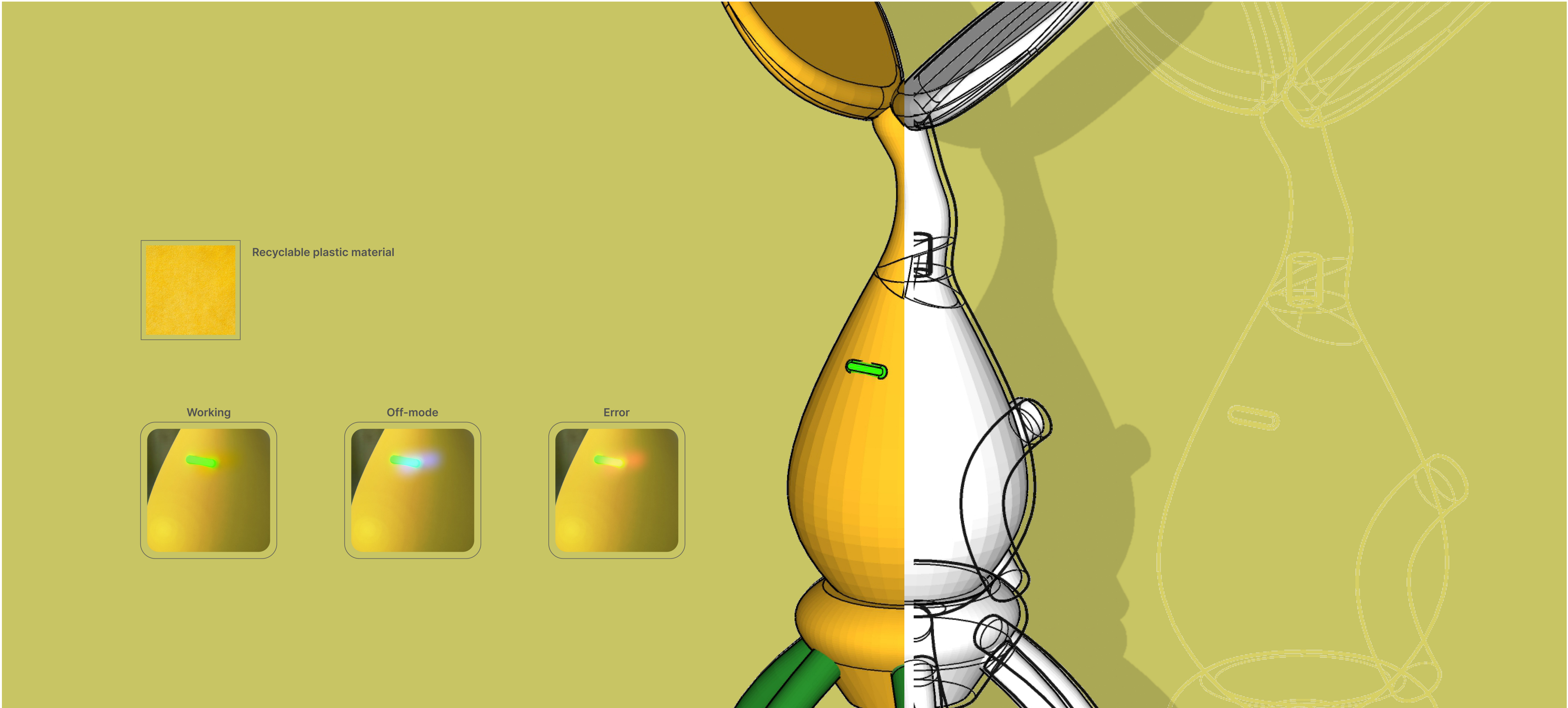

▲ Printing out with 3d model to make molds and pouring silicions

▲ Testing with air-pump and soft robot made with dragon skin.

Recyclable plastic material

Working

Off-mode

Error

▲ Rendering image with Color, Material and Finish(CMF)

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Photographed
By Dongho Shin

Photographed
By Dongho Shin

Result

The final prototypes present in this showcase consist of two parts: a scaled looks-like prototype that illustrates the form of the solution as a whole, and a full-size root prototype that demonstrates the twisting mechanism during the nutrition process.

The looks-like prototype contains soft bodies with light that mimic the hydrafertilizer motion while working in the rice paddy. Meanwhile, the root prototype demonstrates a close-up of part of the project and proves the feasibility of the root twisting mechanism around the roots and main plant body.
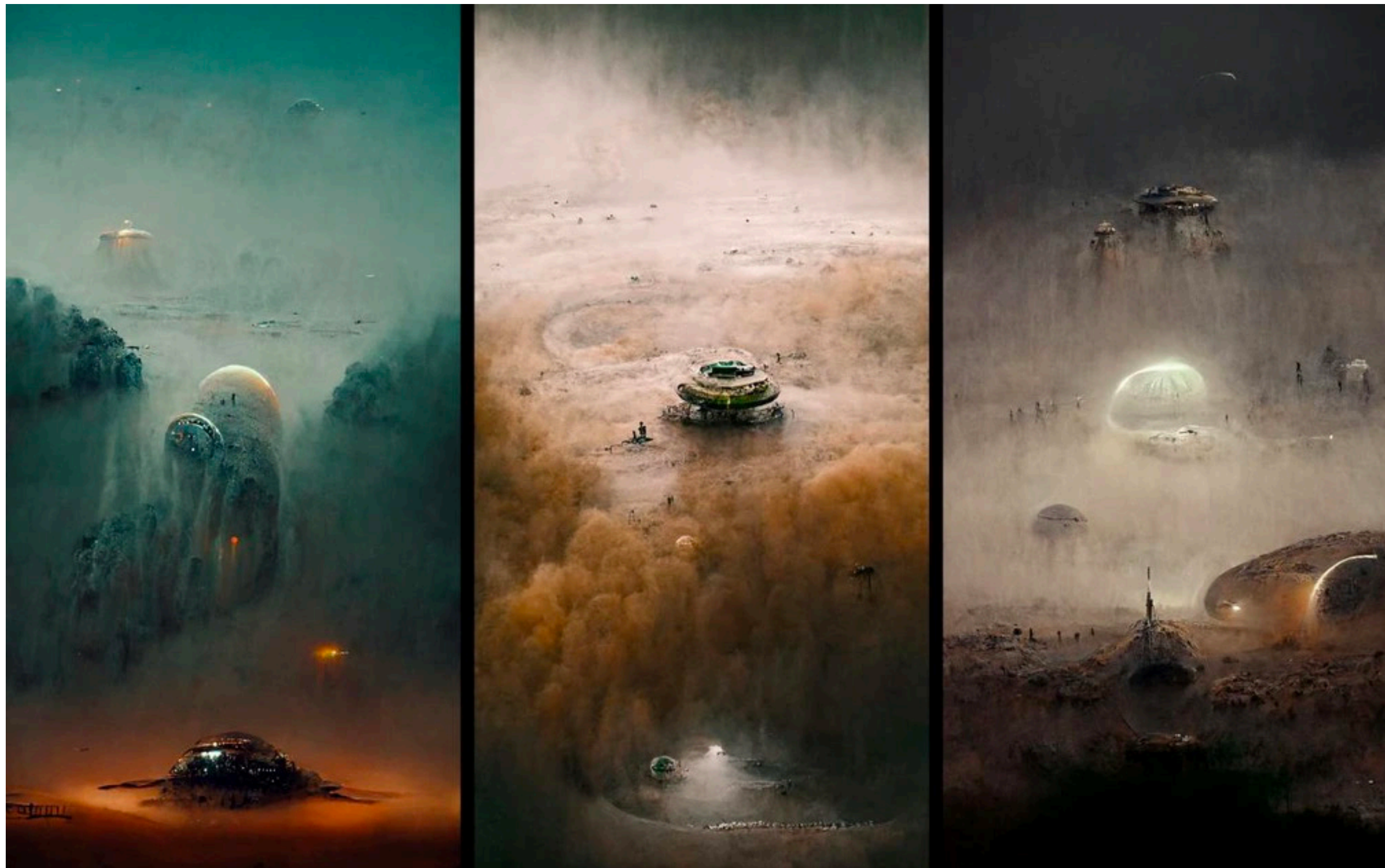
Background

Computer technology has revolutionized art and design, with AI tools like DALL-E and Midjourney aiding artists. Virtual reality (VR) is another creative frontier, yet image-to-image models haven't fully integrated into VR. This project explores using stable diffusion models in VR through the Open Brush app, allowing artists to enhance their VR work with AI-generated content, making it interactive and responsive.

Project Year   : 2022
Team   : Rishi Parikh, Dongho Shin
                           Bao Qiancheng.
My Role   : User Research, Interview,
                           Wireframe, Research related works

Method

In image-to-image models like CompVis, noise strength matters. It's a value from 0 to 1 that controls added noise in images, usually set at 0.75. Higher (0.7-0.9) suits early images, while lower (0.5) works better for complete ones. Artists can choose how much noise they want, with 0.7 being a good default. It's an essential setting for better results.

OpenBrush integrates new tools called "run stable diffusion" and "toggle stable diffusion." These tools allow users to generate and interact with stable diffusion outputs in a 3D drawing environment. The "run stable diffusion" tool collects text and image inputs, with text transcribed using the Oculus Voice SDK.

It then hides other objects to capture a 2D view of the 3D scene for processing, and the result is saved and resized. Since stable diffusion can be resource-intensive, it's wrapped in a REST API, which can run on a remote server. Once the image is returned, it's attached to a billboard in the 3D scene. Users can interact with the stable diffusion outputs by selecting billboards with a pointer tool to resize them, allowing for quick toggling between different views for editing purposes.

▲ Mid Journey 2 AI generated images, Prompt; Space Odyssey with Mars

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Evaluation

This project introduces a tool that leverages stable diffusion in virtual reality to assist artists and designers. The tool allows users to transform simple sketches into visually appealing images, even if they are new to VR devices. The user interface, which includes point-and-click controls, is intuitive and user-friendly. Users quickly adapt to these new tools, even if they were not previously familiar with Open Brush.

The application successfully captures input and generates aesthetically pleasing or inspirational images. Control improvements, such as button debounce and visual pointers, enhance the user experience.
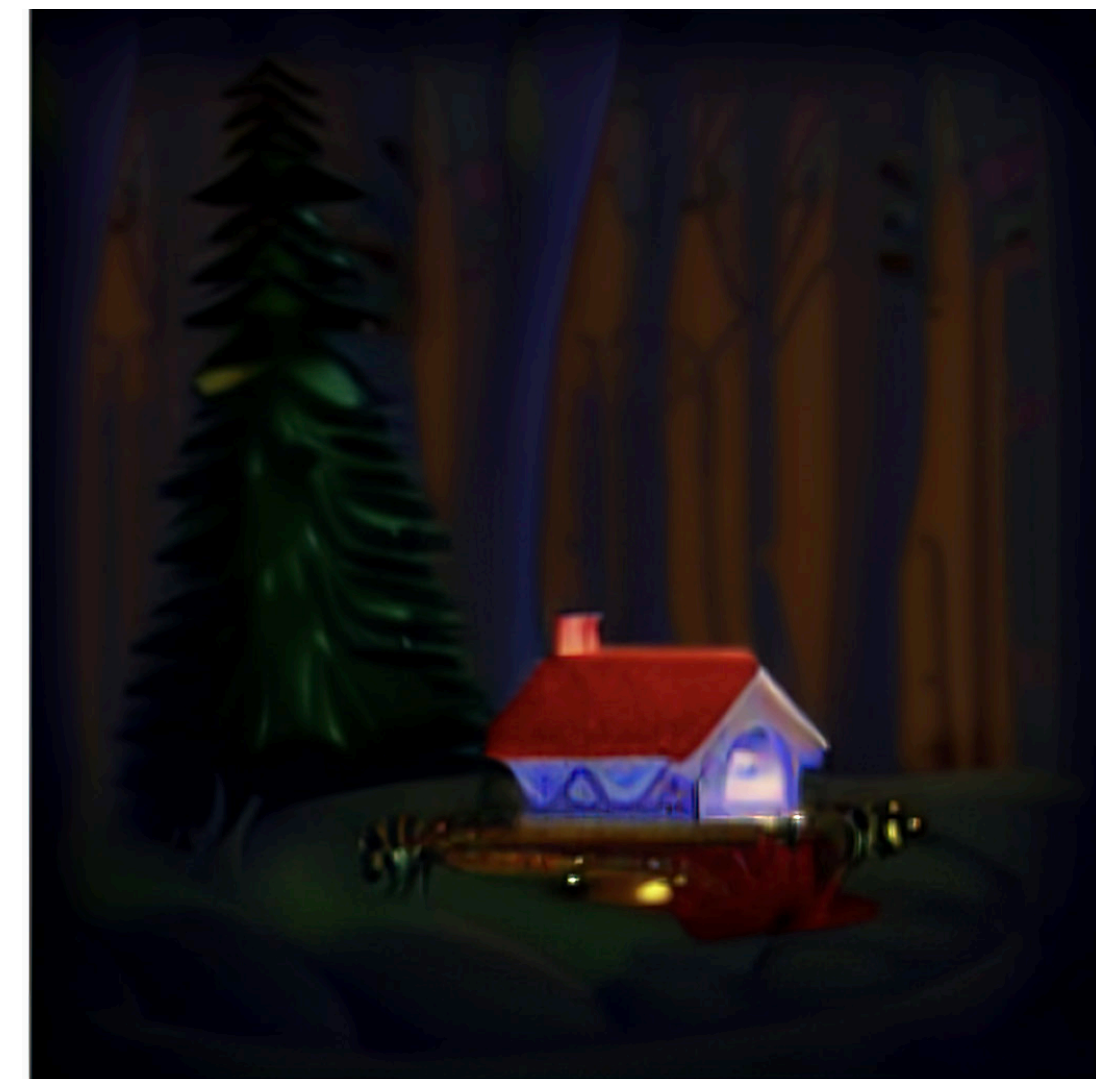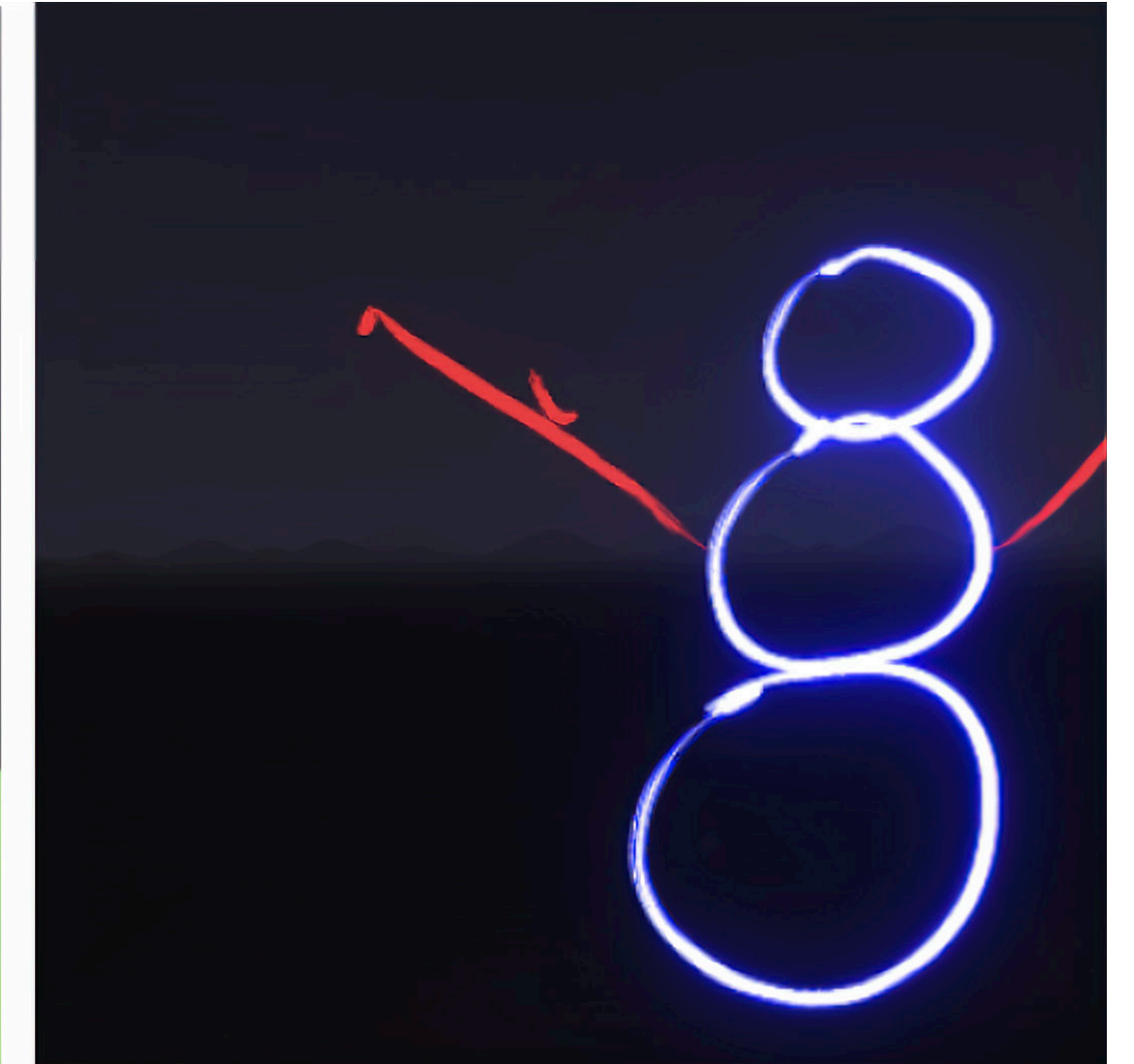
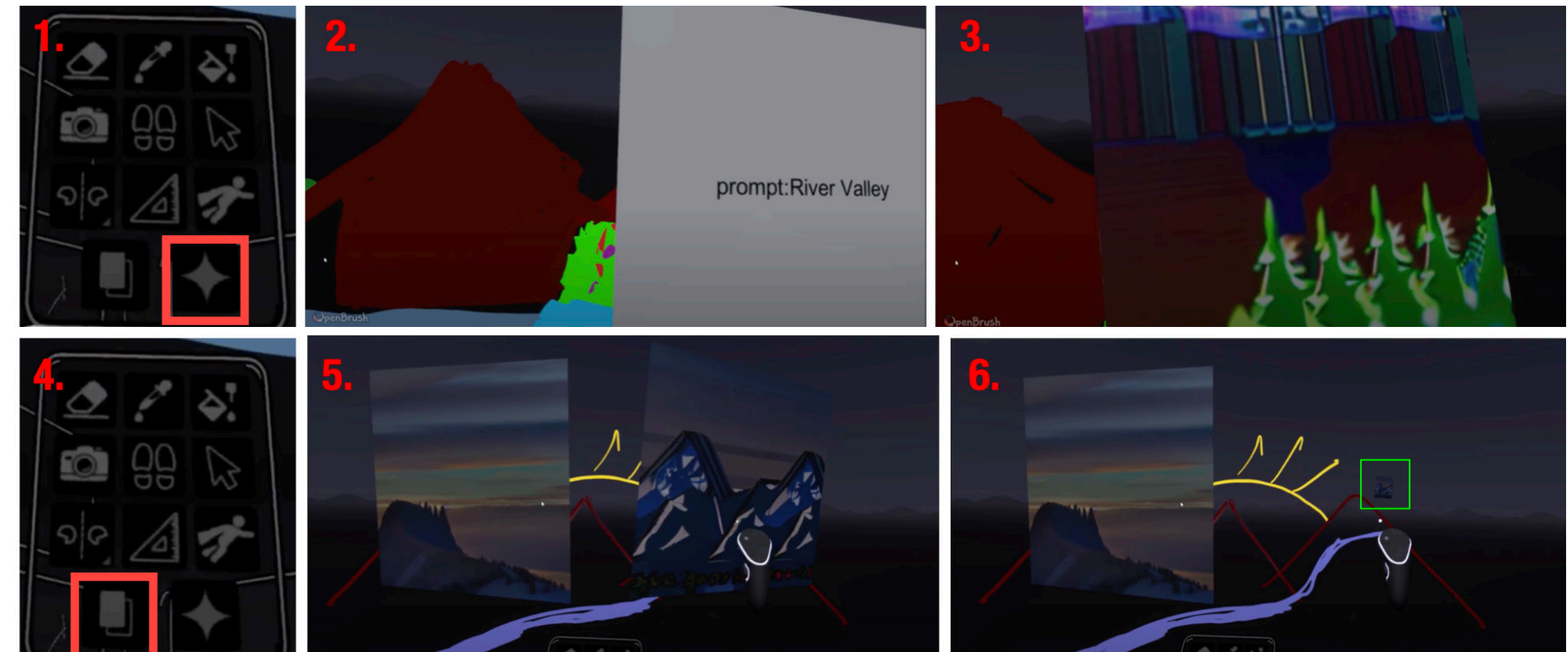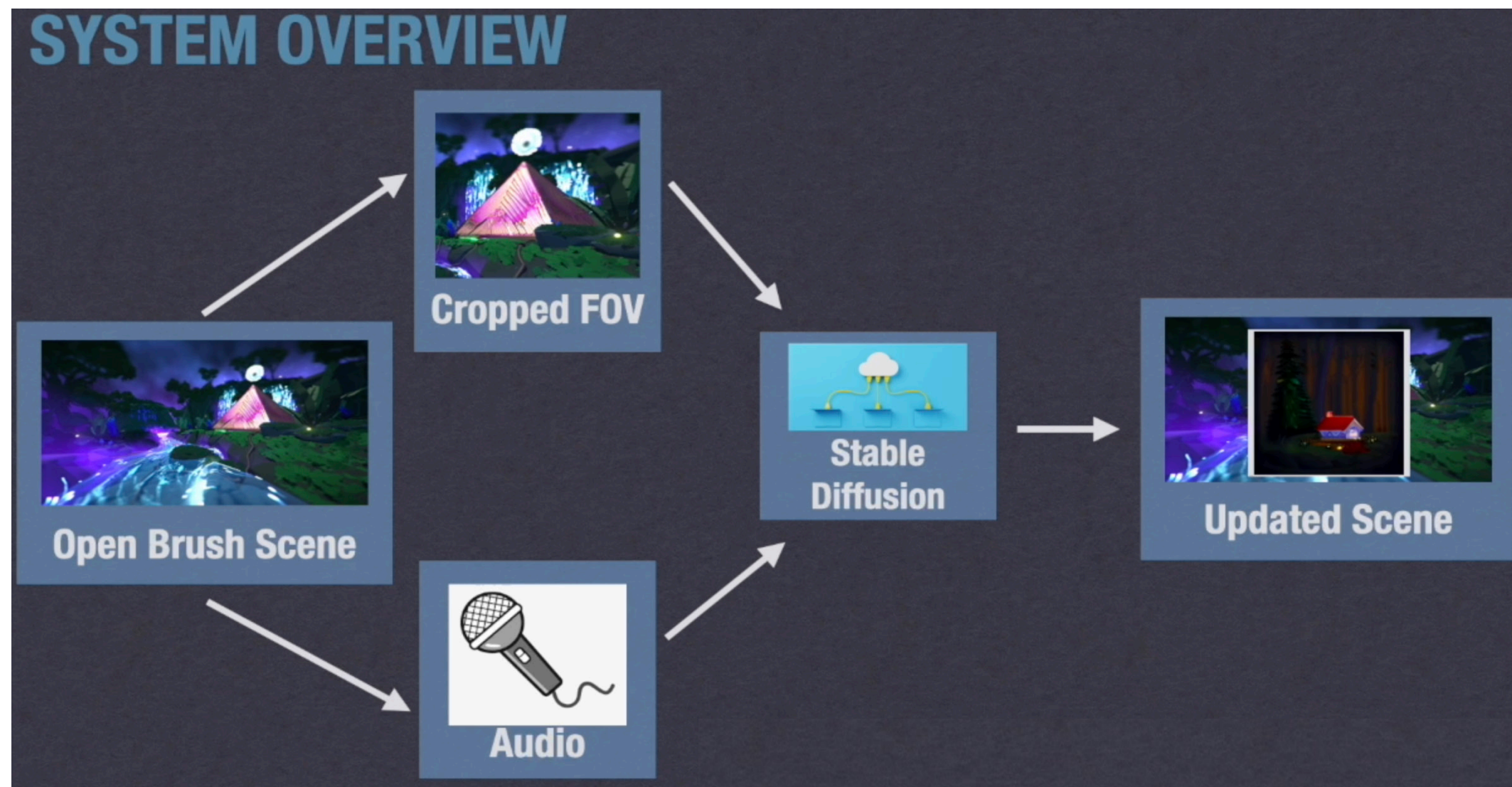▲ User can push prompt a button after drawing it to generate 2D image.

Result

This project introduces a tool that leverages stable diffusion in virtual reality to assist artists and designers. The tool allows users to transform simple sketches into visually appealing images, even if they are new to VR devices. The user interface, which includes point-and-click controls, is intuitive and user-friendly. Users quickly adapt to these new tools, even if they were not previously familiar with Open Brush. The application successfully captures input and generates aesthetically pleasing or inspirational images. Control improvements, such as button debounce and visual pointers, enhance the user experience.

However, there are limitations to consider. While stable diffusion can produce impressive results, it is not always perfect, and errors can occur. Common issues include misinterpretations of text prompts and users looking away during the process.

These problems can be mitigated with warnings or improved camera angle tracking. Additionally, the runtime for generating images can be lengthy, but this is being addressed by using dedicated GPUs and allowing users to continue working while the program runs in the background.

This paper integrates stable diffusion into virtual reality on the Oculus Quest 2, based on feedback from designers and artists. It adds tools for running and resizing stable diffusion outputs and explores real-time integration through REST API. Future work includes user studies, model refinements, and potential 3D model output integration with DreamFusion.

▲ School Lunches Around The World - A Comparative Video by BuzzFeed Blue (2014) featuring school lunches in the UK, Mexico, Russia, Nigeria, Norway, Philippines, Cuba, France, Japan, and India.

Background

Childhood obesity rates in the United States have surged over the years, with predictions indicating a majority of 2-year-olds becoming obese by age 35. School meals are a significant factor, with children consuming up to half of their daily calories at school.

High consumption of ultra-processed, carb-rich foods in school lunches contributes to obesity. Research suggests that stricter school food nutritional requirements can lower obesity rates. Japan, with an effective school lunch program and lower childhood obesity rates, highlights the potential impact of nutritious school meals.

Project Year   : 2023
My Role   : Reserach, Prototyping,
                             Programming, Projection Mapping

Method

An educational project aims to teach children about nutrition by using interactive infographics to compare American school meals with those from other countries. It builds upon a 2015 Business Insider comparison, highlighting that American school lunches often contain more carbohydrates and processed foods than those in countries like France, Ukraine, and Spain. This project uses projection mapping technology and a user-controlled knob interface to allow students to compare American meals with those of two other countries, emphasizing differences in nutrients, student preferences, and macronutrient balance. The focus is on three essential nutrients: carbohydrates, fats, and proteins. The project aims to promote informed choices and a lifelong habit of healthier eating, emphasizing balanced nutrition from a young age.


Percent
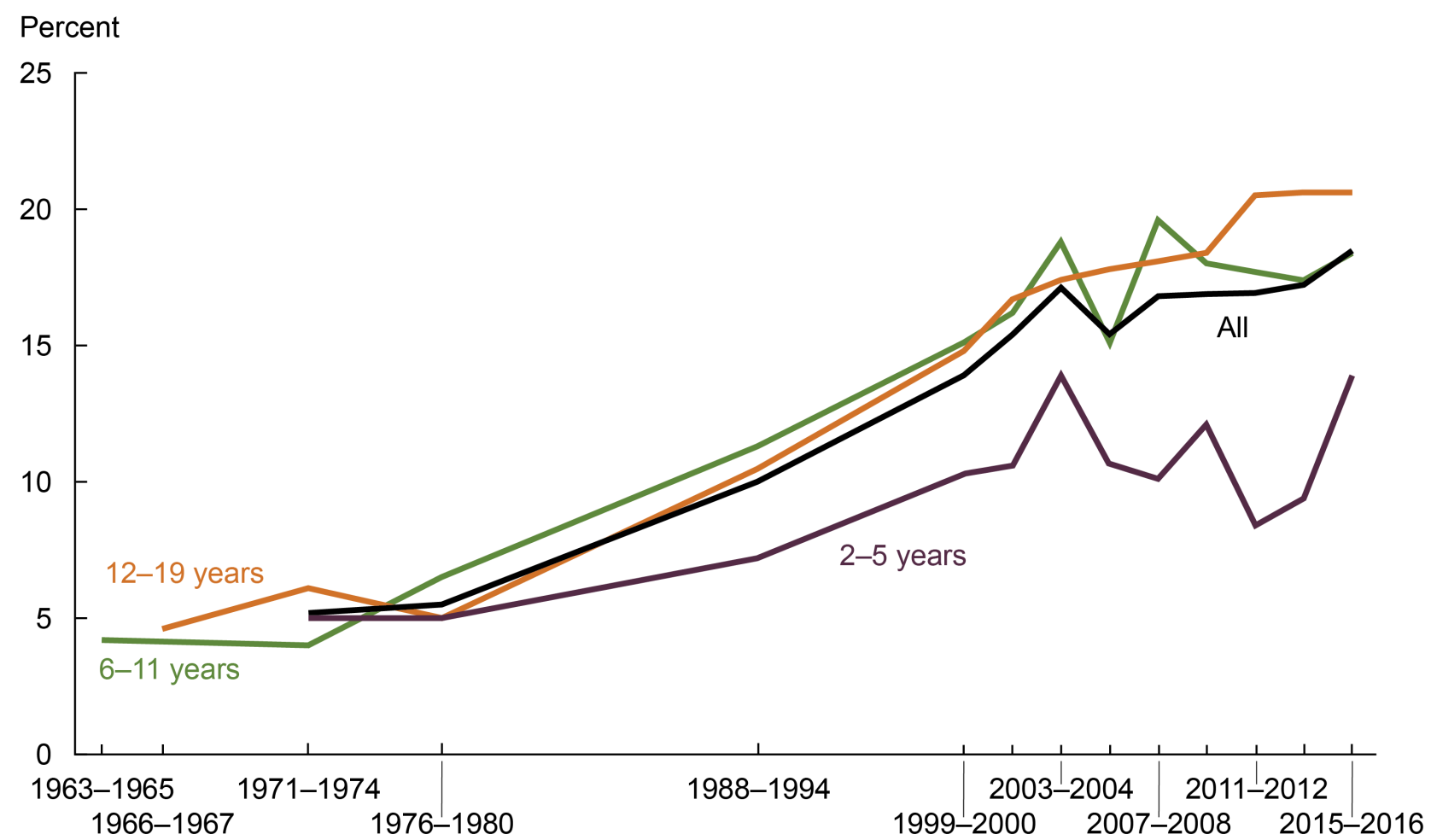
▲ Trends in obesity among children and adolescents aged 2–19 years, by age: United States, 1963–1965 through 2015–2016.

▲ Typical American school lunch now offers heavily processed foods, like corn dogs, tater tots, and cheese pizza.

▲ An educational board game designed for children to understand the harmful effects of consuming hyper-processed foods.
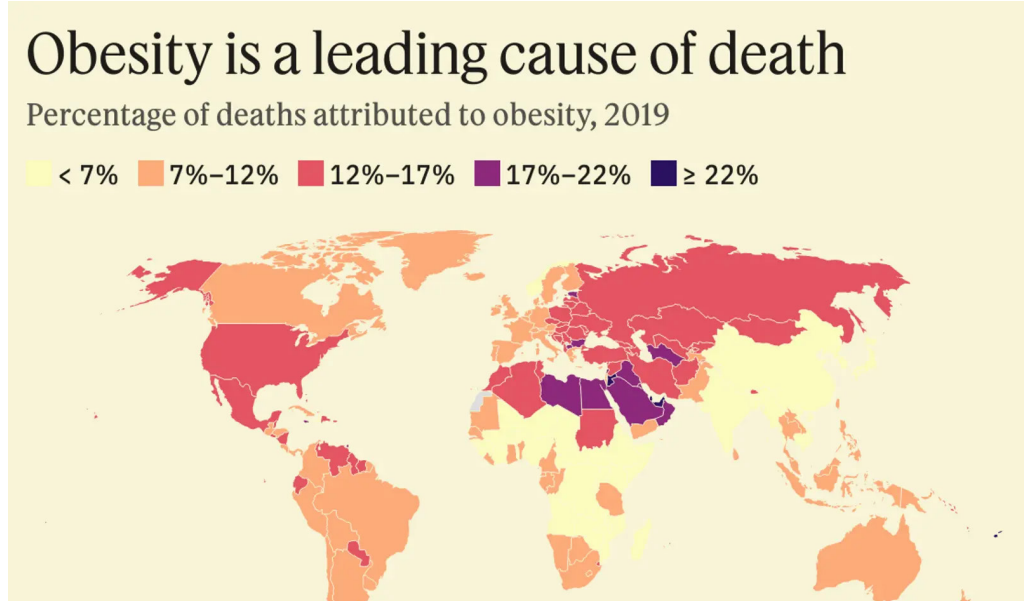
19

Infographic about US school lunch. e.g. history/Budget/
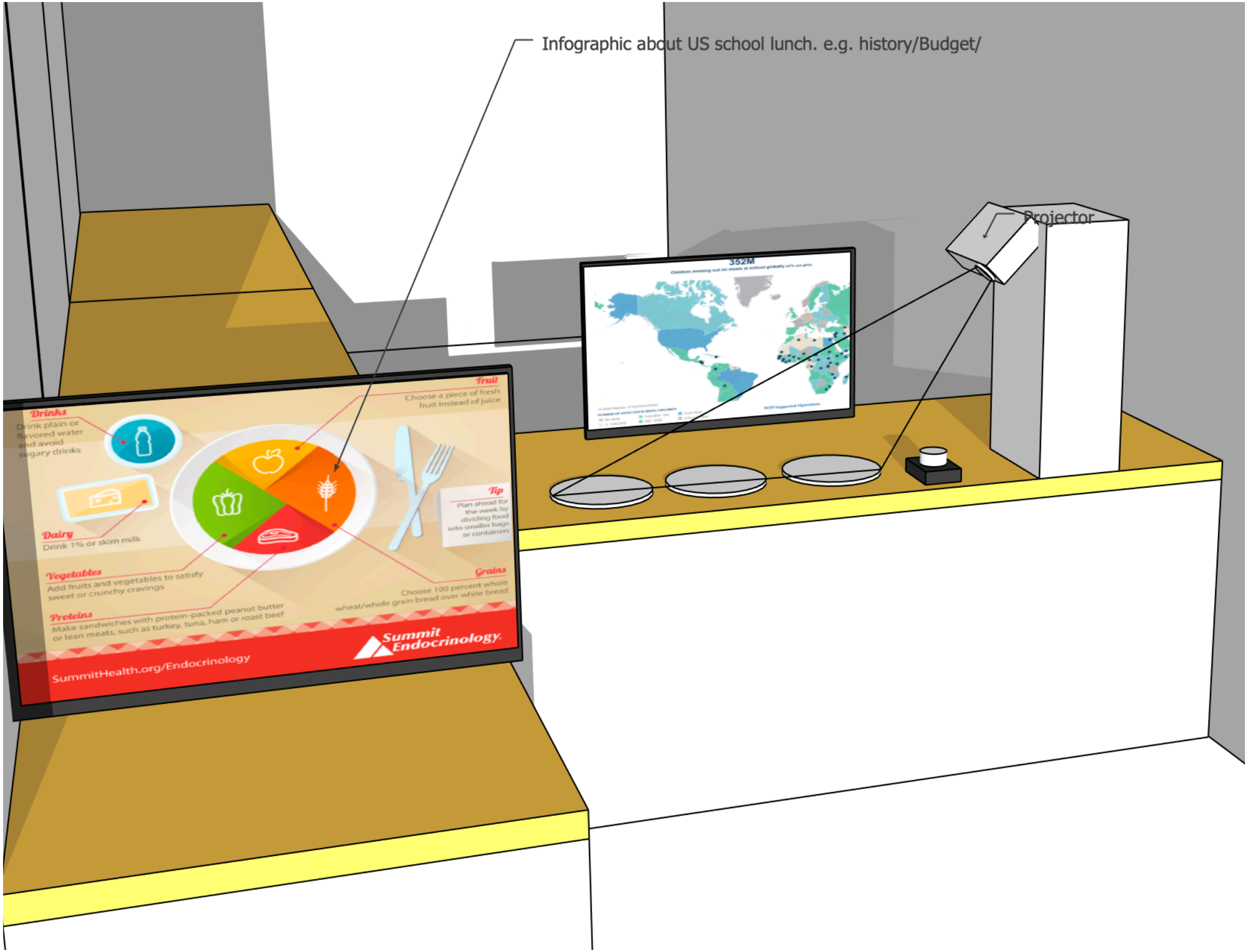
Projector

▲ Exhibition display using SketchUp

Making Process

I am creating a responsive infographic program based on a small mini-computer (e.g., Raspberry Pi).
The projector operates using the Madmapper program. When users turn the knob, input and output values are used to display meals from various countries based on the angle. For the installation, I use laser-cut acrylic to create a stand to ensure the projector maintains the same angle.

I also paint white dishes with white paint to facilitate proper projection mapping. Additionally, I install an extra monitor to display infographics, highlighting the seriousness of childhood obesity in the United States.

Obesity is a leading cause of death
Percentage of deaths attributed to obesity, 2019
< 7% 7%–12% 12%–17% 17%–22% ≥ 22%

▲ Half of the world will be obese or overweight by 2035, according to a report from the World Obesity Federation.

▲ The user can control the interface in real-time using a knob-type controller.

▲ A Metro Detroit restaurant is enhancing the dining experience by using 3D projection

#vegan4lyfe
Instagram mentions of vegan food items
Berlin, summer 2014

Hummus
12%

Sprouts
7%

Avocado
29%

Tofu
19%

Quinoa
7%

Peanut
26%

▲ This project utilizes Data Cuisine's approach to food ingredient visualization, exploring food as a medium for conveying information.

Result

This interactive infographic project has a powerful educational impact, helping children understand the nutritional quality of foods and its connection to their health. By visually comparing American school meals with those from other countries, it simplifies complex concepts and encourages healthier food choices from a young age.

It also promotes cultural awareness and provides data-driven insights into meal nutrition. Furthermore, it can serve as a platform for advocating policy changes to improve school meal standards. The project's interactive technology enhances the learning experience, making it engaging for children and fostering better retention of nutritional knowledge. In summary, this project addresses childhood obesity through education, awareness, and policy advocacy.

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Human-computer Interaction
Portfolio

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