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AUGMENTED REALITY // PRINT AND DESIGN

JUTPOSE

Exploring the technical and
aesthetic potentials of print-based
augmented reality design. 拡張現実



J U X T A P O S E

Exploring the technical and aesthetic potentials of
print-based augmented reality design.

Darren Menorath

MMXIV.

AB- STRACT

A BRIEF SUMMARY ABOUT PROJECT JUXTAPOSE

This practice-led research project examines how the technological and aesthetic components of augmented reality (AR) serve to extend, enhance and disrupt print-based design.

The outcome of the project is a conceptual hybrid AR/print publication that demonstrates the aesthetics and models of AR creation in an augmented space; a book that represents the merging of virtual and physical, in terms of technology and aesthetics.

Juxtapose explores tensions between the digital and the analogue and invites the reader to physically and virtually interact with the artefact. Handmade and digital elements are juxtaposed to enhance, extend and reveal layers of information and representation. The artefact is a site of experimentation that explores the possibilities of interaction resulting from the use of multiple markers to create a playful augmented space.

This project also investigates the concept of an augmented space; a mixed reality (MR) world (a hybrid reality that combines physical and digital objects in a real-time interactive space). *Juxtapose* engages with Matsuda's contemporary vision of an *augmented space* (2016), a term proposed by Manovich (2002) that draws on Baudrillard's concept of hyperreality based on simulacra and simulation (1981). Matsuda proposes that Manovich's augmented space is also a setting where individuals are free to create, customise and contribute to both shared and personal augmented space.

The final artefact uses a collection of zines (handmade magazines) that explores the hyper-consumerist aesthetic of the *Vaporwave* design movement as a form of visual critique, whilst proposing a networked model of content creation in *augmented space*. Taking into consideration current handmade movements such as Zine culture, this project also considers the potential of AR as a participatory creative space.

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Darren Menorath 21 November, 2016

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Darren Menorath 21 November, 2016

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何が真実ではありません、すべてが許可されています

Nothing is true, everything is permitted.
— Unknown Maxim.

INTRO- DUCTION

THE COILS OF LIFE AND DEATH NOW BIND US ALL.

Augmented reality (AR) can be considered “the overlapping of virtual information in real space... mixing virtual objects generated by computers with a real environment, generating a mixed environment that can be viewed through any technological device in real time.” (Redondo, Puig, Fonseca, Villagrasa & Navarro. 2014. p. 16). This project focuses on print-based AR which Lichty (2014) describes as “fiducial” (loose AR print targets) and “planar” (publication/large prints) based markers that serve as triggers for smart device cameras to pick up. AR serves as one of the main components of *mixed reality* (MR), an umbrella term for “technologies that involve merging of real and virtual worlds” (Milgram, 1994. p.3).

This project focuses on the aesthetic and technological potentials of AR in print media, whilst investigating how current modes of content creation affect the outcome of a hybrid publication. Manovich’s (2002) MR concept of an augmented space — the overlaying digital information on physical spaces in our daily living— proposes two key concepts to contextualise this project; a hyperreality that presents Baudrillard’s (1981) vision of a world of simulacra and simulation, and the hypothetical context of an augmented space where AR creation is practiced in their own living spaces, proposed by both Manovich (2002) and Matsuda (2010).

Because an *augmented space* relies on the Internet to display and connect to others in an AR environment, this project investigates Internet art movement *Vaporwave* to explore how AR content will be created in this hypothetical context. Vaporwave’s community, known as the *Virtual Plaza*, provides two key aspects relating to this project: their participatory model of creating art and design that ties into Matsuda’s hypothetical context, and how the visual aesthetics of Vaporwave is a critique and representation of contemporary hyper-reality.

The choice of publication for this project’s artefact are zines: handmade, small-circulation magazines which creators produce, publish, and distribute themselves (Duncombe, 2008). The collection of zines uses Lichty’s (2014) five modalities/gestures to investigate different functions of print-based AR. Each zine adopts a specific AR modality/gesture that explores how other creators have integrated AR into their work. A simplified version of these AR techniques is then demonstrated through various fiducial and planar markers. Zine was chosen as a publication style because it alludes to the notion of a self-made product that expresses the creator’s motives. This aspect ties into Vaporwave’s culture of creating their own digitally remixed content as a form of self-expression.

The overarching goal for this project is to apply AR to print media to explore technological and aesthetic potentials of a hybrid publication. This exploration opens up discussion around simulacra and simulation, how AR content could potentially be made and whom it could be made by, and what the aesthetics of the AR and publication may look like according to current creative movements.

This exegesis is organised into five sections: the literature review, methodology, the AR modalities/gestures, and the overview of the project itself. The review of knowledge covers key topics regarding democratised AR software, how print media can benefit from AR, the vision of an augmented space, and how the Internet movement Vaporwave provides a model of content creation in the augmented space. *Juxtapose's* design-led methodology is discussed in the second section. The AR modalities and gestures section is separated into five areas that cover the different functions of AR: fiducial, planar, environmental, locative, and embodied. The fourth section is an insight into the development of the project and the issues that were encountered. The final section concludes the exegesis and considers future developments.

LITERA- TURE REVIEW

A REVIEW OF KNOWLEDGE AROUND THE
TOPICS AND ISSUES AROUND THE CREATION
OF PRINT/AR HYBRID PUBLICATIONS.

The review of knowledge will be divided into five sections regarding topics and issues around the creation of print/AR hybrid publications. The first section discusses how past issues in AR user experience and interfaces have contributed to the development of democratised AR software. This is followed by the discourse regarding the value of print media and how incorporating AR helps to enrich the medium. The third section covers current user experience issues concerning the tension between print/physical and AR/virtual. The topic of an augmented space and its relation to the theoretical context of everyone being able to create their own AR will be discussed in the fourth section. The final section around Internet movement, Vaporwave will be divided into two subsections; Vaporwave's aesthetics and how it reflects consumerism in the theoretical context of an *augmented space*, and its model of creating Internet-based content utilised in this project.

AUG- MENTED REALITY HIN- DRANCES,

DESIGN, AND ITS INFLUENCE ON CURRENT
AR DEVELOPMENT SOFTWARE AND APPS

Due to the lack of public knowledge around the creation of marker-based AR, many people think that integrating AR into everyday objects is complicated. Makers of the *Designer's Augmented Reality Toolkit* (DART, 2002) noted these issues in their AR software development and determined two key factors behind this perception; the first was the platform user interfaces, which were mostly code-based at that time. The second issue was the massive amounts of work needed to get a prototype going, requiring a small team to work with the software, organise a controlled area, and create the art/and or design for it. (Gandy, MacIntyre, Dow & Bolter, 2007. pp.161-162).

By identifying these issues alongside the development of smart devices, other AR companies after DART brought forth user-friendly AR software. AR platforms and apps such as LAYAR Creator (2009), Qualcomm Vuforia (2011), Wikitude Studio (2015), and Augment Desktop (2016) allow anyone to quickly produce AR content. Basic AR apps offer simple platforms that utilise the basic functions and tools such as simple 2D text and image overlays, hyperlink buttons that send the user to webpages, video playback, and 3D static objects (see Figure 1.1). User-friendly AR tools, available to the public to try for free, open up the opportunity for both designers and Internet creative groups to take advantage of the technology and make it their own. *Juxtapose* contributes to the movement of democratised AR by presenting an artefact that exemplifies simple AR techniques that anyone can do themselves. Utilising *fiducial and planar* based AR, the artefact shows the reader that AR can be made from any sort of print or photo, allowing for great flexibility in terms of creation and use of resources (see Figure 1.2).

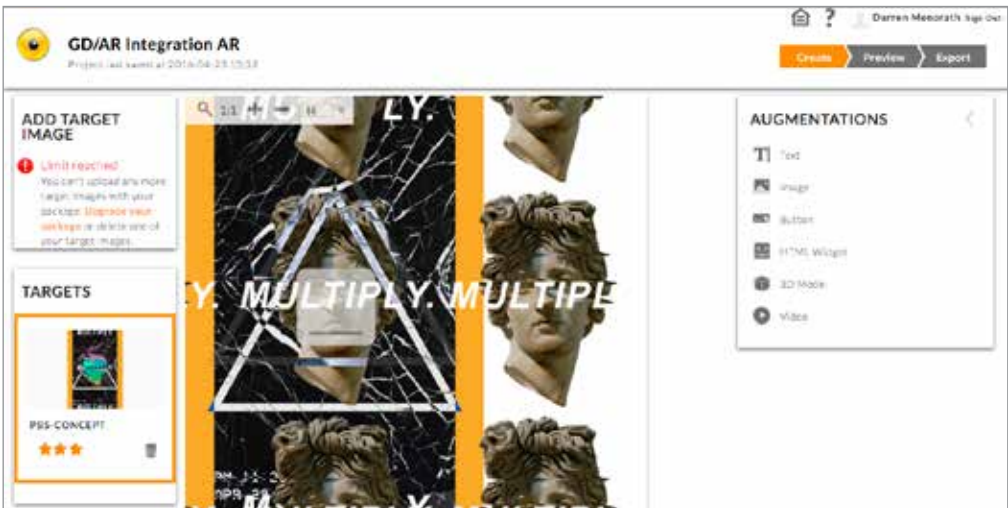
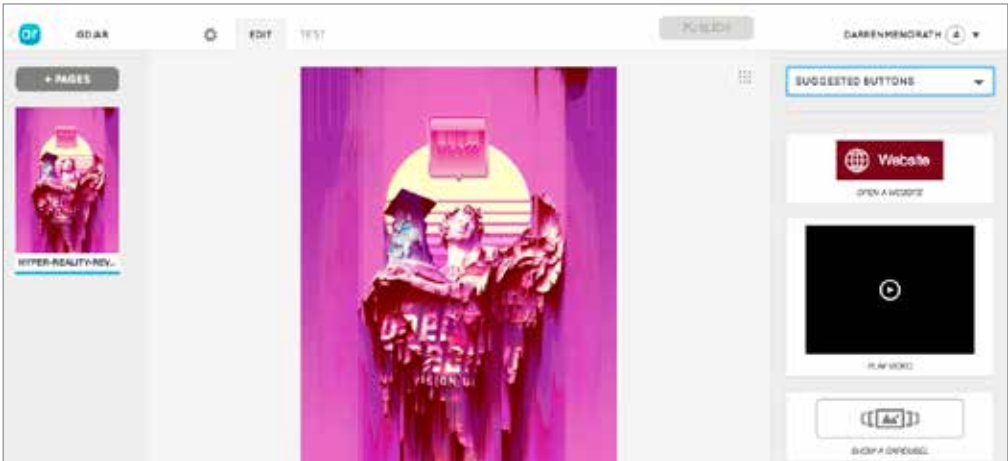
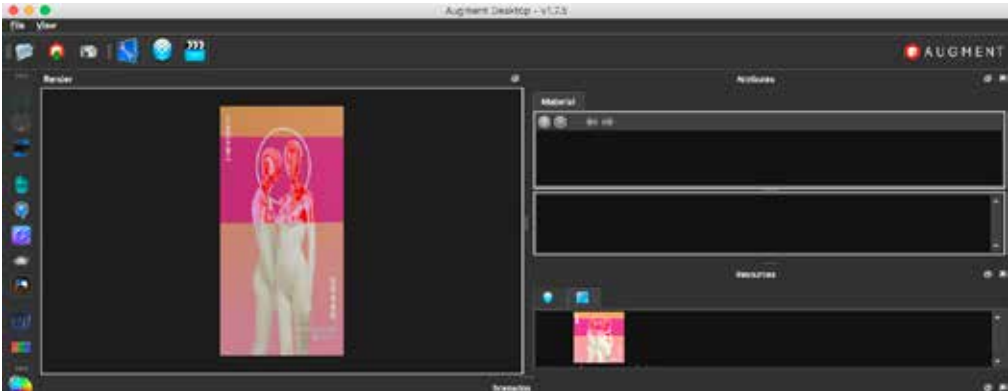


Figure 1.1. [Top] Augment Desktop (2016), [Middle] Layar Creator (2009), [Bottom] Wikitude Studio (2015).



Figure 1.2. Menorath, D. (2016). *Fiducial based AR marker concept*. Screenshot of AR app.

The image marker (on the left) is a simple design print used to test fiducial markers the size of a post-it note (76 x 76 mm). Any image with enough detail can be used as an AR marker. Detail in the image/photo acts points of registration, creating a unique pattern that functions similar to a QR code.



PRINT AS A MEDIUM

PRINT IS DEAD.
PRINT IS NOT DEAD.

The digital information age has brought on a looming dread that print as a medium will die out and be replaced by smart devices that overlay or project virtual information (Blackwell, 2000). For the sake of sustainability in a world of excessive consumerism, this might be the case in the future. However, the value of print media such as books and old posters, hold a sense of provenance and personal ownership that isn't yet achievable with virtual objects (Weedon, Miller, Franco, Moorhead & Pearce, 2014). This project proposes that AR is one of many ways of rejuvenating print media by giving it a new, virtual layer of interaction and depth.

The merging of AR and book can be considered a *hybrid publication*; having both values that come from a physical artefact and virtual image projection. In *Post-Digital Print*, Ludovico's (2012) remarks on this notion stating "if print increasingly becomes a valuable or collectable object, and digital publishing indeed continues to grow as expected, the two will nevertheless cross paths frequently, potentially generating new hybrid forms." (p. 155). Hybrid publications could be the solution David Coupland and Jessica Helfand were looking for in Blackwell's (2000) *The End of Print*: "Print isn't dead; it is just sleeping ... The message here is that the moment something seems dead is the point where it most likely springs back to life." Coupland and Helfand both suggest that something will come along and help rejuvenate print media. This project builds on Ludovico's, Coupland and Helfand's notions, stating that AR is one of many solutions that will help enrich practice around print media.

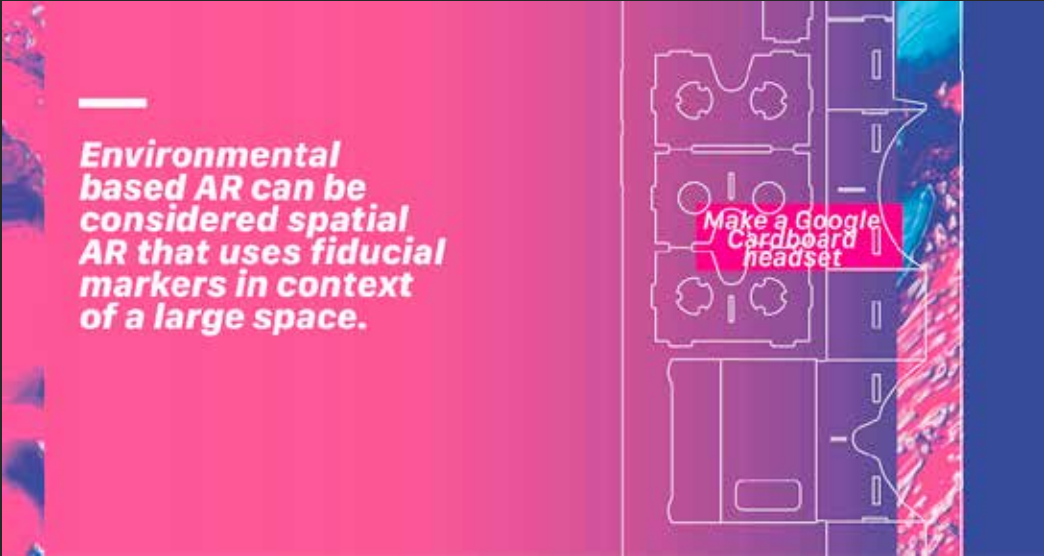
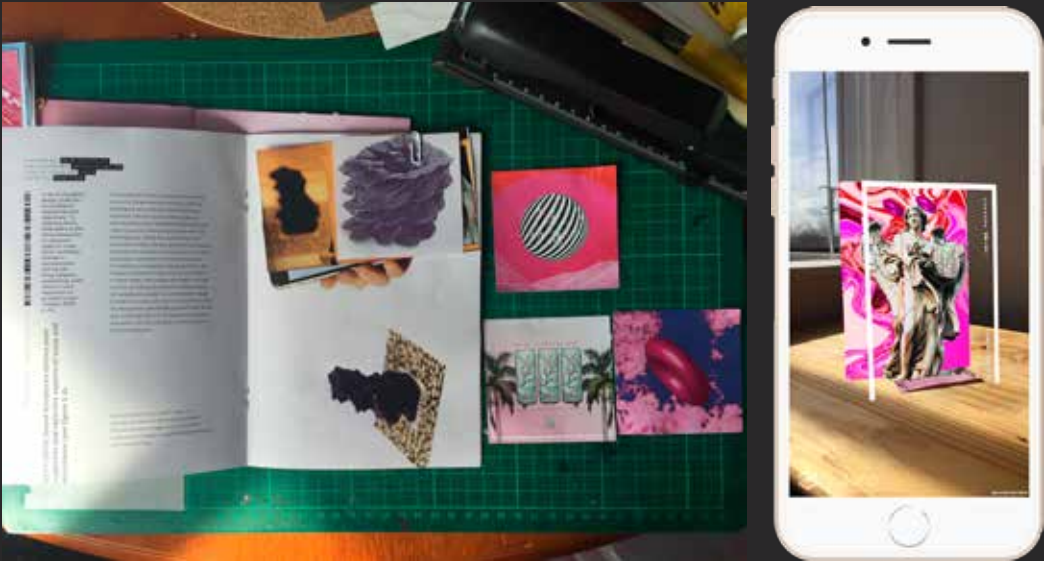


Figure 1.3. Menorath, D. (2016). *Concepts of an environmental based AR experience*.
The motive for this concept was to encourage the reader to stick the image markers (bottom left image) in various areas, whilst using a Google cardboard headset to view the AR content. This was to give the reader a simple example of an environmental-based AR experience that is easily achievable at home (bottom right image).



Because this project is contextualised in an interactive augmented space where both consumer and creator produce AR content for themselves, the aim for the artefact is to aesthetically reflect values of the handcrafted that are present when people create things from their living space. Lardies' (2013) *Impressions- Documentations of Memories* became a source of inspiration to the creation of the project artefact, taking on the concept of tangible bits of print and photos (see Figure 1.4- 1.5). These various items embody a humanist aspect of how we intimately use print media. The work embraces human error such as misprints and the paper being handled too much. Here, print media presents itself flawed in terms of its finite nature. These flaws however, provide a sensory experience unique to the medium as Odihi (2013) states in regards to the materiality of the newspaper: "Central to the phenomenological experience of the newspaper is its materiality. In printed format the tactile receptors of the body experience the newspaper through the sensory faculties of touch and vision" (p. 114). This project artefact takes this sensory experience to another level by introducing AR properties to these loose pieces of print and photo. Rather than just looking and interacting with the artefact from a physical point of view, AR brings a virtual aspect to the piece of print, allowing the reader to move fiducial markers around and join them to reveal new AR content (see Figure 1.6).

[Top]: Figure 1.4. Lardies, G. (2013). *Impressions: Documentations of Memories*. Retrieved from <https://www.behance.net/gallery/12237795/Impressions>

[Middle]: Figure 1.5. Menorath, D. (2016). *Lardies' Influence on Juxtapose's initial concept for publication*.

[Bottom]: Figure 1.6. Menorath, D. (2016). Smartreplicas (2014) and Soundsculptures (2015) *Joint marker AR content*.

The two image markers on the left combine together to reveal a completely different AR content that exemplifies the concept of immersing the AR around the fiducial markers.



The artefact for this project encourages the reader to look for AR content in the publication by combining fiducial image markers seen in Figure 1.6, or simply scanning through the zine with their smartphone. *Night of the Living Dead Pixels* (2009) showcases fiducial/planar-based AR using Quick Response (QR) integrated images (see Figure 1.7). The key element from this example is interactivity and how the paper-engineered booklet intrigues the reader to look for more AR content through its various folded pages. This type of interaction is described by Beach and O'Brien (2008) as a modern form of materiality, "wherein the text physically resides in both actual and virtual spaces" (p.799). The artefact for this project utilises this concept differently, combining tangible aspects from Lardies' (2013) artefact, but incorporating the playful component in *Night of the Living Dead Pixels* (2009). The reader uses the smart device to scan over the print publication to find more content, creating a sense of exploration. However, this repetitive action becomes increasingly awkward, presenting an implicit and explicit tension when print and smart device come together.



Figure 1.7. Gravity. (2009). *Night of the Living Dead Pixels*. Retrieved from <http://www.living-dead-pixels.com/>

TENSION BETWEEN DEVICE AND PRINT MARKER

THE ISSUE PRESENTED IN THE JUXTAPOSITION
OF PHYSICAL AND DIGITAL WORLDS.

Current AR practice has an implicit and explicit tension between the fiducial/planar image marker, the device activating the AR, and the user. What is present here is the miscommunication between human and device. The act of using a smartphone to view AR content creates a technological filtering barrier between the device and print. Without the AR app, the smart device physically interferes with the viewer's vision of the image marker. When it does have the app to reveal the AR, it displays it in a lower resolution than what our eyes perceive. There is a sense of technological filtering here, shifting between embodiment and disembodiment—the marriage and contradiction between analogue and digital. But because the AR content can only be revealed with the app and the smart device, there is a dependency on the device.

The tension between analogue and digital can be attributed to the fact that both the smartphone and the publication are technologies that display information. Ludovico (2012) contextualises notions regarding the tension between analogue and digital with publications becoming e-books: "The printed page is more than just a carrier for things to be shown on some display; it is also the display itself. Changing it consequently changes people's experience, with all the (physical) habits, rituals and cultural conventions involved" (p. 153). Here Ludovico remarks that screen-based technologies will not be able to replicate the essence of print, highlighting the tension between analogue and digital.

Ludovico's statement provides two reasons why a publication is used for this project: to contextualise issues using fiducial and planar-based AR with current smart devices, and to show that the tension regarding the use of AR adds more value to handmade publications by giving a slightly disruptive, but unique experience. Errors present in human-technological interaction can be reflected in today's interest in the aesthetic of glitch in digital art, where there is a miscommunication between human (sender) and device (receiver). The artefact for this project embodies this tension in both a literal and metaphoric way through its juxtaposition between analogue and digital, hence the name of the project (see Figure 1.8). The visual presentation of digital/virtual projection on to analogue/physical planes proposes the possibility of an augmented space that seeks to remove barriers of communication between humans and technology by using MR in daily living.

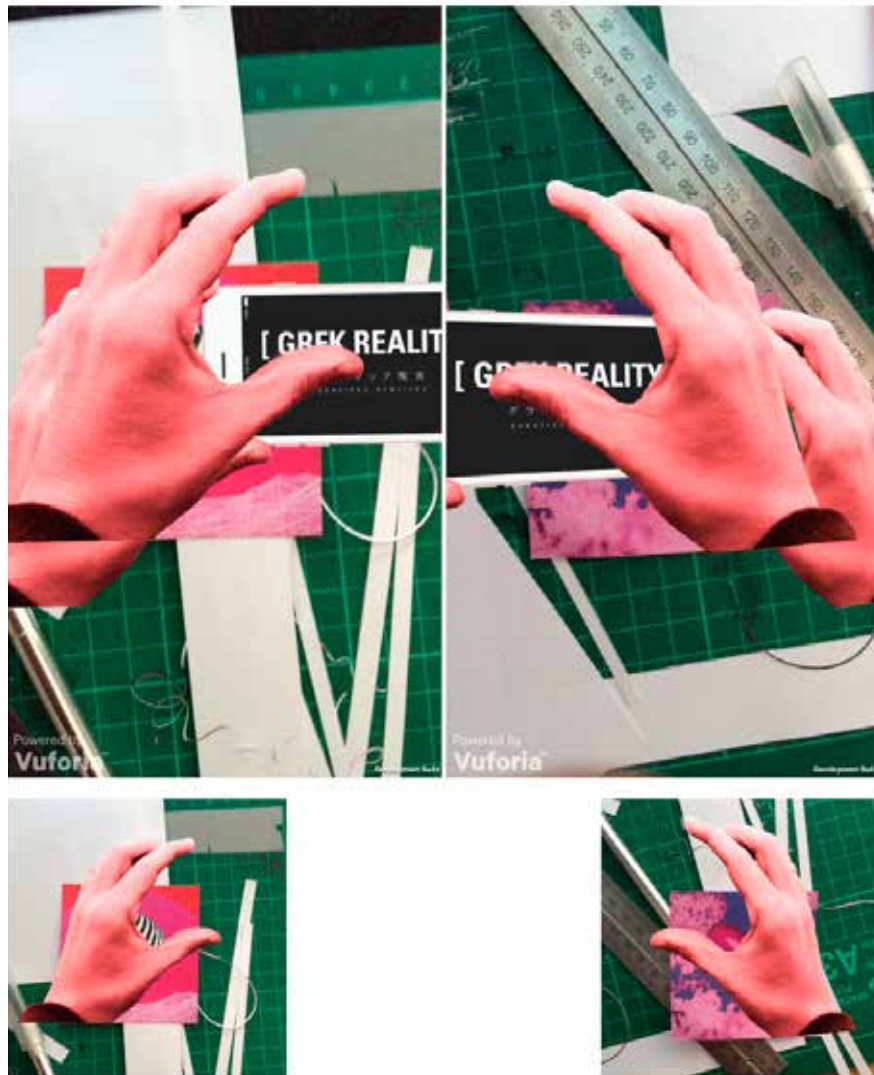
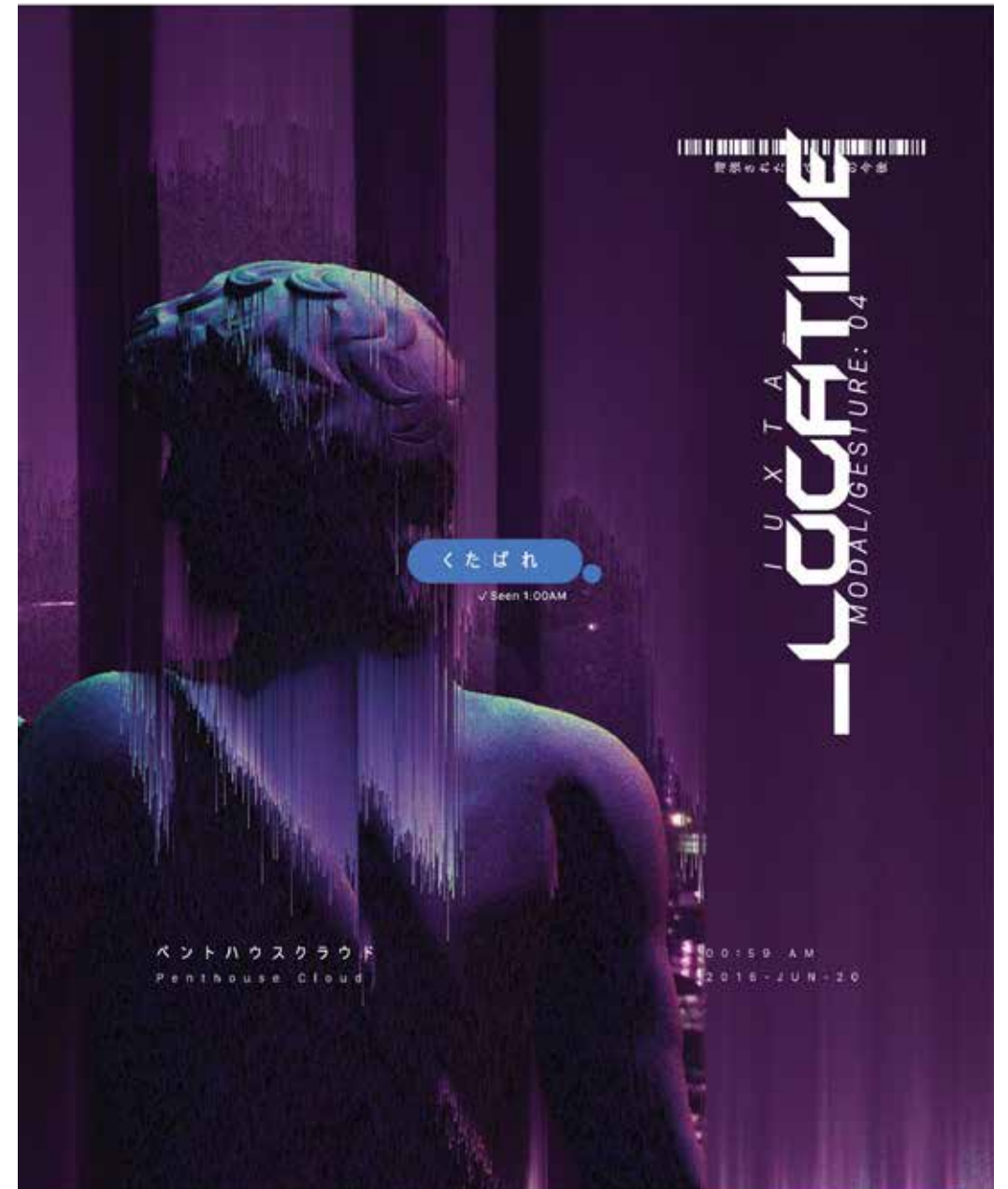


Figure 1.8. Menorath, D. (2016). *Errors with AR image recognition and technological errors as an aesthetic.*

On the left is an example of multitarget fiducial AR markers showing their combined AR image, rather than their single target AR image (bottom images). The right image shows a conceptual page in the zine where there is a deliberate use of the misprint aesthetic. Both images exemplify the miscommunication of technology that are both accidental and on purpose.



AUGMENT- ED SPACE: A VISION OF A MIXED REALITY WORLD

BAUDRILLARD.
MANOVICH.
MATSUDA.

"Like photography, the design of AR environments has been democratized...everyone participates in its consumption and creation. The augmented space is truly a spatial expression of the people who live in it." (Matsuda, 2015. 24:32).

This project's theoretical context where *prosumers* can create AR lies within Manovich's (2002) augmented space: the physical space overlaid with dynamically changing information (pp. 1-2). The *augmented space* can be considered a concept based on Baudrillard's (1981) hyperreality of simulacra and simulation: "The real is produced from miniaturized cells, matrices, and memory banks, models of control - and it can be reproduced an indefinite number of times from these" (p.2). Manovich also proposes the use of AR as "an idea and cultural and aesthetic practice rather than as technology" (p. 2). Matsuda (2010) adds to this notion by proposing a democratised AR environment where anyone can create AR within their spaces: "the augmented city depends on collaboration between those that physically inhabit it" (p. 46). Though this project looks specifically at print based AR publication, its technical function can be applied in the augmented space, as products and objects such as stickers on appliances, posters, and books can inherently have AR capabilities. Matsuda's MR vision (seen in Figure 1.9) highlights two topics that will be discussed in this project: the relationship between the physical and virtual, and to visually contextualise a world bombarded with advertisements— a hyperreality. In the theoretical context, the Internet can be considered the heart of an augmented space, allowing prosumers to share and view each other's AR. This project adopts modes of creating content from the Internet movement Vaporwave to explore how web-based creative communities generate art and design, and how its aesthetics are a reflection of our own hyperreality.

Prosumer is a term coined by Futurist, Alvin Toffler meaning "one who is both producer and consumer" (Ritzer, Dean & Jurgenson 2012. p.2).



RECIPE BROWSER

Cup of Tea

submitted by XisTenZ222

- ingredients -

135ml BRITA FILTERED water [BUY IT NOW!](#)

1 PG TIPS tea bag [BUY IT NOW!](#)

25ml TESCO semi skimmed milk [BUY IT NOW!](#)

1 teaspoon TATE + LYLE granulated sugar [BUY IT NOW!](#)

- directions -

Boil water. Add tea bag to mug. Pour boiling water into mug. Add sugar (optional). Steep tea bag for 3-5 minutes; longer steeping times will result in a stronger tea, but may become bitter if left for too long. Remove and compost tea bag, and add milk. Stir and enjoy while hot.

comments (166532)

NUTRITION INFORMATION

Calories 50
Calories from Fat 23
Total Fat 2.67g
Saturated Fat 1.67g
Cholesterol 11.67mg

Sodium 41.67mg
Total Carbohydrate 4.33g
Dietary Fiber 0g
Sugars 18g
Protein 2.67g

LAST TEA BAG [BUY IT NOW!](#)

Figure 1.9. Matsuda, K. (2010). *Hyper-reality: Domestic Robo-cop AR kitchen*. Retrieved from <https://vimeo.com/8569187>

The hyperreality project superimposes information about objects around us. This example shows that the content and context of things are going to be key things when designing graphical assets for AR. There is a heavy emphasis of gamification aesthetics in terms of the graphic user interface (GUI). This concept of an augmented space could soon be a reality with the development of AR-based technologies such as Magic Leap (2010), Google's AR smart lenses (2014), Microsoft HoloLens (2016).

VAPOR- WAVE

THE MOVEMENT.
THE VIRTUAL PLAZA.
THE AESTHETICS.jpg

*"What the f**k is aesthetic anyway?"* —The Virtual Plaza.

(To see the basic components on how Vaporwave art is made and other visual influences, see Appendix Section I.)

Vaporwave is an "underground art-pop that's exploring the technological and commercial frontiers of 21st-century hyper-capitalism's grimmest artistic sensibilities" (Harper, 2012).

Vaporwave plays two roles this project: how the Internet-based community provides a prosumer model, and its aesthetic as a critique of an MR environment, saturated with AR advertisements. Vaporwave's relationship to this project is tied to the notion of a physical/virtual amalgamation seen in Matsuda's *Hyperreality* (2016), and how Vaporwave aesthetically presents itself as a visual representation of this dual world of physical and virtual taken over by hyper-capitalism. The political standpoint for both Vaporwave and this project can be considered alter-globalisation; it acknowledges capitalism and its effects on current society by making it a point of common ground for discussion and understanding. Its style can be considered digital collages that re-contextualise (though not limited to) 80's and 90's design trends such as Memphis design and retro-futurism, classical arts, Internet art, and foreign cultures. In relation to AR visually, the aesthetic itself is a reflection of a world blurred by the amalgamation between virtual and physical, overrun by advertisements and digitalisation. The mode in which the community functions is an example where creator and consumer is blurred, challenging current standards of professionalism seen also in Zine culture.

VAPORWAVE: VISUAL CON- SEQUENCES OF HY- PER-REALITY

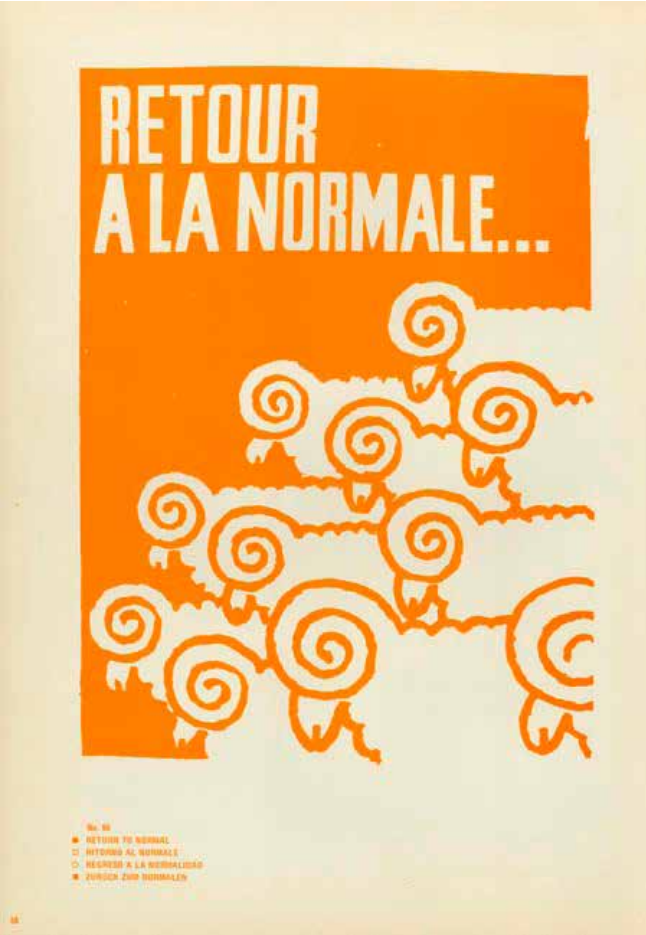
"IT'S ALL IN YOUR HEAD." - FLORAL SHOPPE

Vaporwave as a genre is an artist's reflection on our world of hyper-consumerism and globalisation through the Internet. Along with the juxtaposition between virtual and physical, a hyperreality of simulacra (the representation/imitation of reality with no origin or the original no longer exists) and simulation (an imitation of real world space or system) is brought forth. Baudrillard (1981) claims current society has replaced all reality and meaning with symbols and signs, and that human experience is of a simulation of reality. Members of the Virtual Plaza take on these tropes to satirically mimic the role of the artist/designer, and ironically become real visual creators in the process. This notion of pretending to be someone also became apparent during this investigation for *Juxtapose* when creating content in a Vaporwave manner. The act itself allowed myself as the performer to be part of the community, thus blurring the lines between imitator and originator. This ties back into Deleuze's (1968) notion of everything becoming simulacrum:

... for by simulacrum we should not understand a simple imitation but rather the act by which the very idea of a model or privileged position is challenged and overturned. The simulacrum is the instance which includes a difference within itself ... all resemblance abolished so that one can no longer point to the existence of an original and a copy. (p. 69)

The message behind Vaporwave art and design is existentialism, millennial nostalgia, globalisation, and satire around capitalist advertising. The Virtual Plaza is not with or against capitalism, rather it suggests an alternative globalisation where everyone is connected and understood through the Internet through satire capitalist design. This alter-globalisation attitude can be linked back to the Situationists' anti-capitalist movement, and ideas of culture-jamming (as mentioned in Klein's (1999) book, *No Logo*, see Figures 1.10 and 1.12). Rather than antagonising the actions and outcomes of capitalism, Vaporwave suggests that capitalist business and advertising has created a common ground for global understanding amongst its members. Like the Virtual Plaza, this project communicates raw messages regarding purpose of living and thoughts of consumer culture during the millennial childhood. Most of the design in *Juxtapose*'s artefact is made up of graphical images that allude to tropes of exoticism seen in products from a capitalist culture. By placing consumer products into a context where the composition of graphical element is bad on purpose, it gives the work a sense of satire, whilst highlighting simple visual components that make the product desirable. Figure 1.13 shows this by using a brand of water that uses flowers and palm trees, signifying myths of paradise exoticism. This recontextualisation allows both the *Virtual Plaza* and this project to critique capitalism and create discussion around consumer culture. Vaporwave messages of satirical capitalism and existentialism are usually written in English and/or translated through Google Translate into a foreign language. This is done for two reasons: *Virtual Plaza* wants to connect with people on a global scale, and the members know that Western culture brands like to objectify foreign cultures through their advertising. *Juxtapose* uses this concept liberally through Japanese writing, allowing the work to have a foreign aesthetic that communicates

between English and Japanese cultures. The project uses my own experiences, feelings and interest in a capitalist society to help influence the designs present in the artefact. These designs are then uploaded online for the *Virtual Plaza* who then share the work if they relate to the message and image, thus creating a connection based on emotional understanding between members and Juxtapose.



[Top]: Figure 1.10. Atelier des Beaux arts. (1968). *Situationist Poster: Return to Normal*. Retrieved from <https://www.creativereview.co.uk/may-1968-a-graphic-uprising/>

The message is meant to be ironic, stating how the public goes into a consensual submission for a capitalist system.

[Bottom Left]: Figure 1.11. Eyesaw and Brandalism. (2012). *Culture Jamming: Consume This*. Retrieved from <http://upper-space.org/advertising-shits-head-bill-posters/>

A response to advertising using billboards to promote capitalism and consumerism.

[Bottom Right]: Figure 1.12. A_Street_Scene. (2012). Vaporwave: Made My Life Complete. Retrieved from <http://astreetscene.tumblr.com/>

Vaporwave artists tend to bring satire and a sense of the oxymoronic to their digital collages. The underlying message the artist communicates is that the person's life is made whole through buying something and being part of consumer culture. This differs from the previous two examples because it explicitly highlights an existential ultimatum: Life is to consume, and to consume is what makes your life complete.





Figure 1.13. Menorath, D. (2016). *Conceptual works using Vaporwave aesthetics*.

Each of these images is made from images that inspired this practice-led research. The top image uses deliberate techniques and images used in Vaporwave art that incorporates symmetry, brands, nature, and the use of classical art. The bottom image uses some core graphical elements in Vaporwave to construct an image that detaches itself from brands. This was done in order to avoid issues in overly misusing brands in my final work.

VAPORWAVE AS A MODEL OF CONTENT CREATION

Vaporwave culture provides a model of how Internet communities function and create AR content in the context of an augmented space. Figure 1.14 shows a basic model of how content is created within the *Virtual Plaza*. This participatory model of content creation presented in the *Virtual Plaza* identifies how individuals will gravitate to Internet forums as a form of collective guidance and inspiration. Here, “artists and designers in this genre frequently repurpose already-existent materials and resources, both software and hardware.” (Morgan, 2013. p. 154). This sense of self-creation in the *Virtual Plaza* can be reflected in the theoretical context of an augmented space. Cyber communities such as Vaporwave will be part of the creation of customised AR content in their living spaces, providing future trends. Incorporating Internet communities such as Vaporwave with AR opens up a public participatory design space that disrupts traditional boundaries between creator and consumer. The artefact of this project contextualises a hybrid publication that uses Vaporwave’s model of creation and consumption as a means to highlight the growing use of a prosumer model in today’s sub-cultures.

VAPORWAVE CONTENT CREATION MODEL

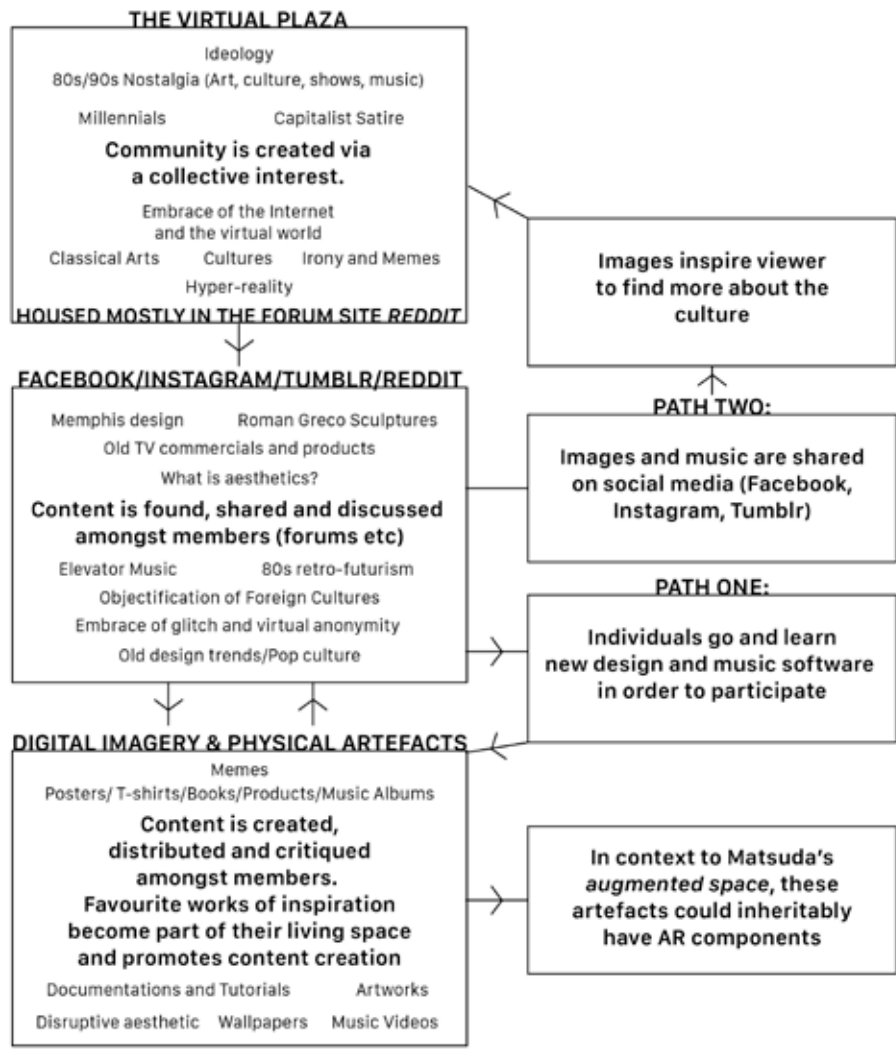


Figure 1.14. Menorath, D. (2016). *Vaporwave content creation model*.

The process itself derives mostly in the cyber world with some physical outcomes such as artefacts and artworks created by members of the community. The participatory actions of the Virtual Plaza are also evident in zine culture. Juxtapose’s design model incorporates some aspects of Vaporwave’s model, such as using social media platforms to contribute my thoughts as to what Vaporwave is.

METHOD- OLOGY

During the early stages of the project, I employed a heuristic form of research where “the research process is designed for the exploration and interpretation of experience, which uses the self of the researcher” (Hiles, 2001). This allowed me flexibility as a designer to explore topics around graphic design and AR. After narrowing down areas I wanted to work with, the heuristic model evolved into a design-led methodology incorporating “research methods that imbues the full spectrum of innovation activities with a human-centred design ethos” (Brown, 2008. p. 1). This was to allow a systematic approach to the practice-led research that utilises a rinse-and-repeat method. The broad framework for all design-led research is analysis and synthesis.

Analysis relates to the methods of investigation, enquiry and understanding central to the research of a project brief, concept or a particular context. Synthesis, meanwhile, is the means by which a designer is able to draw upon his or her initial analytical work and investigation to produce meaningful solutions or interventions.”

(Noble and Bestley, 2005. p. 21)

Figure 2.1 (below) shows Juxtapose’s research model that cycles through three main sections: *Inspiration* through various sources such as the Virtual Plaza and everyday living, my practice *ideation/interpretation* of this form of inspiration in conjunction with the project and the *implementation* of found knowledge into design. This system integrates the Vaporwave creation model seen notably in the inspiration section, where the project draws graphical elements of interest and feedback from Vaporwave social hubs and forums.

The driving force for content creation and data collection for this project was through case studies. Figures 2.1 and 2.2 show a basic visual analysis of how both case studies and my own design are critiqued. Images that are visually relevant to the topic of Vaporwave were also used as case studies, but served more as experimental grounds that allowed me as a designer to familiarise myself with the design style.

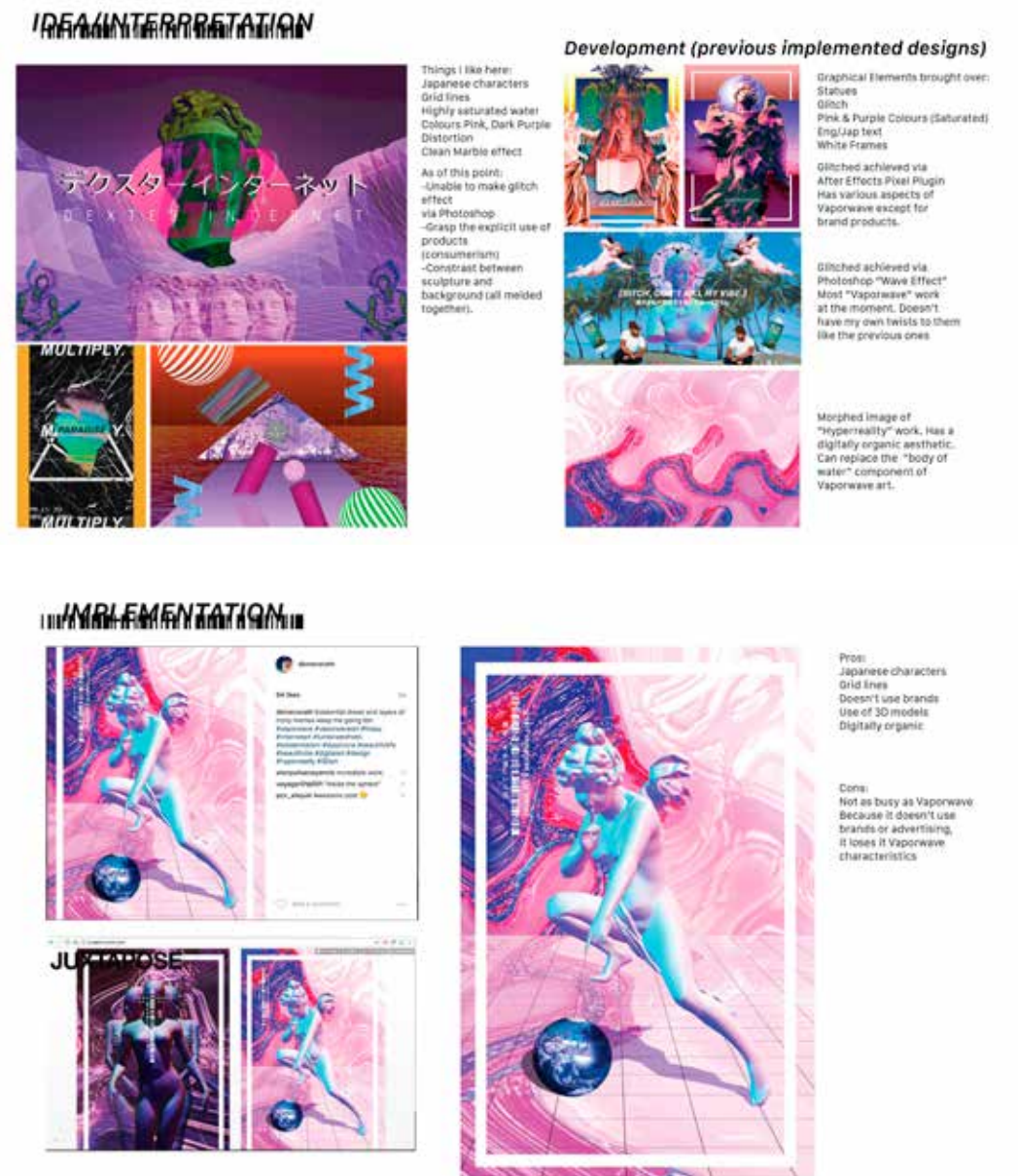
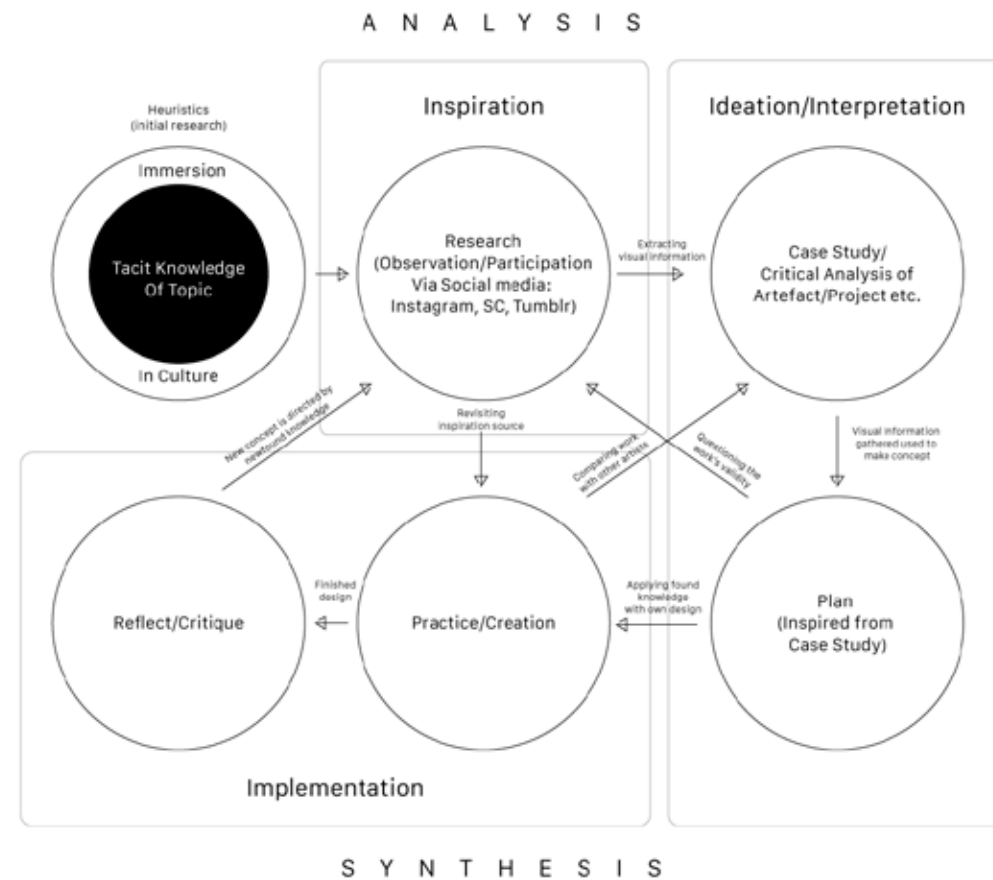


Figure 2.1. Menorath, D. (2016). *Design-led methodology used in project.*

These examples show a systematic approach to the methodology, though the process itself is much more chaotic in nature. "Design projects must ultimately pass through three spaces: Inspiration, Ideation, and Implementation ... Projects will loop back through these spaces—particularly the first two—more than once as ideas are refined and new directions taken" (Brown, 2008. p. 4).

DESIGN CRITIQUE PROCESS

My Work: Clean version (No Glitch)



- Pros:**
- Framed image
 - Use of Aphrodite statue and mannequin (symbolising beauty)
 - Glitch effects
 - English/Japanese text and message
 - Symmetry
 - The GIF version is visually stimulating
 - Digital collage aesthetic
- Cons:**
- Use of colours (because I'm following Vaporwave 0 Colour theory)
 - How the mannequin model sits on an angle
 - Typeface (Arial is popular only because it's a standard font in most software)
 - Glitch is not focused specific
- Next Step:**
- Testing single dominant image
 - Focused section glitch
 - Colours
 - Try removing white frame
 - Remove text in English
 - Incorporate aspects of project case study

Frances Adair McKenzie's AR Book Analysis



Frances Adair McKenzie's "Glossed Over" AR book

- Pros:**
- Erotic Glam
 - Clean background with interesting composition of objects and things
 - GIF art (appealing to the popularity of GIFs)
 - The work overlays over the artwork, making it seem like it's making the image move (simple video overlay on repeat)
 - Use of colours (sexualised and high in contrast)
 - Experimental in terms of combining visual arts with digital media
- Cons:**
- Its Kickstarter failed to meet funds. The project did not make it to production
 - The construction of the book (its perfect bound, its hard to turn pages and hold on to a phone to activate AR)
 - User experience (stated above)
 - Lack of narrative
 - Highly focused on visual images (not exactly a bad thing)
- Next Step (to take into consideration when creating your artefact):**
- Think of the book layout
 - Book is not to be perfect bound
 - Colours must contrast nicely
 - When creating moving images, focus on quick content as opposed to a long videos: there is a lot of content in the book so don't bore the reader.

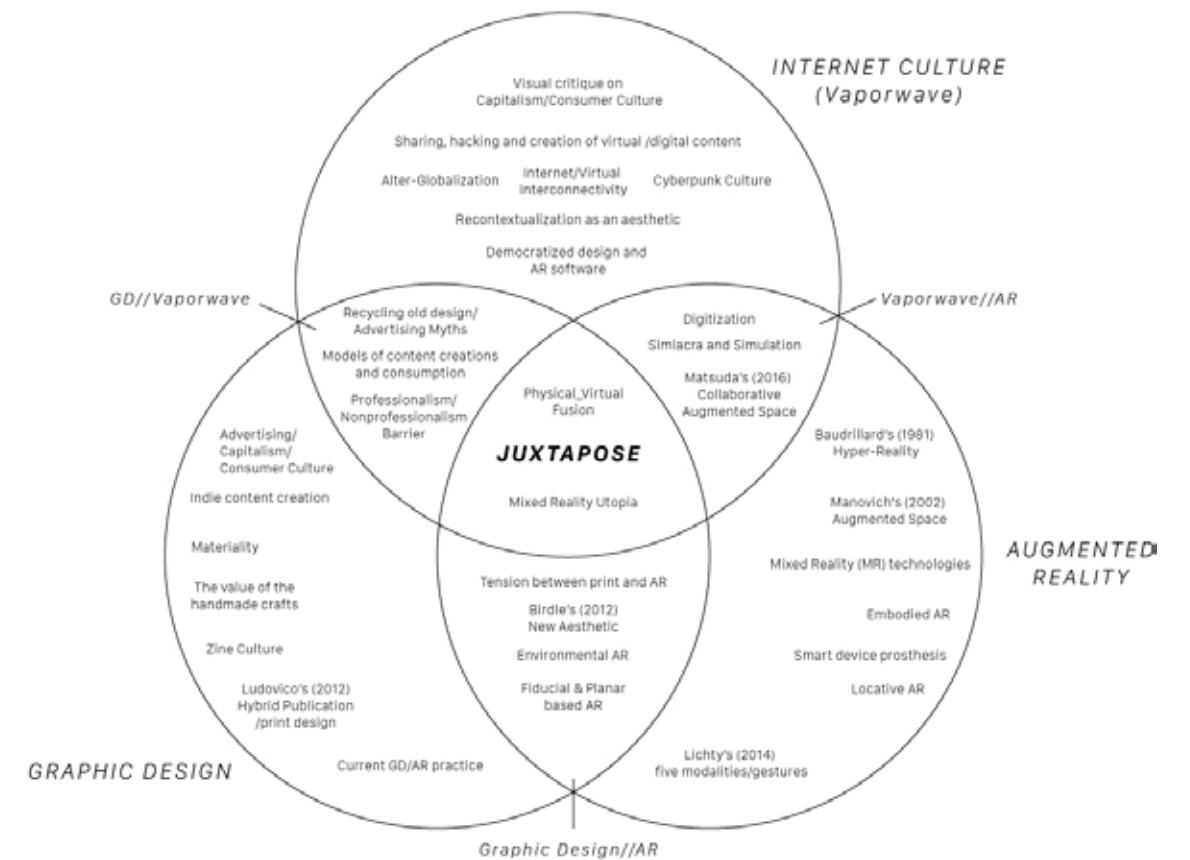


Figure 2.3. Menorath, D. (2016). *Project significance and where it is situated.*

Most of the information in regards to the project was presented as case studies (see Figure 3.2). Juxtapose is situated between three key groups: Graphic design, augmented reality (AR), and Internet culture (Vaporwave). The overlapping section of these groups can be considered special components of the project that oversees the merging of various topics and mediums.

THE FIVE MODALITIES AND GESTURES

Coming from a graphic designers' perspective, this section is a critical investigation of Lichty's (2014) five main modalities/gestures in relation to print design. This project will use Vaporwave aesthetics to illustrate and demonstrate examples from the exegesis.

Over the past decade, AR as a technology has been applied in a variety of areas from books to underground visualisation. However, it has yet to become a staple form of technology in everyday living. "Augmented Reality is new enough that it is not obvious yet how to make the most of this new medium. As such, this is a time to explore, to experiment, and to try new things." (Craig, 2013. p.151). In order to categorise different forms of AR, I will be using the five modalities presented by Lichty (2014):

The five modalities/gestures (Fiducial, Planar, Locative, Environmental, and Embodied), each [have] different relationships between the user, the augment, and the environment. That is, in the experiencing/performance of AR, there is placement of one or many elements between the eye and the recognized target, and the gaze of the agent in experiencing the piece. (Litchy, 2014. p. 100)

Visually, AR is a digital/virtual projection on to a physical image marker, revealed through an app on a smart device. Most image markers are comprised of 2D-based markers that are either printed or vinyl cut (see Figures 3.3- 3.5). The creation model shown in Figure 3.1 is a diagram based on my understanding using the four AR software programs (*Augment Desktop*, *Wikitude Studio*, *LAYAR Creator* and *Qualcomm Vuforia*) to create AR content. Markers presented in the next section (the fiducial) can be used as a basis on how image markers work in the other four modalities.



AUGMENTED REALITY CREATION MODEL

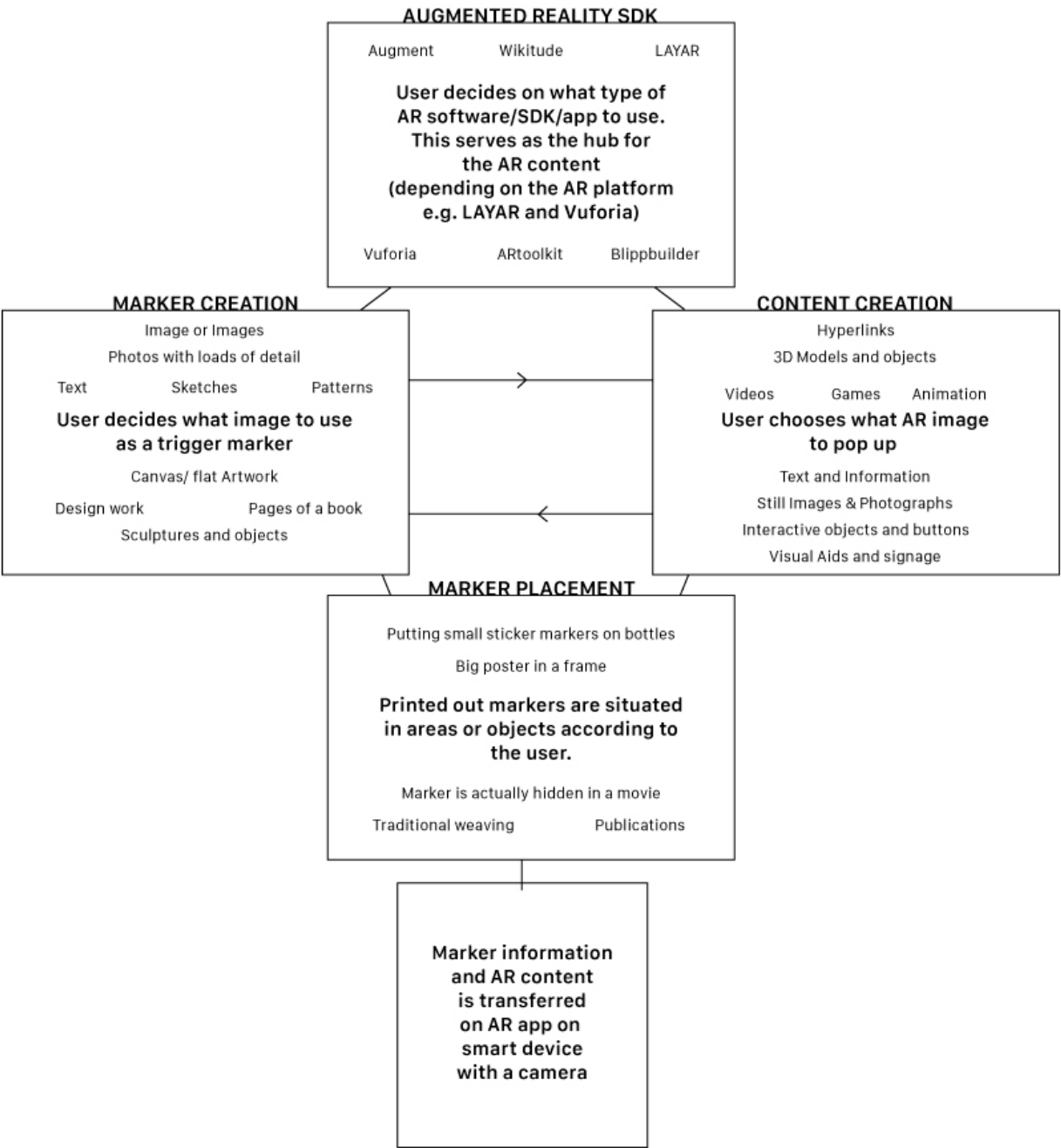


Figure 3.1. Menorath, D. (2016). *Augmented Reality Creation Model based on Vuforia and LAYAR's process.*

JUXTAPOSE AUGMENT- ED REALITY (AR) MANI- FESTO

SEEK AND YOU SHALL FIND THE SENIZ.

FIDUCIAL BASED AR MARKERS

THE PROGENITOR OF AUGMENTED REALITY MARKERS

"Fiducial AR is one of the earliest forms of AR, using markers with a unique signature to an objective seen by a computer camera" (Lichty, 2014, p. 102). Fiducial markers are usually single image targets that reveal one form of information, or react when put with other targets. Fiducial AR are either presented on screen such as a smart device or projected on to a surface. This project focuses on fiducial and planar-based AR through handheld computers such as smartphones and tablets.

In terms of AR and its layered characteristics, unity and gestalt can be achieved through visual wholeness and meaning between the object, subject, and the superimposition of imagery. Dutch designer, Roozenburg uses 3D printing to create replicas of antique objects enhanced with a layer of augmented reality information in her *SmartReplicas* (2014) project (see Figure 3.2). AR serves as the final component to the piece of work, combining a 2D image marker (the plate) and 3D recognition to overlay the patterns on to the cup. The final product is a visual representation of an antique that was lost in time, made whole through the symbiosis of the physical and virtual. Meaning and connotation regarding the antique cup is revived momentarily for the viewer to enjoy. *Juxtapose* uses Roozenburg's AR idea to create a sense of wholeness when specific images are combined to reveal hidden content around the project. This is demonstrated in Figure 3.3 where AR is used to communicate the dual agenda of Vaporwave art, revealing its apparently propaganda-like message of consumption, whereas the AR marker rejects capitalism. This is to allow the reader to understand Vaporwave's dual satire of embracing and rejecting capitalism and consumer culture.



Figure 3.2. Roozenburg, M. (2014). *SmartReplicas: Porcelain replicas enriched with AR*.
Retrieved from <http://s3files.core77.com/blog/images/2014/07/MaaikeRoozenburg-SmartReplicas-4.jpg>

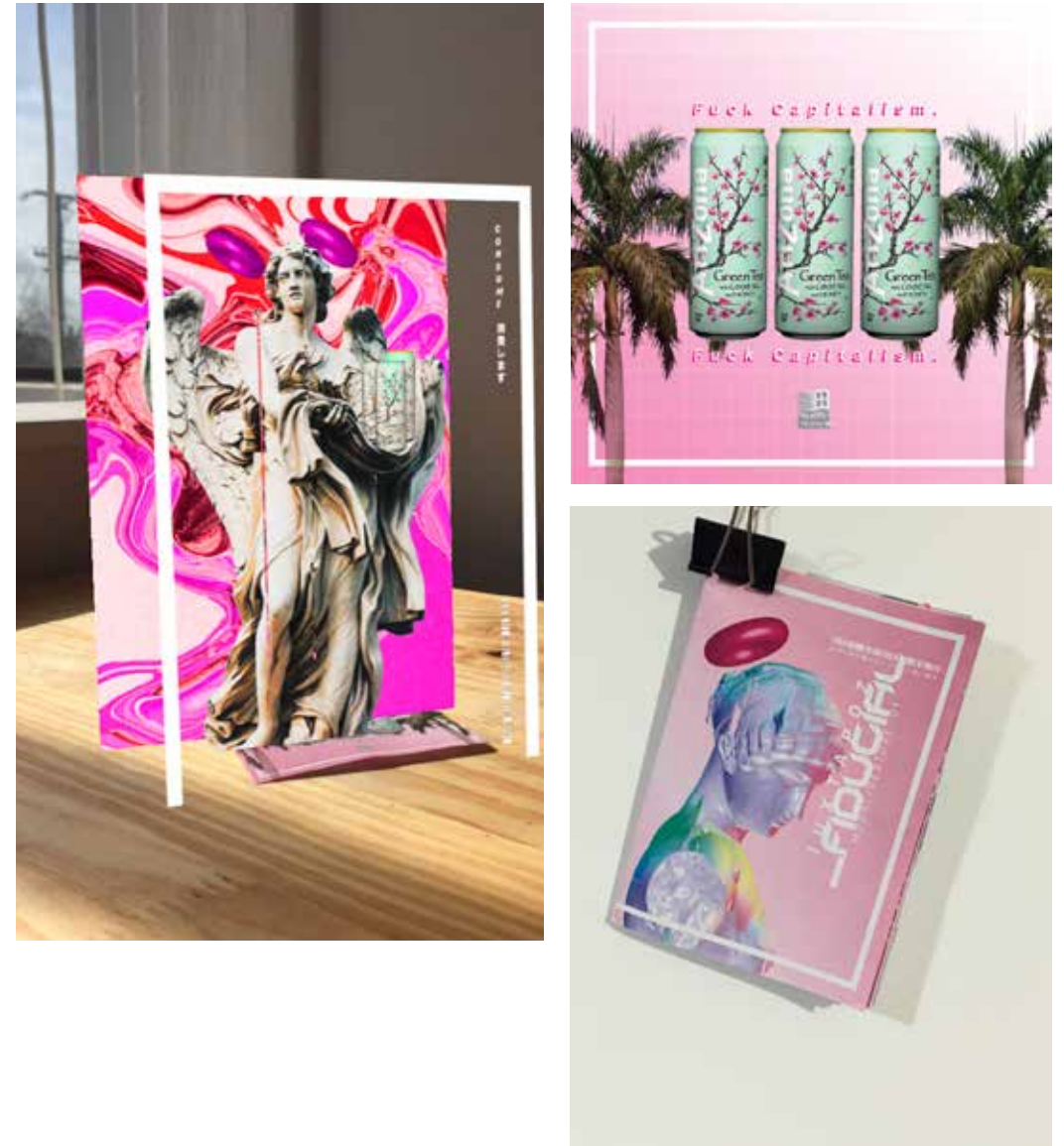


Figure 3.3. Menorath, D. (2016). *Fiducial AR markers used in conceptual zine*.

The image marker (middle image) is designed using Vaporwave's style and language. When the marker is activated, the AR image on the right reveals an alternative image with the opposite message saying "consume" rather than disregarding the consumerist system. The AR image uses a classical statue from Ponte Sant'Angelo holding on to large cans of marketed pseudo-exotic tea, portraying the statue as if it was giving the drinks away. Because the marker and the image overlay are 2D and 3D, AR presents itself in the realm of 2.5D, where the area is in 3D but the image and marker is 2D.

Integrating an AR layer of interaction can allow the work to step out of its physical limitations, and express itself on a virtual dimension. Sound Sculptures (REIFY, 2015) utilises this concept by enhancing a sculpture made from sound with AR that reacts to the music that created the sculpture (see Figure 3.4). Juxtapose utilises this notion of seeing another side to the design— revealing an alternative or hybrid version of the product that was limited to its physical state. Figure 3.5 shows an example of a marker used in one of the zines where the AR is a layered 2D/3D augmentation of the work, showing the viewer a perspective of the design that is locked away on flat print. This experimentation influenced the primary function of AR in this project; to explore the potential of fiducial markers to convey virtual layered meaning, and allowing a 2.5D perspective for specific designs in the zines. The intention behind the loose image markers is to bring a personal touch to the work, inspired by the use of post-it notes and sticky markers in books. Both the publication and fiducial markers connote a sense of handmade, adhering to consumers being creators.



Figure 3.4. REIFY. (2015). *REIFY – Music you can hear, see and hold*. Retrieved from <http://thecreatorsproject.vice.com/blog/3d-printed-music-sculptures-are-the-futures-vinyl>



Figure 3.5. Menorath. D. (2016). *Juxtapose zine- Poster page AR*. The AR on this feature page brings up a 2D/3D layered version of the image. The layering of 2D/3D images creates a sense of depth, allowing the reader to navigate around the image similar to the REIFY sculpture. The AR content is large, forcing the user to back away from the image marker to fully take in the AR, creating a new disruptive form of interaction with the zine.

Screens with moving images can be considered fiducial markers, extending the interactive properties between the projected screen and the handheld smart device. This space opens up the option for content to interact with an environmental 3D area. USC World Building Media Lab (WbML) highlights this in their future of interactive cinematics project, *The Leviathan* (2016). Using a projected animation as fiducial marker, WbML extends elements in the animation out of the projected screen, allowing the viewer (with a smart device) to interact with a specific element (see Figure 3.6). A key aspect of the Leviathan project is extending interaction through mixed media. *Juxtapose's* zines explores this concept through loose pieces of fiducial markers that can be joined together to reveal additional information (see Figure 3.7). By doing this, the project combines the mixed media concept of *the Leviathan* and Lardies' (2013) tangible values in print media. Mentioned in Figure 1.6, this project takes the concept of mixed media figuratively by pushing the limits of joint AR markers, exploring whether or not they will trigger content that is allocated to them or reveal an entirely different image. Though this project is not focused on using screen-based markers, *the Leviathan* project proposes alternative options of AR mixed media and interaction that the artefact demonstrate by being a collective form of print/AR publication.

Fiducial-based markers are the most common and basic form of AR that can be made and utilised by the masses in a personal augmented space. This is due to the flexibility and simple manner in which fiducial markers present information, covering a wide range of media such as homemade products and portraits. AR fused objects, such as those presented in the fiducial modality, have a dichotomous nature; one that serves as a physical façade and body, whilst the other acts as the virtual skin. In regards to the *Virtual Plaza* and an augmented space, this dichotomous characteristic will be explicitly used to exploit aspects of simulacra and simulation to the viewer.



Figure 3.6. USC World Building Media Lab. (2016). *Leviathan Mixed Reality Cinematic*. Retrieved from <https://futureofstorytelling.org/leviathan/>



Figure 3.7. Menorath, D. (2016). *Jigsaw approach: Separate image markers make one whole image*. The example here uses two images (left and middle) from Roozenburg's SmartReplicas that combine to make a whole AR image. The reason behind this was to acknowledge that Roozenburg's artefact can only be whole when two markers (the plate and cup) come together.

PLANAR BASED AR MARKERS

Planar-based AR is the most versatile form of AR in this group, referring to flat image markers that trigger 2D content that overlays on top of the marker. Along with the fiducial modality, planar-based AR is more aligned with print and publication design due to its utilisation of flat surface image markers. Planar AR markers are flat, akin to surfaces that print graphic designers are familiar with. Ludovico's (2012) notion of a hybrid publication can refer to planar-based AR where the reader experiences both physical and digital aspects of the book.

Planar-based AR in print publication helps incorporate digital information that allows the work to speak on different levels that are physical/tangible and digital/intangible. These levels can be considered visual hierarchies regarding how print AR works: AR will always follow and be triggered by print markers. The Portuguese design agency, Atelier Martino and Jaña display these properties in their interactive print book, *Novais Teixeira. O Vimaranesse Errante* (2014) by using subtle AR markers to trigger video content (see Figure 3.8). Atelier Martino and Jaña hide the AR markers within their pages, creating a clear distinction between the AR content and the information in the book. *Juxtapose's* zines use this aspect to hint to readers that some markers in the book can be combined to reveal different content (see Figure 3.9). This project takes Atelier Martino and Jaña's single target AR aspect further by incorporating a multi-target aspect that when specific markers come together, reveals an entirely new form of AR content. The publication is separated into various zines, each embodying both AR and Vaporwave themes. Like *Novais Teixeira. O Vimaranesse Errante*, AR is mostly used in the artefact as a layer for hiding content that could potentially clutter pages, breaking any design rules regarding legibility and topic relativity.



Figure 3.6. USC World Building Media Lab. (2016). *Leviathan Mixed Reality Cinematic*. Retrieved from <https://futureofstorytelling.org/leviathan/>



Figure 3.6. USC World Building Media Lab. (2016). *Leviathan Mixed Reality Cinematic*. Retrieved from <https://futureofstorytelling.org/leviathan/>

AR presents itself as a creative medium that helps blur the lines between fictional and real in terms of art and meaning. *The Museum of Stolen Art* (MoSA) (2014) demonstrates this by juxtaposing lost artwork into empty art frames (see Figure 3.10). This creates a narrative of a lost piece of physical history that the public will never be able to recover. The deception created by the digitally imposed artwork to replace the original, blurs the lines as to what is appreciated as art— a sense of simulacra and simulation. James Kerr, known by his pseudonym Scorpion Dagger (2014), carries out a similar approach with his AR book that turns famous Renaissance artworks into a collection of surreal, irreverent animations (see Figure 3.11). Aspects of recontextualisation are present in his GIF, injecting current satire and pop culture into the Old Masters' work. What MoSA and Scorpion Dagger present in their work is a metaphorical merging of traditional/classical and modern art/design and technology.



[Top]. Figure 3.10. Bilde, P., & Vroom, C. (2014). *Museum of Stolen Art*. Retrieved from <http://www.museumofstolenart.com/>

[Bottom]. Figure 3.11. Kerr, J. (2014). *Scorpion Dagger: Remixes of Early and Northern Renaissance paintings*. Retrieved from <http://anteism.com/shop/scorpion-dagger-augmented-reality-soft>

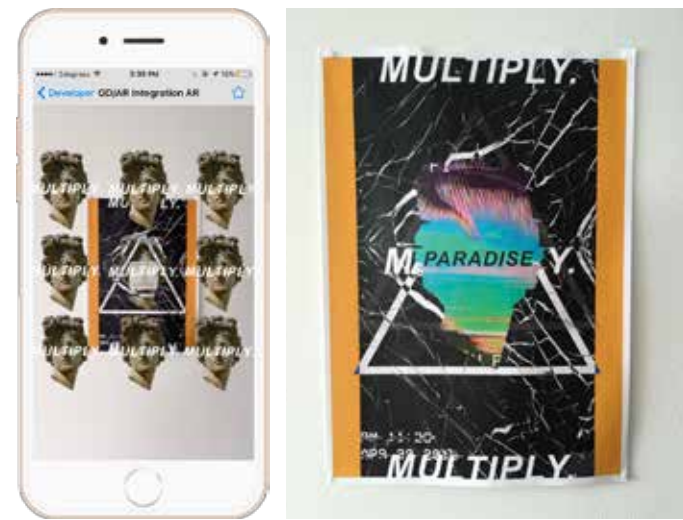


Figure 3.12. Menorath, D. (2016). *The jigsaw AR concept practised on Wikitude Studio*. Juxtapose explores MOSA's AR technique, initially tested on Wikitude Studio (2016), where the head of Helios was juxtaposed into the sculpture's cut-out on the marker. The image marker felt empty, heavily implying that it needed the AR to fill its space in order to create wholeness.

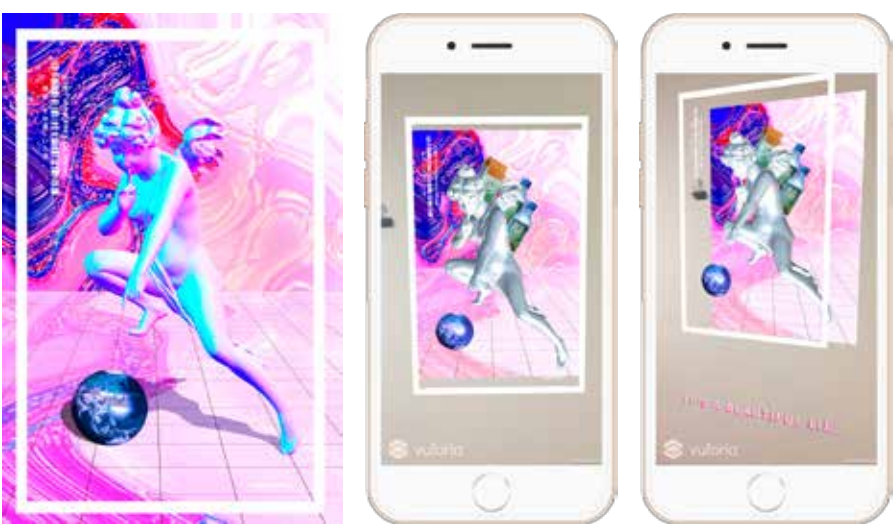


Figure 3.13. Menorath, D. (2016). *Juxtapose zine poster*. Graphical elements in the poster are projected as 2D/3D layers, creating a sense of depth. Recontextualisation is evident in this poster, where the 3D sculpture of Cupid is seen as a large deity that oversees Earth with his cigarettes and water. Figure 5.6 demonstrates Scorpion Dagger's satirical approach though the design's AR, that when revealed, visual tropes that are related to Vaporwave are attached on to the existentialist poster.

ENVIRONMENTAL BASED AR MARKERS

AUGMENTING OUR SURROUNDINGS.
ONE PRODUCT AT A TIME.

Environmental-based AR utilises fiducial markers installed in a large space or controlled area to create an augmented environment. Issues regarding the use of fiducial markers for outdoor use come down to the legibility of the image marker. Factors such as weather and the time of day, and issues regarding bodies and moving objects within the area such as vehicles that would obstruct both the marker and AR overlay. Due to these limitations, most experimental environmental AR is created in an indoor context.

Darf Design's project, *Hermaton: Enter the Grid* (2013), is an example of an indoor environment AR that utilises the essence of Point-Line-Plane (PLP) in a maze (see Figure 3.14). The 2D patterns trigger a digitally organic and detailed 3D maze that connects to specific points on the pattern. This integration allows the work to be appreciated as a whole, and indirectly, reflecting the dependant duality between image marker and AR. The maze invites the participants to interact and perform within an augmented physical space. *Hermaton* visually proposes that environmental AR is the placement of fiducial or planar markers within a large space. *Juxtapose* demonstrates this concept through poster image markers, suggesting that an environmental AR experience can be created by sticking image markers up on to walls (see Figure 3.15). In regards to the theoretical context of an augmented space, this experiment show how the prosumer is capable of setting up an environmental AR space quite easily.



Figure 3.14. DARF Design. (2013). *Hermaton: Enter the Grid*. Retrieved from <http://www.darfdesign.com/hermaton.html>

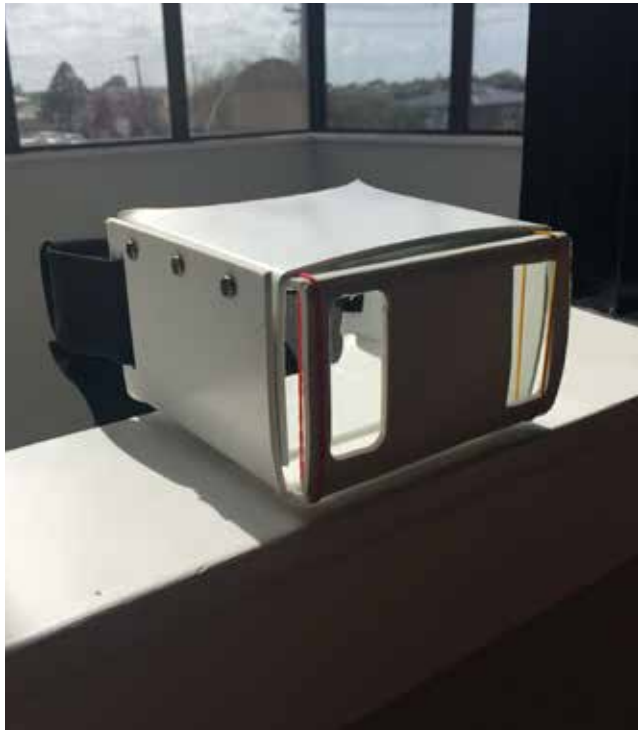
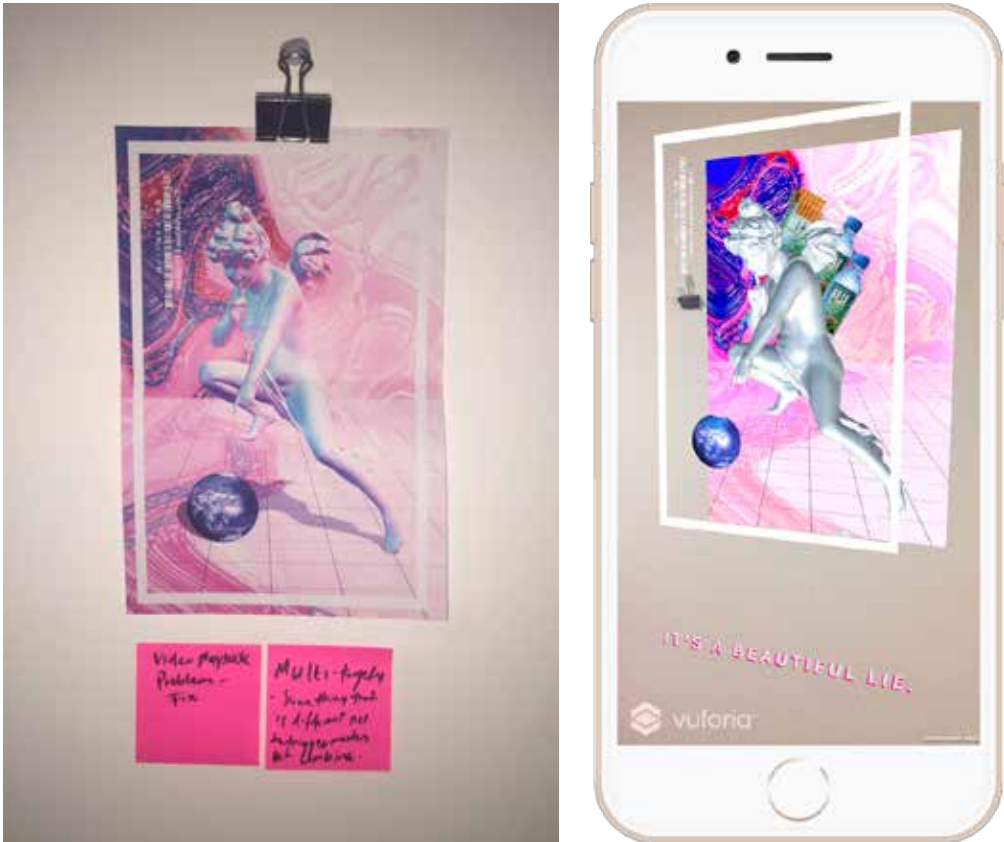


Figure 3.15. Menorath, D. (2016). *Environmental based AR using fiducial markers*. Environmental-based AR takes up more space than planar and fiducial AR, allowing the option of the content to contour with its surroundings. Environmental AR highlights the scale of the projected image, allowing the user to perform and interact with the AR. The bottom image is a screenshot, viewed from the makeshift Google headset, giving the users an opportunity to experience an AR environment.



Creating environmental AR in the future will not need fiducial/planar markers in a controlled space demonstrated by DARF Design's *Hermaton*. Companies such as Microsoft², Samsung³, and Magic Leap⁴ will rely on spatial technologies such as Google's *Project Tango*⁵ to help trigger AR content in specific areas. This will call for a demand in user-friendly graphical user interface designs (GUI) for MR/AR software and products that will be built around mixed reality technologies. As of this moment, the majority of the interfaces for wearable AR are akin to smart devices and desktop computer interfaces. Microsoft's (2015) Hololens uses their Windows 10 flat design interface due to its flexibility and minimalist approach, whilst providing thematic consistency in their products (see Figure 3.16). Though the artefact doesn't explore AR interface design, it does relate to the project's theoretical context of an augmented space, and the possibility of custom UI design made by the prosumer. The project's exploration around environmental AR proposes a primitive or simpler alternative to spatial recognition AR that uses print and vinyl markers in designated areas that serve as an AR interactive spot.



² <https://www.microsoft.com/microsoft-hololens/en-us>
³ <http://www.samsung.com/global/galaxy/gear-vr/>
⁴ <https://www.magicleap.com/#/home>
⁵ <https://get.google.com/tango/>

Figure 3.16. Microsoft. (2015). *Hololens AR headwear concept*. Retrieved from <https://www.microsoft.com/microsoft-hololens/en-us> (See Appendix Section II regarding current UI design)

LOCATIVE BASED AR MARKERS

LOCATION. LOCATION. LOCATION.
IT'S ALL ABOUT THE LOCATION.

Rather than using fiducial markers, locative-based AR utilises GPS and the Internet to trigger AR content in a specific vicinity. "Locative/GPS based AR can be considered the most complex out of the five modalities, due to its dynamic relationship between user, media linked to points of interest in the landscape, and the objective background in which the media is overlaid" (Lichty, 2014. p.118).

The concept of augmented space in everyday living falls into this modality. Due to current technological limitations, current locative-based AR consists of overlaid content on static Points of Interest (POI). Locative AR could be considered one step up from environmental modality because of its implementation of GPS technologies such as *Google Maps* to aid in creating content within areas. In regards to Manovich's augmented space and Juxtapose's investigation, locative-based AR is considered the pinnacle of AR interaction. Taking into account the development of bodily integrated AR technologies, such as smart contact lenses, locative-based AR creates a seamless AR/MR experience that eliminates some of the awkwardness of using smart devices with image markers. Though this artefact does not have locative AR properties, highlighting its importance in the development of MR spaces allows designers to conceptualise what spaces are going to be replaced with AR.

In Figure 3.17, Matsuda's video shows an example of virtual signage and gamified graphic user interfaces (GUI) that have replaced analogue technologies such as phones and physical signage. Because Matsuda's concept is based in a current setting, the concept proposes that billboards, signage and GUI will be graphically designed the same way. The content itself will exist in the virtual realm, projecting into spaces where physical signage previously existed. Because this project is focused around print/AR publication rather than spatial design like Matsuda's, it suggests that locative AR can be interpreted in two ways; a specific location/landmark triggered by *GPS/Google Maps* such like Matsuda's or through a unique fiducial marker that is specific to an area. This proposes that fiducial markers can be used like a locative AR hotspot, thus opening up possibilities on how locative AR can be perceived. In this context, *Juxtapose's* artefact (being a one off copy) follows a locative AR modality, where its AR content is specific to the location of the publications.



Figure 3.17. Matsuda, K. (2016). *Hyperreality* [Screenshot]. Retrieved from <https://www.youtube.com/watch?v=YJg02ivYzSs>

Sekai Camera AR (2008) uses locative AR as a form of storytelling through collaboration and social interaction. The app utilises a community-based AR system where the users can use virtual post-it notes and emojis to communicate to people around the city (see Figure 3.18). Different areas within the city talk about different things, creating a narrative specific to its location. There is a personal component that comes with these small notes, where people are trying to reach one another through small captions and images of themselves and of the area. *Juxtapose's* artefact incorporates post-it notes as a way to emulate a feeling of virtual, personal ownership (see Figure 3.19). The artefact also proposes that if Vaporwave were to incorporate AR into their art, the shift from desktop to buildings will allow the *Virtual Plaza* to create a dual physical/virtual reality that explicitly contextualises their art in the areas in which capitalist advertising originated: cities, towns and suburbs.



Figure 3.18. Tonchidot. (2008). *Sekai Camera AR Interface*. Retrieved from <https://www.youtube.com/watch?v=oxnKOQkWwF8> (see appendix section II regarding current AR storytelling)



Figure 3.19. Menorath, D. (2016) *Zine artefact: Post-it note markers*.

Niantic's *Pokémon GO* (2016) can be considered the first app to globally popularise locative/GPS AR and its potential as a technological medium. *Pokémon GO* embodies the marriage of fictional, virtual and physical worlds. The game contributes to a hyperreality and aspects of simulacra and simulation by blurring physical reality with fiction and virtuality. Players perform and embody their virtual players from a game that was previously bound to a virtual world. Though the content is still bound to digital devices, the act of juxtaposing virtual objects with physical reality brings a sensation of merging worlds. The artefact for this project conceptualises this phenomenon by introducing Vaporwave's design aesthetic that existed mostly in the virtual world into a physical form of print. Introducing AR to certain imagery in the book expands it beyond its base limitation, thus creating a hyperreal image consisting of layers. Vaporwave's collage and layering aspect can be reflected in the way AR works by overlaying virtual information on to the physical, creating its own juxtaposition of virtual/physical collage. *Juxtapose* emulates this layering concept in its artefact through its paper clipped fiducial markers and AR composition (see Figure 3.21). The project plays with the literal meaning of juxtaposition by placing AR components in close proximity to one another, so that they intersect and interact.



Figure 3.20. Niantic. (2016). *Pokemon GO* gameplay. Retrieved from <http://thenextweb.com/apps/2016/06/16/catch-pokemon-go-ar-game-next-month/#gref>

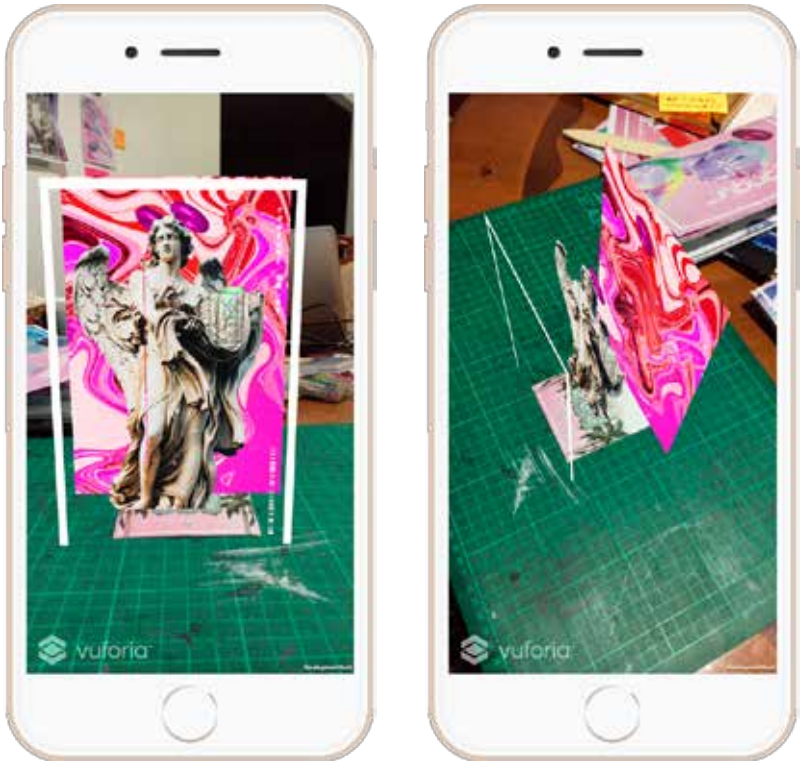


Figure 3.21. Menorath, D. (2016) *Zine artefact: Print and AR layering*.

EMBODIED BASED AUG- MENTED REALITY

THE INTEGRATION OF PHYSICAL AND VIRTUAL.
VIRTUAL AUGMENTATION OF THE SELF.

Lichty (2014) hypothesises a future where interaction and delivery of media/mediated reality (such as AR) transits from screen, to handheld devices, then on to the body, and finally onto architectural spaces. Out of the four stages mentioned, bodily-based AR would be the most explicit yet intriguing form of AR. Bodily AR can be approached in two ways: the digital projection and the hardware that will be integrated with our sight (AR contact lenses, micro projectors etc.). *Juxtapose* takes a satirical approach to bodily AR, suggesting readers to stick markers on to themselves, allowing themselves to have AR properties (see Figure 3.22). This experiment proposes that bodily AR could be possible through fiducial markers stuck to clothing or tattooed on to body parts, thus making the AR a virtual extension of themselves.



Figure 3.22. Menorath, D. (2016). *Attempt at AR embodiment using cyborg model overlay.*

This experiment uses a written post-it note as a fiducial marker used to trigger the cyborg model overlay. The user sticks the post-it note to their forehead, allowing the cyborg AR to juxtapose on to their head. This experiment showcases that embodied AR can be achieved in a simple and playful manner.

Normals (2016) take an artistic approach to bodily projected AR, seen in their project called *APPAREL* (see Figure 3.23). Normals use digital geometric shapes to layer on top of their clothing, creating a physical/virtual human hybrid. In short, the real look of the clothing is revealed when both AR and the person wearing the clothes are together. Each visual element, from the construction of shapes for the AR and the space around the model and the AR, creates a provocative and dominant sensation. The *APPAREL* project uses screenprinted markers shaped as numbers and icons on their clothing, suggesting that printed AR markers are not limited to paper. The *Juxtapose* artefact could also be seen in a similar light, where the true form of the zines is revealed through AR interaction.



Figure 3.23. Normals. (2016). *APPAREL augmented reality app*. Retrieved from <http://mixtur.es/normals/apparel/a-p-p-a-r-e-l-v-1-0-catwalk/>

The AR app shows a provocative juxtaposition of reality and virtual. The dress itself exists both in the physical and virtual planes, allowing the wearer to traverse between the two planes.

The second form of bodily AR is technological integration. The transition from goggle-based MR headsets such as Microsoft's *Hololens* (2016) to less evasive technologies like Google's smart contact lenses (2014) will allow both locative and environmental-based AR to flourish. Noninvasive AR technology removes two issues: disembodiment when using AR with a handheld smart device and the need to download AR apps.

Like the previous modalities/gestures, embodied AR can take cues from fiducial markers. Though fully functional embodied AR requires facial/spatial/bodily recognition technologies, *Juxtapose* allows the viewers to play around with a basic version of embodied AR through fiducial markers. Much of this project's challenge was in utilising fiducial-based AR markers to function within Lichty's (2014) five AR modalities/gestures without technical complications. In the context of prosumers being able to quickly create AR within their personal spaces, they too will utilise these modalities/gestures in their own AR creations.

SOFT- WARE USED

FAIL AGAIN. FAIL BETTER.

Currently, the issue with most AR software is the unfamiliarity of the user interface (UI), and the availability of resources such as software tutorials. I chose Qualcomm's software development kit (SDK) *Vuforia* (2011) because it provides a plethora of information and guides on how to use their product, whilst having a Unity SDK option, allowing users the flexibility to create both simple or code-aided AR. The *Unity-Vuforia* system allows designers the option to approach Unity as a drag-and-drop platform for 2D/3D content created on Adobe *Photoshop* and Autodesk *Maya* (2015). Because Unity is a flexible platform, designers also have the option to program behaviour commands such as image tracking to their visual elements (see Figure 4.1).

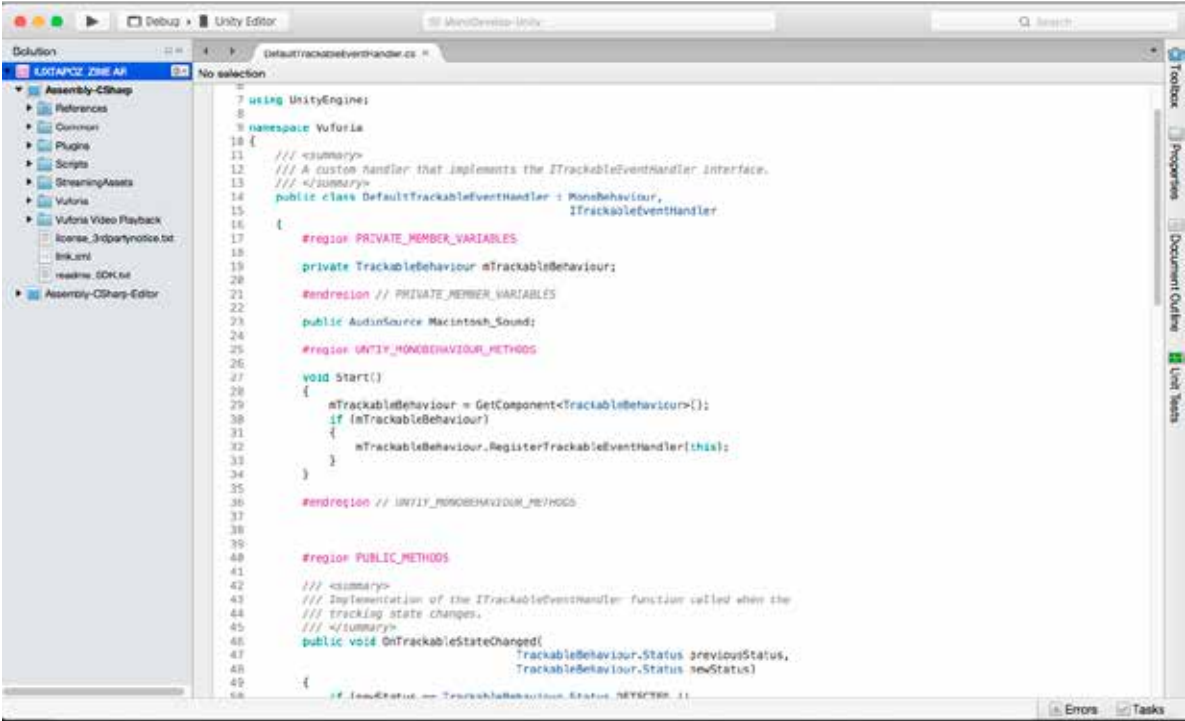


Figure. 4.1. Menorath, D. (2016). *Unity-Vuforia Image tracking and behaviour coding section*. Unity uses C# coding language to program behaviours and commands.

As a graphic designer, most of the design platforms used for this project came from the Adobe Suite, such as *Photoshop*, *After Effects*, *Premiere Pro*, *Illustrator*, and *InDesign*. 3D modelling platforms were also used, such as *Maya*. The visual content created for both publication and AR ranged from 2D, 3D, videos and still images. Images would go through a variety of software in order to achieve certain aesthetics. In Figure 4.2, visual assets that were created on *Illustrator*, *Photoshop* and *Maya* were collated together and put through *After Effects* to achieve the glitch effect.

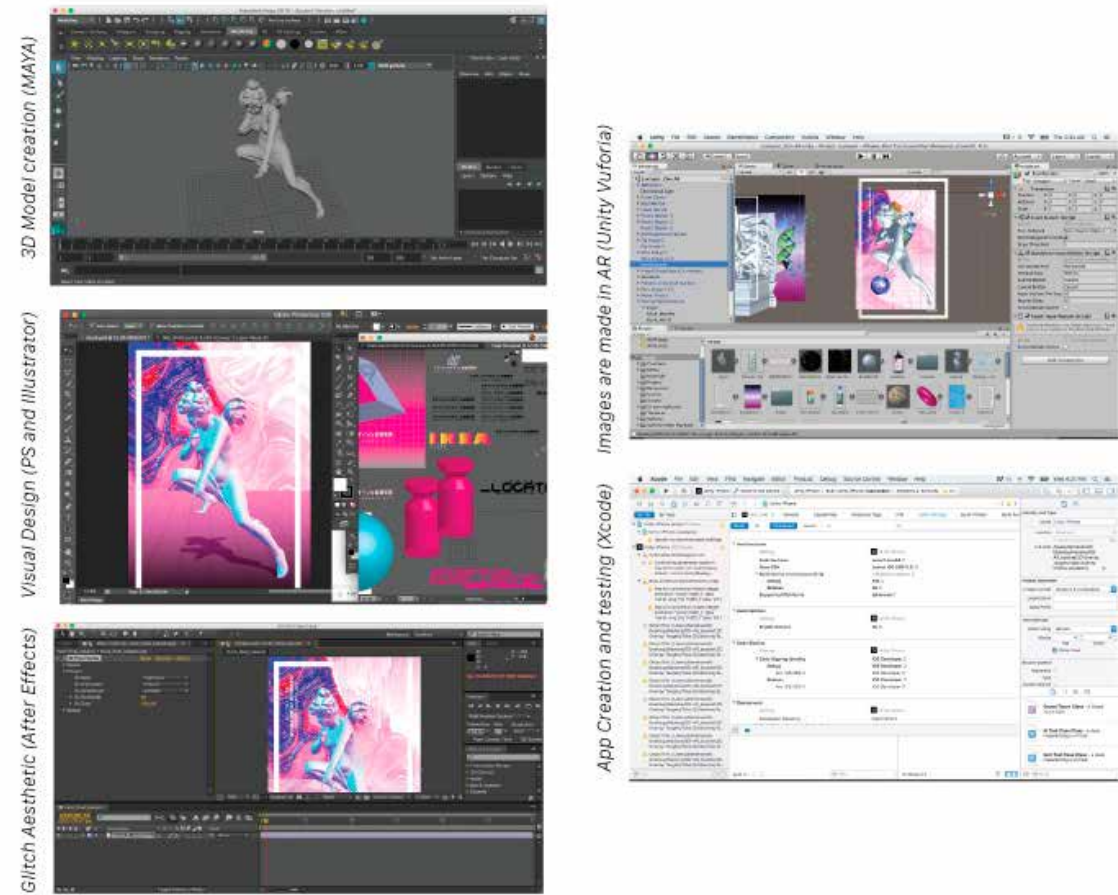


Figure 4.2. Menorath, D. (2016). *Example of image processing through various design software.*

DESIGN PROCESS

THERE IS NO UGLY DESIGN.

For this project, I positioned myself as a member of the *Virtual Plaza*, approaching methods of design in a similar matter. These methods consisted of digital reproduction and manipulation that scaled from being basic such as cropping images, to advanced skills such as creating glitch effects and 3D models. *Juxtapose* incorporates the *Virtual Plaza* habit of using borrowed images that are digitally manipulated and made as their own. Figure 4.3 shows how the research inspires conceptual design that is developed into the artefact. Concepts start with visual elements of interest, which are collated together to make various concepts. Critiqued by both peers and the *Virtual Plaza*, developed works are collated together to identify recurring themes and elements.

(See Appendix Section I to see the breakdown on how Vaporwave art is created)



[Right]: Figure 4.3 Menorath, D. (2016). *Vaporwave visual creation process*.

This design highlights the contradiction of a happy life achieved through consumerism. The work uses English and Japanese lettering to acknowledge tropes of Eastern exoticism. This is akin to Vaporwave's collective view of global understanding through foreign advertising.

The process of design is driven by visual influences found during this investigation. The first iteration of a design concept can be considered mimicry and deepens understanding of the research. The design subsequently develops through visual manipulation, injecting Vaporwave-like components and glitches through *After Effects*. The final product is one that relates to the topic of the book, whilst maintaining the AR components that inspired it. A self-critiquing system is applied to the final product, pointing out pros and cons that help the development of the next concept.

Experimental designs are uploaded to creative social media platforms such as Tumblr and Instagram in order to test which concept appeals to both the public and the Virtual Plaza. By doing this, I am constantly contributing to the community through my interpretation of Vaporwave, influencing others to create similar designs and vice versa (see Figure 4.4). Members of the *Virtual Plaza* become the critics that allow me to identify and develop visuals. This system allows me to inspire other members, thus creating their own rendition of the image and topic (see Figure 4.5). The *Virtual Plaza* not only provides an environment where creators bounce off each other’s ideas, but allows members to hack and share design software amongst each other so that they can contribute to the movement.

This shift from distribution to circulation signals a movement toward a more participatory model of culture, one which sees the public not as simply consumers of pre-constructed messages but as people who are shaping, sharing, reframing, and remixing media content in ways which might not have been previously imagined.
(Jenkins, Ford & Green, 2013. p. 2)

This form of cyber participation will be a key aspect in the future creation of AR in an augmented space. It is important to note biases present in the different social platforms and how themes specific to the platforms affect the popularity of the design. *Tumblr* being a blog/portfolio social platform holds creative and expressive aspects where each person’s blog represents a theme of interest. *Instagram*, however is more focused around photography, evidenced in its square photo format that references polaroid film. *Juxtapose*’s designs function better on *Tumblr* because viewers are encouraged to share the work on their blog pages.

The intention behind the use of AR for this project was to provide a layer of interactivity, whilst highlighting language and colour that is present in Vaporwave culture. Each AR content was designed according to the theme of the modalities in the zines. This content varied from personal opinions on the topic of Vaporwave and hyper-reality, to 3D augmentations of sculptures in the markers. The fiducial/planar markers in the zines can be considered the author’s hidden voice that brings a whole different nature to the artefact. Because the artefact uses fiducial and planar based AR, it is meant to show the readers that AR can simply be made and applied in everyday materials.

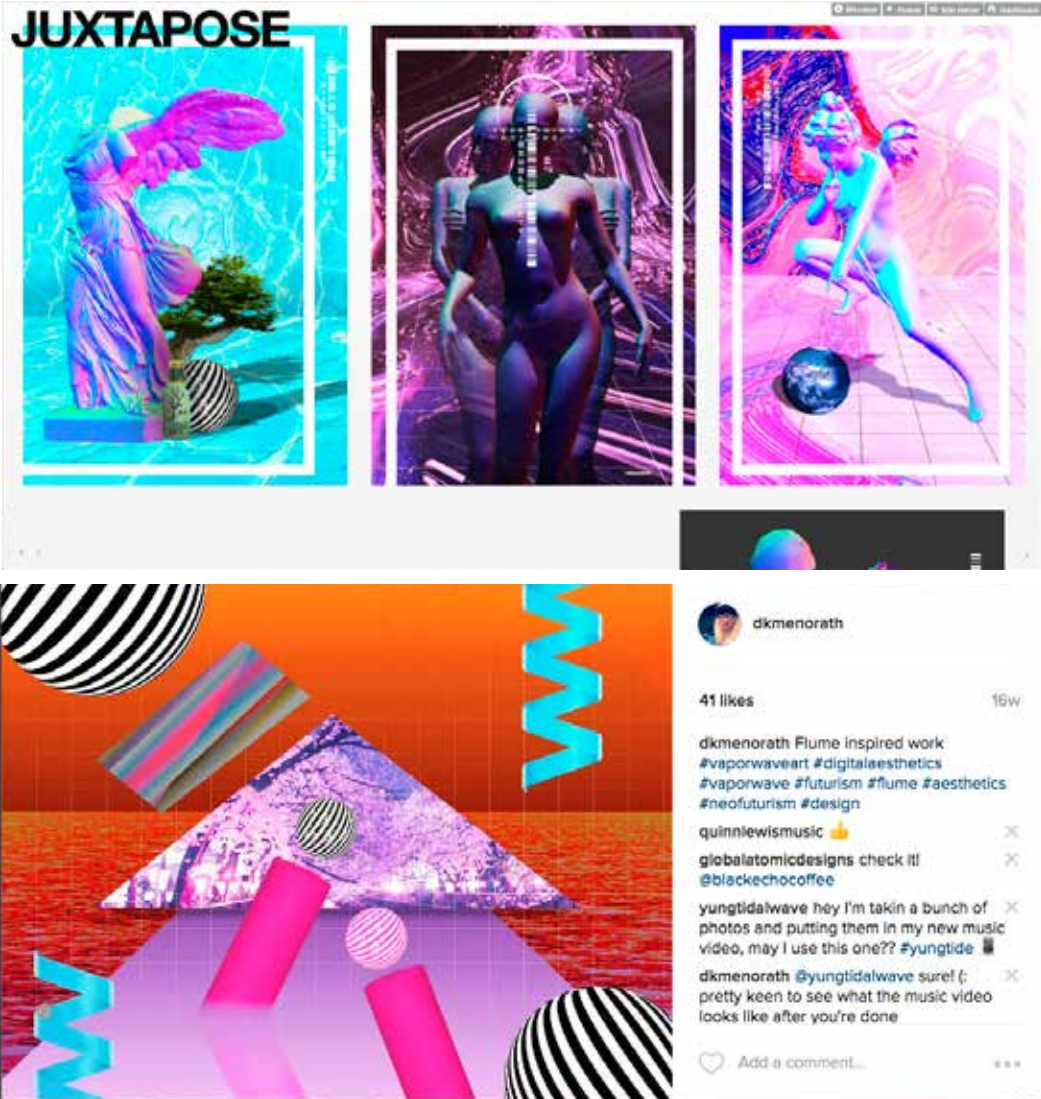


Figure 4.4. Menorath, D. (2016). Images uploaded onto Tumblr/Instagram.



Figure 4.5. Menorath, D. (2016). Vaporwave design: Xanax. After uploading this work on to Instagram (left image), a member of the Virtual Plaza expressed their interest in the work. They went away and created their own rendition of the topic of the drug Xanax.

VISUAL INFLU- ENCES

ROTHSCHILD.CARMAGNOLA.HONDA.

Visual Influences

(See Appendix Section I for information regarding refined Vaporwave aesthetics and artists that have influenced *Juxtapose*)

The visual style of *Juxtapose* can be categorised as Internet Art, due to its digital nature and various influences that are only made apparent through Internet culture. This project draws from many aesthetic sources due to Vaporwave's recycling of design trends such as glitch and Internet art, 3D digital hyperrealism, 80s kitsch and neo-futurism, and 90s computer graphic aesthetics. Along with various anonymous Vaporwave artists, more established artists such as Yoko Honda (2014), Giacomo Carmagnola (2015), and Felix Rothschild (2016) could be considered the main visual influences for this project (see Figures 4.6 to 4.8).



Figure 4.6. Honda, Y. (2014). *80s Kitsch Collection*. Retrieved from <http://yokopium.wixsite.com/home/pattern>



[Top]: Figure 4.7. Carmagnola, G. (2015). *CALIGULA*. Retrieved from <http://giacomocarmagnola.tumblr.com/post/133590495464/caligula-100-x-100-cm>

[Bottom]: Figure 4.8. Rothschild, F. (2016). *Stranger Things* [Screenshot]. Retrieved from <https://www.facebook.com/flxrothschild/videos/1402461496436164/>

Because this project is primarily based on Vaporwave aesthetics, colours used are mostly highly saturated or pastel-like, due to the deliberate disregard of colour theory. I incorporated Kobayashi's (1992) colour theory as a means to categorise colour combinations and what they convey (see Figure 4.9). Colours from 80s retro-futurism and cyberpunk were incorporated into this project due to its connotation to myths of city nightlife exoticism. Figure 4.10 shows how the colour palettes were chosen through a collation of Vaporwave images put through a colour extract tool. The colour palette falls into Kobayashi's gorgeous and elegant spectrum, alluding to an atmosphere of digital romanticism in a cyber sci-fi zeitgeist.

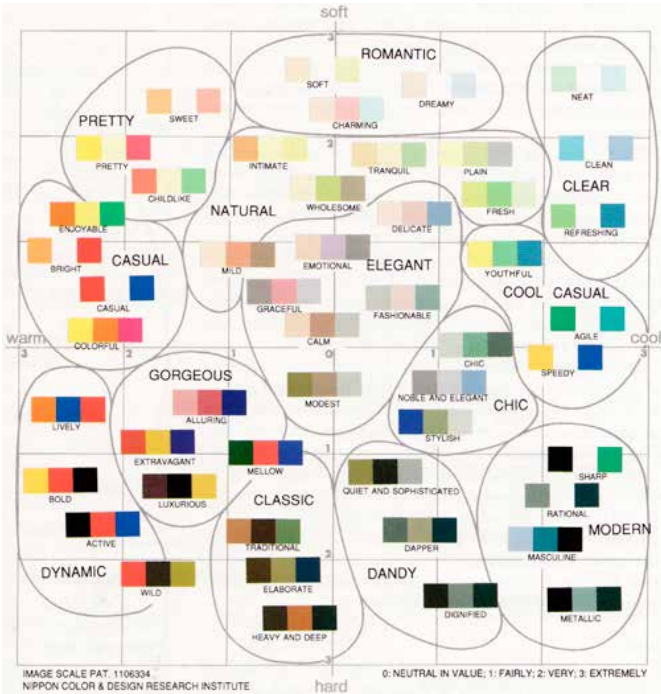


Figure 4.9. Kobayashi, S. (1992). *Color Image Scale: Color Combination Image Scale Chart*. Retrieved from <http://www.particletree.com/notebook/color-image-scale/>

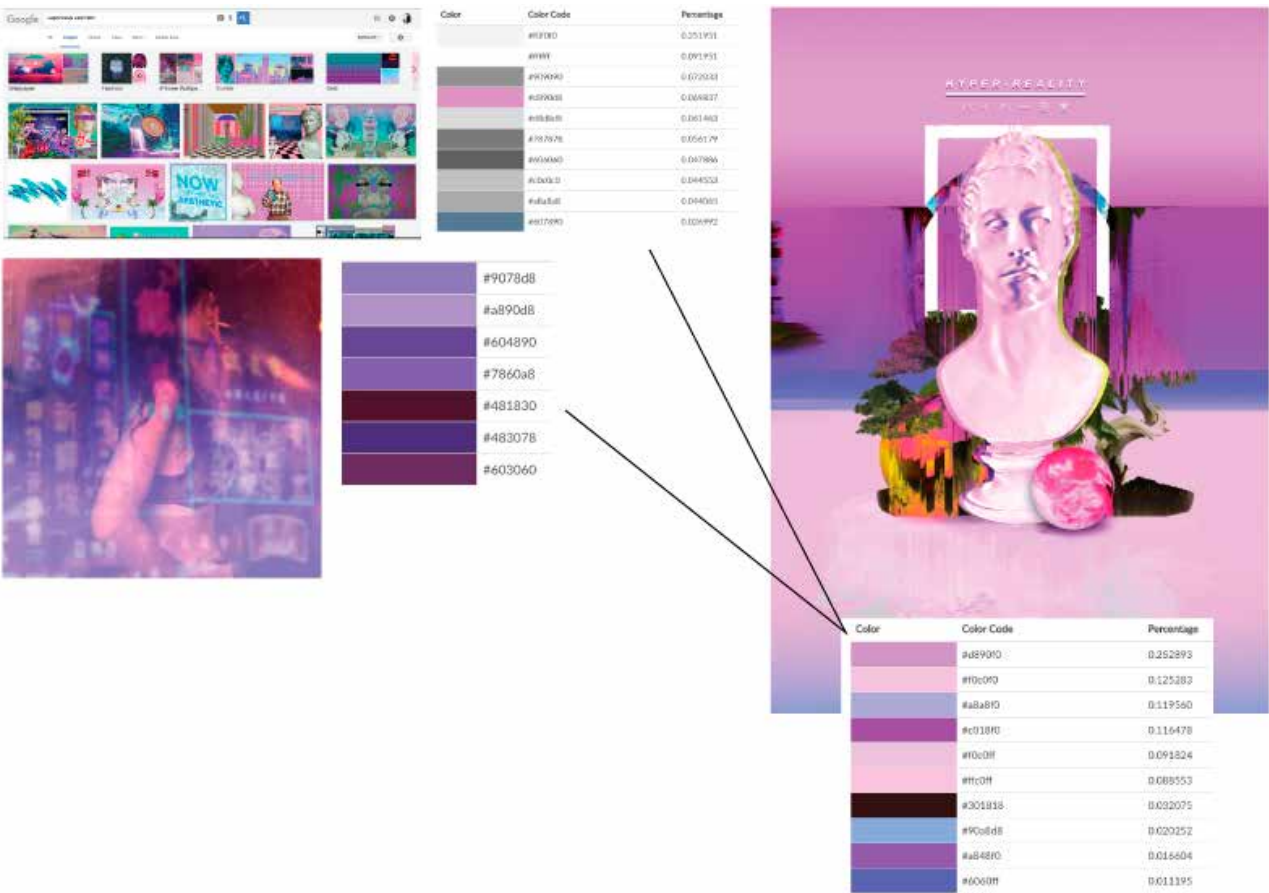


Figure 4.10. Menorath, D. (2016). *Colour Palette for Hyper-reality*. Colours are sourced from Vaporwave art that has inspired parts of this project. During this process, I found that the majority of current Vaporwave art has similar colour themes. A colour extract tool was used to select the ten most common colours used in the collation of images.

ISSUES PRESENT- ED IN THIS PROJECT

I DIED TWICE DURING THIS PROJECT.

Issues presented in the project

During the production of the zines and AR content, there was a re-occurring issue regarding the tensions between publication and smart device, due to different ways each medium displays information. As mentioned in Chapter One (p. 32), Ludovico (2012) states that the problem regarding screen and print is that digital technology disrupts traditional display conventions in analogue/print media. Rather than trying to fix it, both Ludovico and Juxtapose propose that the tension between screen and book is a flaw and glitch that is part of the experience. These glitches are seen in Figure 4.11 where AR content flickers between its individual and combine type, making the images warp. These flaws are somewhat Vaporwave in nature, embracing its shortcomings as a form of aesthetic. The artefact also embodies these flaws on a physical level, being something that is both visually and technically explorative in terms of functionality and legibility.

Another issue in this project was my lack of knowledge around C# that was needed to code interactive commands on Unity. Though I worked around most of the interactive aspects of AR, the project could benefit more from programming commands into the AR content. As a graphic designer, coding languages such as C# was not taught during my time at AUT's art and design school. Though it is becoming a prerequisite for graphic designers nowadays to learn HTML and CSS for web design, this investigation suggests that future graphic designers incorporate disciplines outside of their conventions, such as programming and AR. Michael Rock adds to this notion in Albinson's, Giampietro & Leslie's (2011) book, *Graphic Design: Now in Production* stating, "The true investment is the investment in design itself, as a discipline that conducts research and generates knowledge—knowledge that makes it possible to seriously participate in discussions that are not about design" (p.18). As of this moment, AR is predominately taught in creative technology labs such as MIT's Media Lab, AUT's CoLab, Georgia Tech GVU, University of Canterbury's HIT lab, and NCSU Design. While the artefact lacks in coding and interactive components, *Juxtapose's* hybrid publications serve as a precursor that encourages other prosumers to take print-based AR beyond the conventional.

<http://fluid.media.mit.edu/projects/smarter-objects>

<https://colab.aut.ac.nz/>

<http://www.gvu.gatech.edu/research/labs>

<http://www.hitlabnz.org/>

<https://design.ncsu.edu/masters-graphic-design-augmenting-reality>

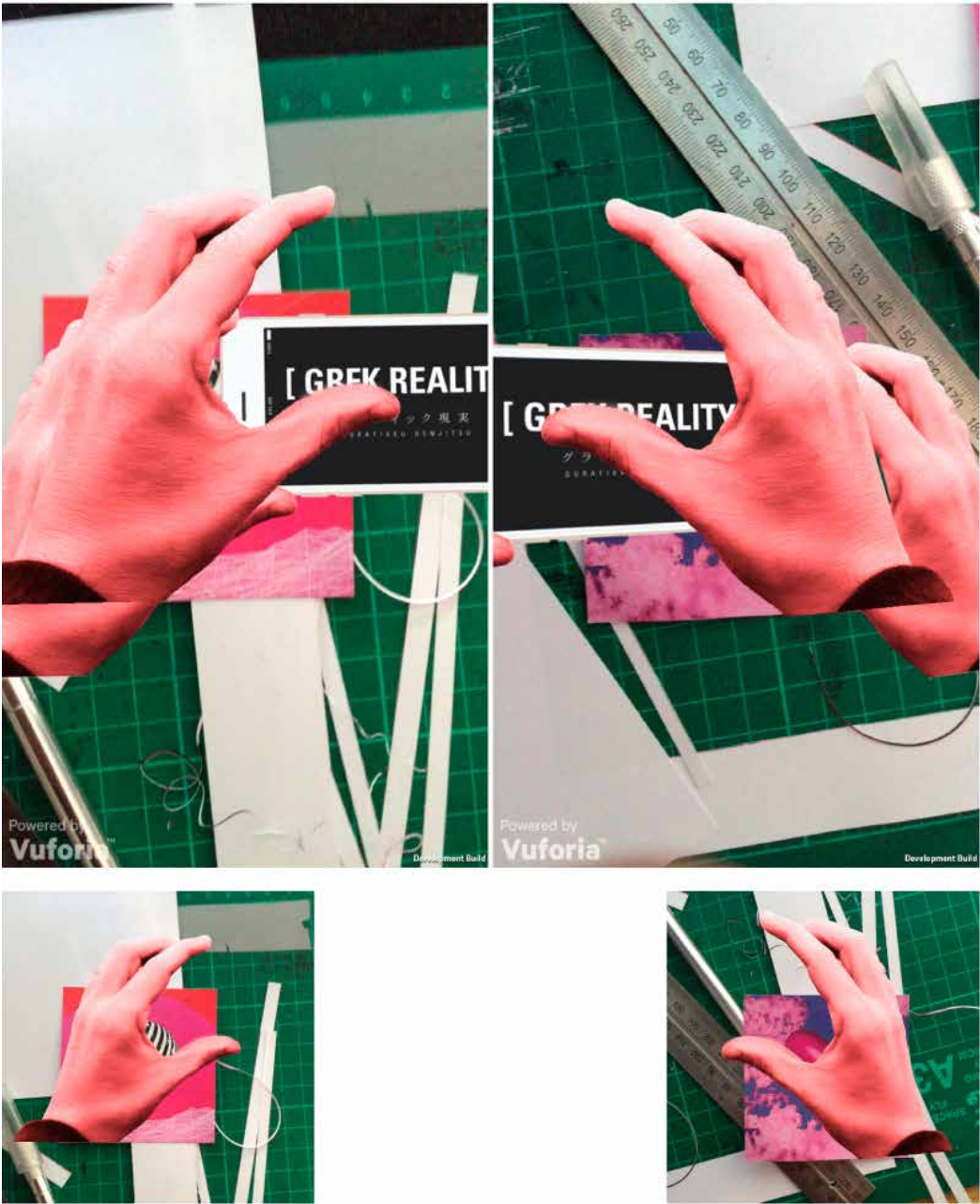


Figure 4.11. Menorath, D. (2016). Multiple AR marker registration issues. This investigation highlights two visible limitations present in fiducial-based AR markers: multiple image registration and legibility of small target (76x76) at certain distances (2m).

CONCLU- SION.

THE JOURNEY STARTS HERE.

Based in the context of augmented space where AR is integrated into daily living, Juxtapose exemplifies the possibility of AR GUI and content being created and dictated not only by designers, but also by various creative groups. Products in this future will have AR properties, presenting the possibility of indie-based hybrid products such as this artefact. The development of user-friendly AR software and apps such as LAYAR and Wikitude Studio creates another form of democratised design, opening doors to the public to create their own fiducial/planar based AR.

Research conducted for this project looked into four key aspects that could potentially play a part in customised AR for the masses in the near future: AR aesthetics and mode of creation (Vaporwave and the New Aesthetic), the hybrid AR/print publication (current AR functions and Zines), the democratisation of AR software and design tools that encourages a possible participatory design space, and the tension between physical and virtual (smart device and image marker/AR, the smartphone, and print).

This investigation led me to three conclusions relating to the technological and aesthetic aspects of AR in print based design: AR helps rejuvenate print design by incorporating new forms of interactivity through the virtual layers of information, democratised AR helps encourage prosumers to create print/AR hybrid content, and the introduction of AR to Internet genres such as Vaporwave will bring on a vast array of AR content that will help the medium find a steady purpose and function in daily living. The use of AR in conjunction with Vaporwave's model of creation opens up notions around a participatory design space that disrupts traditional boundaries between professional and amateur/creator and consumer. This investigation also suggests that AR as creative medium plays an integral role in graphic design development, enriching those who incorporate it into their practice and it as a profession.

AR is one of many mediated reality technologies that will shape the way information will be communicated in the future. Designers must be ready to explore this medium, collaborate with others and create immersive works that redefine current AR norms. Through the development and popularity of AR technologies, the theoretical context of an augmented space will become a reality, allowing people to use AR as a medium of expression and communication. With possibilities of cyber cultures such as Vaporwave using AR in the future, the variety of augmented content will help bring unique aspects and approaches to the medium. This project concludes by suggesting that teaching AR in graphic design schools can help enrich the profession and could potentially be further explored and developed in the future.

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Appendix I: Vaporwave and Design

Characteristics of Vaporwave art

Because Vaporwave is a relatively new art movement, there isn’t much academic material around this genre. The Vaporwave community, notably known as the Virtual Plaza, is the cyber powerhouse of creating content and knowledge around its cyber-nostalgia punk movement. Members within the Reddit community have put up guides on how construct a Vaporwave aesthetic. By doing this, they have separated graphical elements and tropes that go into each image. The list below is a combination of ppk80 (2015) and FrankJavCee’s (2015) guide to creating vaporwave aesthetics:

- Relation to 80s and 90s zeitgeist, encompassing pop culture, art, design, music, film, television, and technology during the era.
- Notion of exoticism through foreign languages juxtaposed with English text.
- Emoji’s (optional). The virtual way of transferring emotions
- Product of consumerism (promoting consumer culture- both ironically and not).
- Nature (notably plants of exotic nature such as palm trees)
- Romanticism of Classical Art
- Representation of the self through objects
- Connotation to millennial childhood nostalgia
- Balance (Symmetry is rare in nature)
- Digital technology and any association with it (e.g. hyperrealism chromatic objects)
- Homages to Internet art (Glitch art, Health Goth influence and Sea punk)
- Mediocrity
- Association with Retro-futurism and Cyberpunk
- Low-poly 3D models
- Lack of knowledge of design (No colour theory)
- Exaggerated effects on design software

Figure 5.1 shows these elements being incorporated in this project. The work is also juxtaposed to contributors to the Vaporwave aesthetic to compare the use of design rules as opposed to free-styling (see Figure 5.2).



In essence, the Virtual Plaza is a machine that recycles digital content. Recontextualising old digital content, recycling and repurposing lost digital information into high art and pop culture artefacts, exposing digital indices, and juxtaposing the analogue world with the digital in a beautiful array of fractal pixelation. This is one of the many reasons why the vaporwave aesthetic shares a resemblance to other Internet subcultures such as Seapunk, Health Goth and Pastel Goth. From its roots of ironic existence and nostalgia dreams, vaporwave has died and respawned as an art form that embraces its flaws. It has gone so far beyond the post-ironic age that it can no longer be thought of in terms of being parody or in earnest. It is in fact a superimposition of these states, both and neither at the same time.

Vaporwave embodies irony in design. It deliberately wants to be bad and break design rules in order to make a point: to disrupt people. This phenomenon could be considered as disruptive innovation, "a powerful means of broadening and developing new markets and providing new functionality, which, in turn, may disrupt existing market linkages" (Yu & Hang, 2010). This digital mantra of disruption or be disrupted, echoes in activists works such as the Live Wild Collective (2014) and Metahaven (2010) who use Vaporwave aesthetics to create disruption and questioning.



How Vaporwave is related to Meme culture aesthetically, and how this ties into its popularity

Previously, Vaporwave visuals came in the form of memes: “a media virus that is actively engaged and/ or remixed into existence — because something about a given image or phrase or video or whatever lines up with an already-established set of linguistic and cultural norms.” (Jenkins et. al, 2013. p. 27). Because of its iconic layout, Floral Shoppe’s album is considered to be one of the most copied Vaporwave styles, used to communicate everything under the tone of satirical design that is represented by the Virtual Plaza. An example of this is seen in the Floral Shoppe ISIL cover, where an anonymous member of the Virtual Plaza created a meme in regards to ISIL destroying cultural artwork (see Figure 5.3- 5.4). Vaporwave is shifting itself more as a serious art form, embracing its ironically digitally reproduced collages of images and music.



[Top]: Figure 5.3. Floral Shoppe (2011). *MACINTOSH PLUS* - リサフランク420 / 現代のコンピュー. Retrieved from https://upload.wikimedia.org/wikipedia/en/e/e9/Floral_Shoppe_Alt_Cover.jpg



[Bottom]: Figure 5.4. Floral Shoppe’s *MACINTOSH PLUS* album cover (2016). *In response to the destruction of cultural heritage by ISIL*. Retrieved from <http://i3.kym-cdn.com/photos/images/original/001/002/572/628.jpg>

***H a b i t s o f t h e V i r t u a l P l a z a :
R e c o n t e x t u a l i s a t i o n a n d I n t e r n e t
a n o n y m i t y***

This action coincidentally allows both creator and community to inject new meaning into images, allowing figures within the work to represent something relevant to the time it is created. The album artwork for Floral Shoppe's (2011), MACINTOSH PLUS - リサフランク420 / 現代のコンピュー is an example of the community injecting meaning, consequently objectifying the cultures represented in the image and recontextualising them.

Recontextualisation allows visual elements within the work to have new light from past connotations. Markovic (2012) reflects this notion stating,

... with all other objects of everyday use, they can be judged as more or less beautiful, elegant, well designed, and the like. However, only when they lose their everyday pragmatic meaning and transcend into the new symbolic level of reality does the aesthetic experience emerge. (p.1)

Barthes (1973) summarises the actions of the Virtual Plaza as "The supreme creation of an era conceived with passion by unknown artists, and consumed in image if not in usage by a whole population which appropriates them as a purely magical, superlative object" (p.95). The anonymity the Internet presents allows the Virtual Plaza to have multiple and fluid identities that allow members to get away with copyrighting imagery that is not their own, even though the nature of the work is recreational. However, their actions bring up notions of simulacra and simulation that can be reflected in Matsuda's augmented space, questioning what is truly original in an augmented society.

***A p p e n d i x I I : A u g m e n t e d R e a l i t y
A R i n t e r f a c e d e s i g n a e s t h e t i c***

AR user interfaces (UI) or GUI aesthetics currently draw their influences from two areas: information (flat/2D design) and gamified (digital/game design) aesthetics. The GUI is considered the second dimension of AR, following the first dimension, command line interface.

Flat design aesthetic plays an integral part in displaying graphical information in today's digital media. Vector graphics and their ability to maintain quality when enlarged on digital formats is the reason why flat design is popular amongst designers. This correlates well with presenting information in the clearest and most accessible way. Over the past decade, user interfaces (UI) have started to incorporate gamification: the use of game design elements in non-game contexts (Deterding, Dixon, Khaled & Nacke, 2011. p.3). One of the more popular examples of gamified UI is seen in Tony Stark's Iron Man HUD (see Figure 5.5). The Iron Man HUD indirectly promoted AR interfaces to be integrated into aiding gear and tools such as Daqri's (2016) Smart Helmet and Rideon's (2016) Ski goggles.

The presence of flat gamified UI is evidently seen in Matsuda's project and Rideon's (2016) AR Ski Goggles where the AR interface is simply geometric shapes and text. Graphical elements that lack beauty and utility on print are reborn as something stimulating and functional on screen. With the possibility of overloading the user with visual information, it is important that readable content doesn't need to be visually stimulating. Modernist architect Ludwig Mies van der Rohe motto of less is more is the key aspect of keeping content clean. By keeping this model, even a visually chaotic aesthetic such as vaporwave can be utilised effectively without compromising function and form.



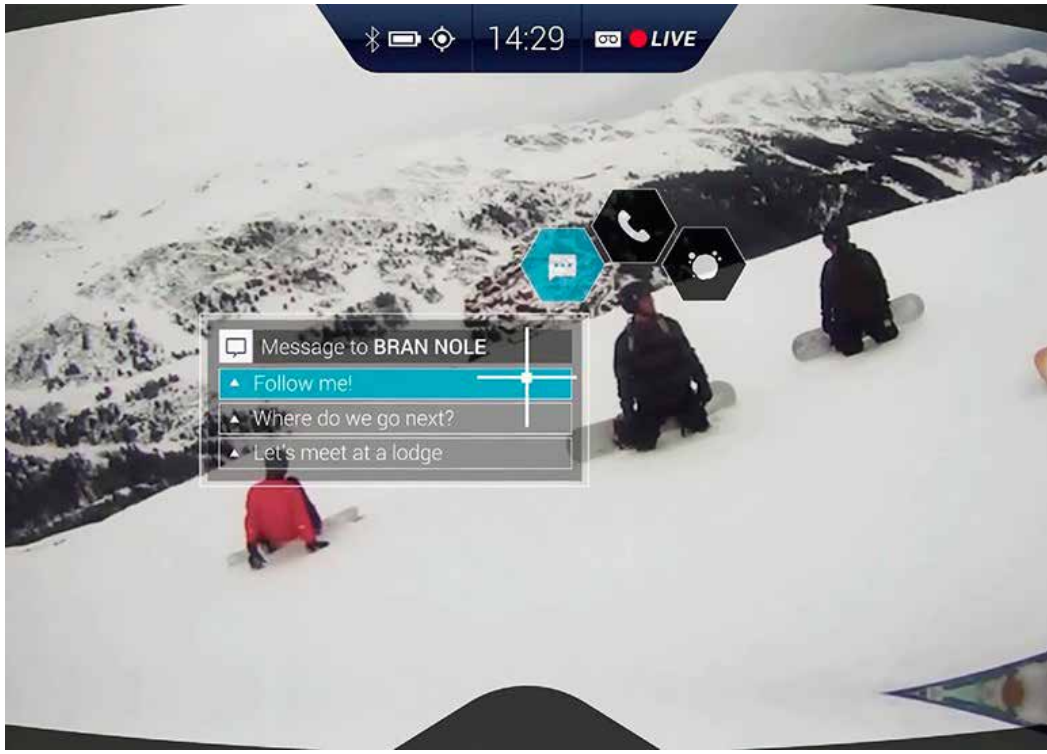
[Top]: Figure 5.5. Hansen, J. (2012). *The Avengers: Iron Man Mark VII Screen UI HUD*. Retrieved from http://jayse.tv/v2/wp-content/uploads/2012/05/IronMan_Mark_7_HUD_battle_jayse_hansen1.jpg

Jayse Hansen, the designer behind the Iron Man screen UI incorporates a blend of information and digital sci-fi aesthetics, making the interface look geometric, layered and simple.

[Top Right]: Figure 5.6. Matsuda, K. (2016). *Hyperreality* [Screenshot]. Retrieved from <https://www.youtube.com/watch?v=YJg02ivYzSs>

Matsuda's video shows an example of digital signage, where AR has aspects of gamification. The way things are designed such as billboard, signage will be created the same way (graphically), only the content itself will exist in the virtual realm, projecting into spaces where physical signage previously existed.

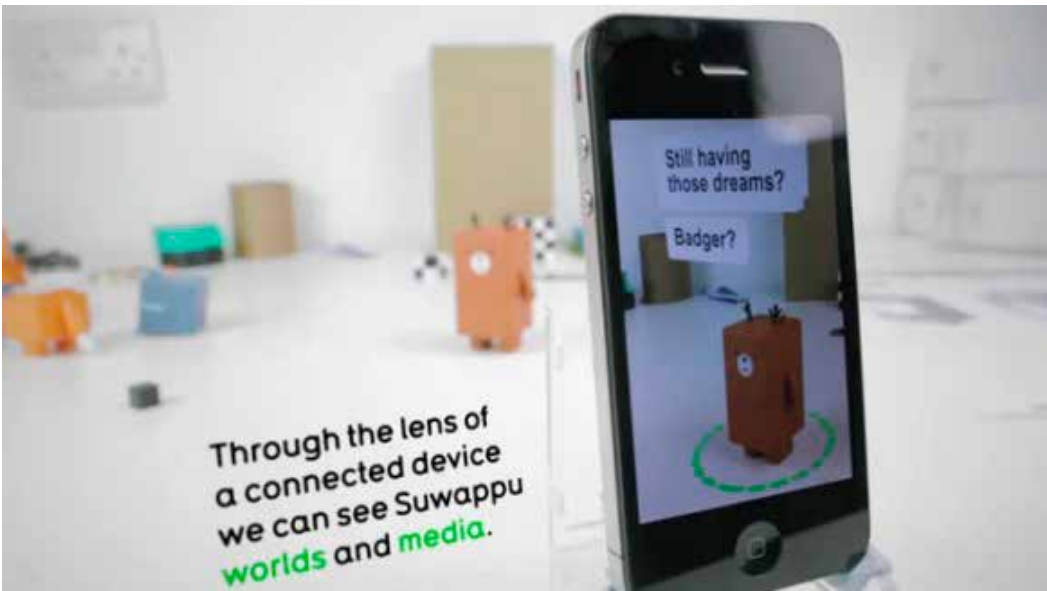
[Bottom Right]: Figure 5.7. Rideon. (2016). *AR Ski Goggles: Interface*. Retrieved from <http://innovativeisrael.dk/wp-content/uploads/2015/02/rideon-goggles-6.jpg>



AR content: Storytelling

According to Craig (2013), what makes good AR is compelling content; without it, AR becomes nothing more than a technological novelty (p.151). From a designer’s point of view, compelling content must create synergy between the subject of interest, the narrative, and how it visually communicates this. “Designers trade in storytelling, not through content narratives, but through the devices of telling: typography, line, form, colour, contrast, scale, weight etc. We speak about our assignment, literally between the lines.” (Albinson, et al., 2011. p.15). An example of this is seen in the comic book, Modern Polaxis (2014), where AR is used as a storytelling mechanism (see Figure 5.8). AR is used as a tool by the character in the story to reveal and hide information in his personal journal. The narrative takes advantage of AR’s “hidden/reveal agenda” that encourages the reader to interact and connect with the character.

Design studio BERG (2011) created table-top toys called Suwappu, that use facial recognition targets that change AR information when they swap faces with the toys. In Figure 5.9, aspects of gamification are seen in this work, where dialogues between the figures emulate conversation on online gaming. By creating narrative between the toys, it gives them a sense of personality and humanist aspects that children can relate to. Berger (2005) concurs with the notion of immersive digital narrative, stating “Digital narratives add another powerful element to this potential by offering us the opportunity to enact stories rather than to merely witness them (p. 194). AR has a great grasp of this, allowing the user to interact with both virtual and reality, blurring lines between the two and potentially immersing the user.



[Top Right]: Figure 5.8. Campbell, S. (2014). *Modern Polaxis: AR based graphic novel*. Retrieved from http://i.vimeocdn.com/video/499648665_1280x720.jpg

The comic has a journal aesthetic that is juxtaposed with the digital interfaces of AR.

[Bottom Right]: Figure 5.9. BERG. (2011). *Suwappu*. Retrieved from <http://www.geek.com/wp-content/uploads/2011/04/Suwappu-580x325.jpg>

The Kickstarter project by Florian Pariset, called StoryFab (2016), also wants to blur the lines between reality and virtual through storytelling (see Figure 5.10). The focus of the AR app is to create a product that promotes collaboration between virtual actors and us as the audience. The app holds a library of 3D AR presets, allowing users to quickly produce content wherever they are. Though in its early stages, StoryFab represents one of many future concepts of how AR could possibly be used as a storytelling medium by the masses. StoryFab shows the simplicity of the app, streamlining various aspects that would have required cross-platform software, such as adding music, camera actions, and generating virtual props.





**YOU ARE NOT
DEEP.
YOU ARE NOT AN
INTELLECTUAL
YOU ARE NOT AN
ARTIST.
YOU ARE NOT A
CRITIC.
YOU ARE NOT A
POET.
YOU JUST HAVE
INTERNET
ACCESS.**

— UNKNOWN (YEAR. 2814)