PORTFOLIO

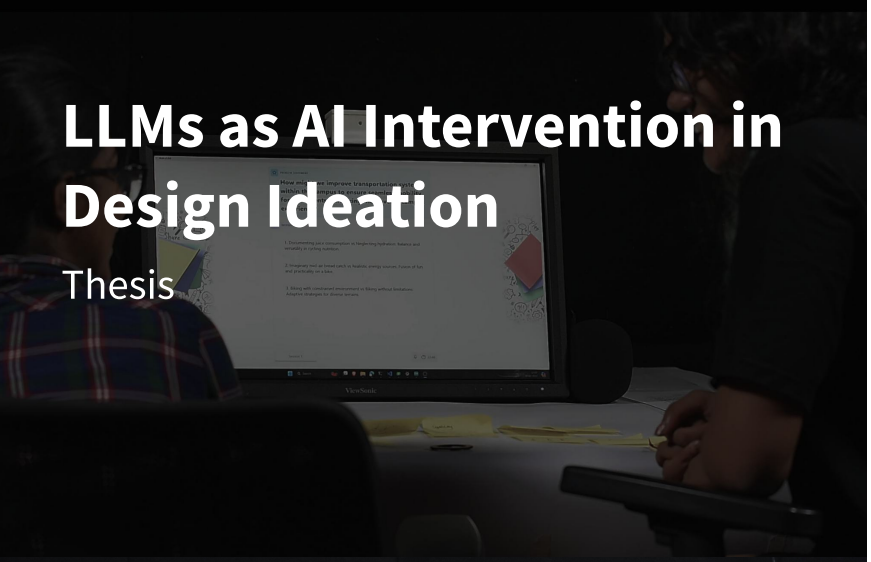
Rutvik Kokate

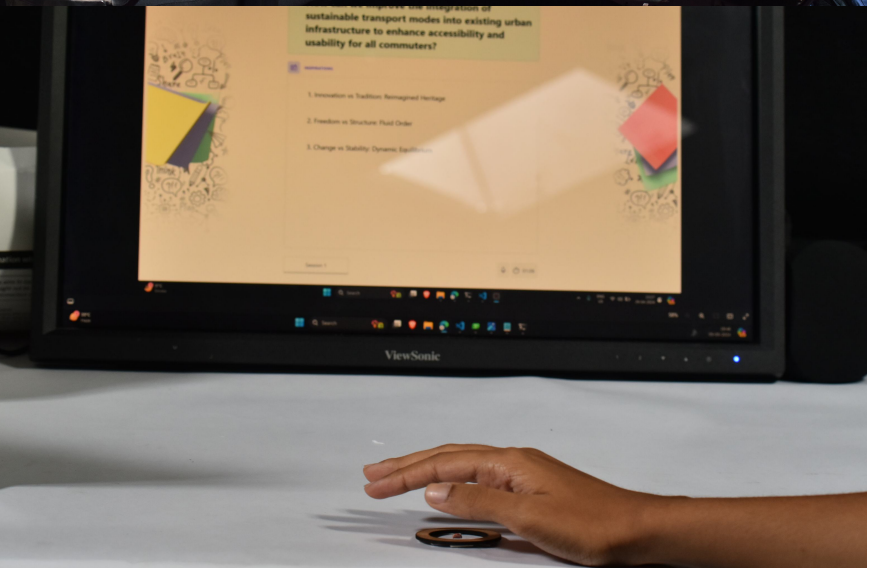
Interaction designer having experienced technical skills with interests in HCI, Design research, Immersive media and Human-computer behavior. Dedicated hands on experimenter with a vision to enhance knowledge and deliver positive results.

BEHANCE LINKEDIN WEBSITE

LLMs as AI Intervention in Design Ideation

Thesis





Summary

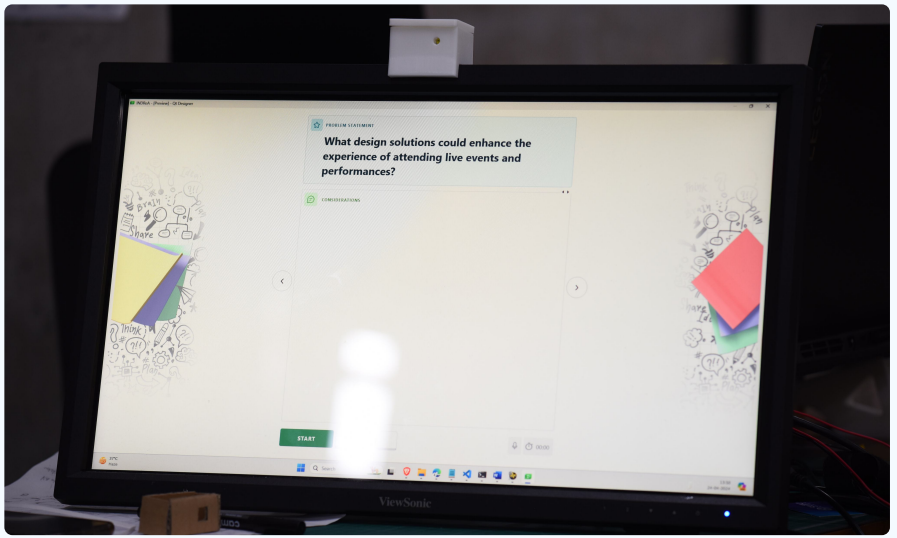
This study examines the role of Generative AI in augmenting the design ideation processes by developing and testing an assistive tool for Context Aware Brainstorming (CAB) in group ideation and brainstorming scenarios.

Motivation

Design ideation and creativity is becoming highly relevant across wide range of fields including engineering, entrepreneurship, design research etc. Ideation has the power to engage humans and trigger wide spectrum of thoughts and creativity. LLM's lack of context and mismatch of the response expected by the users due to difficulty in articulating are some of the challenges that must be addressed. The motivation behind this study was to explore ways in which a structured ideation method can be integrated by making use of LLMs as content generator and natural language interactions.

Background

Creative potential is a notion highly relevant to design practice and research, especially in the initial stages of ideation and conceptualisation. This study examines the role of Generative AI in augmenting the design ideation processes by developing and testing an assistive tool for Context Aware Brainstorming (CAB) in group ideation and brainstorming scenarios.



We examine the role of generative AI in augmenting the design ideation processes by developing and testing an assistive tool in various group ideation and brainstorming scenarios.

The tool is developed by applying structured idea generation methods to a large-language model (LLM) and enabling natural speech-based user interactions.

Prompt design

Prompt design is the craft of sculpting prompts to elicit desired outputs from a language model. Strategies such as setting the **right context** can greatly enhance model's output.

SYSTEM PROMPTS

"Generate 10 distinct short one-worded meaningful keywords based on the summary: {summary}.\n. Generate only these words and nothing else"

AI PROMPTS

AIMessage(content='The human expresses gratitude that AI did not take anything from them in their previous conversation....'),

HUMAN PROMPTS

HumanMessage(content ='Again like if he wants to see then maybe like when others are giving like after your system will still be there now.'),

System flow

Description	*Component*	*Function*
The human uses Natural Interaction - Speech as a source of input to the application.	HUMAN	Speech-to-Text
The application understands human converstaions and builds up a summary over time.	APPLICATION	Summarization
		Generation of ideas
This summary is used to generate Words, Suggestions and Book Title (Oxymorons).		Synectic brainstorming
The users simultaneously use the physical space provided for idea generation on whiteboards.	PHYSICAL SPACE	Discussion
		Sticky notes
		Visual observation

Mapping interactions

Intentions include declarative knowledge (“what” needs to be done), procedural knowledge (knowing the “how-to” of a task).

Formulation of Conceptual Model

Formulation of intentions

CONVENTIONAL HCI

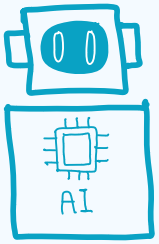
In **Conventional HCI**, designers invent a conceptual model, based on human-centered practices.

The designer may analyze user’s past experiences, prior knowledge and analogies to shape the behaviour of the system.

Users adapt their intentions based on both their cognitive task processes (what they want to accomplish) and their system mental model (what can be accomplished through system actions).

LLM Systems

The link between user intentions and system actions is less clear, users lack a conceptual model of how LLM functions.



Given the very different nature of transformer processing in machine learning, even experts are unable to predict how inputs determine outputs in LLM systems

LLMs remove the need for structured interfaces in favor of unconstrained use of natural language. Language as interface is more challenging for users.

Without system mental models, users cannot effectively predict outcomes or explain interactions with LLM models. This often leads users to pose ambiguous and ill-defined queries and yet expect the LLM to understand and respond appropriately.

Design considerations for LLMs

Theses factors introduce unpredictability while designing interface elements like cards, text boxes, bullet points. Based on user testings, string based output was chosen and displayed in a more human-readable manner.

Temperature of model

Models have temperature range between 0 -1, where 1 is more creative and 0 is more precise.

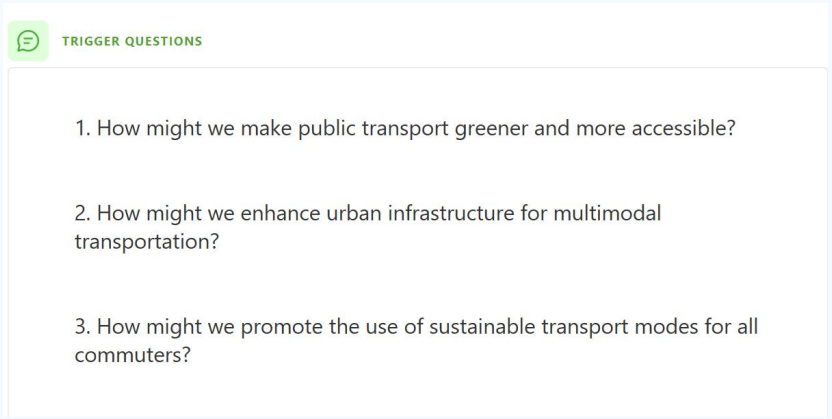
Non-determinsitic nature of LLMs

Output parsing

Depending on the output format of the model's response, the way information is presented also changes. E.g: Json, String, Comma Separated.

STRING

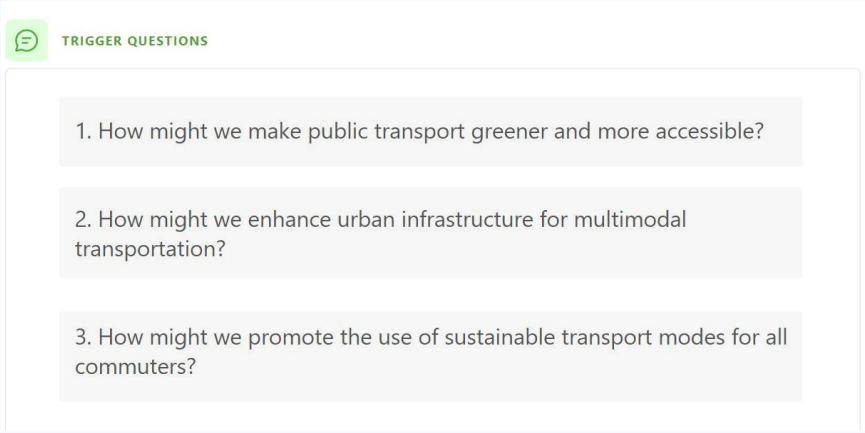
1.How might we make public transport greener and more accessible? \n2. How might we enchance urban infrasturcture....



Plain text with line gaps and limiting the responses to 3 made it easy to read for the participants.

COMMA SEPARATED

[1.How might we make public transport greener and more accessible?,2.How might we enchance urban infrasturcture....]



The participants often confused the card-lists with buttons and tried pressing them, expecting a change in state.

Design considerations for LLMs

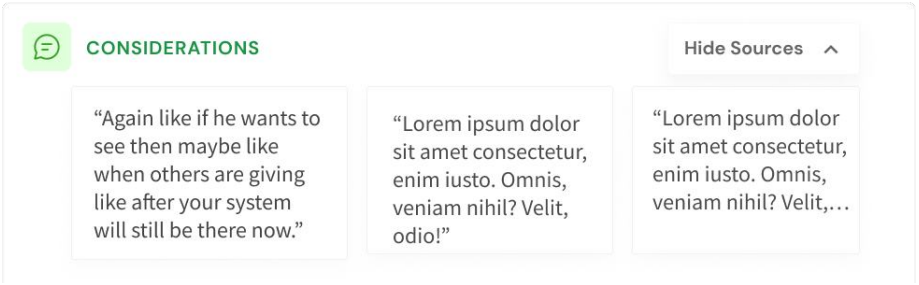
Prompting

Focus is not on mimicking human-to-human conversation, but rather on learning how to instruct the system to get appropriate and useful responses.

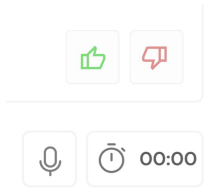
Prompt designing and Natural language interaction

Voice/Gestures as a modality

LLMs have the ability to build a conversational resilience by correcting speech misinterpretations.

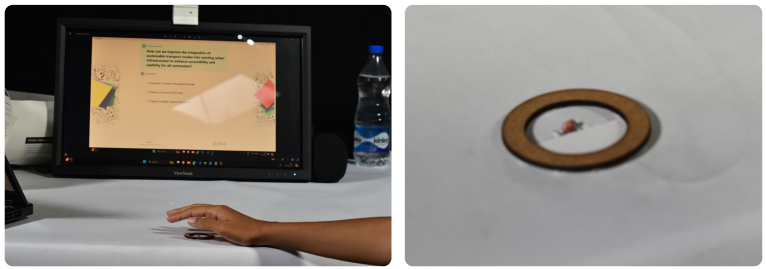


Making the output explainable. Letting the users know on what basis the response was generated.



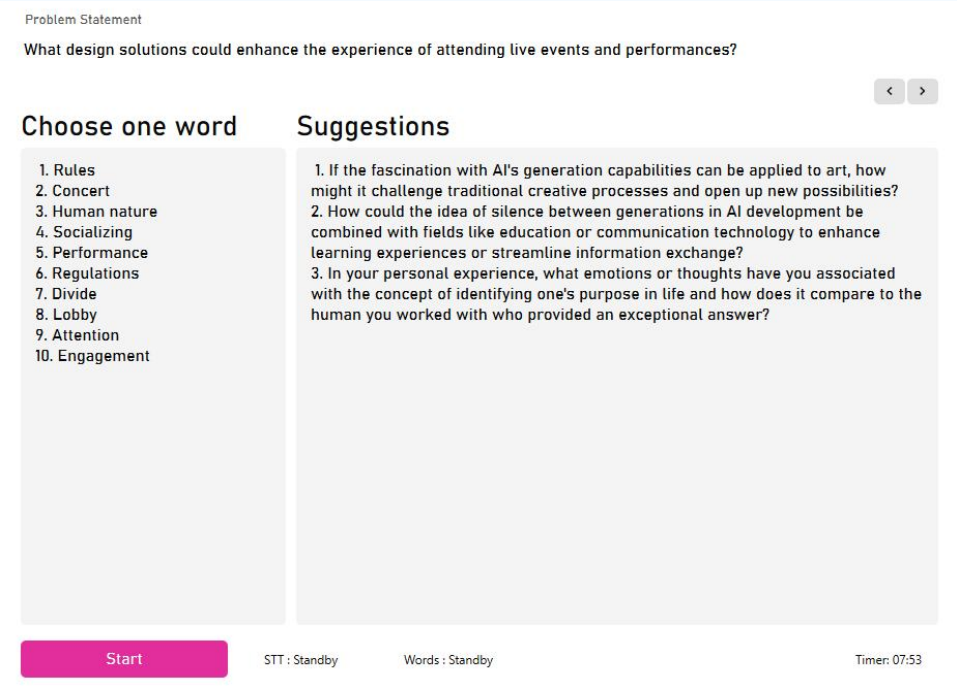
Feedback of response. Giving users the control of the experience by asking for realtime feedback and improvement of the generated response.

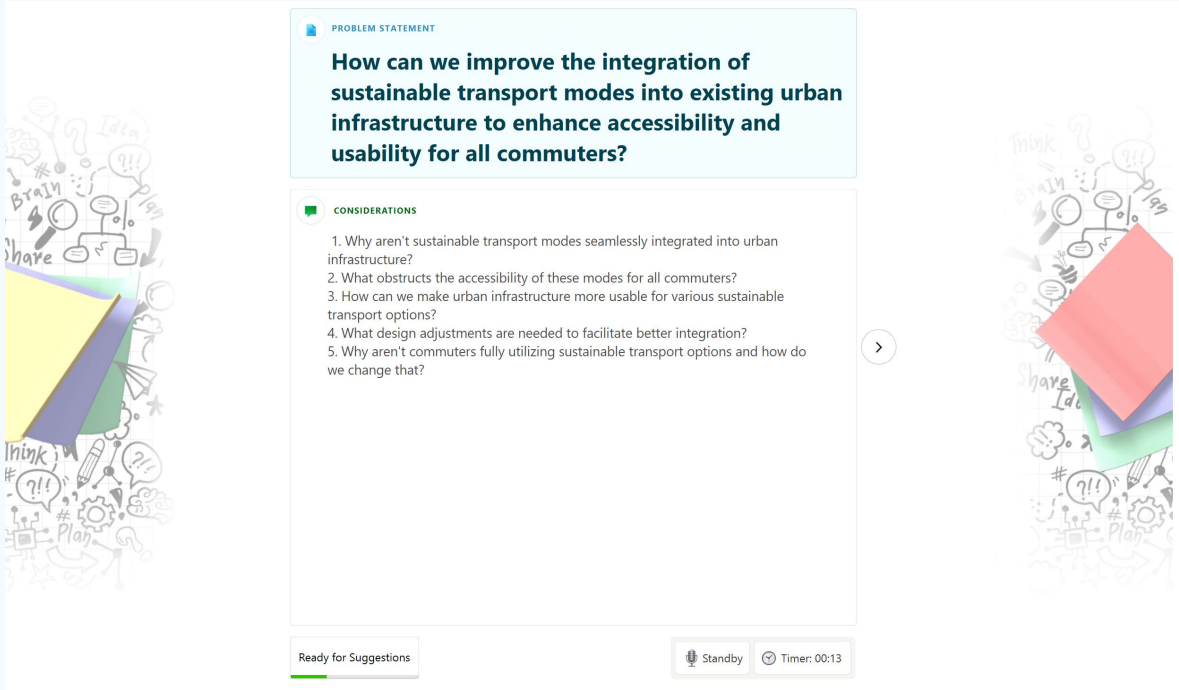
Prototypes address the use of natural language as an interaction method where it listens to voice inputs between the participants.



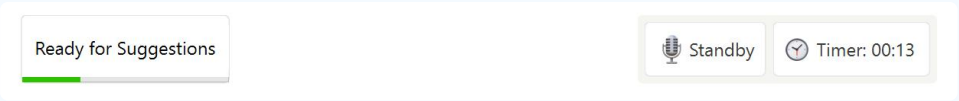
Breaking the natural flow of communication by touching the screen at intervals just to change a page didn’t align with our intentions. Prototype addresses this by using a gesture input close to their arms-length. Cover the hands to suggest new response

Prototype



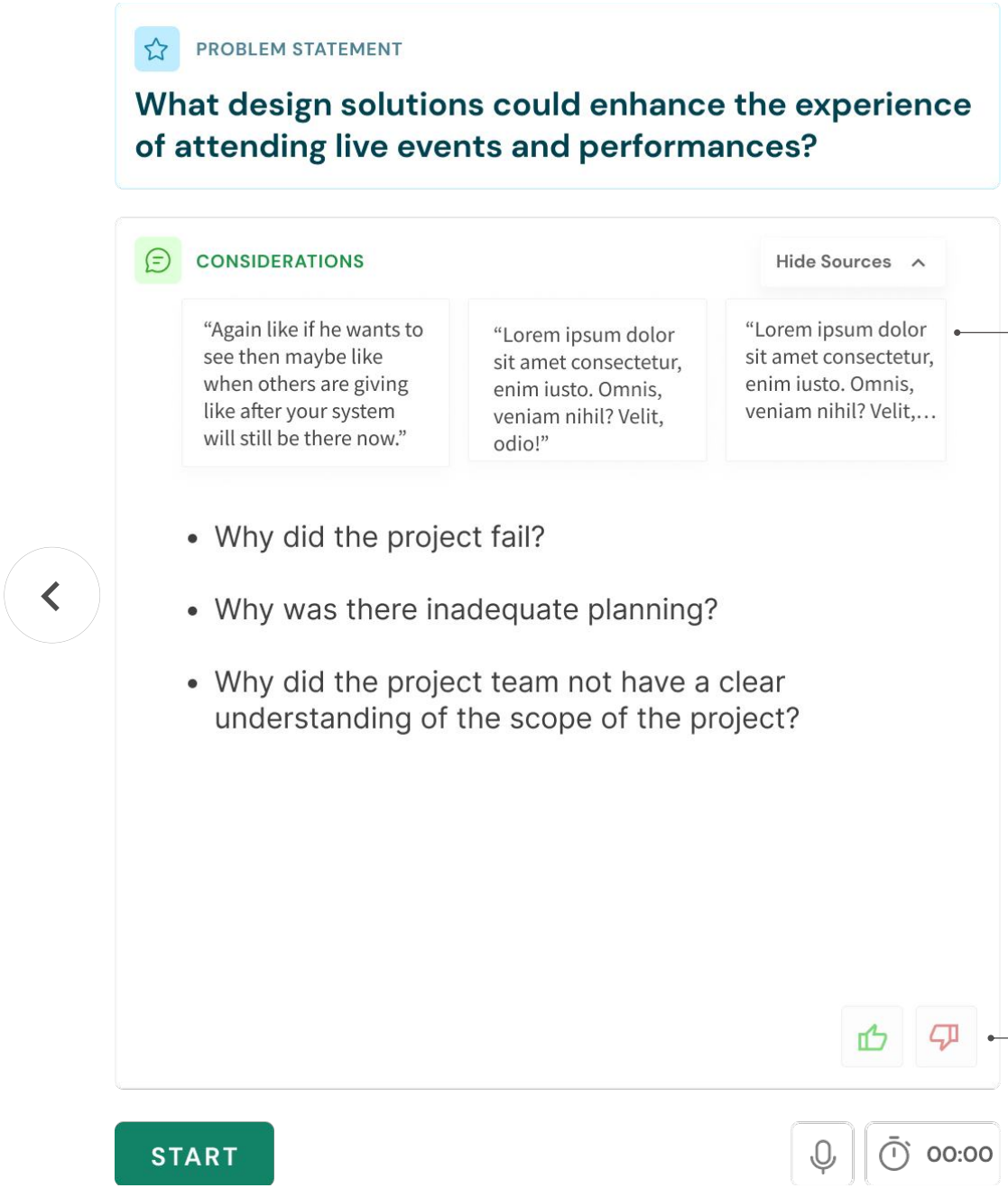


Early prototypes



Feedback and status bar

Natural voice and gesture based interactions



Explainability

Source of information (past participant conversations) on which responses were generated.

Control

Option to change / view previous or next pages whenever applicable.

Feedback

Response feedback to evaluate and improve suggestions.

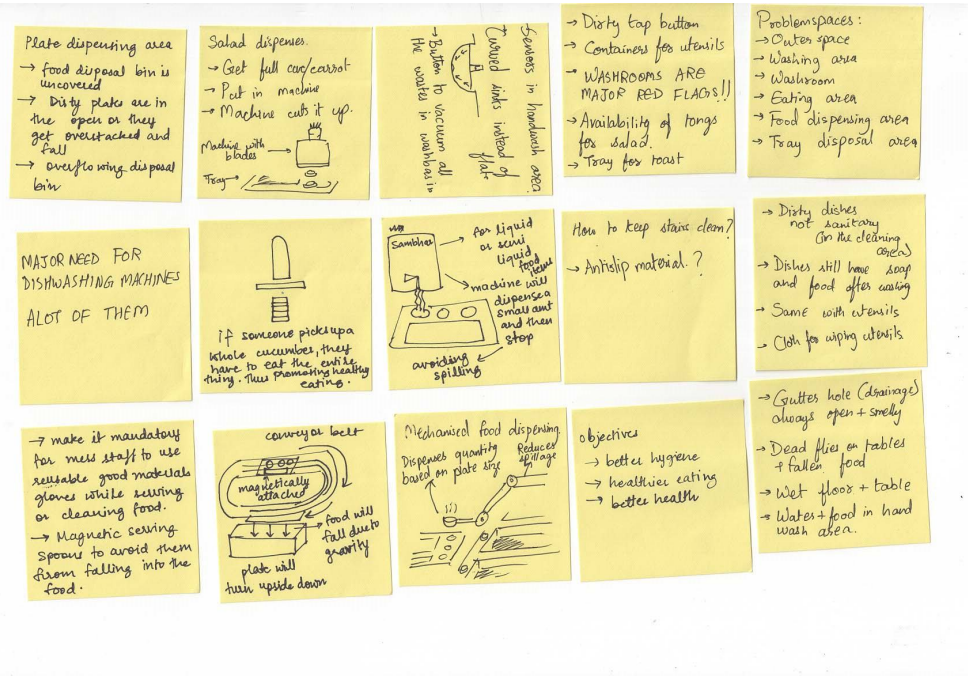
Visual indicators

Time moderation and speech synthesis status.

Analysis

Sampling of data

- Ideas generated from each group are evaluated from the sticky notes.
- Evaluation metrics are - Novelty, quality, quantity and variety of ideas.
- Comparison of results are done across a control group without using the intervention.



Setup

- Ideas generated from each group are evaluated from the sticky notes.
- Evaluation metrics are - Novelty, quality, quantity and variety of ideas.
- Comparison of results are done across a control group without using the intervention.

END

Ethyro

UX Design • Digital Healthcare • Technology

Timeline
May - June 2023

Full Project
Behance

Summary

Ethyro is an ecosystem of interconnected digital devices - a Digital Pill bottle, a Smartwatch and an Interactive Holographic display which aims to help Thyroiditis patients to better manage their medication adherence and motivate in their medication journey.

☆ Motivation

Design ideation and creativity is becoming highly relevant across wide range of fields including engineering, entrepreneurship, design research etc. Ideation has the power to engage humans and trigger wide spectrum of thoughts and creativity. LLM's lack of context and mismatch of the response expected by the users due to difficulty in articulating are some of the challenges that must be addressed. The motivation behind this study was to explore ways in which a structured ideation method can be integrated by making use of LLMs as content generator and natural language interactions.

Background

The product

Ethyro is an ecosystem of interconnected digital devices - a Digital Pill bottle, a Smartwatch and an Interactive Holographic display which aims to help Thyroiditis patients to better manage their medication adherence and motivate in their medication journey.

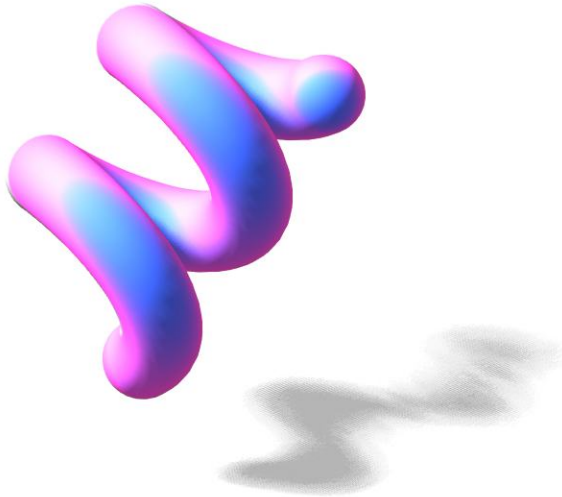
Medication adherence can affect quality and length of life, health outcomes, and overall healthcare costs. Nonadherence can account for up to

50%
Treatment failures

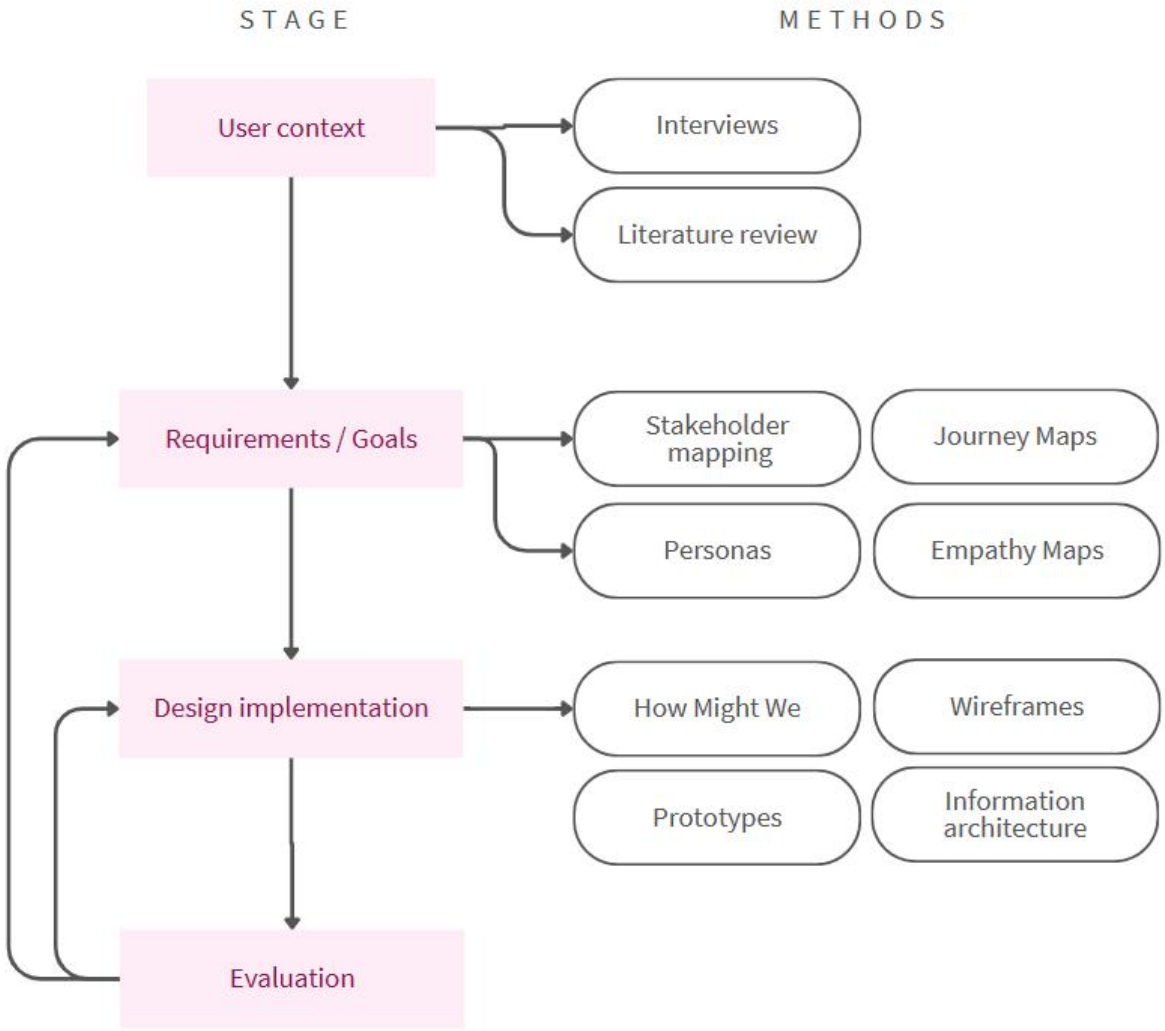
125,000
Deaths

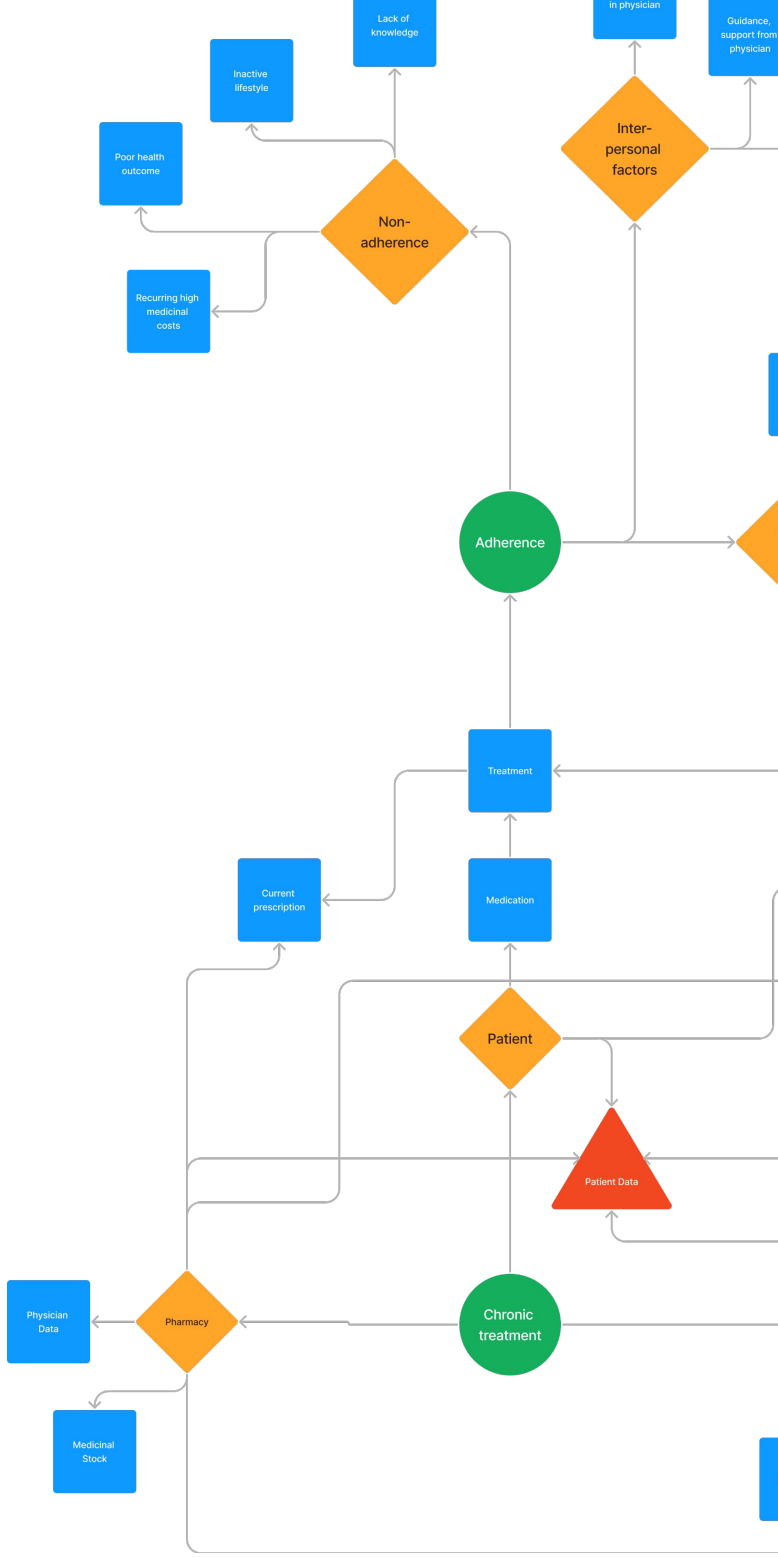
25%
Hospitalizations each year

Data recorded for USA population



Methodology





User Journey

Capturing the varied emotions and challenges the user faces. With Journey maps, different phases of treatment scenario was picturized. This helped to gather some opportunities for their respective pain points.

Journey Map

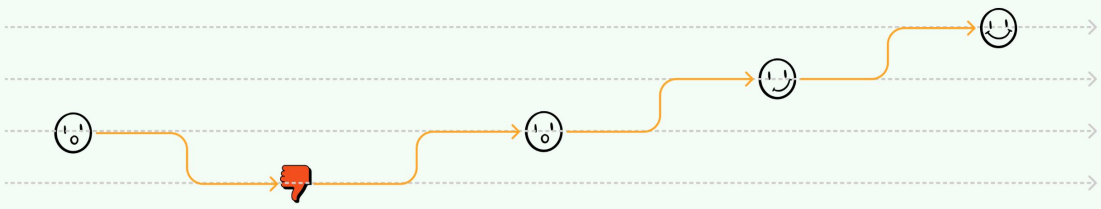
The User Journey of...

Ankita

Scenario: Ankita has been experiencing changes in general health and mental fatigue since past few weeks after stopping the medication as it was in range. She decides to again visit the physician to consult and know how her treatment needs to be adjusted.

Expectations

- Get information of new adjusted dosage.
- Know well in advance of possible spike in TSH levels due to ongoing symptoms.
- Need of psychological support and motivation.

Journey steps	Trigger	Effects	Consultation	Treatment	Relief
User actions What actions are they currently taking? How are they doing it? What information are they seeking?	Unaware, often neglects such symptoms	Searches on web,starts realizing relevance to thyroid.	Goes to physician for check-up and remedy of current health issues.	Starts the medication as per prescription.	Starts general activities with reduced health issues.
User goals What is the user trying to accomplish? What is the problem to be solved?	Need early awareness/ information of possible reasons.	Prevent frequent spikes of thyroid levels, keep it in range.	Get back to normal health quickly without a drastic change in daily routine.	To follow the new regime and adhere to it.	Be engaged in the process, live without restrictions.
Quotes and sentiment How do they feel in this moment?					
Opportunity What are some things that could improve this moment? Could this be skipped or solved elsewhere?	Predictions based on historical data for possible trigger of symptoms.	Provide enough information and guidance, support and importance of adherence.	Develop concordance with physician for smooth treatment regime.	Make it interactive, digital intervention for better engagement.	Realtime metrics of health parameters, Goal setting till next due test.
Pain points	Inability to understand, comprehend change in health/ behaviour.	Physical pain, psychological side effects	Visiting the physician, lab tests, medical expenses	Adjusting to new treatment, dosage patterns.	Medication adherence, Lack of motivation, Legibility of treatment.

How Might We

Reframing user insights into opportunities and ideating possible interventions for the problems come across during the user research phase.

HMW	Ideas			
Motivate the patients, elevate the mood.	Provide a reward based on completing a milestone	Include a family/ friend/ physician in journey.	Personalize the journey of medication.	Self reporting of medication.
Make the patient realize importance of continuous medication.	Subtle hints on alternate benefits if medication followed.	Provide sufficient knowledge of treatment, information guides	Multicomponent interventions, placing cues in the environment to trigger medication-taking behavior	Sound cues, triggers for medication reminders, alarms.
Provide patients continuous feedback of treatment progress?	Prediction of possible TSH range over next few days.	Progress line for the next follow up.	Validation and positive feedback.	
Empower the patient, take control of treatment.	Shared decision making of diet plans,	Virtual companion , take care of it.		

Design

Wireframeing for smartwatch and phone application. Interactive prototypes of Holographic Display.

For SmartWatch

Smartwatches come in different shapes and sizes. For the scope of this project, a circular dial smartwatch, WearOS was studied.

Components

Apps

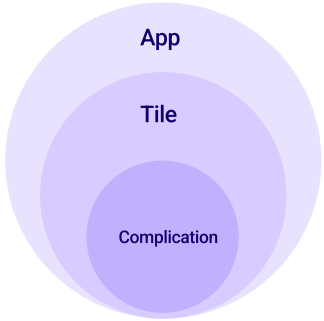
- An app is one of the primary surfaces.
- Provide complete experience of the intended task, takes full advantage of hardware.
- Acts as a control panel for all settings and preferences of the application.

Tiles

- Most accessible surface. Immediate critical content.
- Focus on single tasks.
- Latest data accessible.
- Error handling status, ongoing activity.

Complications

- Highly glanceable information.
- Small components to complete frequent tasks.
- Can have self-contained action. e.g: increment count or open/access application.



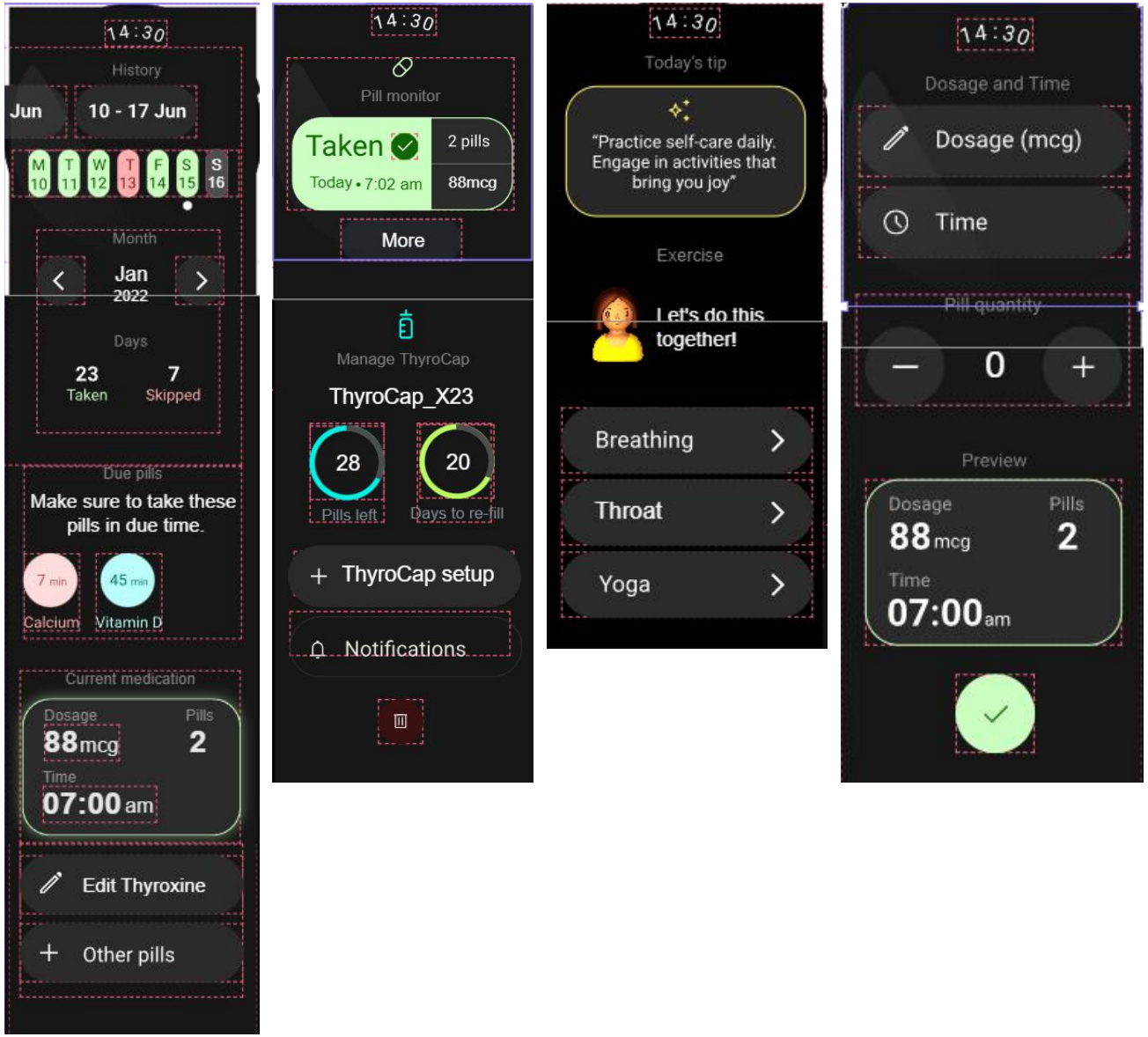
Screens

High-fidelity wireframes for the smartwatch and smartphone application.

Prototype Link : https://cloud.protopie.io/p/9453adea356d224f6b509031

Prototyope

Functional prototypes for effective and realistic usability testing.



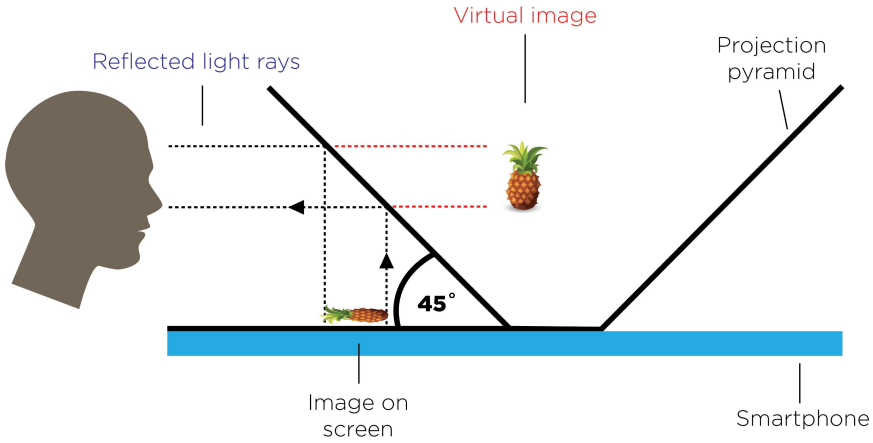
Motive

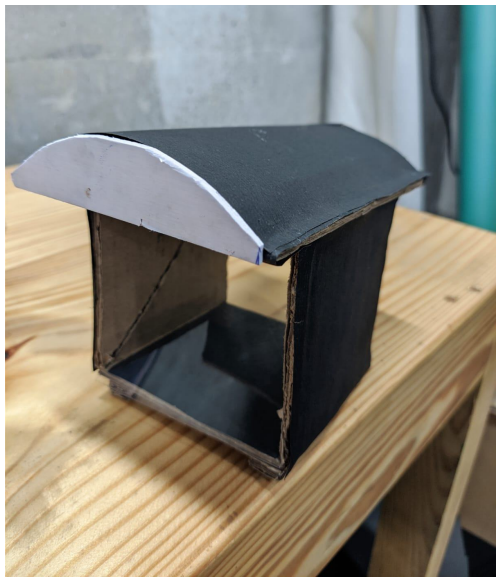
The motive of prototype is to create an experience of a smartwatch app with an assistant. The application guides the patients with their medication routine. The companion/assistant as a buddy in their journey.

Prototyope

Holographic assistant plays a curcial role in this workflow to guide the patients, which also acts as a companion.

Holography visuals





Working holographic prototype

Evaluation

Feedback on the experience and testing usability of the solution. Conducted Usability Testing to collect Qualitative data helpful for iterative improvements.

User tasks - Pill usage

Analyzing the user actions for scope of improvements, how accessible the features are to the user.

ThyroCap

- **Scenario:** The ThyroCap pill bottle can keep a track of your pills. To ensure you are not left with empty bottle, you need to track the pills left periodically.
- **Task:** From the main app screen, how would to navigate to the section where you can view the number of pills left in the bottle.

- **Scenario:** You need to know the medication history to share it with your physician for proper diagnosis and future dose prescriptions.
- **Task:** How would you navigate to the pill tracking section and view the pill intake history over a period of weeks or months.

- **Scenario:** The doctor has changed the current pill prescription due to recent increase in TSH level. You need to setup the new dosage and schedule in the smartwatch.
- **Task:** How would you navigate to the required page to edit the dosage, timings and save the new prescription.

User tasks - Wellbeing

Companion

- **Scenario:** You may frequently want to know the current progress, dashboard of daily medication and follow up information. This information can be experienced on the Holography display.
- **Task:** In the smartwatch, how would you navigate to find and start the dashboard visualization feature.

- **Scenario:** After a busy working day, you see that your average heart rate was high. To relax, you need to have a calming session with your companion which is interactive in the Holographic display.
- **Task:** From the main app screen, how would you navigate yourself on the watch to find and start a slow breathing exercise with the companion.

Analysis

Insights based on the Qualitative study of usability testing.

Navigation

- A small change was required in the Information architecture, as users were confused with the new terminologies and where to find the ‘Edit Dosage’ feature.
- The interface of watch being simple, most of the tasks were completed easily.

Multi-modality

- Visualization on the Holographic display was engaging for the users.
- Were able to practice and follow the ‘Breathing’ exercise with the companion.
- Users were able to switch their interaction mode between Holographic display and smartwatch efficiently.

Overall Usability based on Demo

Out of 16 participants in a online demo

80%

Worth installing

Fluid Minds: Ferrofluids as an engagement tool

User research • Ethnography • Tangible

Timeline
Aug - Dec 2024

Full Project

Summary

Physical medium-based visuals with audio may achieve safe and controlled distraction. Usage of relatively less explored material - Ferrofluid is studied in the making of a Fidget distraction tool capable of creating dynamic and attractive visuals to keep them engaged before the medical procedure starts.

☆ Motivation

Design ideation and creativity is becoming highly relevant across wide range of fields including engineering, entrepreneurship, design research etc. Ideation has the power to engage humans and trigger wide spectrum of thoughts and creativity. LLM's lack of context and mismatch of the response expected by the users due to difficulty in articulating are some of the challenges that must be addressed. The motivation behind this study was to explore ways in which a structured ideation method can be integrated by making use of LLMs as content generator and natural language interactions.

Methodology

Literature review → Engagement | Embodied interactions

Study of existing literature around these keywords was done to find existing facts.

User context → Contextual enquiry | User interviews

Information was collected through visual study and interrogation.

Material exploration → Raw materials | Composition experiments

Experiments done on material composition and interactivity with fluid carriers.

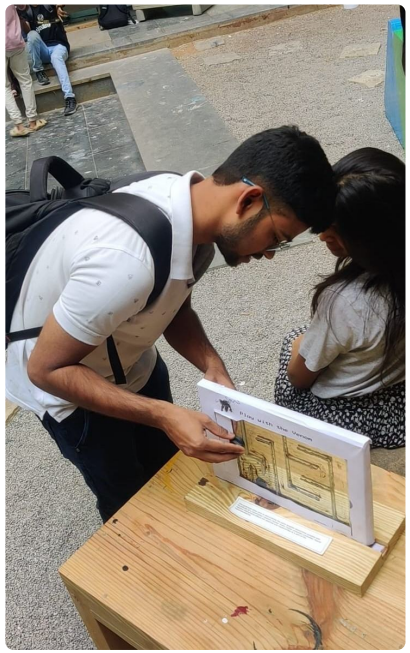
Prototype → Tangible tool | Ferrofluid interactivity

A digital tool was developed utilizing LLMs and natural language interactions.

Evaluation → Engagement levels

Analysis and evaluation of engagement metrics with the tool.

Prototype in action

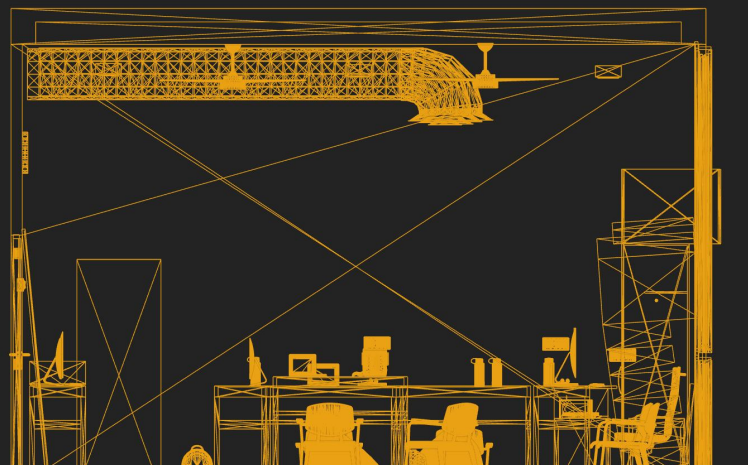


Digital Twins in Virtual Reality

Virtual reality • 3D modeling • Unreal

Timeline
Feb 2024

Full Project
Behance



Summary

Part of Digital Twins and Virtual reality course at IIT Hyderabad, a group project which aimed at re-creating a highly realistic virtual environment of a physical space.

Tools

- VR Integration
- Advanced Texturing,Lighting

- 3D Modelling
- Model Animations

- VR Prototyping
- Quest Link View

Process

Literature review

As a group, we read various research papers related to AR/VR technology and its applications

Space study

We observed the physical space of the classroom ,features of the room such as dimensions of tables, chair etc

Content creation

Building of 3D models, textures, interactions. Adding, creating high detailed textures and lighting.

Prototyping

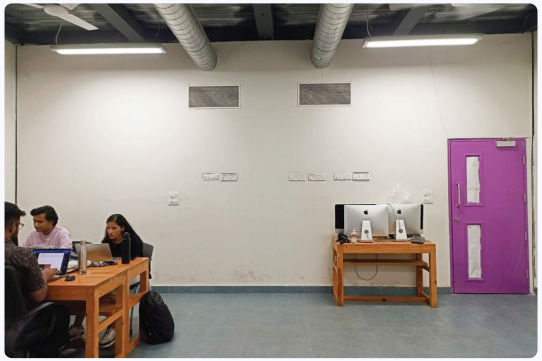
Integrating models into Unreal, adding interactions. Configuration of Oculus for viewing in VR space.

Testing

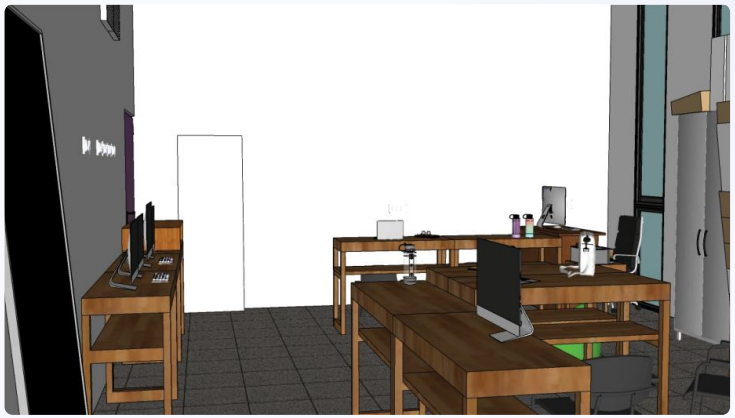
Using the prototype on Quest 2 for testing scale of models, lighting conditions etc., Iterative changes.

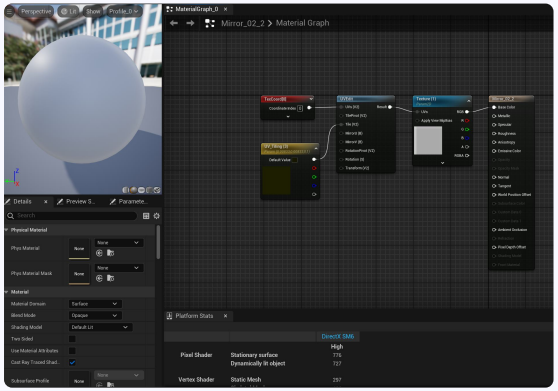
3D modelling & Unreal workflow

3D modelling was done on sketchup and texturing, UV scaling, VR integration, interactivity was programmed in Unreal.










Video Link

Ancient Egypt in Augmented Reality

Augmented reality • 3D modeling • WebXR

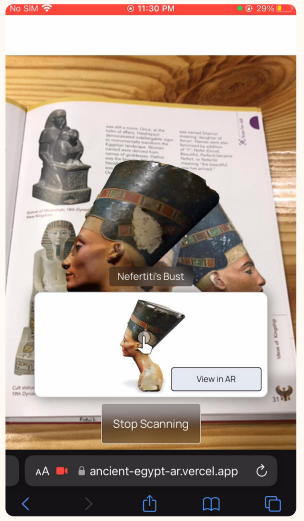
Full Project
Website

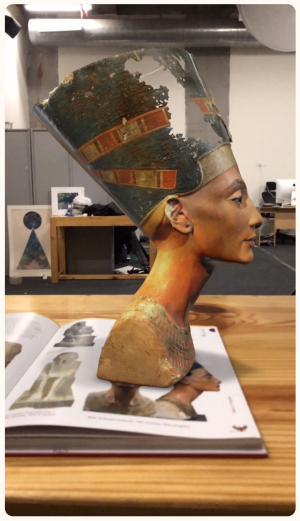
Summary

A creative and interactive book publication project executed along with professor as the author and students as contributors at IIT Hyderabad. Developed a webpage with core AR functionalities to view models in an immersive medium.

Flow

Readers scan the QRcode → Webpage opens on phone browser → Readers start scanning for AR enabled pages → View AR in physical space





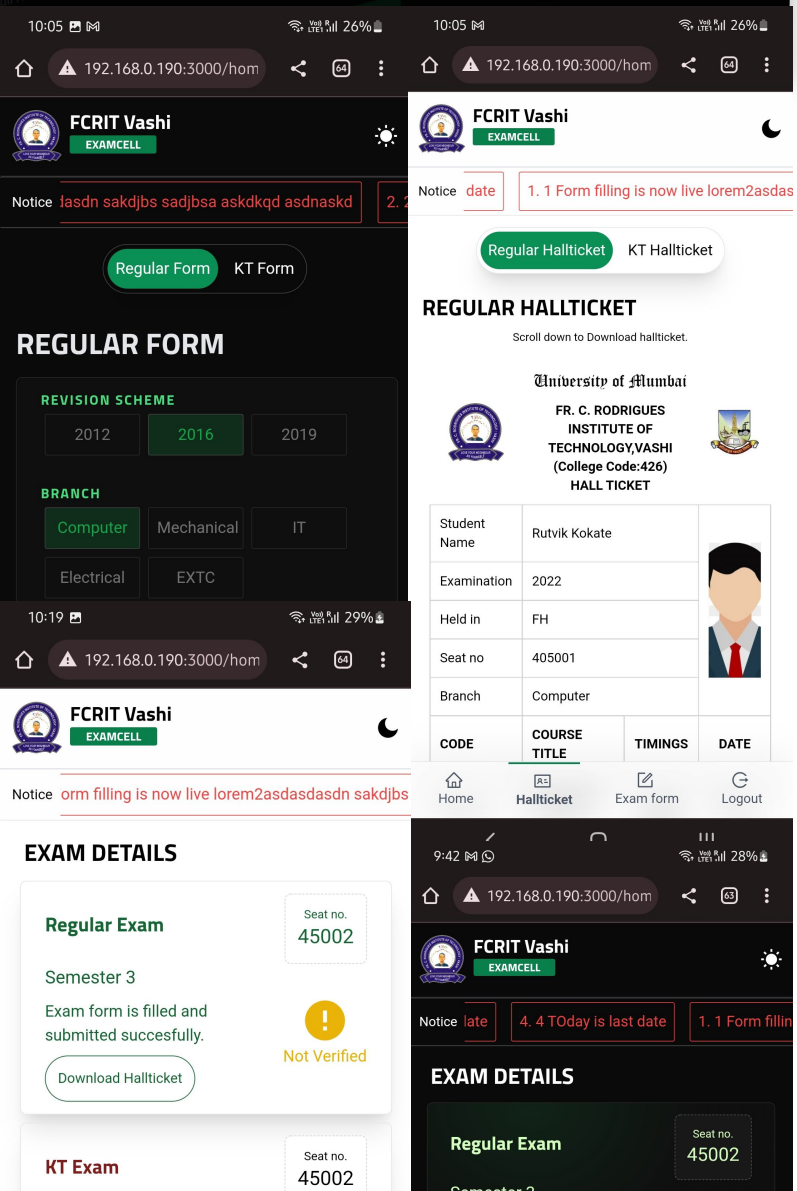
Video link Amazon

Examcell Portal

UX Design • Web Development • Education

Timeline

Jan 2020 - Jan 2023



Summary

The project aimed at developing a Digital solution for the Examcell department of FCRIT Engineering Collefge, Navi Mumbai to digitalize process of examination activities ranging from form filling to Halltickets to generation and management of student data. The portal helped students to easily fill exam forms and drastically improved working efficieny of Examcell Admin.

Problem Statement

Students and exam admin spend long time and efforts while form fillng process in college during the examination season. This activity takes places twice in a year. The admin experiences workload due to the offline activities.

This hinders efficient and fast working of the examcell department at the cost of college resources. As time , manual efforts , resources are the important areas to readdress , the new goal would be to provide a system which can make the process quick, require less human efforts along with high accuracy and make less use of tangible resources to avoid wastage.