

CPSC599.2 Project: AR Interactive Cards

Karen Kuribayashi

Calgary, Canada

karen.kuribayashi@ucalgary.ca

Abigayle LeFranc

Calgary, Canada

abigayle.lefranc@ucalgary.ca

Minh Hang Chu

Calgary, Canada

minhhang.chu@ucalgary.ca

ABSTRACT

Background: This is a group project for CPSC 599.2 Design of Mixed Reality Apps in Winter 2021 at the University of Calgary. Our idea was to create interactive AR cards for special occasions.

Methods: We first brainstormed the project's ideas together, and then each sketched 10 ideas based on our initial discussion. After our individual ideation, we came together to share our drawings and discuss what project interested us. We finally decided to work towards creating interactive Augmented Reality cards for special occasions. After a second discussion, we chose to use 8th Wall as our hosting website. It is a web-based developer platform for WebAR that uses A-frame, javascript, HTML and CSS and allowed easy group sharing.

Result: We created two cards; a Christmas card and a Birthday card that users can have a unique AR experience by interacting with 3D objects, watching video messages and listening to music through AR.

Conclusion: As it was our first time creating a webAR project, we learned the basics of making webAR projects and how we can create or edit 3D models and animations.

Author Keywords

Augmented Reality; WebAR; 8th Wall; interactive; cards; AR; Mobile Device; QR Code

INTRODUCTION

AR has been a widespread topic in the world today, with the invention of AR glasses and virtual reality gaming. One of the most basic and popular AR ideas today is the creation and use of AR information cards, whether it is for business cards, pamphlets, or catalogues. For our project in CPSC 599.2 Design of Mixed Reality Apps, we decided to create interactive cards for special occasions like Christmas, Birthdays and other occasions when cards are mostly used.

Goal and motivation

The goal is to learn how to design and implement simple mobile augmented reality applications which is one of the goals of this course. We want to make a product that everyone can experience AR with simple and fun interactions in daily situations.

RELATED WORK

There are many works and projects that use similar techniques as it is the most basic way AR is used. One

common product that uses image targets is information cards, whether it is for business cards and brochures, and game products.

Related projects, systems, papers

Nintendo 3DS AR Cards: A system that is closely related to our project is the Nintendo AR cards that were introduced with the Nintendo 3DS around 2011. These were one of the first introductions to AR within society. These cards were scannable character cards that were interactable once scanned from the Nintendo 3DS cameras. The users would scan these cards using the outer camera and view characters moving about the card. These cards were also used with some games, for example, Nintendogs and Nintencats. In these games, once the card was scanned gave users extra content such as new exclusive outfits for pets. Another example of this was the *Mario Party: Island Tour* where users would scan the cards to play two exclusive games. With the creation of these cards came the famous predecessor, amiibos, another NFC object that was released by Nintendo later in 2014.

Business cards: Business cards are essential when networking, and are still to this day a form of communication between companies. These cards typically only display a name and contact information and do not give very much info to the other person and as such require others to search up the information themselves. The creation of building AR into business cards is an ideal way to build connections. They are convenient and give more room for expression. AR business cards use image recognition to find visuals such as the card itself. Using this, mobile devices display AR onto the fixed location in relation to the card. Once the QR is scanned, the space on the card is expanded and anything the creator wishes to display can be shown such as an introduction video, parts of resumes or displaying skills.

Brochures: Using AR with brochures turns reading and information guides into a new digital process. Using QR codes users can scan documents or ads and gather new content that may not have been shown. QR codes on brochures, leaflets and flyers can include items like,

displaying video, obtaining emails, inviting people to social media, invites, discount codes and after sale services.

Another way to use AR would be with menus and catalogues. One most recent and well known development is Ikea's use of AR for their shoppers catalogue. With AR, customers have the ability to see the model in 3D which would be ideal when shopping for an item. Customers would be able to see the item, rotate the object for closer inspections, change the color and many other features.

CONCEPT

Our main goal in the creation of this project was to learn about the ways AR is designed and created. With this project we hope to create a project that we are proud of and to bring a positive and memorable experience with the combination of tangible and virtual objects for everyone from tech beginners to tech savvy people.

In terms of novelty or originality, it is not too unusual or different to other celebration cards or ecards that are currently sold online. Our initial project was considered with the thoughts around AR business cards and the challenges of receiving cards and fun ways to socialize through the pandemic. Our ideas were original in our thought process and what one wishes to see in cards and special events that happen throughout certain holidays, ex. Santa and snow for Christmas, and presents for Birthdays.

Initial sketches

After sketching different project ideas and deciding on an idea that we all agreed upon, we individually came up with several different ideas for using a card with image targets. Abigayle came up with four different ideas (see Figure 1, Figure 2, Figure 3, and Figure 4). Karen came up with seven ideas for cards of special occasions (see Figure 5, and Figure 6). Minh came up with five ideas for cards of special occasions (see Figure 7, see Figure 8, see Figure 9, Figure 10 and Figure 11). After discussing all the ideas, we decided to use Karen's idea of a Christmas card and a combination of Karen's idea of a Birthday card and Minh's idea of a Birthday card.



Figure 1. Abigayle's sketch. By scanning the QR code on the card, a video is displayed of the sender singing. The words are also interactive by tapping.

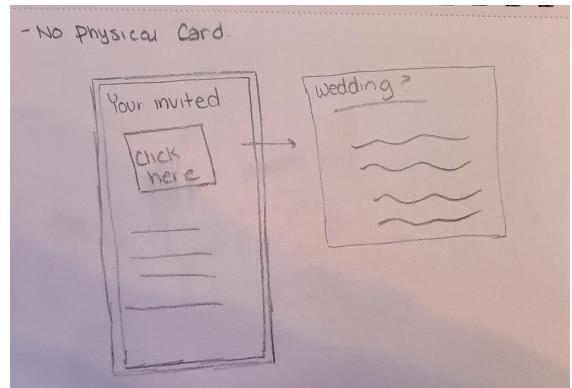


Figure 2. Abigayle's sketch. A virtual wedding invitation that when clicked an AR message will appear with information.



Figure 3. Abigayle's sketch. An avatar would appear and interact with its environment, ex. walking around the card, smiling and waving. There would also be an AR message in the background with what the card was meant for.

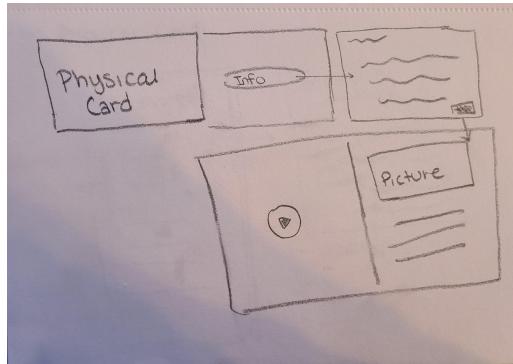


Figure 4. Abigayle's sketch. It shows the boxes that are displayed in AR and by tapping on the info buttons on each section more details will appear.

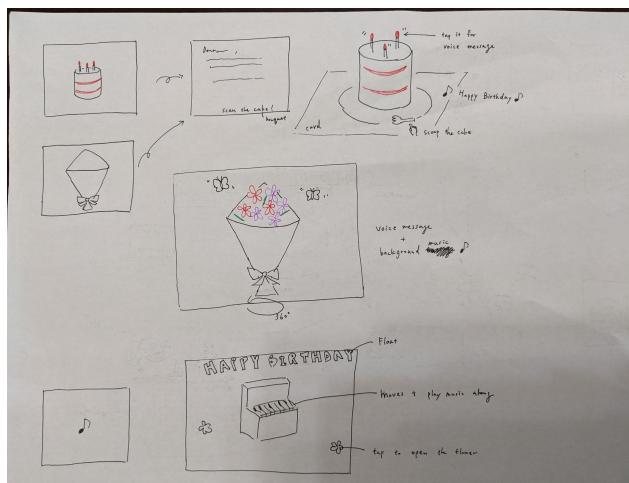


Figure 5. Karen's sketches. These sketches explored ideas for birthday cards with a 3D cake, flowers and a piano with interactions, music and voice message.

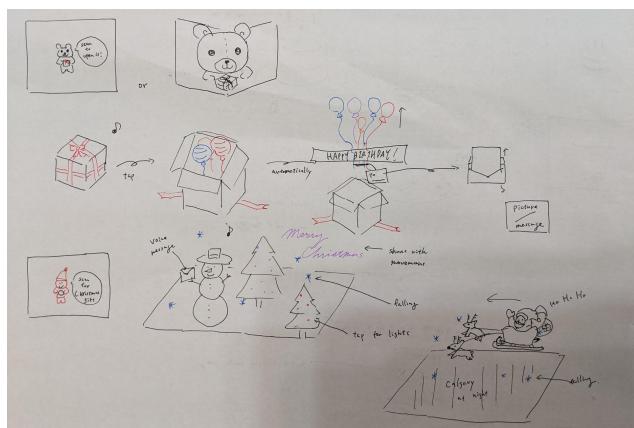


Figure 6. Karen's sketches. These sketches explored ideas for birthday and Christmas cards with 3D models of a gift box, balloons, a snowman, a banner, trees with lights, Santa and snow with music, animation and message.

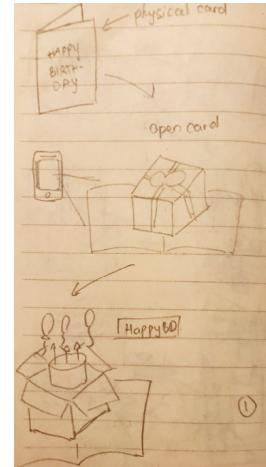


Figure 7. Minh's sketch. By scanning a card, it will show a 3D gift box. By tapping it, it will show a balloon and cake inside with a banner displaying a happy birthday.

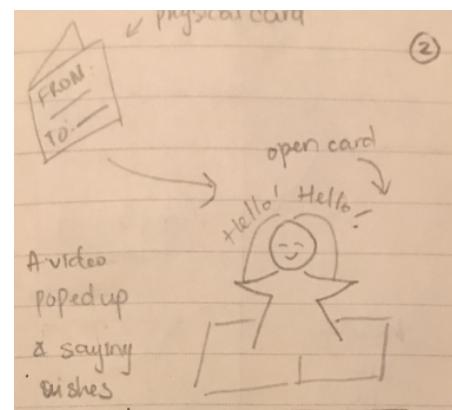


Figure 8. Minh's sketch. By scanning a card, users will see a short video to say wishes as a 3d pop up from the card.

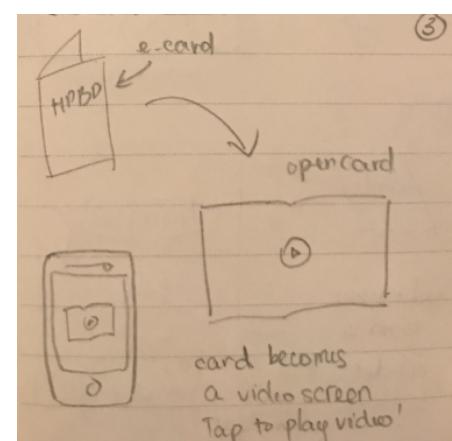


Figure 9. Minh's sketch. By scanning a card, it will display a personal message which will turn to a video player.

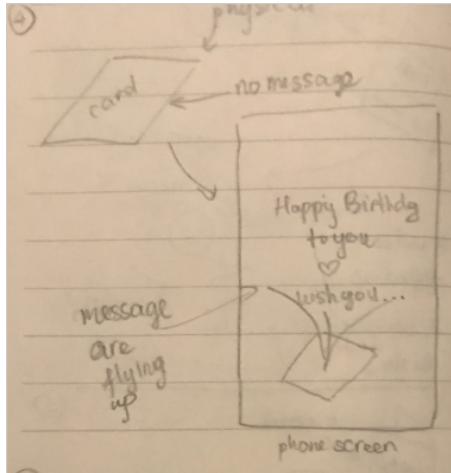


Figure 10. Minh's sketch. By scanning a card, the messages will start floating up in different shapes.

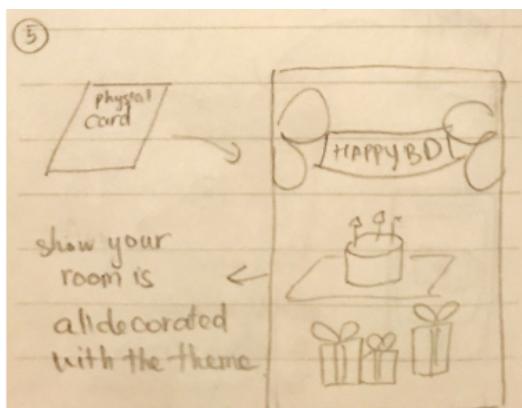


Figure 11. Minh's sketch. By scanning a card and the user's current settings, the application will turn their current settings with different theme decorations.

Sketches from proposal

Initially for our proposal stage, for the Christmas card, we decided to have a card with the design of a reindeer that users will scan (see Figure 12). After scanning (see Figure 13), trees will show up on the card with animated snow and music playing (see Figure 14). By tapping the trees, colourful tree lights will turn on and Santa with reindeer will start flying around the card (see Figure 15).



Figure 12. The front side of the Christmas card.



Figure 13. Scanning the christmas card to experience AR

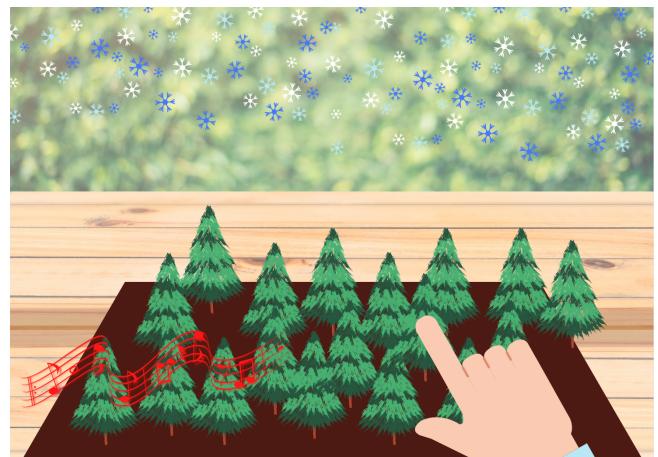


Figure 14. After scanning the card initially, there will be animated snow, interactive trees and music playing.



Figure 15. After tapping the trees, lights will turn on and Santa with reindeer will start flying around.

For our proposal stage, for the birthday card, we decided to design a card of a cat celebrating that users will scan (see Figure 16). After scanning (see Figure 17), a gift box will appear on the card (see Figure 18). By tapping the box, it will open, and a cake and balloons appear with music (see Figure 19). After the balloons go up, the users can tap the candle to blow it out, and a banner will appear displaying a happy birthday (see Figure 20).



Figure 16. The front side of the birthday card.

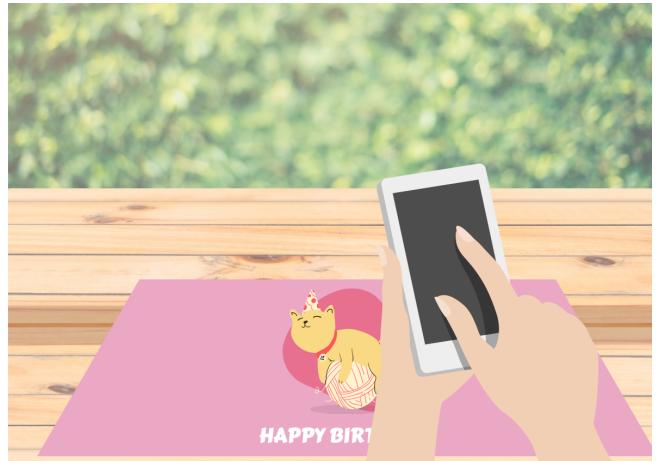


Figure 17. Scanning the christmas card to experience AR



Figure 18. After scanning the card initially, there will be an interactive gift box.



Figure 19. By tapping the gift box, it will open, then a cake and balloons show up with music.



Figure 20. After the balloons go up, by tapping the candle to blow it out, a banner displaying happy birthday will appear.

SYSTEM

Our final project had no major changes and is still interactive cards for two special occasions; Christmas, and Birthday. With our idea, in order for everyone to interact with the cards, we decided to use 8th Wall for WebAR. Through 8th Wall, we used A-Frame, HTML with CSS and Javascript to implement the projects.

Demo

For the Christmas card, we kept the initial design of a reindeer as the front side of the card. (see Figure 21). We made the backside of the card to scan the QR code to start the webAR experience (see Figure 22). After scanning the QR code on the backside of the card (see Figure 23) and scanning the front side of the card, trees will show up on the card with snow falling (see Figure 24) and by tapping the surface of the card, music will start. By tapping the button which is at the bottom of the screen, lights will turn on, gifts will appear at the base of the trees and Santa will appear and start flying around in a circle around the card(see Figure 25). By scanning the backside of the card, there will display a thumbnail of a video (see Figure 26). Once the thumbnail is tapped, a video message will start. (see Figure 27).



Figure 21. The front side of the Christmas card.



Figure 22. The backside of the Christmas card with a QR code to start the webAR.

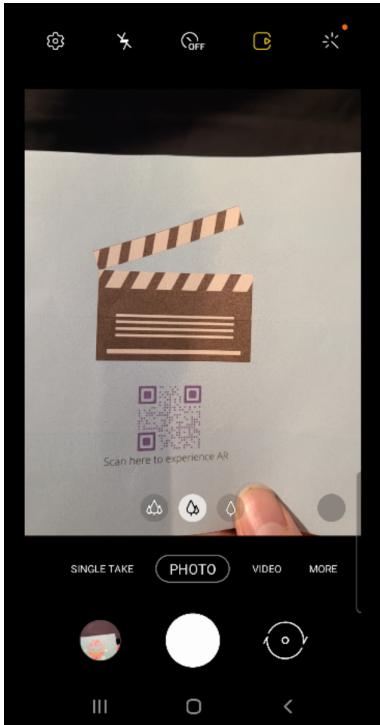


Figure 23. Scanning the QR code with a phone camera.

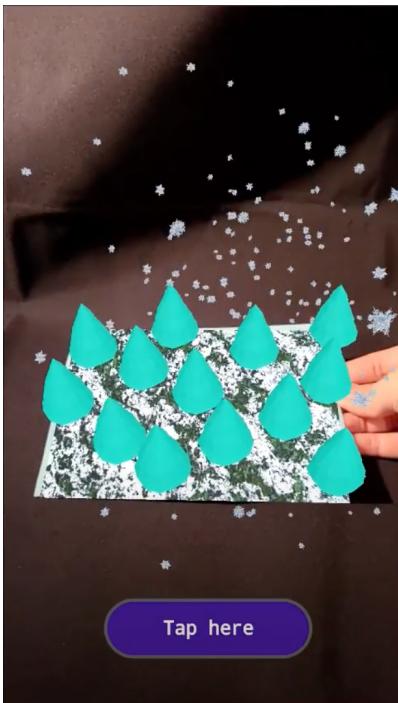


Figure 24. After scanning the front side of the card, trees will be displayed with snow falling. By tapping the surface of the card, music will start playing.



Figure 25. By tapping the button at the bottom of the screen, the lights will turn on, gifts will appear at the base of the trees and Santa will start flying around.

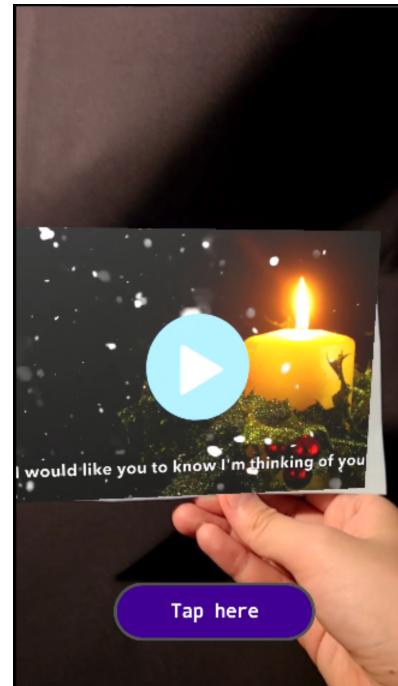


Figure 26. By scanning the back side of the card, a thumbnail of a video message will appear.



Figure 27. By tapping the thumbnail, the video message will start.

For the birthday card, we kept the initial design of a cat celebrating on the front side of the card. (see Figure 28). We made the backside of the card scan the QR code to start the webAR experience (see Figure 29). After scanning the QR code on the backside of the card (see Figure 30) and scanning the front side of the card, a gift box will appear on the card (see Figure 31) and by tapping the surface of the card, music will start. By tapping the button which is at the bottom of the screen, the gift box will open, and a cake and banner will appear. (see Figure 32) Then, balloons will repeatedly appear and animate to float towards the sky. (see Figure 33). By scanning the backside of the card, there will be a thumbnail of a video. (see Figure 34). Once the thumbnail is tapped, the video message will start (see Figure 35).



Figure 28. The front side of the birthday card.

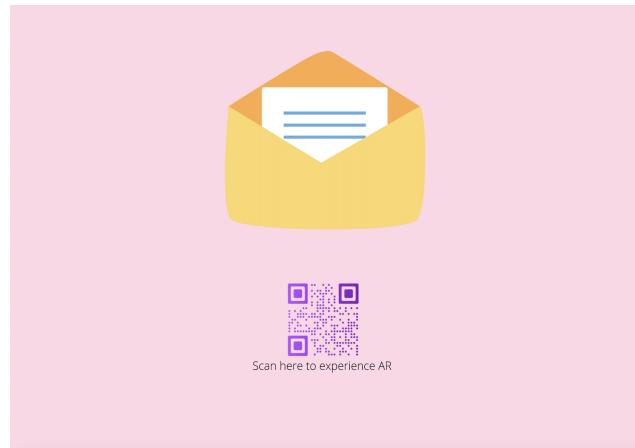


Figure 29. The back side of the birthday card with a QR code to start the webAR.

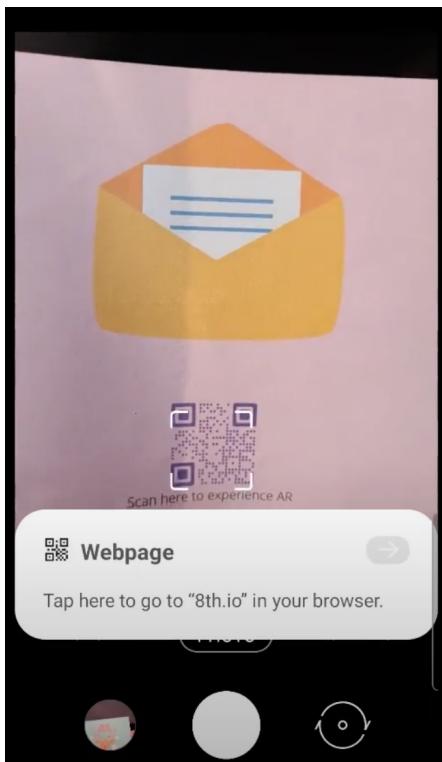


Figure 30. Scanning the QR code with a phone camera.



Figure 31. After scanning the front side of the card, a gift box will appear. By tapping the surface, music starts playing.



Figure 32. By tapping the button at the bottom of the screen, the box will open, and a banner and a cake will appear.



Figure 33. By tapping the button at the bottom of the screen, the box will open, and a banner and a cake will appear.

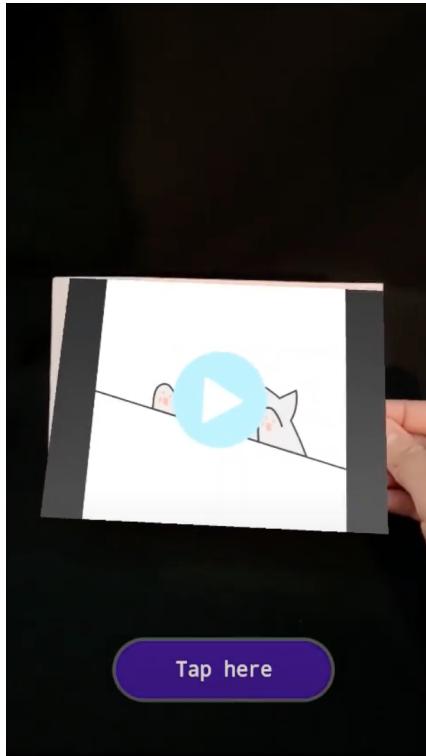


Figure 34. By scanning the backside of the card, a thumbnail of a video message will appear.

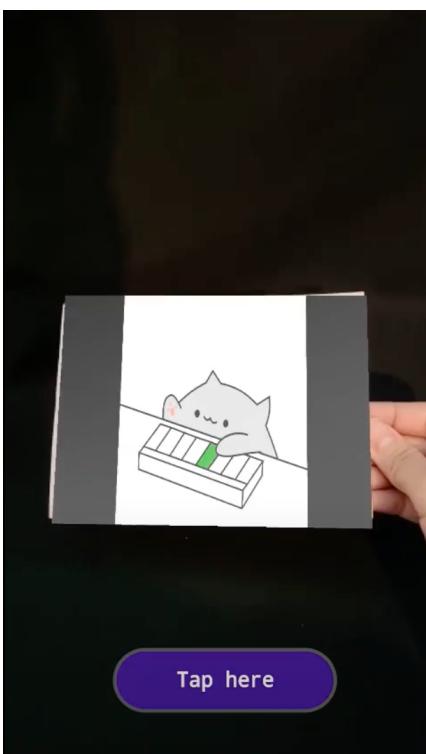


Figure 35. By tapping the thumbnail, the video message will start.

If you would like to watch our demo video, please click the link here :

<https://drive.google.com/file/d/1wPGE-NcH1BysjIJMYSeGq-BwiULc3vkI/view?usp=sharing>

System description

By scanning the QR code on the back of the Christmas card, it accesses the 8th wall project through a link. By scanning the back of the card, it will show a video message on the surface of the card by using image targets and a-frame. By scanning the front of the Christmas card using image targets, trees will show up on the card with animated snow. With an interaction of tapping on the card, music will start by using image targets and A-frame. By tapping the button which is made by HTML with CSS, it sets attributes for lights and animated Santa to appear by using javascript and A-Frame.

By scanning the QR code on the back of the birthday card, it accesses the 8th wall project through a link. By scanning the back of the card, it will show a video message on the surface of the card by using image targets and a-frame. By scanning the front of the birthday card using image targets, a gift box will show up on the card. With an interaction of tapping on the card, music will start by using image targets and A-Frame. By tapping the button which is made by HTML with CSS, it sets attributes for an opened gift box, a cake and animated balloons to appear by using javascript and A-Frame.

Most of the 3D models used for these projects are downloaded from Google Poly or Sketchfab. All the downloaded 3D models are edited with Blender and also, some 3D models are created with Blender.

Challenges

Since this was our first time making an AR project and making 3D models and animation, we learned how animation works on Blender and A-Frame.

After working on playing background music, we found out that there are limited resources of audio for 8th Wall. Instead, we decided to create a video that combined our chosen audio with an image that would sit on the plane of our card as music. For playing a video itself, we believe that there are no options that allow us to automatically play without first tapping a thumbnail, but found that there are ways to stop and loop the video once it starts.

Another challenge that we faced was when we wanted to tap 3D objects themselves to interact with them, however, after working on implementing tapping interactions, we noticed that it is hard for users to know where to tap or what to do with the AR. We decided to make a button with HTML with CSS and javascript so that by clicking the button, users can interact with 3D models.

Finally, another challenge that we faced was creating our own animations on Blender to play in A-Frame as for some we found worked and other animations did not. We were able to work around this problem by directly implementing animations through A-Frame. One example of this was the Santa 3D model, as we worked to create animations using Blender to move in a wave formation while circling around the card. Instead, once we found the animation did not work on 8th Wall, we decided to try A-Frame to get Santa to circle around an invisible object placed in the center of the card.

POSSIBLE APPLICATION SCENARIOS

Once a user receives the Christmas card, the user has to use a phone to scan the QR code on the card. By scanning the QR code, the WebAR application will open with a mobile camera. By scanning the back of the card, the user will see a thumbnail of a video message. By tapping the thumbnail, the user can watch a video message on the surface of the card. This video can be rewatched and also by tapping, it can be paused. After watching the video, the user flips the card to see the front side of the card. By scanning the front of the card, trees will show up on the card with animation of snow falling. By tapping the surface of the card, music will start. By tapping the surface again, the music can be paused as well. By tapping the button on the bottom of the screen, lights for the trees will turn on and Santa will start flying around.

Once a user receives the Birthday card, the user has to use a phone to scan the QR code on the card. By scanning the QR code, the WebAR application will open with a camera. By scanning the back of the card, the user will see a thumbnail of a video message. By tapping the thumbnail, the user can watch a video message on the surface of the card. This video can be rewatched and also by tapping, it can be paused. After watching the video, the user flips the card to see the front side of the card. By scanning the front of the card, a gift box will show up on the card. By tapping the surface of the card, music will start. By tapping the surface again, the music can be paused as well. By tapping the button on the bottom of the screen, the gift box will open,

and a birthday cake will appear from the box, a banner to display a happy birthday and balloons will go up.

For both scenarios, not only the user received a letter from someone for special occasions for tangible memories, the user can watch the personalized video message and interact with AR. Having the AR experience with cards, it makes the card to be more unique and memorable.

LIMITATIONS AND FUTURE WORK

There were some limitations due to the time frame of the project and the limited resources for 8th Wall as well as some improvements that we can consider for the future.

Completed ideas

We were able to follow and implement the majority of our initial ideas for creating scannable cards that provide 3D models that are interactable, music and animations to the users. Additionally, based on the feedback we received from our professor and classmates, we created a backside to the card, for video use.

What was not completed

While working on this project, we learned how to make animation with 3D models for webAR. Initially, we wanted to create more detailed animations. One example is editing the Santa, instead of the circular motion that we currently implement, creating a better animation so Santa would also travel in a wave formation.

We initially planned to have a tapping interaction with 3D models, such as tapping the gift box to open the gift box and tapping the candles to blow them out. However, we decided to make a button to tap for all the interactions and animations with 3D models because, with our design, it is hard for users to know what they can interact with. We believe having more direct interactions with 3D models would have been better and if we had time to implement a guide to show where and what to interact with, we could have implemented different kinds of interactions, for example, dragging and swiping,

We planned to create all the 3D models by ourselves from a scratch at the beginning, however, with our professor's advice, we used some free 3D models from Google Poly and Sketchfab. We were able to create a happy birthday banner and an open box as well as lights and decorations for the trees, but we decided to not include the part of blowing the candles out as we could not find a well-suited 3D model for a candle with the 3D model of a cake online.

Reflection

As it was our first time creating a webAR project, it was a great experience to be able to learn the basics of making AR projects with A-Frame, HTML with CSS and Javascript. Not only were we able to gain more experience with the code, we also had the chance to create or edit 3D models and animations. This project opened our eyes to the future of AR and many new and exciting implementations.

The current limitations and future work

Due to the time limitations, we were not able to do as many of the detailed animations that we were initially hoping to complete.

For future work, our first steps would be to create more cards for other holidays and celebrations such as Easter, New Years' and many more. Another step we would begin immediately would be to create our own 3D animations that match our own designs and not use as many 3D models from other creators on Google Poly and Sketchfab.

Looking into the further future, since our project is solely focusing on AR, we hope to be able to expand our cards into other concentrations. Creating 3D avatars speaking instead of personalized videos, or integrating with Artificial Intelligence.

CONCLUSION

AR is an interactive experience with the combination of real-world environments and virtual objects and is very slowly integrating with society's lifestyles. Creating projects such as AR Cards is the first step in this direction.

Working with AR through the duration of this semester and through the final project has taught us the importance of virtual reality and the future that it holds. We are excited to continue to work towards creating better projects that make AR usable for everyone.

ACKNOWLEDGMENTS

We thank the support and feedback from our professor Ryo Suzuki, and our classmates from CPSC 599.02.

REFERENCES

- [1] Danny Bittman. Pine Tree. 2017. Retrieved April 23rd, 2021 from <https://poly.google.com/view/2Qo-fmVKuSG>
- [2] Poly by Google. Balloon. 2017. Retrieved April 23rd, 2021 from <https://poly.google.com/view/d1gDDhM7pTf>
- [3] Jarlan Perez. Strawberry Shortcake. 2017. Retrieved April 23rd, 2021 from <https://poly.google.com/view/dEpv0DZj3WO>
- [4] Elin. Looping Snowflakes. 2020. Retrieved April 23rd, 2021 from <https://sketchfab.com/3d-models/looping-snowflakes-fe> d2f293395147a388fdb6c47021b4c9
- [5] MATB. Santa Claus. 2020. Retrieved April 23rd, 2021 from <https://sketchfab.com/3d-models/santa-claus-fff7fc4dd7b84e0992ffbb10aeb4a3b1>
- [6] Unknown. snow, grass, ground. 2013. Retrieved April 23rd, 2021 from <https://pixnio.com/nature-landscapes/grass/snow-grass-ground>
- [7] Poplar.Studio. What's an AR Business Card and How Do I Get One? 2019. Retrieved April 23rd, 2021 from <https://poplar.studio/blog/ar-business-card/>
- [8] NintendoWiki. AR Card. 2020. Retrieved April 23rd, 2021 from https://niwanetwork.org/wiki/AR_Card
- [9] 077 cicok. Bongo Cat - Birthday Song (TRAP REMIX). 2018. Retrieved April 23rd, 2021 from <https://www.youtube.com/watch?v=RaeLAwacDG4>
- [10] Jon Brooks - Music Composer. Merry Christmas 2020... Video Message . 2016. Retrieved April 23rd, 2021 from <https://www.youtube.com/watch?v=rFr98jRusMs>
- [11] R3 Music Box. Happy Birthday to You/Birthday Song [Music Box]. 2015. Retrieved April 23rd, 2021 from <https://www.youtube.com/watch?v=x3xfijEQufU>
- [12] R3 Music Box. Jingle Bells/Christmas Song [Music]. 2015. Retrieved April 23rd, 2021 from <https://www.youtube.com/watch?v=T-4UC68BDFc>
- [13] iGreet. 2018. Retrieved April 23rd, 2021 from <https://www.igreet.co>