

Geobased Memory Book

Dr. Blair MacIntyre, Mohini Thakkar, Samrat Ambadekar, Varun Thakkar
Georgia Institute of Technology -
Georgia, United States of America.

Abstract— Location-based apps are one of the most common AR technologies we currently have. All you need to do is point your smartphone or tablet to your surroundings and you'll see the magic unfold on your screen display.

Our idea is use all this and go beyond the normal trend. We place photo gallery in 3D space which is geo-located for users to interact with. Imagine going to a place where a friend has left a memory footprint in the form of an image for you to view. Our application generates that content on the user's arrival in the particular geolocation. The content is made interactive. We leverage the orientation sensors in the phone, touch capability to provide specific movements and interactivity for the content visible. The user can issue voice inputs, touch inputs, tilt phone forward or backward and shake phone as well each resulting in different kind of interactive experience.

Index Terms — **Augmented Reality, Argon, geo-location, memory book, social networking.**

I. INTRODUCTION

Augmented reality (AR) is a live, direct or indirect, view of a physical, real-world environment whose elements are augmented by computer-generated sensory input such as sound, video, graphics or GPS data. It is related to a more general concept called mediated reality, in which a view of reality is modified by a computer. As a result, the

technology functions by enhancing one's current perception of reality.



Fig 1. The time line view of photos. They move based on device attitude and orientation.

II. BACKGROUND

So far we dreamt of a future of maintenance and repair, travel and tourism, property and real estate, and advertising and retail but, for the final piece in the series, we thought we would bring it to a close with something to involve everyone. This is what augmented reality could do for your social life.

AR will enable us to experience events and places in real-time we may not otherwise have access to. Imagine participating in a live concert, sporting event, or visiting the destination of your choice all from the comfort of your own home through AR. Film and television extended the notion of being transported to other worlds through the moving picture and live telecasts viewed on dedicated screens, and now with AR, we can bring the world to us anywhere and anytime, appearing in our space and reality as a highly personalized experience.

III. CURRENT SCENARIO

AR is no longer a technology only accessible to a select few, but now available to plenty which is being experienced by consumers on a daily basis.

Let's take a look at what is currently available for AR on the social scene. The short answer is not much. There's a decent clutch of apps out there on iOS and Android. In terms of the way they work though, ultimately, they're rather similar and suffer the same kinds of problems as much of the mobile augmented reality out there at the moment, but the ideas are certainly in the right direction.

There a lot of demo applications in terms of games and visual effects that leverages Augmented Reality. But, it's difficult to find how AR can be used in the social media environment. Our project targets the concept of sharing stories, photographs and images basically what memories that make up our lives, through Argon (an augmented reality web browser.)

IV. MOTIVATION

AR based app to encourage social interactions. We felt it would be interesting if the user was able to add his own experiences and memories at the location itself. These can be in the form of photos, audios etc. People can basically create circles and share stories with others in their circle. Stories will be narrated by someone at a specific geolocation. All other people that have him in their circle will be able to hear his story when they are at the geolocation where the media was shared. They will be also being able to view the images on the AR view of their phone that supplement the story. This application is aimed at people who are willing to share stories with their friends. They can use this application whenever they are traveling to work, school etc. The photos can be liked just like other social networking applications. Voice commands are used to listen to the comment or story associated with each photograph. Panning photos in 3D space, zooming interaction techniques involving touch events, shaking the phone to got to previous page are all novel ways to make our application interesting yet user friendly.

We explored a novel way of navigation through 3D space, particularly in the AR view. The effect is similar to navigating through an actual gallery, with some modifications considering the constraints of the phone screen. The basic navigation is achieved without any screen interactions/inputs from the user. The user can move through the gallery by simply tilting the phone. The speed of navigation can be controlled by increasing and decreasing the tilt angle. To stop and look at a particular picture the user just has to turn the phone sideways. The gallery walls then move away from the user to provide a more holistic view. At this point the forward navigation stops to allow the user to watch the pictures more closely. This effect is reverted when the user again turns to move forward. The user can also zoom in on an image by simply clicking on it once. Additionally, the user can also like the picture. This is achieved by a double tap. Finally the user can close the gallery by again clicking on the album object. This takes him back to the initial album view. From there he can choose another album.

V. OVERVIEW

Our application tries to leverage Augmented Reality in the context of social applications. The application uses the three3D space around us to network with our friends by sharing thoughts and memories in the form of photographs. Every user can share his photo amongst his circle. His circle may include friends, family, colleagues. They are placed at specific geo-location for others to see. Multiple photos are aggregated / clustered in the form of an album. This album is represented in the form of a corresponding Collada model. So when the users close enough to the geo-location of the album the model becomes visible. There is novel interaction techniques set aside to make the experience visually appealing. In the backend, we have kept tags to represent the subject content for each photo. When there are multiple photographs with the same content type within a predetermined geo-area threshold they get aggregated into one album. Based on the content in the album, corresponding Collada models are used to represent each album. For instance, we have albums of cars, nature, and football to show for demo. Theoretically, there can be multiple aggregated albums represented by a 3D model representation.

In order to view the images inside each album all you need to do is click on the album. This displays an interactive 3D photo gallery of images which can be viewed more closely using the cell phone's sensors. The user can tilt the phone and the timeline of the images starts moving in the direction of the tilt. On panning the phone on the right or left makes the photo, the photo in front of the screen will be centered and visible. The rest of the photos in the album will move away. I can now click on the photo and zoom to see well. Our logic to exploit the phone's sensors mainly yaw pitch and the device

attitude is to make the experience as convenient, one handed and without clicking or using fingers. The albums can be populated by using Facebook accounts etc. to share photos with ease. Each photo has a corresponding XML file which stresses the tags, the number of likes, the category, and the comments associated with it. On clicking the like button the count on the photo likes is incremented. One of the more novel features of social application is the use of Audio. The users can use the voice command "Play" in order to hear all the comments associated with each photo. All of these interaction techniques are different from the ones which are currently there yet easy to pick up. This brings about a seamless interface of sharing, socializing in 3D with minimum user effort and interesting yet easy ways to interact. We feel closest to someone's presence on sharing both time and physical space with them.

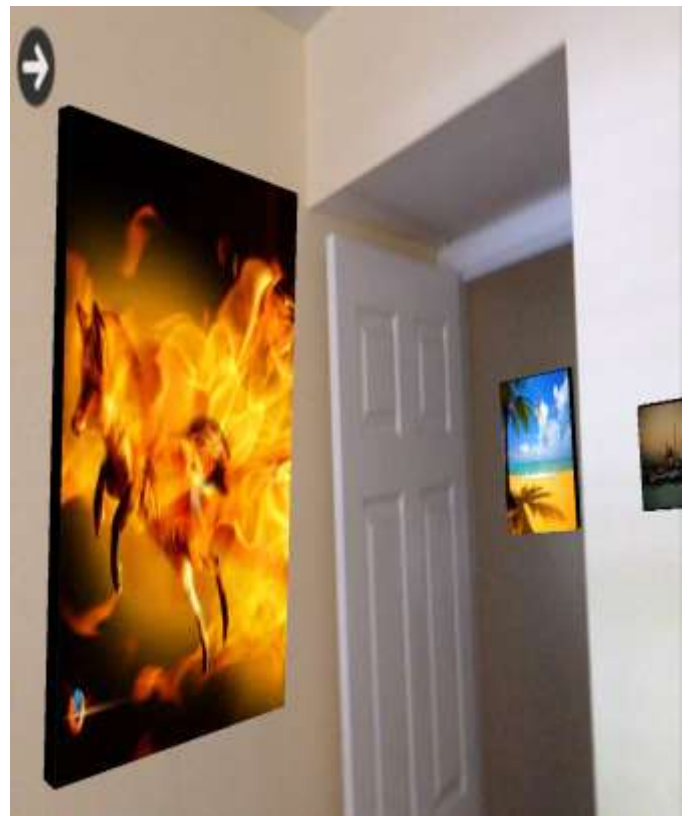


Fig 2. On panning the phone in one direction the image gets detached from timeline and centered on screen slowly for independent viewing.



Fig.3. The Collada model of the car representing the photo album of car images. On clicking this the album expands to view individual photographs.

Our application tries to exploit at least the physical space. Imagine this particular scenario where you meet a friend in the pub and they are telling you about their holiday photos, some film they have seen or song they like and you can then see it and access it in the air around them. They can choose to share it with you and you either view it together, there and then, or perhaps you download it to enjoy on your journey home.

VI. IMPLEMENTATION ISSUES

There were a few challenges in building this application, to start off with the geo-location on the phones is not accurate enough. This created a

problem in sharing albums based on geo-location. The idea of using Facebook login and accessing the photos of user tagged in was later changed due to lack of technological support.

One challenge that we faced was the navigation through the AR content. In case of geo-location based AR the content is mapped on the location. This requires the user to be very close to the location and also creates navigation issues. More importantly, the user has to constantly move around searching for content which is not a practical solution.

We tried to address these issues by providing a much simpler and usable way of information display and navigation. In our application, the content is loaded based on user's location. The grouping is done based on the tags. These groups or clusters are initially displayed to the user. Once the user selects a cluster, contents of the cluster are displayed in the AR view in the form of a gallery.

We wanted to eliminate the use of HTML and CSS and focus solely 3D content mapping. There are many applications already available that use HTML for interactive content display in AR. But these applications fail to provide a real 3D effect. This issue is addressed by THREE.js where content is mapped around the user in the 3D space provided. This feature coupled with accurate distance information of the user's surroundings can help us map the AR content on the real world objects. We used the device's attitude and the accelerometer properties to display the photos accordingly. This interaction technique which involved tilting the phone in 3D space was new to us and difficult to implement.

The use of audio commands to read comments associated with each photograph and also aggregating data based on the corresponding XML tag data and representing a Collada model for each album was a task. The use of Collada slows down the application slightly.

VII. CURRENT TECHNOLOGY DRAWBACK

However all is not good when it comes to this technology. The fact that the geolocation accuracy is not great is a major problem when dealing with any geolocation based AR application. Even though there is tremendous improvement in the gyros, compasses and accelerometers of phones it still a long road ahead.

- **Technology** – Like any new technology, AR browsers are not fully stable and still under intensive development. As a result, they will surely have technical glitches, errors and bugs which are not seen with good eyes by today’s technology-savvy users who are less forgiving than they used to be.
- **Social** - All media coverage of mobile AR browsers has given birth to a number of thoughts and worries which may affect its adoption. Starting from the awkward feeling of people watching you when moving your mobile camera around to more serious fears of being tracked down by criminals when posting on Twitter etc
- **Profiling** - The use of facial recognition technology, combined with geo-location and augmented data will lead to a seamless integration of our online and offline lives. People knowing our background through AR social context without our permission is again a major concern.
- **Physical danger:** Augmented Reality, like any mobile media technology presents some real physical safety issues. Just like mobile phones that are currently a distraction while driving a car, think of an augmented windshield feeding you driving directions, along with more data about your surroundings than you may need. Or imagine crossing a busy street in an unfamiliar neighborhood, while simultaneously using an Augmented Reality

interface to look for that hot new restaurant, checking out what people are tweeting about it and being bombarded with ads through it all.

VIII. DISCUSSION AND FUTURE WORK

Our Geo-Based Memory book is an exploration of AR social networking. Our goal is to show the possibilities in this application domain. We feel that with sufficient user studies and improvements in the technology AR will be used widely in this domain. The display and interaction techniques are new and we would like to design even better and intuitive techniques in future versions. With sufficient changes we aim to replace the traditional form of social interactions.



Fig4.

IX. CONCLUSION

The negative reactions while the technology is still in its early stages may mean that a lot of people will take time to accept it in the long run. Augmented reality will ultimately become a part of everyday life. Kids will use it in school as a learning tool – imagine Google Earth with AR- or

AR- enabled text books. Shoppers will use it to see what products will look like in their home. Consumers will use it to visually determine how to

set up a computer. Architects and city planners will even use it to see how new construction will look, feel, and affect the area they are developing. The potential may be tremendous but it still needs to be wholeheartedly accepted to see the desired level of sophistication and acceptability.

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REFERENCES

- [1] Steven Dow, Jaemin Lee, Christopher Oezbek, Blair MacIntyre, Jay David Bolter, Maribeth Gandy: Exploring Spatial Narratives and Mixed Reality Experiences in Oakland
- [2] Norbert Braun: Storytelling in Collaborative Augmented Reality Environments
- [3] Oliver Bimber¹, L. Miguel Encarnação² and Dieter Schmalstieg³. The Virtual Showcase as a new Platform for Augmented Reality Digital Storytelling



Fig.5. The like count gets incremented on clicking the like on screen. Additionally voice speech commands can be used to do the same and also to hear the comment associated with each photograph

- [4] Elizabeth D. Mynatt, Maribeth Back, Roy Want, Michael Baer, Jason B. Ellis: Designing Audio Aura
- [5] Nitin Sawhney, Chris Schmand: Nomadic radio: Speech and Audio interaction for contextual messaging in Nomadic Environments.
- [6] Steven Feiner and Blair MacIntyre and Doree Seligmann, "Knowledge-Based Augmented Reality", Communications of the ACM, 36:7, July 1993.
- [7] Enhancing and evaluating users' social experience with a mobile phone guide applied to cultural heritage (Youngjung Suh, Choonsung Shin, Woontack Woo, Steven Dow, Blair MacIntyre.
- [8] MacIntyre, Blair, Alex Hill, Hafez Rouzati, Maribeth Gandy, and Brian Davidson. 2011. "The Argon AR Web Browser and Standards-Based AR Application Environment." Paper presented at ISMAR '11. November 2011. IEEE.
- [9] Witmer, Bob G.; Michael J. Singer. Measuring Presence in Virtual Environments: A Presence Questionnaire, Presence: Teleoperators & Virtual Environments, Volume: 7
- [10] Whitton, M. C. 2003. Making virtual environments compelling. Commun. ACM 46, 7 (Jul. 2003), 40-47.
- [11] Audio Based AR Browser
- [12] School in the Park
- [13] Newspaper AR