

# AUGMENTED MEMORY

## The Role of AR in Enhancing Memory Recall and Emotional Reconnection with Loved Ones

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### ABSTRACT

Augmented Reality (AR) is becoming increasingly influential across various industries, particularly in enhancing user engagement. This immersive capability has significant potential to amplify emotional experiences. This study investigates the use of AR in facilitating the recalling memories of loved ones through self-recording videos. Specifically, it explores how AR can enrich the vividness of memory recall and its emotional impact. A key finding reveals AR enhances happiness and encourages reconnection with loved ones.

### KEYWORDS

Augmented Reality, Immersive Experience, Virtual Overlays, Emotional Reconnection, Nostalgia, Memory Recall, Memories Triggers, Personalized Engagement

## 1 Introduction

AR is a technology that overlays digital information onto real-world content, blending virtual and physical environments to enhance user engagement and immersion across various industries, including education, fashion, gaming, and film. Recalling memories, especially those of loved ones, is essential to human experience and can evoke nostalgia – an emotion that helps individuals cope with stress (Sedikides, 2016). This research aims to explore how AR can enhance the recall of those memories to be more meaningful. Additionally, it investigates the effects of AR on emotion and how it can support individuals after these memories are recalled.

## 2 Related Work

Research shows that AR features generate more personalized experiences, enhancing engagement and memory retention than traditional content (Khan et al., 2024; Zuo et al., 2022). Specific AR characteristics—such as novelty, vividness, and informativeness—have been shown to enhance user experience in sports context (Du et al., 2024). In the fashion industry, AR try-on features strengthen consumers' connections with brands by creating interactive and engaging experiences (Kim et al., 2024). This research explores more on the features that enhance the recalling memories in self-recorded video, the emotion and the potential on how to support after recalling those memories.

## 3 Interview study

The result from the interview study on “Recalling memories with your loved ones in AR” (Maruyama, 2024) indicates that participants found the experience of memory recall is more immersive through AR, enhancing, the feeling of closeness despite the physical separation. Participants also noted that AR provided personalized and interactive experiences, evoking complex emotions such as relaxation, healing and motivation.

## 4 Probe Study

### 4.1 Study aims

Our previous interview study revealed that AR enhances engagement and immersion in recalling memory of loved ones, triggering complex emotions. This study explores the question “how can AR be useful for recalling memory of loved ones in self-recorded videos?” To achieve this, I utilized a probe study method, which helps the participant engage deeply with the context and reflect on inner thoughts and feelings after activities. Follow by the prob interview to gain more insights, then the thematic analysis is conducted to analyze the meaningful result.

### 4.2 Probe design and motivation

[Link to probe kits video](#)

These probe kits aim to create an immersive experience that showcases AR's capabilities, assesses its potential, and explore its effects on memory recall. Inspired by tools like inspirational card deck and creative journals, each element serves a specific purpose. The AR possibilities card deck introduces the participant to AR features. The AR journal encourages imaginative thinking, allows the participant to reflect on these features and emotions. Then the participant writes postcards to her loved ones to explore feeling tied to memories then captures her meaningful objects with a polaroid camera. Those postcards and photos are stored in a scrapbook for further reflection. Finally, the participant writes a letter to herself supporting self-reflection.

### 4.3 Participant

I invited a participant who frequently records personal videos of her loved ones and has a hobby of collecting items like shells. Although she has limited experience with AR, she expressed interest in it, making her an ideal fit for this study.

### 4.4 Result

AR can enhance the recalling memories of loved ones in meaningful ways, overlaying virtual elements to create immersive experiences that increase happiness and foster reconnection to the participant. Detailed results are as outlined below.

**AR Features Leads to Stronger Emotional Response:** Incorporating AR elements such as changing stories, virtual background or emotional interaction can intensify the emotional depth and engagement.

“if I can put more feeling, change the background or something to make it my picture or video better.”

“..change about story, may be like I get more feeling.”

**Supporting Video Quality with AR features:** The ability to enhance video quality by fixing blurry parts, personalized filters and effects makes the memories more vivid and appealing.

“under the sea sometimes is not good for the video, right and if AR VR come make that video clearly and can see every like a more vision. I think it is good.”

**Enrich Feeling and Foster Reconnection:** Recalling memories of loved ones through AR not only elevates the sense of happiness but also encourages desire for reconnect with loved ones.

“..and may be send the message to my loved ones, like Hi how are you? I just saw this video it makes me miss you.”

**AR Video Influence on Sharing Memories:** AR enables users to easily overlay filters which increases the likelihood of keeping and sharing those videos on social media.

*“When I take the video, I would like to do the video to post Instagram, so I think about if I put some filters may be make a good video”*

### 4.5 Discussion

This study finds that physical cues, such as shells, beaches, and sand, which are related to participant’s childhood memories play an important role in memory recall. Gifts for loved ones are also strongly linked to memories. Additionally, social media serves as both a personal archive and a social connection platform. The study further reveals that the types of relationship seem to influence the kinds of memories recalled. The participant often recalls everyday activities with family members. In contrast, she recalls challenging

experiences with friends more vividly. Finally, the participant is open to and easily adopts new experiences after trying and understands them.

## 5 General discussion

This study supports previous findings, showing that participants find memories more immersive with AR. While familiar with photo-taking, participants expressed a desire for simpler steps in video. This study reveals the potential features of AR that can be developed. Design possibilities include real-time, user-friendly video **record** guidance, such as best-angle detector and focus suggestions. **Remix** filters could enrich the experience by changing background or stories, while an emotion detector enhances the dynamic, immersive experience. Additionally, scanning physical cues, like shells or beaches, to **rewatch** related videos and **reconnect** by inviting loved ones to watch together with scheduling requests. User could also send messages or gifts inspired by these memories to loved ones or plan to **recreate** a moment together, fostering deeper connections.

## 6 Conclusion

In conclusion, this study uncovers AR's potential to enrich memory recall and strengthen emotional connections with loved ones. While social media provides a space for storing and sharing these memories, high-quality video is essential for this purpose, and AR features for video capture could enhance the overall experience. Memory triggers are significantly linked to the participant's childhood memories. Features such as scanning objects to rewatch related video and sending instant messages to loved ones can foster reconnection. Overall, AR makes capturing memories more meaningful and strengthens bonds with loved ones even when they are far away.

## ACKNOWLEDGMENTS

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## REFERENCES

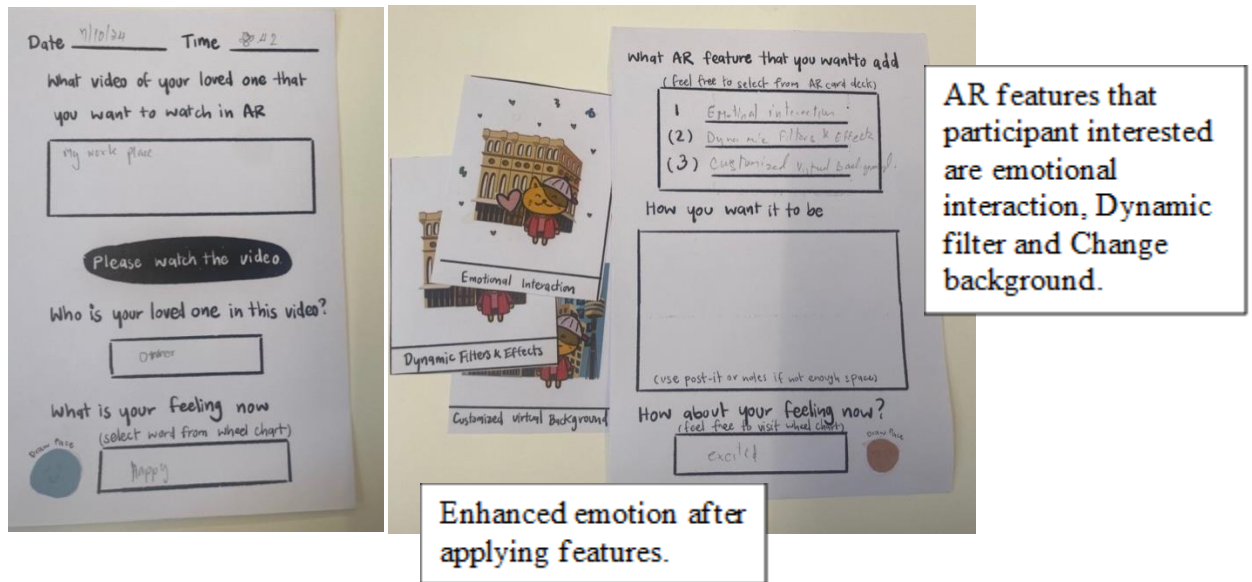
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## APPENDICES

### Analysis

#### Probe kits coding

#### AR possibility activity element



Date 7/10/24 Time 8:42

What video of your loved one that you want to watch in AR

my work place

Please watch the video

Who is your loved one in this video?

Daddy

What is your feeling now  
(select word from wheel chart)

happy

What AR feature that you want to add  
(Feel free to select from AR card decks)

- 1 Emotional Interaction
- (2) Dynamic Filter & Effects
- (3) Customized Virtual Background

How you want it to be

(use post-it or notes if not enough space)

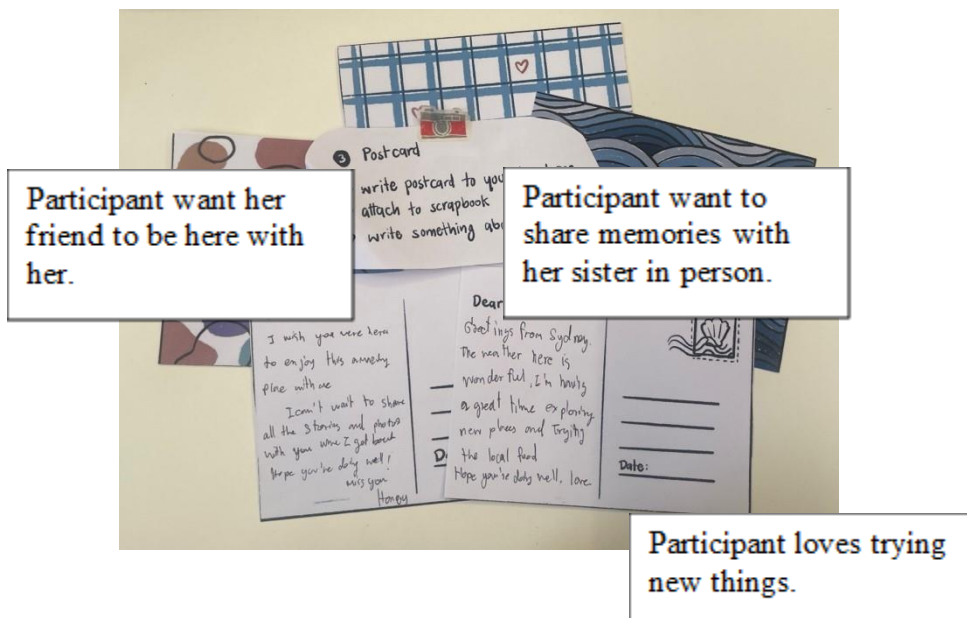
How about your feeling now?  
(feel free to visit wheel chart)

excited

AR features that participant interested are emotional interaction, Dynamic filter and Change background.

Enhanced emotion after applying features.

#### Writing postcard element




Postcard

write postcard to you  
attach to scrapbook  
write something about

Participant want her friend to be here with her.

Participant want to share memories with her sister in person.

Participant loves trying new things.



She picked the photo based on childhood memories with her sister.

she picked the photo based on loved ones' preference.

Taking photo element



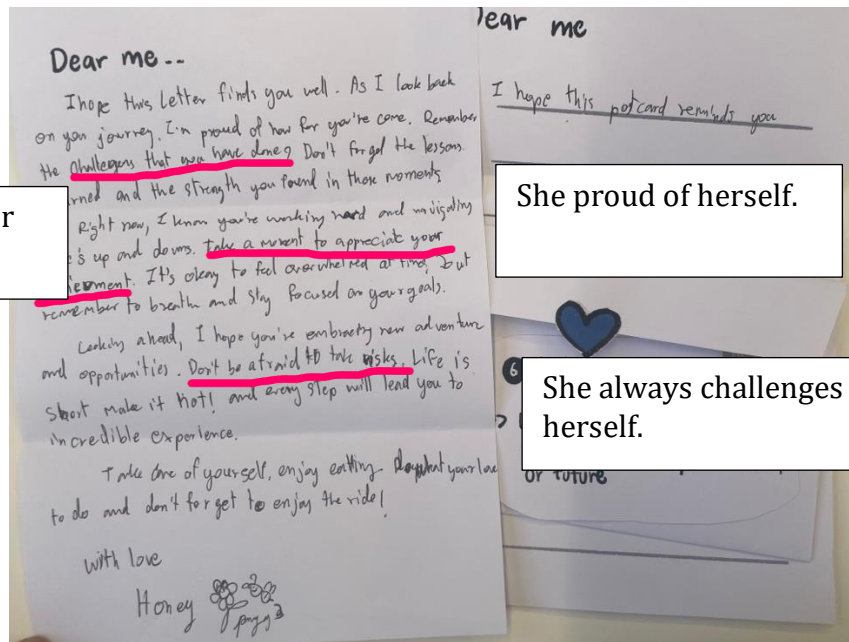
She loves nature.

Beaches connect with childhood memories.

Most pictures connect with beaches.

She loves collecting memories in physicals.

## Letter to self element



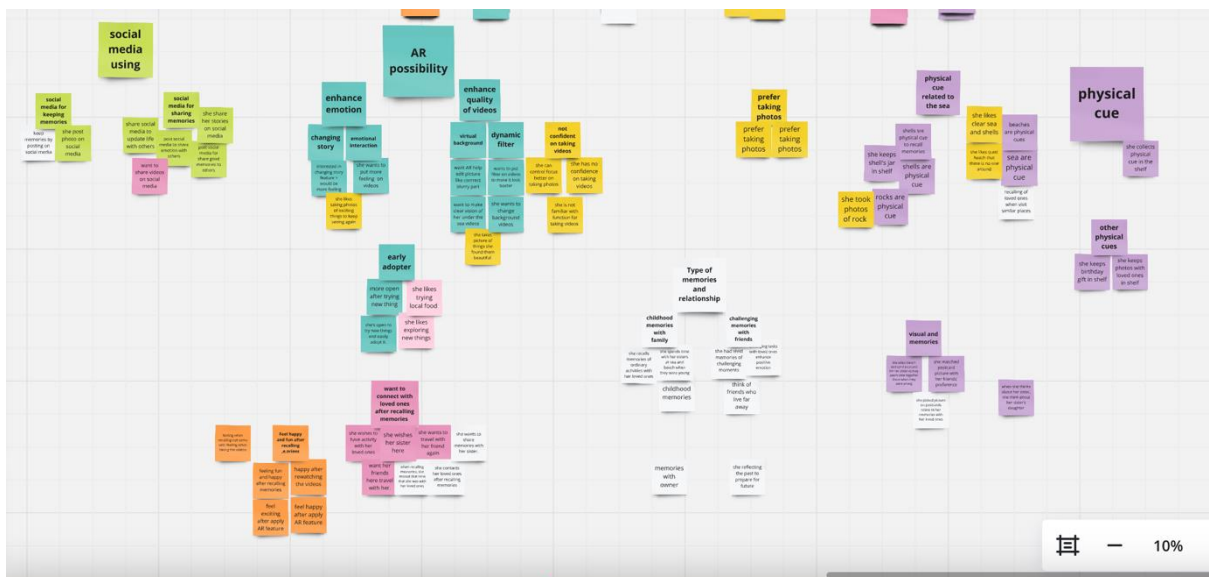


# Thematic Analysis

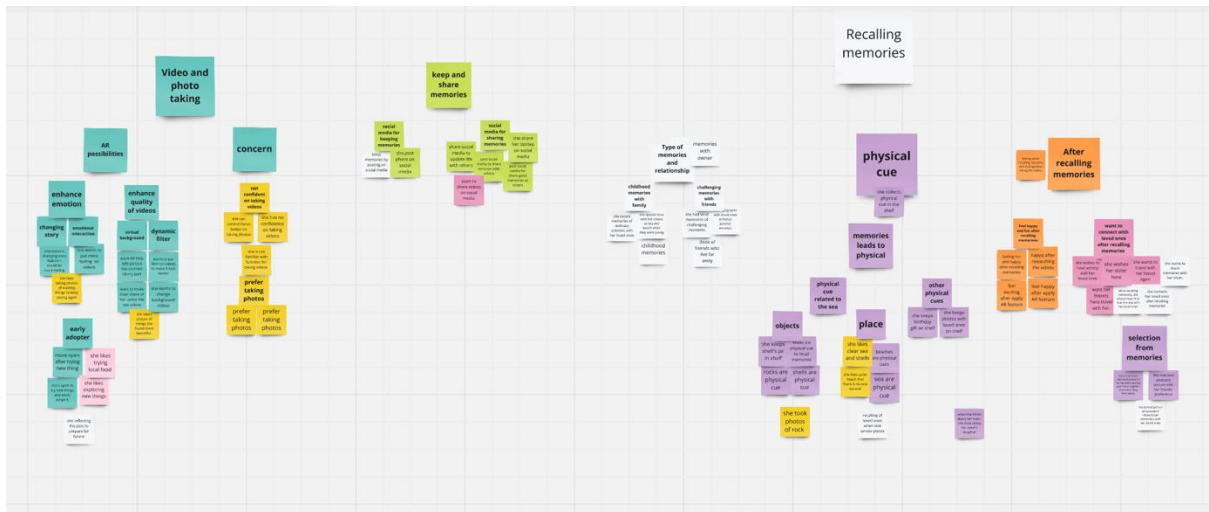
## Round 1



## Round 2



## Round 3

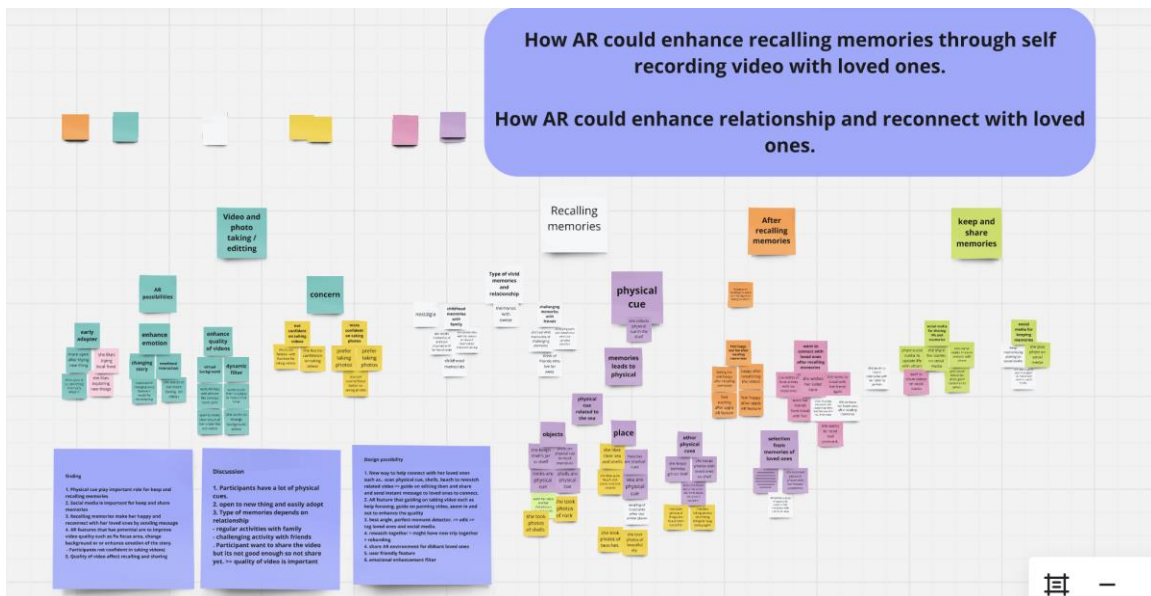


## Round 4

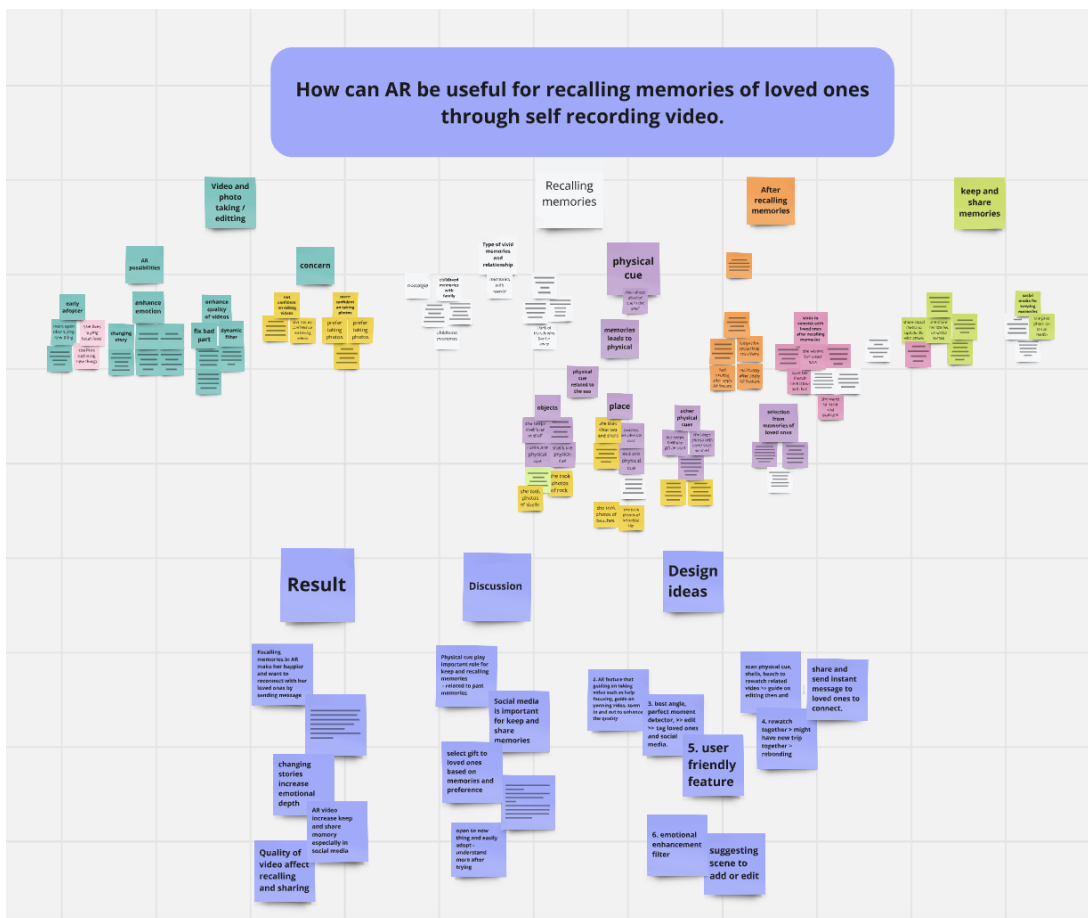


## Round 5

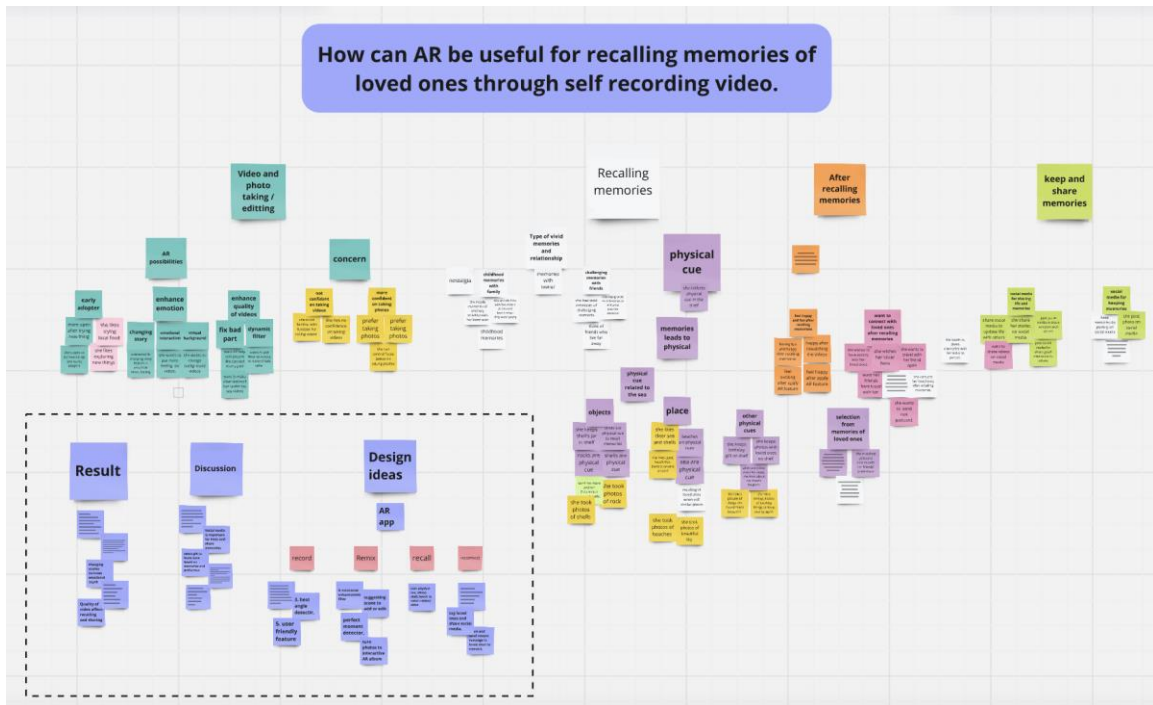




## Round 6



## Final Round



## Probe Kits Design

### First Draft



### Final Design (Futragoon, 2024)

#### AR features card deck

<p>Let's draw cards to see what AR could do</p>	<p>Interactive Annotations</p>	<p>Dynamic Filters &amp; Effects</p>	<p>Changeable Story</p>	<p><b>AR VIDEO</b></p> <p>Blending reality with the digital world</p>	<p>AR allows you to add message, story behind the video that you want to add to the video</p> <p>Interactive Annotations</p>	<p>AR can add real-time filters, animations, or effects to personal video, such as adding objects, make up, costume to person in the video.</p> <p>Dynamic Filters &amp; Effects</p>	<p>AR allow you to change the story or reaction of your loved ones. The interaction will change depending on what you tell AR.</p> <p>Changeable Story</p>
<p>Emotional Interaction</p>	<p>Flash back Moment</p>	<p>Sentimental keepsakes</p>	<p>Customized virtual Background</p>	<p>AR can recognize gestures and facial expressions and add specific elements such as confetti or hearts appear when you smile.</p> <p>Emotional Interaction</p>	<p>AR can pull up the video of your loved ones when you visit the same place that you took video in the past.</p> <p>Flash back Moment</p>	<p>AR allows you to add digital elements that help recalling memories, such as souvenirs from travelling trip, handwritten letters, cards in the video</p> <p>Sentimental keepsakes</p>	<p>AR can change background of the video to create a personal story telling or fun effects</p> <p>Customized virtual Background</p>

#### AR Possibilities Activity

Date \_\_\_\_\_ Time \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

1 \_\_\_\_\_  
(2) \_\_\_\_\_  
(3) \_\_\_\_\_

(use post-it or notes if not enough space)

1 foot 10 in to waist wheel chair

A collection of hand-drawn doodles including a calendar, a girl in a frame, a heart, an envelope, a "Memories" sign, a "Dream" banner, a "Note" card, a purple notepad, "Love" text, a pocket watch, a spiral notebook with flowers, a camera on a clipboard, and a rainbow.

## 12

<p>Dear me</p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	<p>Dear me--</p>
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## Task list and schedule

Task list 1	Task list 2	Task Description	Task Description 2
Day 1 take a look at AR card deck ①	Day 8 visit scrapbook ⑤	① AR possibility deck -> take a look at AR cards.	④ Take Photo -> Take photo of anything that you think of or want to add in your video -> attach to scrapbook -> write something
Day 2 AR video possibility ② write postcard ③	Day 9 repeat day 2 ② ③ Day 10 repeat day 3 ④ ⑤	② AR video activity -> follow the AR video activity	⑤ Scrapbook -> Decorate or draw or write something
Day 3 Take a photo ④ put postcard & photo to scrapbook ⑤	Day 11 visit scrapbook ⑤ Day 12 write letter to yourself ⑥	③ Postcard -> write postcard to your loved one -> attach to scrapbook -> write something about the postcard	⑥ Letter to yourself -> Write a letter to yourself could be in the past, now, or future
Day 4 visit scrapbook ⑤	Day 13 visit scrapbook ⑤		
Day 5 repeat day 2 ② ③	Day 14 visit scrapbook ⑤		
Day 6 repeat day 3 ④ ⑤			
Day 7 visit scrapbook ⑤	— End —		

## Notepads

