Har Suyash Bahadur Sinha's portfolio

Section III - Portfolio

1. Pour: assistive device for blind users
2. Paper potli: craft+AR game for gender awareness
3. EDUS: Cognitive engagement in online classrooms
4. Other projects briefly:

    a. Work project at Postman: accessible error signifier

    b. Girl Up Seher volunteer work: graphic design for impact

    c. VAVE: virtual musical instrument with hand gestures

POUR

Assistive device for visually impaired users to pour safely

WHY? Pouring is a great independent skill

I wanted to experiment with tangible interactions to create a complete experience for visually impaired users to pour confidently.

Empathising with the users

Observing blind people pour liquids and conducting a blindfold simulation

I **observed several people on YouTube** channels who post about living life as a blind person and noticed common issues.

I also **visited National Association for Blind (NAB)**, Worli, Mumbai to interact with visually impaired people. I had a conversation with a lady working in their canteen and another man at the training centre.

Additionally, I **performed a blindfold simulation on myself** for different scenarios and with different utensils to get a first hand experience.

Locating

"Is the jug perfectly over the glass?"

Aligning

"Oops! I just spilled over the edge."

Pouring

"How much is it filled and how much to tilt the jug?

Stopping

Analysing problems

Existing solution: electronic level indicator

Existing devices provide audio feedback when the cup is full. However, they **don't ensure safety or accessibility** as-

- Aligning the vessels is challenging and leads to spilling
- Lack of continuous feedback slows users down

Inspiration

"For assistive devices, one needs to consider the **abilities** along with the **disabilities** of the user."

- Wu, MA and Chang (2006)

"Recognise more than just the **barriers**. Understand **motivations** that we all have in common."

- Microsoft's Inclusive Design

SWOT analysis to design for accessibility

Simulation can help us experience the problem first hand but it only focuses on the disabilities or what the user lacks.

SWOT (strength, weakness, opportunity, threat) analysis is one way to understand the user more holistically.

Strengths

S1 Muscle memory and coordination

S2 Perform tasks step by step

S3 Good tactile sense

S4 Easy to pour with small openings

Weaknesses

W1 Difficulty in aligning objects

W2 Can't touch hot objects

W3 Lack of continuous feedbacks

W4 Handling many discrete objects

Threats

T1 Hot liquids can cause burns

T2 Burnt by touching a hot vessel

T3 Steam rising from vessel

T4 Dropping and breaking

Opportunities

O1 Device to funnel, filter & measure

O2 Measure first and then pour

O3 Separate dispensing system

O4 Electronic device, audio feedback

Explorations

Using points from SWOT to ideate

After SWOT analysis, Weihrich (1982) proposed a strategy called the ‘‘TOWS’’. TOWS maximises the Strengths and Opportunities, while minimising the Weaknesses and Threats.

The corresponding labels with the sketches **(S_1O_2, W_1O_2, etc.)** indicate the n^{th} SWOT point.

Alignment of cup and bottle

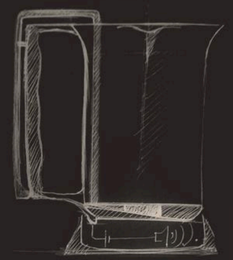
W_1O_2

Difficulty of directly handling heavy vessel

W_2O_2

Special bottle with dispensing compartment

W_2O_3



Special measuring cup with floater

S_3O_2

Floating mech. for cont. feedback

S_3O_4

S_3O_2

Electronic sound

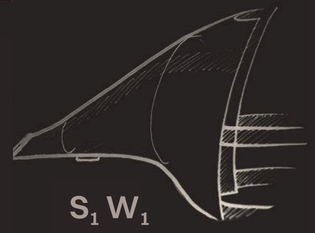
Pre-measure in a funnel

S_4O_1

Opening to dispense

Measure first then pour

S_2O_2



S_1W_1

Attached to a container with large openings

Experimenting with floater mechanism that rises with the liquid, giving cont. feedback

Conceptualising

Criteria for choosing concepts

Safety

1. No spilling over the edge while pouring
2. Avoid touching hot vessel

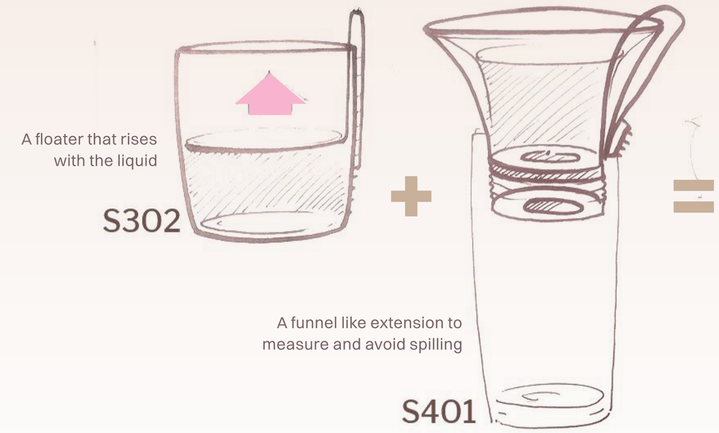
Functionality

1. Pour measured/ desired amount of liquid

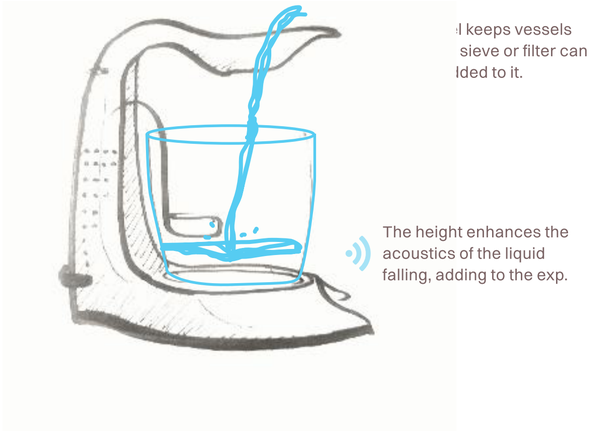
Usability

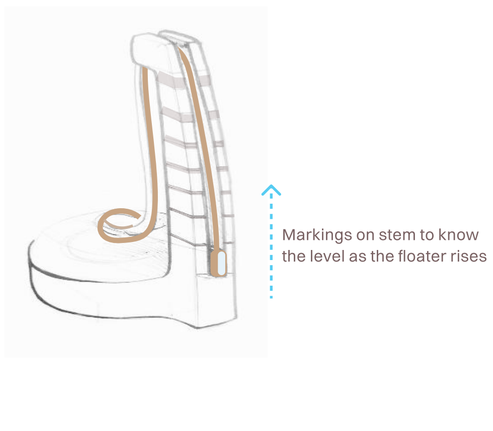
1. Ease of measuring
2. Ease of pouring/ controlling the flow

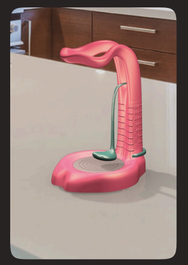
Chosen concepts -



Final design-







Form and aesthetics

To avoid a taboo of using assistive devices, the person should look stylish using it and it should be **an appealing experience for the observer.**

Testing in context

Results

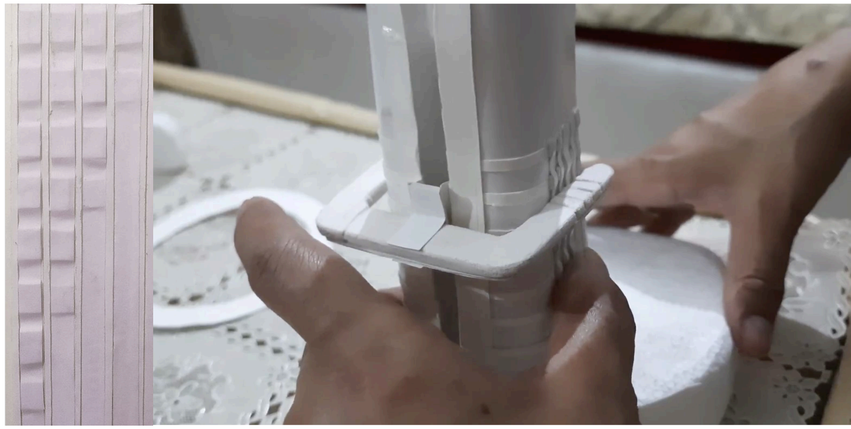
- Safe from any contact with hot liquid
- Successfully filled 1/4, 1/2 and full cup

Time motion analysis was used to check how fast and confident the user was while pouring.

	Locating	Aligning	Pouring	Total
Control (without the product)	5 sec	2 sec	28 sec	35 sec
With the designed product	1 sec	4 sec	20 sec	25 sec

The glass is half full

- a blind optimist



Paper Potli

Strong

Meticulous

Tactful

Group of 2 (contribution: designing paper doll, gender research)

Craft + AR game to dilute gender stereotypes among children

WHY? There still are misconceptions and stereotypes about gender

What starts as an ignorant cultural bias often leads to a toxic and non-inclusive environment for people of various genders.

Insights
from primary research

Gendered parenting

Only girls are expected to do house chores

Boys are told to be strong and not cry

Confusion and taboo

Gender is still perceived as binary

LGBTQIA+ considered western concepts

Harms of stereotyping

Boys get bullied for expressing femininity

Discrimination at work based on gender bias

“Only my wife looks after kids as I have to earn money”

-Male taxi driver

“We don’t like dancing as it is girly. We like to watch them dance”

-Government school boy

“We are a traditional family and don’t like discussing gender”

-Mother of a high school girl

“We hear about LGBTQ on social media but all this will spoil our kids”

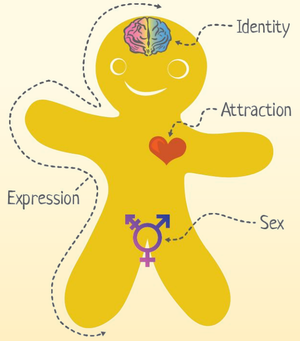
-Mother of a high school girl

Gender?

Inspiration
from secondary research

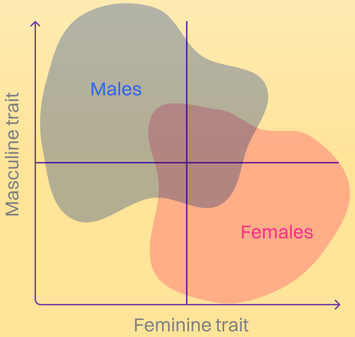
Sam Killermann’s Genderbread Person illustrates different dimensions of gender and separates them from biological sex.

Sam Killermann
(Artist, author)



Sandra Bem’s Sex Role Inventory statistically shows how we can be both masculine and feminine and how it is healthier.

Sandra Bem
(Psychologist)

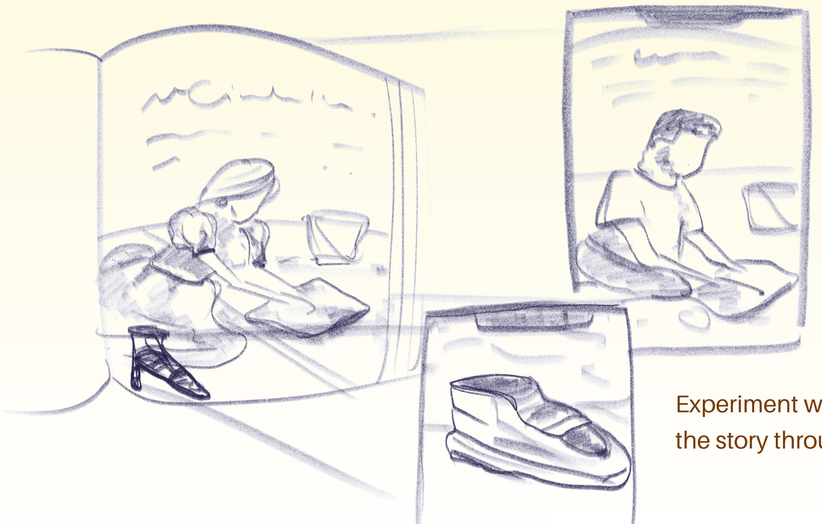


A social construct

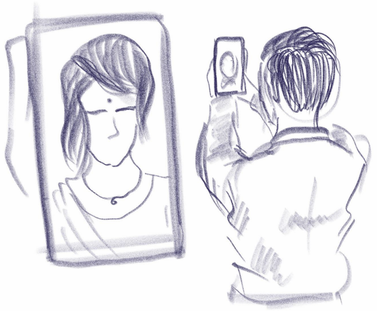
Explorations

Idea #1 AR stories

A lot of stereotypes are reinforced through traditional stories.
AR can add another dimension on top to explore.



Experiment with gender in the story through an AR app



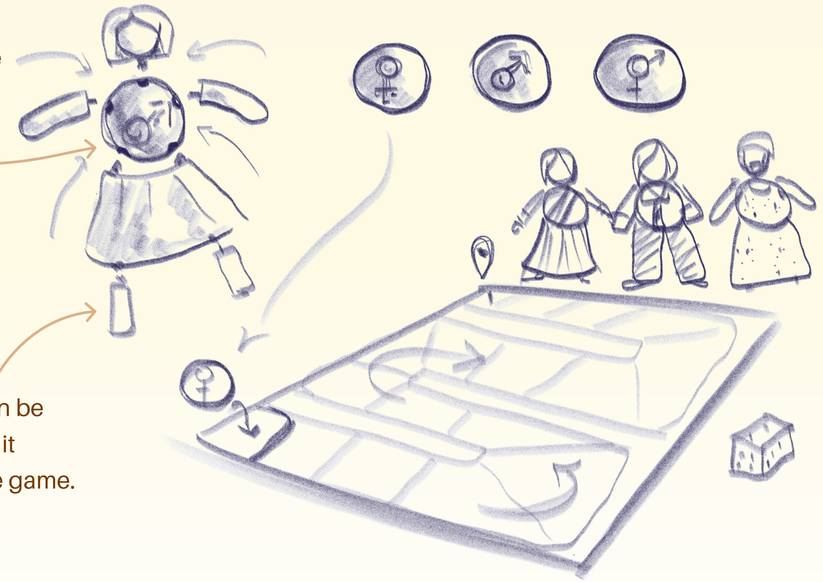
Idea #2 AR Avatar

AR filters to help people explore and express different expressions of gender

Idea #3 Board game " journey of gender"

Game starts with a core assigned with a biological sex

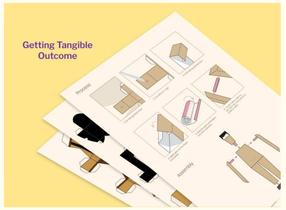
Gender expressions can be attached to the core as it progresses through the game.

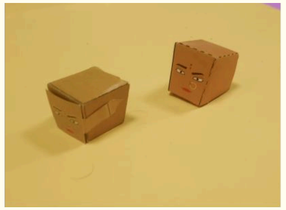


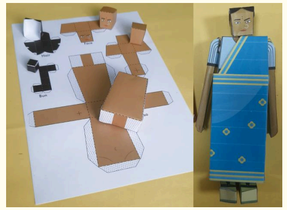
Learnings

- **AR as a medium** can add more dimensions to tangible objects.
- **Role playing** through stories and dolls can help engage children.

- People perceived **androgyny as absurd.** Characters should feel real.
- Talk on Sex and gender **can be stigmatised.** Build on people's biases.







1. Express through avatars:

Children can design them on the app, print templates and craft 3D dolls. Dolls are popular children toys to role-play and this makes children learn to make things.

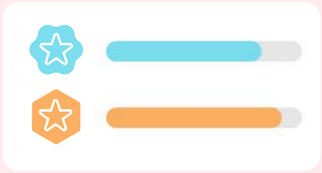
2. Explore through AR role-play:

The paper doll comes alive in an AR app and can perform tasks. Children pick up stereotypes from their environment eg. observing their mother in the kitchen. The AR world aims to create extension of the real world.

Paper Potli
(Final concept)

3. Explain through gender traits:

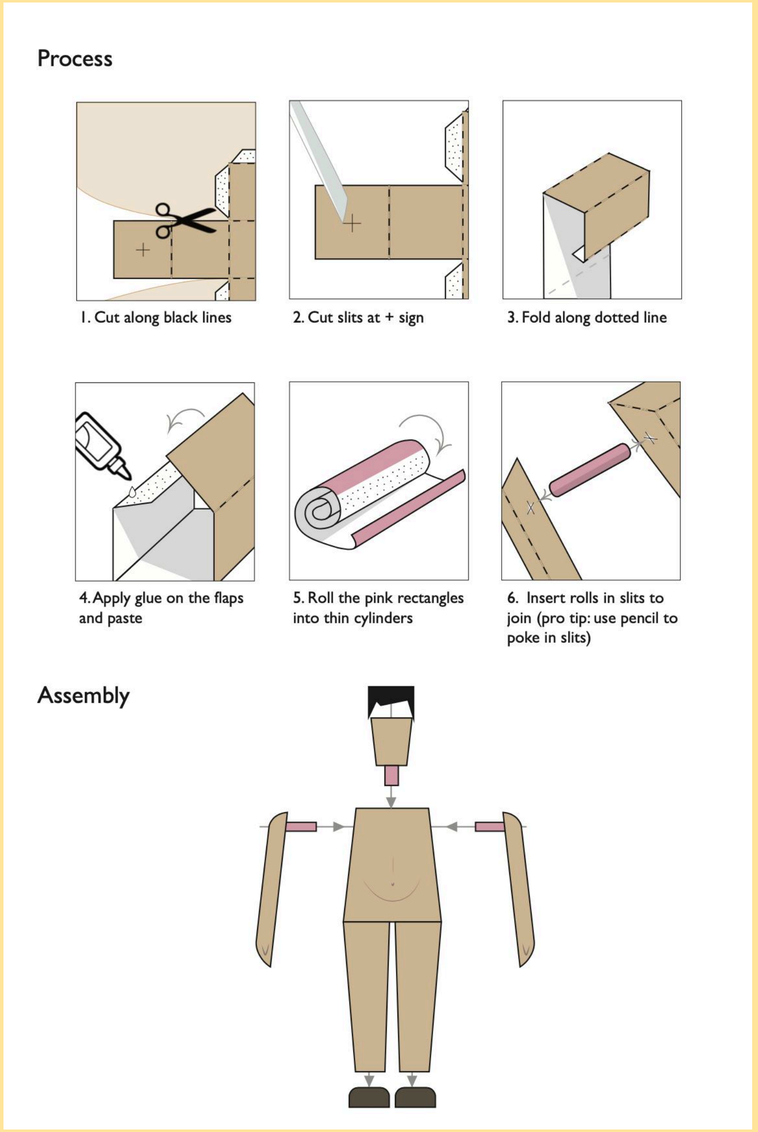
For each role done in AR, We allot a balance of masculine and feminine traits. It demonstrates how something like cooking that is considered a woman's role, has aspects like working with dangerous tools and self-reliance that are typically considered masculine.

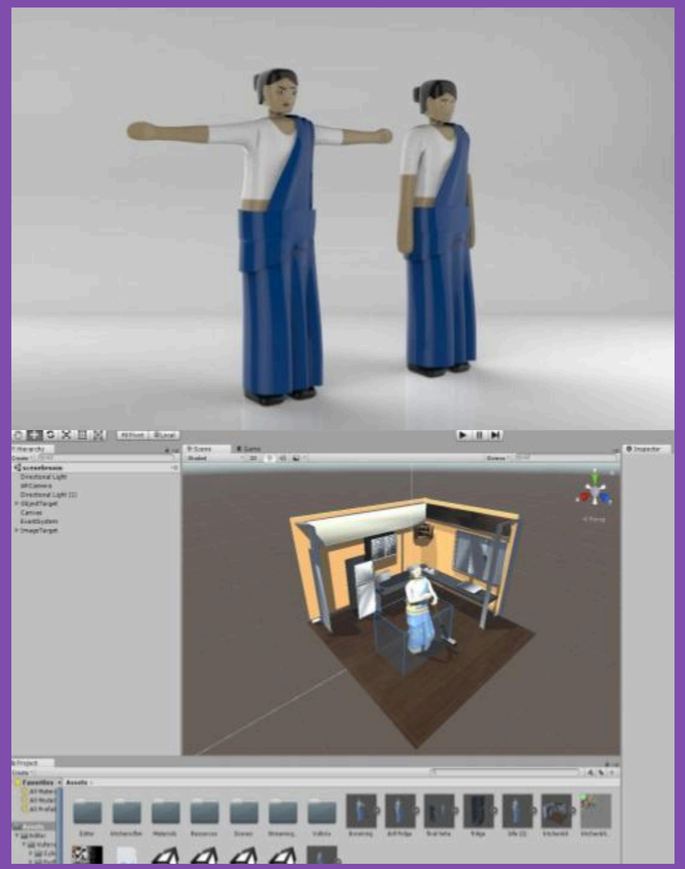


Self-reliant Strong Meticulous Tactful

Gender traits taken from the Bem sex role inventory without explicitly labelling as masculine or feminine.

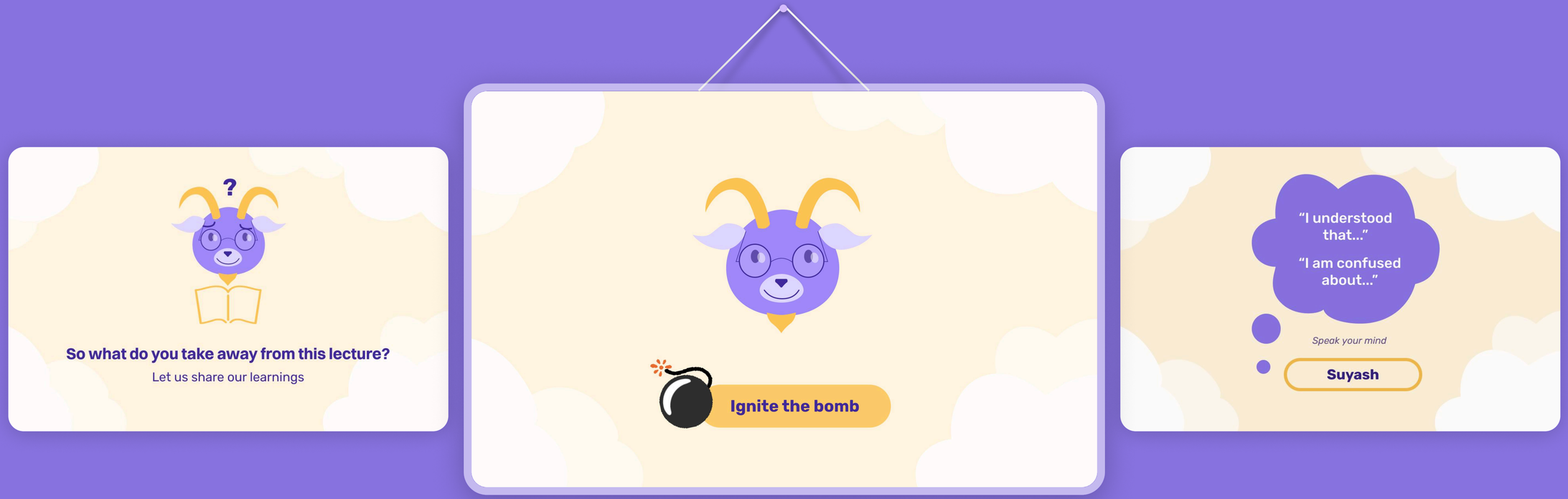
Designed instructions and template for crafting paper dolls





Designed the 3D AR world to be mapped with doll using Unity

Contribution



EDUS

Design driven research · Learning experience design

Cognitive engagement in classroom interactions

WHY? There is scope for more interactive learning in India.

Performance anxiety, hesitation, lack of articulation are some barriers for students to actively engage and learn. These issues are hardly addressed by many interactive teaching tools.

Understanding the problem

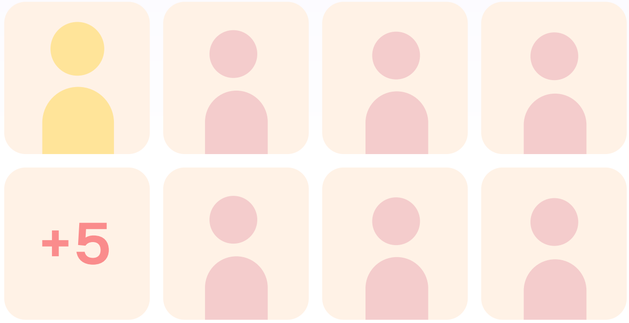
Online education beyond pandemic

- Education faces serious challenges during COVID19
- The shift to online education is sudden for many schools.
- The platform has shifted but we are practicing the old models of teaching involving lecturing that has led to students being less attentive

Traditional classroom landscape

The Shift in Pedagogy - Sage on Stage vs Guide by the Side

- Traditional way of teaching involves lecturing
- A teacher has more control over the class
- The landscape and the dynamics are different online



Online classroom

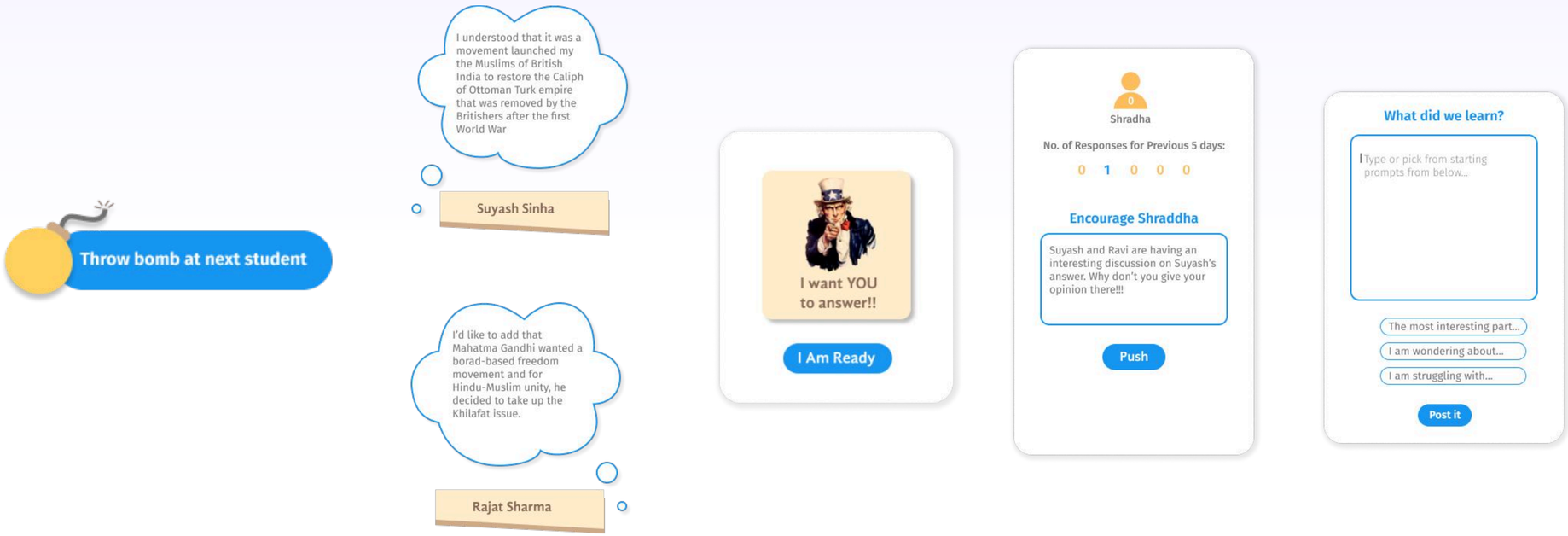
Going to the root of lack of motivation

Factor 1- Fear of Judgement/ being right or wrong

- Judgement of individuals not ideas
- Stage fright/ too much attention
- Too much emphasis on performance

Possible solutions for factor 1

- Creating a perception cloud to show variations
- Shared participation/ supporting students if they are stuck
- Take away point in the end to show there is something to learn



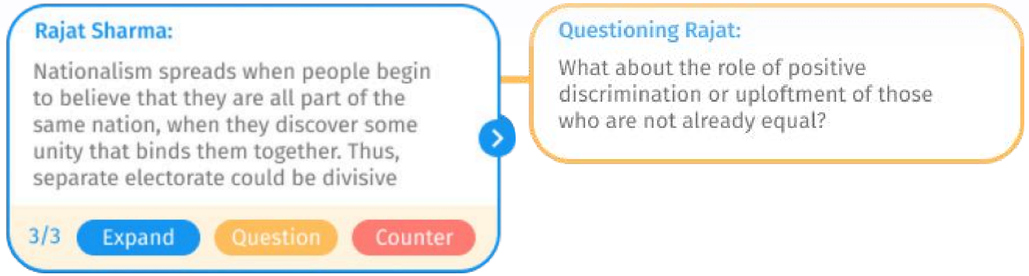
Going to the root of lack of motivation

Factor 2- At loss of what to say/ ask

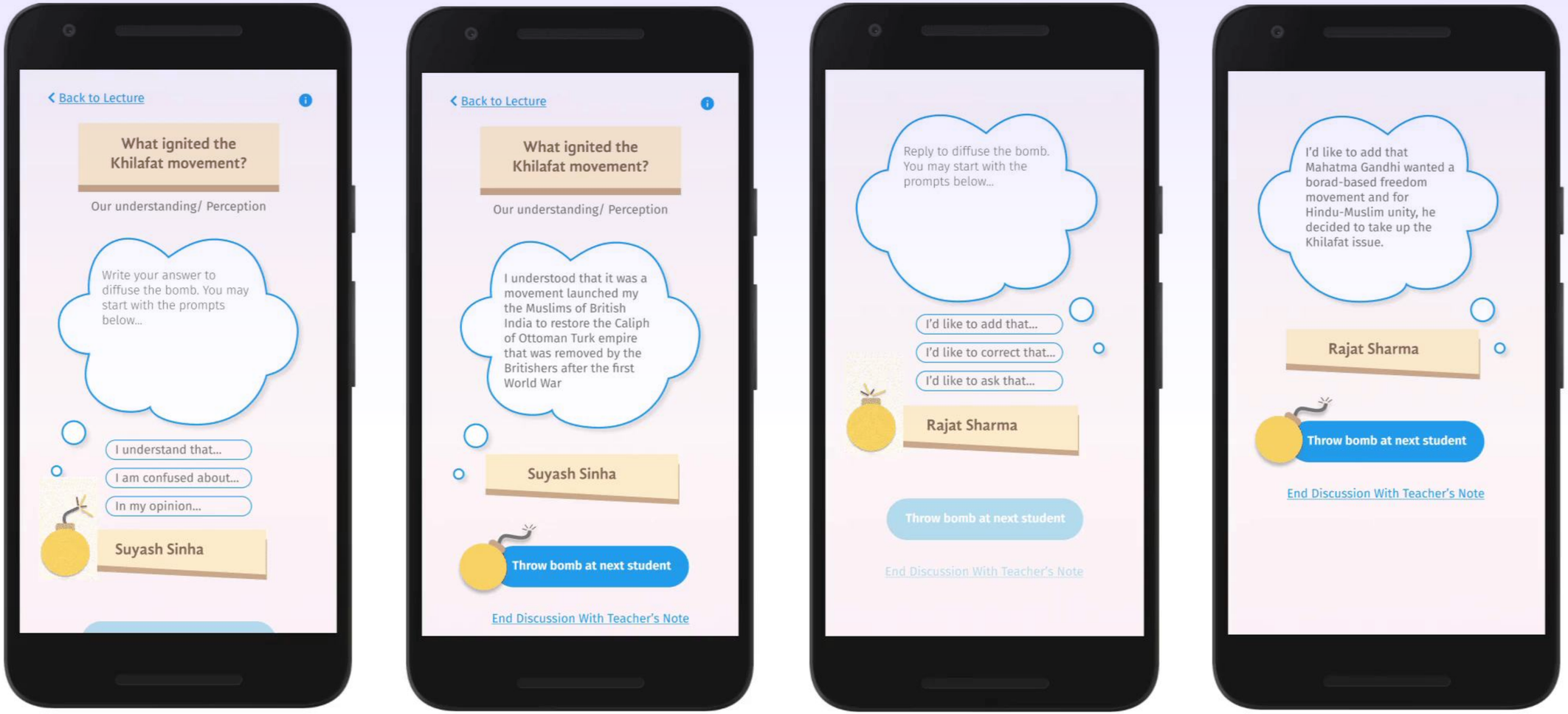
- Too open ended questions/ it's outside the text
- Not listening carefully or not questioning what they are told

Possible solutions for factor 1

- Giving existing prompts to facilitate thinking
- Distributing Question Cookies at the start to find answers
- Stream of thought- adding on to the previous person



Flow of discussion



Simplified user journey to test in online classes

Goals to evaluate for psychological engagement:

1. Effect of external locus of control to increase relatedness with the teacher
2. Effect of small of positive stressors to improve focus and attention
3. Effect of prompts and sentence starters to help students think
4. Effect of encouraging teachers to help students
5. Ease of use for teachers for on the spot formative assessment through cold-calling

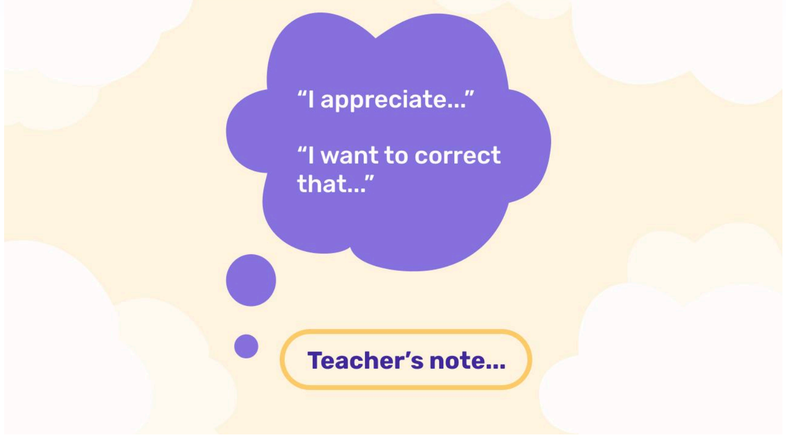
External locus of control to ask questions and nominate people

Teacher can put questions in this template and place them in slides

Random nomination of people with a bomb to build some tension

Cheering and celebration for positive emotional response

Giving prompts and an option to seek support from teacher



Appreciation and feedback from teacher rather than feeling judged

Tested the solution in an online class, took feedback from students through questionnaire and self reported likert rating

4. Method

4.1 Research framework

An exploratory mixed method study [19] was used in the current study with more emphasis on qualitative methods. The quantitative portion includes data from 10 self-reported questionnaires taken from the Intrinsic Motivation Inventory (IMI) [20]. IMI contains statements to determine enjoyment, perceived competence, pressure/ tension, perceived choice (autonomy), relatedness. These can be rated on a 7 point likert scale (from 1 “not true at all” to 7 “very true”). IMI was chosen as the components evaluated in IMI align with our goal to increase psychological and emotional engagement. The qualitative part consists of insights from interviews with the participants to know more about their experience and also investigate their response in IMI indepth. To make sure that any positive result was because of the design intervention itself, two scenarios were tested with the same group- one without any design intervention (regular class) and one with the design intervention implemented.

4.2 Participants

The study was conducted in an online class of sixteen 7th grade students at Amity International School, Lucknow. History class was chosen due its descriptive nature that allows more open discussion along with testing memory retention of facts leading to more cold-calling from time to time. Seven of the sixteen participants were male and nine were female. The participants were selected through convenience sampling, which is that the researcher selects participants based on their accessibility and proximity. Prior permission was taken by the Principal, the teacher and parents through an online consent form. They were informed about the procedure and that this is a non-compensatory volunteer expt with low to no risk. Further, assent of the students was taken.

4.3 Procedure

Firstly, students’ pre-test response was taken to the IMI after a conventional class (NO design intervention) involving cold-calling. Next, a post-test response of the same group was taken after a 1 class using Edus. The mean score of the same group was compared in both the scenarios (without intervention and with intervention) to check for any increase. Lastly, brief semi-structured interviews were conducted with the students to further examine their experience and assess their subjective emotional response.

4.4 Data analysis

Self-reported scores from the IMI questionnaire are summarised using descriptive statistics, showing the central tendency (mean) and spread (standard deviation) in students’ response. As the low sample size (n=16) limits the generalizability of the result, we mostly rely on descriptive statistics and qualitative assessment. However, a paired t-test was done at the end to check for any statistical significance even in the small sample. The data from the interview was analysed to identify recurring themes, gain insights and support the self-reported quantitative data.

5. Results

There was a slight increase in the self reported psychological engagement from the scenario 1- conventional class ($M = 5.58$, $SD = 0.81$) to the scenario 2 with the design intervention ($M = 6.04$, $SD = 0.55$). Mostly students (n=15) reported having fun with the interactions with Edus. Many students (n=12) reported they wished that their name showed up on the screen more often.

Postman UX

Accessible error signifier

UI/UX design • Convincing team for accessible designs through systematic explorations

https://www.postman-echo.com/get?foo1={{variable}}&foot2={{my_variable}}

Original inaccessible designs for {{variables}}

https://www.postman-echo.com/get?foo1={{variable}}&foot2={{my_variable}}

https://www.postman-echo.com/get?foo1={{variable}}&foot2={{my_variable}}

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https://www.postman-echo.com/get?foo1={{variable}}&foot2={{my_variable}}

Explorations

Design element	Resolved	Unresolved
Box	Element property used- Solid fill {{variable}}	property used- doted stroke {{variable}} {{variable}} Adding error icon for more emphasis
Highlight	property used- no highlight {{variable}}	property used- use highlight {{variable}} Other option was to use underline but not used to avoid conflict with spell checks in browser or OS. {{variable}} {{variable}}
Value	bold content primary **{{variable}}**	regular content tertiary {{variable}}

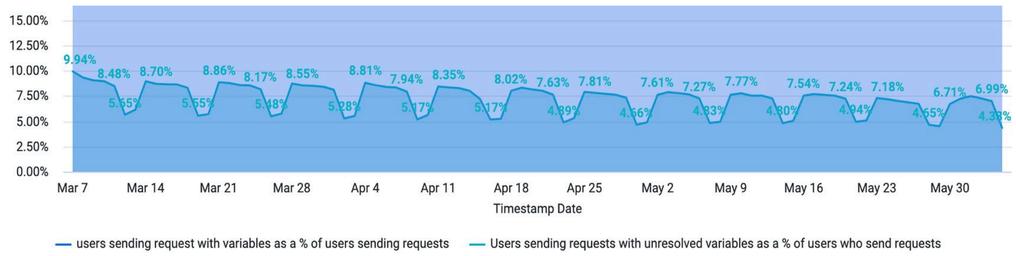
Articulating exploration in systematic way to communicate with the team

Ground rules-

- Don't rely only on colour for the binary info eg. red-green.
- Use colour for only attention, making something stand out.
- Unresolved should communicate some negative/warning feedback but not harsh error. (tbt)
- Resolved should communicate some positive feedback but shouldn't be very loud all the time.
- Both should feel like from same family and a unit separate from URL with affordance of hover.

{{baseUrl}} {{baseUrl}}

intervention: Adding a subtle background to highlight error

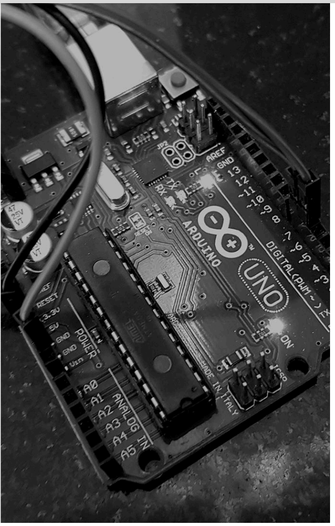


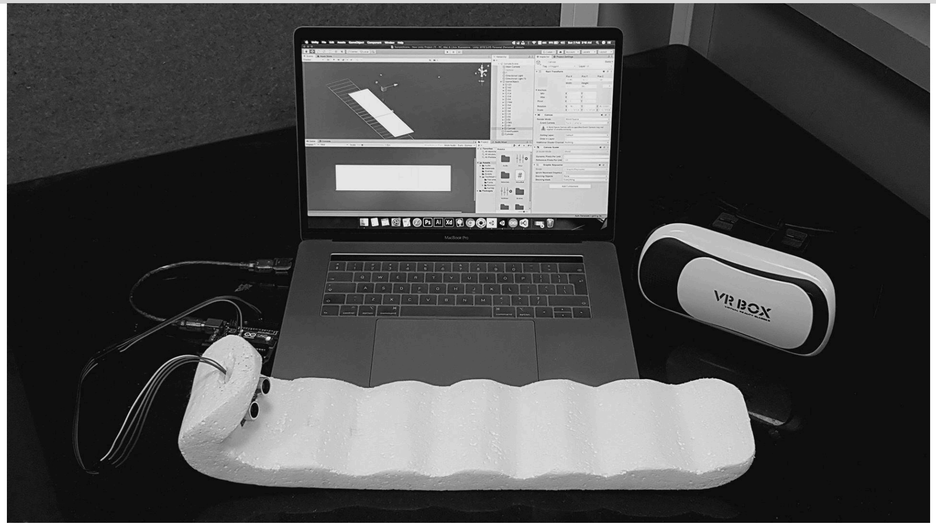
impact: Users facing the variable error reduced from ~10% to ~6%

One of my projects at Postman was a small change big impact story. We had to redesign the way variables were represented when they had an error. While **advocating for colourblind accessibility which was often neglected**, I went through systematic explorations and user testing to get the team's confidence. It was evident how **accessibility makes product easier to use for all (as shown in data).**

VAVE Gesture based musical instrument

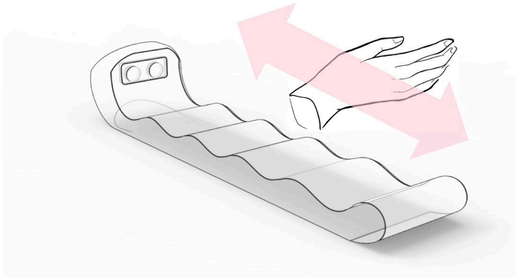
Jan 2020 (3 weeks) • Group of 2 (my contribution: prototyping with sensors and Arduino + physical prototype)



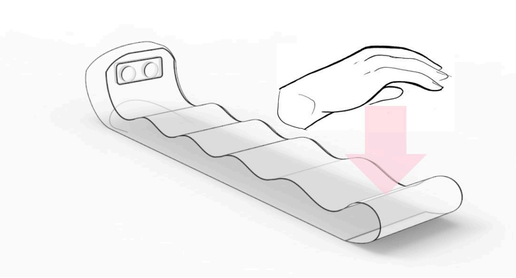


VAVE is a handy instrument played by waving and making other hand gestures over it. The physical instrument was to have a tangible mode of interaction while the music was played electronically by detecting the position of hand through an ultrasonic sensor and mapping it to musical notes using Arduino, processing and Audio Helm extension in Unity.

PLAYING THE NOTES

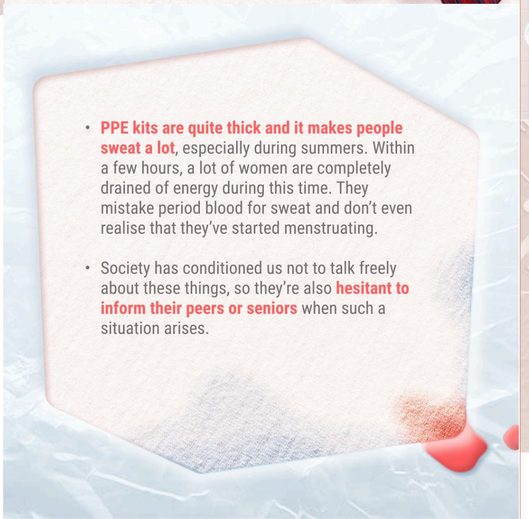


VOLUME FADE



Graphic Design at Girl Up Seher

Graphic design • Design for social media campaigns • Volunteering with Girl Up Seher



Instagram page

While working with Girl up Seher, an organisation dedicated towards gender equality, I got the opportunity to design social media posts for several campaigns such as on menstrual hygiene.

I used imagery with **real-life textures, photo manipulation and illustrations to provoke emotions while maintaining an aesthetic appeal.**