

AUGMENTED REALITY AND ANIMATION IN THAILAND CONTEXT

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ABSTRACT

The advent of game changing technologies have allowed human civilizations to advance with everyday tasks while improving the quality of life. One such technology is Augmented Reality (AR), which is coming to fruition after 20+ years of development. With digital content being mainstream, electronic communication has becoming ever increasing. Focusing specifically on computer animation, the imagination and scope of ideas in this form of media is endless. The paper will discuss how various methods of creating social change can be converted to new technology, in the case of AR and animation, to serve an audience who is visually and digitally competent. The paper will also summarize the brainstorm session held March 12, in Chulalongkorn University, where participants developed public service and social topics in the AR environment.

Keywords: Augmented Reality, animation

INTRODUCTION

Animation and Augmented Reality

The strength of animation is that it is an illusion. From the process to the finished product, animation is simply still drawings. However, when combined and played in sequence, at a speed in which our eyes can not detect speed, the drawings come to live, and begin to move. The typical speed is 12 drawings per second, and smoother style of animation is 24 drawings per second. The first major boom in animation came in 1937 with Walt Disney's Snow White and to much success, brought Disney from a small studio to a world leader in animation. Since then, other companies have formed and used advanced computer techniques to produce their animation, from Industrial Light and Magic for Star Wars, Dreamworks for Kung Fu Panda and Shrek and Pixar, for Toy

Story and numerous other films. Considering this then, hand drawn animation is laborious and costly to create. However, combining animation with the realization that anything can be created, animation has boomed and over the course of the past hundred years, has come to be infused into all forms of media, from TV, movies, video games and now, Augmented Reality (AR).

The most common definition of AR is the one by Azuma [Azuma, 1997] , requiring AR systems to:

- Combine real and virtual
- Be interactive in realtime
- Be registered in 3-D

Although AR shares several characteristics with Virtual Reality (VR), there are important differences. Milgram and Kishino [Milgram, 1993] have identified the ‘reality-virtuality continuum’ (see Figure 1), which connects completely real environments to completely virtual ones. Mixed Reality (MR), which includes AR refers to everything in between fully virtual and fully real environments. Moving from left to right the amount of virtual imagery increases and the connection with reality weakens. ‘Augmented Virtuality’ refers to mostly virtual display environments, either completely immersive, partially immersive, or otherwise, to virtual environments to which some amount of (video or texture mapped) ‘reality’ has been added.

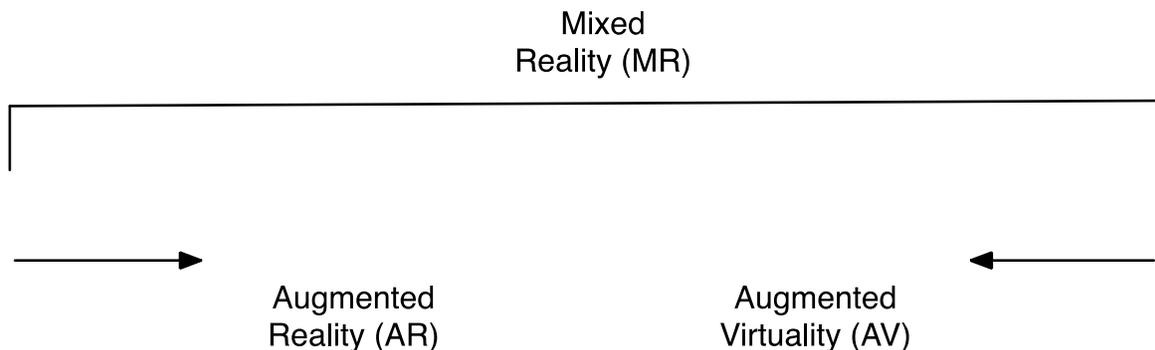


Figure 1 Reality-Virtuality Continuum

AR has been applied to a lot of different application domains, including: military, industry, education, and more recently entertainment. One of the most popular examples is Pokemon GO [Niantic 2016] that runs on a world-wide scale, but is of limited fidelity as there is no interaction between the virtual content and the real environment. On the other hand, several games on the Microsoft HoloLens, for example Roboraid [Microsoft, 2016] are very high fidelity, based on very precise tracking and correct interactions (e.g., occlusions) between the real environment and virtual content.

VR is a technically simplified version of AR and is therefore several years ahead in maturity. We can currently observe a large number of entertainment products (e.g., movies and games) being ported to VR---a similar wave will occur within a few years when AR will reach consumers in a

similar fashion that we can currently observe for VR. Apple's Tim Cook said, "AR has the ability to amplify human performance instead of isolating humans" [Techradar 2018].

The key difference between AR and VR is that in AR, the real world becomes a crucial part of the experience. Therefore, it is possible to design experiences that are tied to specific places; for example, we have previously developed an AR ghost story in an ancient Japanese temple in Kyoto [Youkai 2017]. In our workshop, we have asked students to specifically focus on the place where they want their experience to take place and also how the virtual content interacts with the place.

Preproduction – Concept and Storyboarding

One integral method to producing any creative content is to start with preproduction, which is a series of processes before committing to producing the project. The preproduction process can often take as long as production, and is the most important process in the entire production. Preproduction for animation or AR is similar to that of any time based projects and begins with a concept, then expands on the concept by writing a synopsis or script and proceeds with a series of storyboards, to visually represent the script.

The storyboarding process is typically completed with analogue methods, with a pen and paper. Storyboard templates are also available, and allow space for 'thumbnail' drawings, or small 2 inch boxes to fill with drawings. Since animation and AR typically are time based, each box or drawing covers anywhere between .1 seconds to 2-3 second of content.

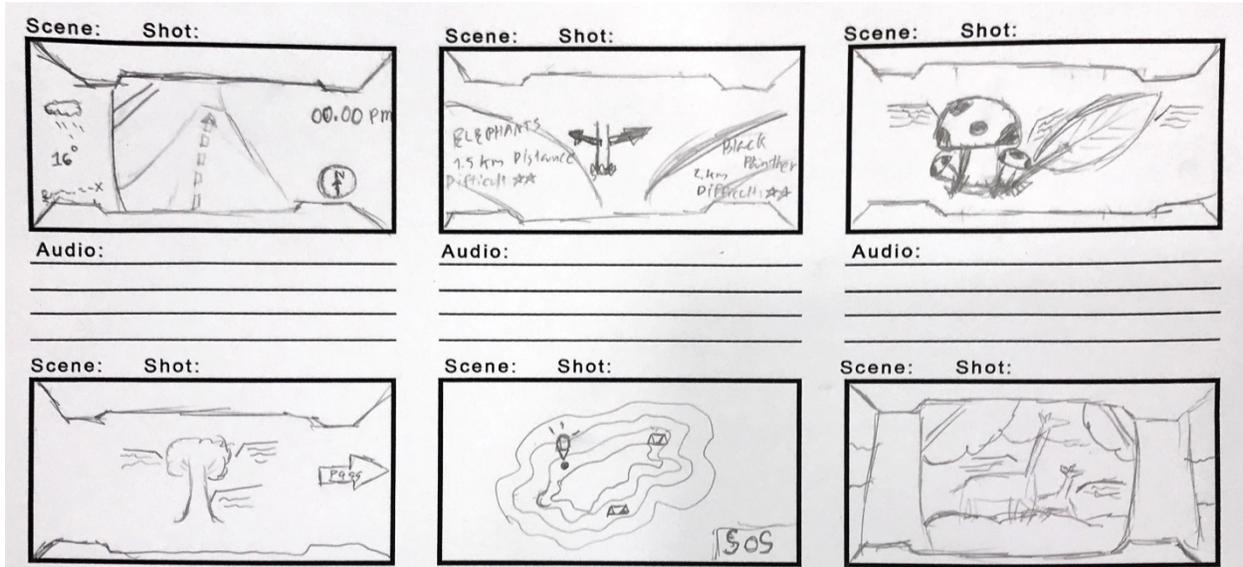
The following are some of the proposed projects from the various teams, which were formed organically, along with their storyboard drawings, depicting their projects visually.

National Park Guide for Navigating and Understanding Khao Yai

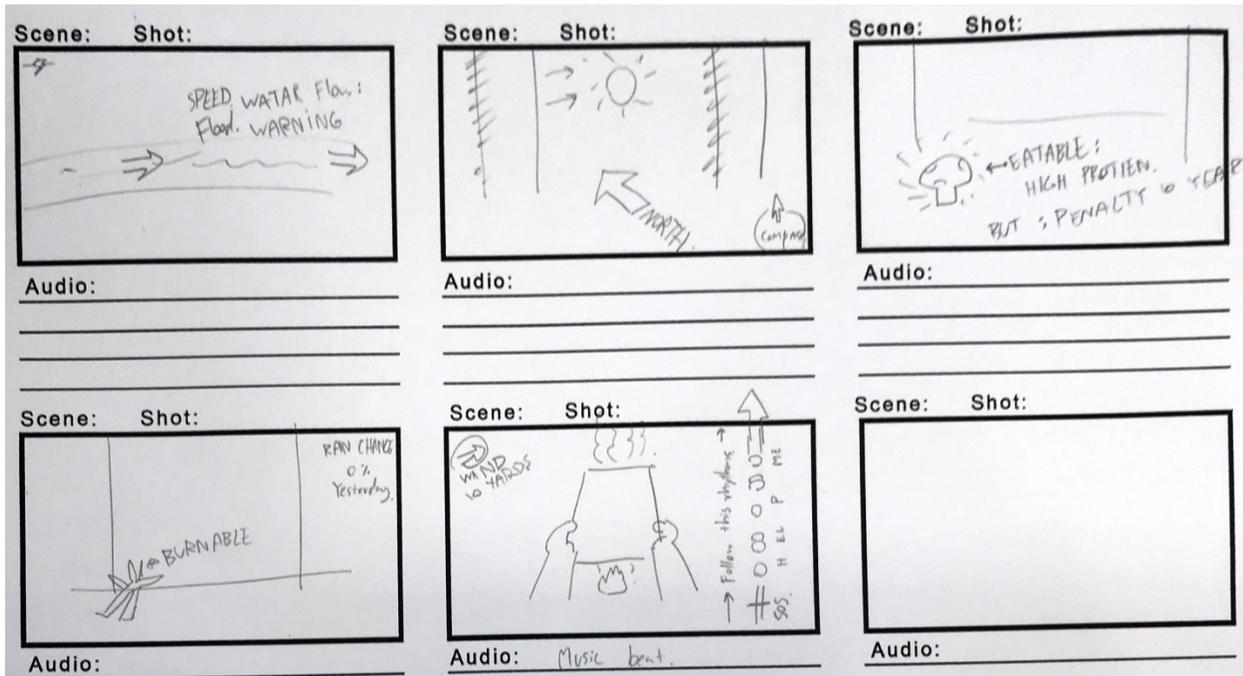
Dejawat Adulyarat, Teerapong Wonghom, Wasan Thanyakaew, Pawarit Chaemchuea, Martino, Cipriani, Whitchthana Tarnchindawong, Gabriel Camelin

Team 1 imagined using AR as an informational travel guide and tool, to explore Khao Yai, a National Park in Central Thailand. Thailand is in its golden age of tourism, with over 35 million international tourists visiting the country in 2017 (Thaiwebsites.com) while the Thai middle class is expanding with disposable income to travel. The team would use AR to display information on the various animal and plant species in the park. AR has the ability to perform computer vision, and by scanning the same tree, can learn to decipher the small differences in each type of tree it 'sees.' Information on plant life would consist of the type of plant, and its uses such as for building furniture, homes or medicinal purposes. The same processes can be applied to animals to determine

their breed and type. AR can determine which animal it sees and can deliver information about that species.



Other information includes valuable navigational measurements from displaying different trails to location of various attractions such as waterfalls and locations of rare species of animals. Tracking locations of animals requires the use of tagging the animals. Information overload is a constant issue with display information so data such as air temperature, altitude and humidity could be displayed on and off as required.

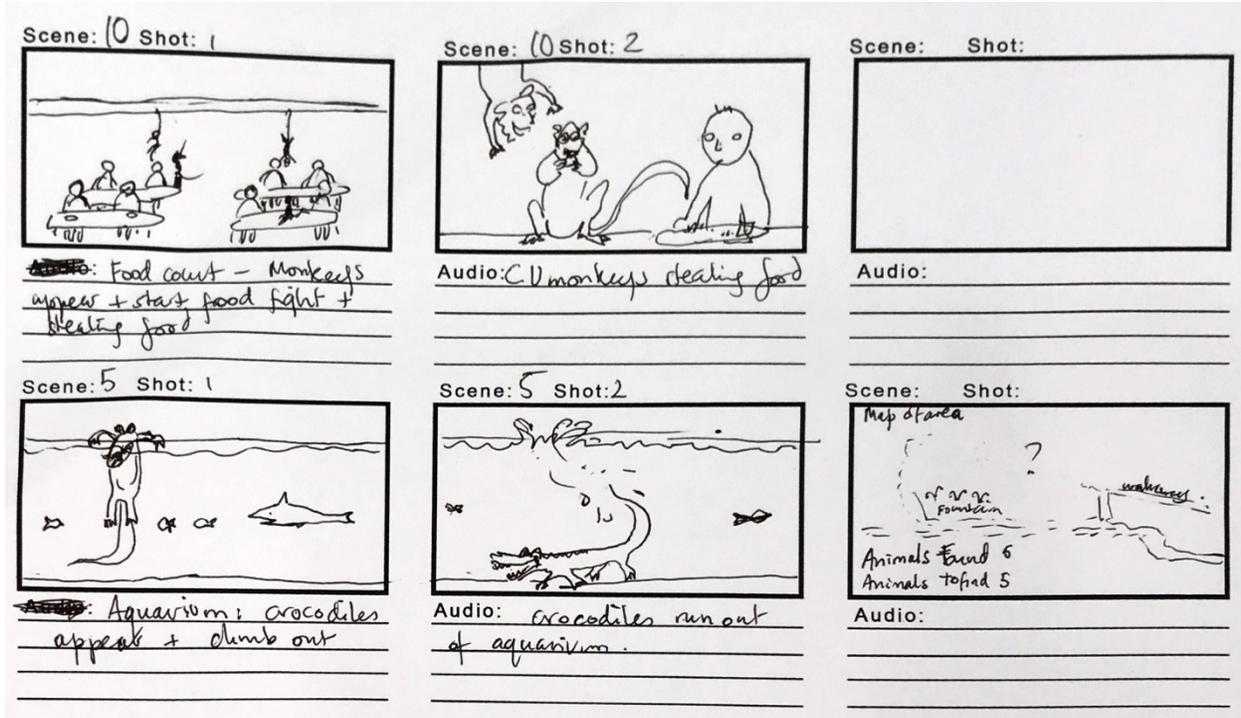


Informational tools within AR are common, as it allows the user to view it within the headset, rather than another device, like a smartphone which is a handheld device and does not allow for a hands free experience. As devices continue to become commonplace, it is important to understand the convenience of AR, as a display tool to be nonobtrusive, in comparison to a phone or handheld device. To compare to a smart watch, which is also hands-free, the major problem with those devices, is the limited screen space allowed.

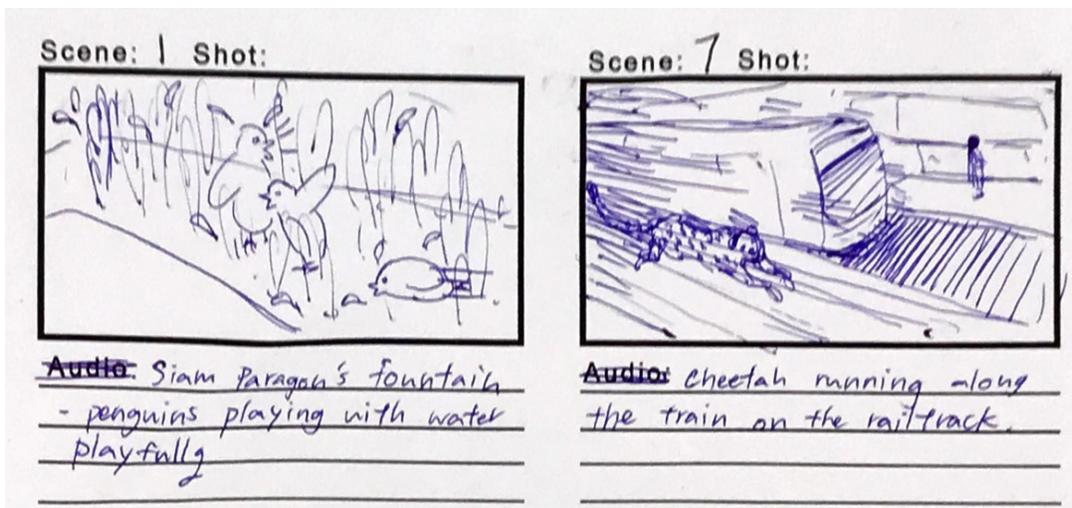
Animal City - Hybrid Edutainment and Commercial Application for Learning about Animation Species

Thatana Banchuencharoensuk, Napassawan Panthavuthiyanont, Aboom Leelaswatanakah, Millicent Young

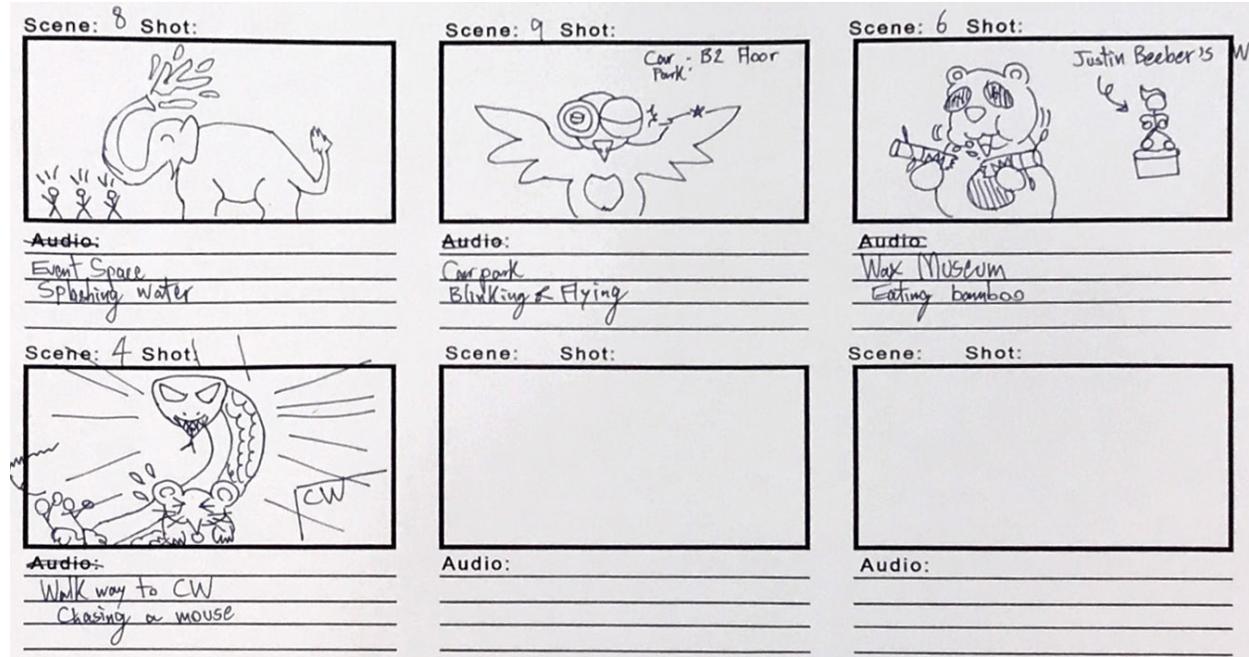
Team 2 came up with an imaginative and impactful way to discuss social issues in today's society by focusing on overdevelopment and overpopulation of cities. The project is a good example of edu-tainment, where the content is intended for entertainment purposes, but has an educational theme. As learning becomes digital, many digital ideas are fusing together. Such are the examples of digital video games and e-learning, and the use of gamification that can make the user addictive to games. Concepts such as elaborate graphics, score keeping, unlocking achievements and competitive play are concepts that gamification provides, to create an intuitive learning experience. For Animal City, similar concepts are applied. Their project imagines the user visiting popular sites around Bangkok, and how nature could reclaim these areas. The team proposed various sites around Siam Paragon, a famous and high-end shopping mall in downtown Bangkok. Known to tourists alike, this crowded area also connects to the BTS, Bangkok's sky train (elevated railway) system, making it a very accessible and a popular location. In 2013, it was Instagram's most photographed location in the world (The New Republic). In the basement floor, the food court would have monkeys climbing and eating food from the different stalls, among the crowded tables of tourists.



Between the large outdoor space between Siam Paragon and another mall, Siam Center, lies a number of water fountains and birds can be seen playing and drinking the water.



Outside the shopping center, a busy transportation hub, called the BTS, would have a cheetah running along one of the skytrains. In other scenarios, snakes are among the travelers along the skywalk (elevated pedestrian walkway) to Central World, another mall in the Siam area, as well as crocodiles swimming within the large aquarium displays outside Ocean World, an aquarium in the Siam Paragon shopping mall.



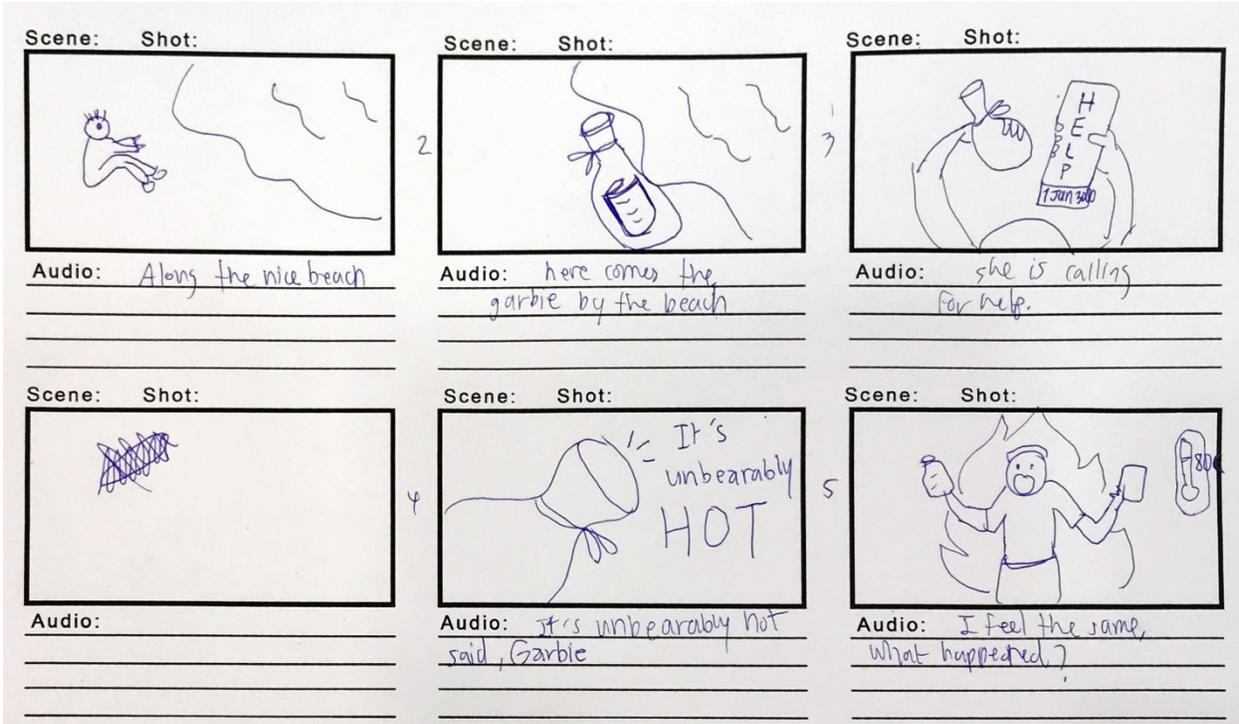
This type of project has a commercial appeal as well. It could serve as a promotional marketing tool for advertising the Dusit Zoo or Chiang Mai Zoo where the animals on display at those zoos would be on display in the AR screen. In many ways, advertising in AR has the potential to revolutionize the technology. Advertisers salivate at the idea of being able to feed target ads to particular audiences while also embedding these ads as they conduct their daily activities, when wearing the headsets. When compared to today’s methods of advertising, such as billboards placed in specific high traffic locations, or online on a specific website, the AR environment can allow ads to stay with the AR enabled user for any location, at any time.

Message in a Bottle – Alternate Reality Narrative to Promote Waste Management

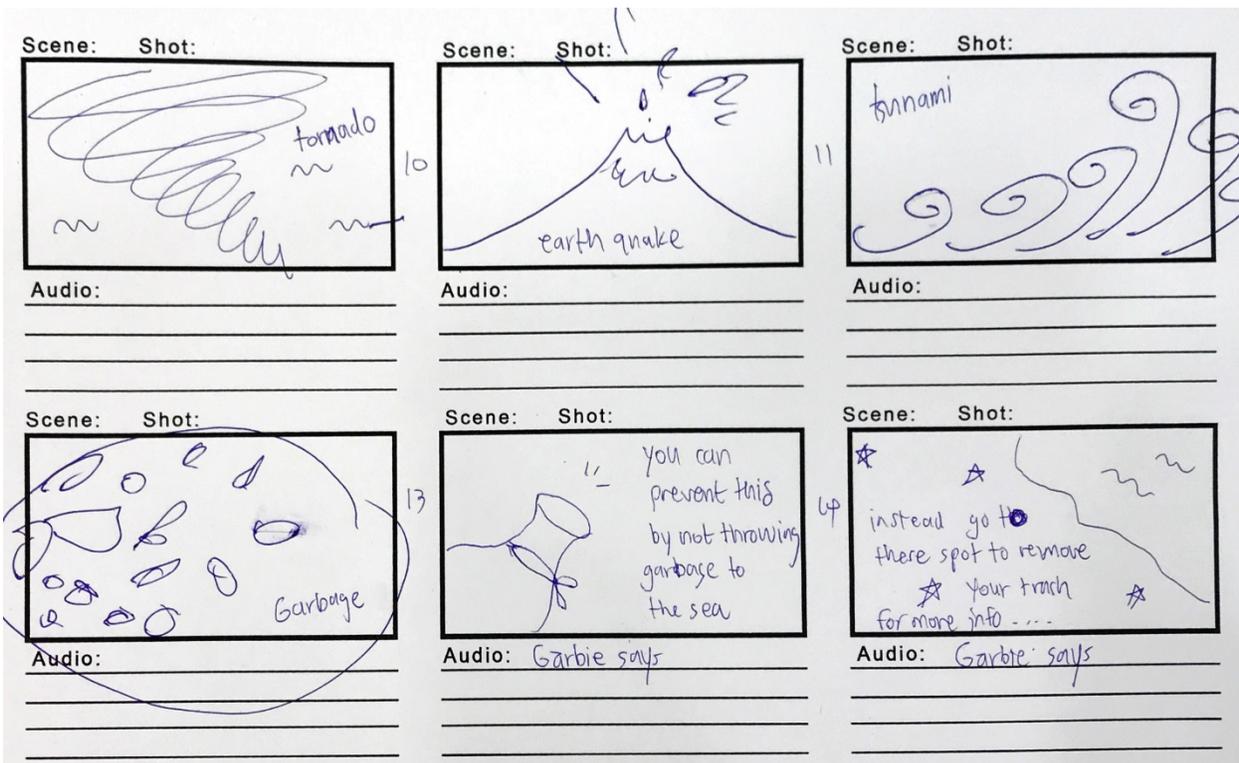
Pitchanut, Nueangjamnong, Aornthanatt Kiathisaksakorn, Wilailuck Kamjam

Team 3 designed a look into a utopian future, where the outcome of polluting the earth would cause grave effects on the environment, specifically focusing at the oceans. The project also discusses Thailand’s lack of infrastructure to support the growing number of tourists in various island destinations. The environment has been heavily strained to accommodate the overcrowded beaches, resorts and their waste footprint.

This project is similar in many ways to Animal City, as a teaching and entertainment tool but it has one major difference. This project has a strong narrative theme, with a clear beginning and end with character involvement. The user would find a message in a bottle, and upon opening the letter the message would read, ‘Help, Stop Polluting the Oceans.’



From this, the journey would begin as best described, is a time machine. The viewer would be taken from the current conditions of the ocean, to seeing it transform with today's current mishandling of the environment to 25 years beyond in a time lapse experience.



As with this type of proposed project, AR usually relies on a location, rather than in virtual reality, in which the space is manually generated. This allows AR to suggest the present, while also to act as a visualization tool, to show the future and past. Because it relies on a physical space, it is more relatable to audiences. The comparison could be made with fully computer generated movies versus special effects movies. On one hand, the fully computer generated environment and story can be more imaginative in such examples as *Coco*, or *Shrek*, however, by using special effects in movies, the connection is stronger with the audience because situations are grounded by reality. Special effects movies routinely are the most popular, based on box office revenue, than fully computer graphics (CG) movies. 2017's top movie grossing movie was *Star Wars –The Last Jedi* (Box Office Mojo), which uses heavy GC but relies on real actors and locations. Therefore, by referencing real life, the audience can better relate, easily consume the media and therefore, have an enjoyable experience.

AR and Animation - Current and Future Trends

Christopher Stapleton pioneered Mixed Reality Storytelling in works such as [Stapleton 2003]. One of the most expensive productions was later led by Ron Azuma with his *Westwood Experience*. He describes it as: “a location-based narrative using Mixed Reality effects to connect participants to unique and evocative real locations, bridging the gap between the real and story worlds.” Their paper [Wither 2010] describes the experience and a detailed evaluation of it. Azuma later condensed his insights from building several such experiences into a valuable overview of the topic [Azuma 2015]. Stapleton has also applied Mixed Reality to related areas including Education and Training. The plentiful related work is organized in a survey article [Hughes 2005].

Besides *Pokémon Go*, which is a form of AR in consumer entertainment, AR is being used in onscreen displays for luxury vehicles. Automakers such as Toyota and BMW have used AR technology to display speed and directional information on the windshield. This 'always on' data gives users precise information at all times, which leads to less directional mistakes, while keeping other drivers safe from sudden road situations. This makes AR a logical technology for education. AR implications can provide limitless amounts of information with real-time interaction with the environment. This delivery method is the most natural method, so far. Already the knowledge gap has changed, since the advent of the internet, to provide information that has allowed human civilization to value critical thinking over information memorization. In this thinking, AR will allow for people to learn more naturally, and while freeing their hands, to learn and perform hands on. This could lead to more effective learning since it has been known that experiential learning is a proven form of learning.

Animation, on the other hand, has primarily been used for entertainment in the 1800s to the 1990s for passive, screen audiences for various forms from movies, TV shows, music videos and

commercials. Its integration to video games soon followed with the advancement in technology and further expanded into VR. Hasbro, the world's largest toy maker, has launched an AR app with its Iron Man helmet to let the user experience the battle with Thanos (Wired, 2018). The user is the character instead of playing the character in a video game. From entertainment, animation can be seen everywhere, from interfaces in mobile applications, visualization for architecture to medical animations to explain a complex procedure.

It is predicted by 2025, that AR will penetrate the healthcare industry, for the visually impaired and with aiding doctors in complex surgeries (Medium, 2018). Another sector in which AR will dominate, is in the retail sector where consumers can wear the clothes in an AR experience and can reorganize a room, and place furniture to envision how a particular piece of furniture will behave in the space (Entrepreneur, 2018). Zara, a popular mainstream clothing label based in Spain, has an AR app that you can 'try on' their clothing digitally, as seen in Siam Paragon. Travel is also a major player in the AR space. Some 84% of consumers would be interested in using AR for travel experiences (Entrepreneur, 2018). The list of purposes of AR include: provide itineraries, maps of the area, recommendations of the best restaurants and top sightseeing spots.

Future of AR and Animation in Thailand

The storyboards to concept ideas from students at Chulalongkorn University can give a very valuable insight on the future of AR projects in Thailand. First and foremost, the openness of Thais to tourism and their emphasis of providing an educational experience shows their willingness to educate local and international visitors. The use of wearing glasses, makes for a natural experience of reading text, frees the hands to explore and conduct other activities. Although the AR devices will be expensive and less accessible to every Thai citizen, it does mean there will be an emphasis on the development for international tourists. Bangkok, with its 27 million international visitors per year makes tourism a logical sector to develop AR. (Business Insider). A user could simply see the best restaurants and sights from the AR device. When compared to a traditional means of navigating a new space, through maps and smartphone, AR can make tourism more natural, and possibly more effective. The focus for Thais in the future, is to use AR technology to enhance the visitors experience of Thailand. Thailand could be an excellent opportunity to test new AR possibilities in tourism, which could happen once AR has fully penetrated the markets of first world countries.

Entertainment, in the form of interactive content such as video games was not mentioned during the brainstorm and proof of concept discussions. Entertainment is a driving force in AR, and its absence in the discussion means that entertainment in Thailand is still developing. The Thai drama, Thai horror and I-san movies still lead the way in Thai content creation. Simply put, Thai audiences prefer the passive experience of watching a TV, instead of playing Thai video games and watching Thai animation. Another explanation of the lack of original Thai entertainment

content, is because of the American influence. America is the global leader of entertainment from blockbuster movies, to multiplayer online and casual gaming markets. Thailand cannot compete in creating original content for movies and animation because America has world class production houses, and massive marketing and distribution methods globally. Because of this, there is little incentive to compete and push the envelope of game development and animation in AR in Thailand. Additionally, Thai animation can not compete on the local stage. The overwhelming majority of Thai audiences prefer foreign content over Thai content. The lack of engagement of Thai audiences, means Thai animation will be overshadowed by international content creators such as media giants such as Pixar, and Disney. Fundamentally, Thais need to understand that animation is not only reserved for children, but can be experienced by all. This has pushed Thai feature length animation to the background, as many Thai feature length animations has been losing significant amounts of money in recent years (Bonutzuu, 2018). Animation in Thailand is still in its early phases, with few popular franchises and financial means to push creativity, both critical areas of a strong animation industry.

Conclusion

AR and computer animation are on the cutting edge of communication arts and will continue to morph and change. From creating AR experiences for education, as seen in the proposed project Khao Yai, the technology will be used to enhance the experience for the user, in navigation, education and to create a full experience of the national park, all through a hands free device. Education appears to benefit most from AR, with information on a heads on display, freeing the user of memorization and focusing on critical thinking skills. The Animal City project takes a different form, in which edu-tainment and gamification ideals come to form. The user is entertained with the advanced graphics and the interactions of animals in public spaces makes for imaginative experiences while informing educational information to the user of the various types of species. It also can serve a commercial entity, in advertising large institutions such as zoos and tourist sites. Message in a Bottle takes a similar edu-tainment approach but adds a narrative, to teach audiences about pollution and its effects on our oceans. The use of AR to bring real locations to perspective, in visualization, and can act as a 'time machine' into the future or past. Those strengths in relying on reality allow AR to relate to more audiences than fully computer generated environments, and has the potential to be more popular as mirrored through the success of special effects movies.

In the Thai context, there is a strong emphasis on tourism in all the projects. With Bangkok being the most visited city in the world (Business Insider), there has been a strong influence to provide visitors with informational guides. Visitors can have information at their finger tips, to find the city's top sites, best food and shops. However, overcrowded airports and commercial shopping centers, have left Thais questioning the sustainability of their country from the international influx of people. The rapid development of Bangkok, and other cities in Thailand have put a strain on the

environment, while other basic services such as waste management, transportation and infrastructure have been left to play catch up. So as AR projects are being imagined and created in Thailand, there will be a strong focus on tourism and its impacts to society. As a whole, AR will simplify our lives by taking information ‘at our fingertips’ to taking information to our vision, freeing our hands to do other things. Advancements in technology, in display, processing and authoring will make AR creation easier, faster and more believable in the coming years. AR and animation in Thailand will not see mainstream adoption for a few more years. As technology is developed and experimented in first world countries, Thailand will be playing catch up to develop innovative uses of AR and animation. As entertainment is the main benefactor for AR and its largest industry, Thailand looks to play in the tourism industry, as they are the world leader in tourism. However, as AR and animation borrows concepts from different forms of communication, in narrative and time based media, graphics and videogames and education and books, it will continue to morph and change shape as it continues to become more and more integrated to enhance our daily lives.

REFERENCES

- Box Office Mojo. 2017 Worldwide Grosses. (2018).
<http://www.boxofficemojo.com/yearly/chart/?view2=worldwide&yrr=2017&p=htm>
- Paul Milgram and Fumio Kishino. A Taxonomy of Mixed Reality Visual Displays. *IEICE Transactions on Information Systems*, E77-D(12):1321–1329, December 1994.
- Ron T. Azuma. A Survey of Augmented Reality. *Presence, Special Issue on Augmented Reality*, 6(4):355–385, August 1997
- Entrepreneur. 2018. The Future of Augmented Reality. (2018)
<https://www.entrepreneur.com/article/312271>
- Bonutzuu. 2018. The Legend of Muay Thai: 9 Satra Review (+ a brief history of Thai animation). (2018) <https://bonutzuu.wordpress.com/2018/01/21/the-legend-of-muay-thai-9-satra-review-a-brief-history-of-thai-animation/>
- Medium. 2017. 6 Things That Are Happening In AR Right Now. (2017)
<https://medium.com/bluelabellabs/6-things-that-are-happening-in-augmented-reality-right-now-c67a061d8af3>
- Microsoft. 2016. Roboraid. (2016). <https://www.microsoft.com/en-us/hololens/apps/roboraid>

Chanthanakone, P. and Sandor, C.

Niantic. 2016. Pokemon GO. (2016). <https://pokemongolive.com/en/>

Interactive Media Design Lab. 2017. AR Yōkai. (2017). <https://aryoukai.com>

Thai Tourism Statistics 2017. Thatwebsites.com. (2018).

The New Republic. 2014. The World's Most Instagrammed Place Is a Mall in Thailand. (2014) <https://newrepublic.com/article/116078/siam-paragon-mall-worlds-most-instagrammed-place-thailand>

Business Insider. 2017. Thirty Most Visited Cities in the World in 2017. (2017). <http://uk.businessinsider.com/the-most-visited-cities-around-the-world-in-2017-2017-9>

Wired. 2018. How Augmented Reality Is Shaping The Future of Play. (2018) <https://www.wired.com/story/ar-toys-the-future-of-play/>

Techradar. 2018. Apple's Tim Cook: 'AR has the ability to solidly human performance.' (2018) <https://www.techradar.com/news/apples-tim-cook-ar-has-the-ability-to-amplify-human-performance>

Wither, Jason, Rebecca Allen, Vids Samanta, Juha Hemanus, Yun-Ta Tsai, Ronald Azuma, Will Carter, Rachel Hinman, Thommen Korah. The Westwood Experience: Connecting Story to Locations Via Mixed Reality. IEEE International Symposium on Mixed and Augmented Reality 2010, Arts, Media and Humanities Proceedings (ISMAR AMH 2010) (Seoul, Korea, 13-16 Oct. 2010), pp. 39-46.

http://ronaldazuma.com/papers/ISMAR2010_paper.pdf

Azuma, Ronald. Location-Based Mixed and Augmented Reality Storytelling. Chapter 11 in the book Fundamentals of Wearable Computers and Augmented Reality, 2nd Edition, Woodrow Barfield, editor. CRC Press, Aug. 2015. pp. 259-276.

http://ronaldazuma.com/papers/Chapter_Azuma_2nd_Fundamentals_Wearables_AR_final.pdf

C. E. Hughes, C. B. Stapleton, D. E. Hughes and E. M. Smith, "Mixed reality in education, entertainment, and training," in IEEE Computer Graphics and Applications,

vol. 25, no. 6, pp. 24-30, Nov.-Dec. 2005.

<http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=1528429&isnumber=32639>

Christopher Stapleton and Charles Hughes. 2003. Interactive Imagination: Tapping

the Emotions through Interactive Story for Compelling Simulations. IEEE Computer. Graph.
Appl. 23, 5 (September 2003), 11-15. DOI:
<https://ieeexplore.ieee.org/document/1231172/>