Technology used by Graffter (Augmented Reality)

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1. Introduction

Graffter App is the first app that transforms the buildings into the world's biggest communication space. Mobile users can conquer buildings and monuments, uploading and sharing their content at that space. Graffter allows the visual recognition of facades from any angle and light condition thanks to their proprietary technology of AR.

The Graffter is a technological company in the field of ICT with a value proposition based on converting the building's façades of the cities into a new communication channel. Graffter is set out to create the first Augmented Reality (AR) platform in the world that, using a mobile terminal (Smartphone), could be used to recognize, in a natural way (different angles, luminosity and distance) the façades of the cities, and to be able to locate, with highest accuracy, virtual contents at those façades, using AR techniques. All with the aim that the visual experience of the user resembles that of looking at a physical poster (Eg. outdoor advertising posters). Currently, the company have reached a minimum viable product (MVP), and is all set to focus on finding the right market to exploit the GRAFFTER technology.

This is where my team comes. We will do a business analysis to understand and define the mechanisms to engage the end user in a cultural and Tourism scenario sponsored (in some cases) by brands. This assignment is to do a study on the technology they are using which is Augmented Reality. This paper will be covering all the business analysis on the said technology.

People who are part of the assignment were:

Entrepreneur and Expert: Miguel Angel Orellana (Graffter)

Coach & Lecturer: Javier Segovia (I&E, UPM)

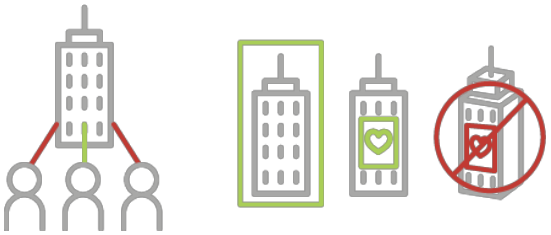
Users: Our study includes lot of target users (students)

2. Augmented Reality

Augmented Reality is an enhanced version of reality where live direct or indirect views of physical real-world environments are augmented with superimposed computer-generated images over a user's view of the real-world, thus enhancing one's current perception of reality. Augmented Reality (AR) may not be as exciting as a virtual reality roller coaster ride, but the technology is proving itself as a very useful tool in our everyday lives. From social media filters, to surgical procedures, AR is rapidly growing in popularity because it brings elements of the virtual world, into our real world, thus enhancing the things we see, hear, and feel. When compared to other reality technologies, augmented reality lies in the middle of the mixed reality spectrum; between the real world and the virtual world.

Applications of augmented reality can be as simple as a text-notification or as complicated as an instruction on how to perform a life-threatening surgical procedure. They can highlight certain features, enhance understandings, and provide accessible and timely data. Cell phones apps and business applications by companies using augmented reality are a few of the many applications driving augmented reality application development. The key point is that the information provided is highly topical and relevant to what you want you are doing.

Graffter allows users to leave virtual content at city walls and users to interact with them using a mobile app. The technology used by Graffter app is an advanced augmented reality markerless platform that visually recognizes real buildings from any angle and light conditions. Graffter has developed the world first Augmented Reality Platform based on a proprietary (IPR in process) algorithms capable of visually recognize real objects like buildings from any angle and light condition. This also solves the limitations of current AR platforms which recognition area doesn't allow the natural recognition of real buildings.



Current Augmented Reality platforms

Graffter enhanced AR platform

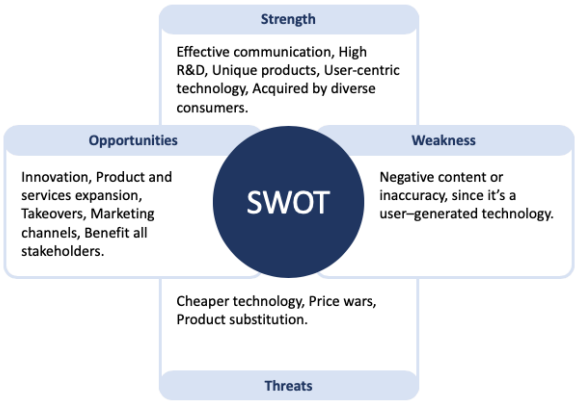
3. Understanding AR (PESTLE & SWOT)

The origin of the word augmented is 'augment', which means to add or enhance something. In the case of Augmented Reality (AR), graphics, sounds, and touch feedback are added into our natural world to create an enhanced user experience. Several categories of augmented reality technology exist, each with varying differences in their objectives and applicational use cases. There are various types of technologies that make up augmented reality, but the one that is used by Graffter is Markerless and Superimposition based AR.

Markerless Augmented Reality: One of the most widely implemented applications of augmented reality, markerless (also called location-based, position-based, or GPS) augmented reality, uses a GPS, digital compass, velocity meter, or accelerometer which is embedded in the device to provide data based on your location. It is most commonly used for mapping directions, finding nearby businesses, and other location-centric mobile applications.

Superimposition Based Augmented Reality: Superimposition based augmented reality either partially or fully replaces the original view of an object with a newly augmented view of that same object. Example: Ikea augmented reality furniture catalogue. By downloading an app and scanning selected pages in their printed or digital catalogue, users can place virtual Ikea furniture in their own home with the help of augmented reality.

Political	Economical	Social	Technological	Legal	Environmental
• E-governance: citizen engagement and e-services • Asset management & maintenance • Culture, heritage and tourism • Regulations	• Business cycles • Economic growth	• Demographics • Cultural norms and acceptance • Lack standard mechanism of social interaction.	• Emerging technologies • R&D efforts • Tech transfer among industries	• Regional laws • Law enforcements • Privacy issues or laws • Intellectual property (copyright) • User generated content • Data protection	• Resource management • Energy availability • Climate considerations



4. Virtual Reality vs. Augmented Reality

Virtual reality (VR), or virtuality, is an artificial replication of a real-life situation or environment, generated by a computer – a world that does not exist but feels real enough to have a sense of place. As the name "virtual reality" refers, the point is to immerse the users and convince them that they have entered a completely new reality – principally by stimulating their hearing and vision with the use of headsets.

Augmented reality (AR) is used to enhance the experience of the physical world with the use of virtual information overlaying a real-life scene. There are countless applications that utilize this technology in different fields – anywhere between travel and the military purposes.

There are three main principles that divide these two technologies: the depth of immersion, purpose and delivery method. VR offers a computer-generated recreation of a real-life situation, aiming to drop its users into an artificial, but convincing world. AR delivers useful or entertaining virtual data as an overlay to the real world. When it comes to the immersive aspect, VR is immersive by its very nature, as the headsets block out the surrounding, external world. Whereas, the headset is not necessary when using AR – by design, the connection between the user and the real world is maintained. While VR creates a reality of its own, which is entirely produced and driven by a computer, AR improves experiences through supplementary computer-generated components (e.g. pictures, sensations or graphics) as a layer that interacts with the real world. Also, AR is increasingly exploited on mobile devices (e.g. laptops, tablets or smart phones), VR is typically delivered via a handheld or head-mounted controller. Though both AR and VR are growing, AR is getting more share of the pie. AR plays a big role to bring content, interactions with customers and services. The nature of augmented reality, blanketing the real world with digital content, helps in driving interaction with a customer in a physical space to display a wide a variety of products.

Parameters	AR	VR	Comments
Interaction with real world	++	--	AR enhances experiences by adding virtual components with the real world. VR creates its own reality (computer generated and driven).
Visibility	-	+	VR: totally immersive experience replacing the "real" world with an alternate one. AR: replace imagery on an existing space.

Parameters	AR	VR	Comments
Experience	-	++	AR is exciting, but we don't have many ways to experience it. VR is an experience where you put on a headset and get transported to another world, with two of your senses cut off from reality.
Development cost	++	-	AR: $5250-$28000 VR: $5000-$100 000
Development time	++	--	AR: 150-800 hours VR: 3-24 months

PESTLE analysis of Augmented Reality with Virtual Reality

5. Entry barriers

Few of the barriers found for Augmented Reality to enter the business markets are mentioned below:

High cost: Implementing AR technology involves high price as it needs to be integrated into the entire product range of the company. Despite the fact that the implementation helps in the long run, one needs to spend a vast sum to start using AR.

Return on investment: Even though many companies have already started using this technology for better customer experience, the return on the investment they made is not satisfactory. In case of small and medium brands, this becomes a significant barrier to entry into this technology.

Technical support: As AR technology is in initial stages of development, it is tough to have enough expertise in designing AR tech, which involves high cost too. Maintaining technical staff adds more burden to the company regarding money.

Facing ethics: Who will control its deployment, who will ultimately be in control of its augmented content, and for what purposes will it be used? Will individuals be freed, or, on the contrary, be locked into purely commerce-driven experiences?

Tracking: Most of the research into AR is about getting the real and virtual to line up properly. Even if the GPS location was spot on, the application still needs to know exactly which way user is facing, which angle they are looking at and what orientation their head is in at the time; and it needs to do all of that in an instant to keep the computer-generated overlay in

precise sync with the real world. This is made harder because of the sensors in smartphone, the gyros, compass and accelerometer, which are not as accurate as they need to be. Also, the device has no computer vision of the real world and the camera no real perception of what it sees.

These are few of the entry barriers in terms of usability and business for Augmented Reality.

6. Future of Augmented Reality

To understand the future of AR, it is very important to know the potential and development areas of the technology. According to a study done they have tabulated a chart explaining the same (given below). AR is a technology that could turn into an everyday help for the common person, helping them make better decisions about food, transportation, people and many more.

Area	Potential	Development
Awareness/Demand	AR being an unfamiliar term	Popular already existing apps (Snapchat)
Purpose	Informative	-
Risks	-	Addictive, Lack of interaction, distraction
Features	-	Lack of interaction
Sweet Spot	Absorption, Entertaining, Educational, History & Cultural	Negligent participation
Meaningful experience	Learning, Positive emotions, Storytelling	Weak foundation, Authenticity, Interaction

The areas of potential and development for the better future of the technology of Augmented Reality

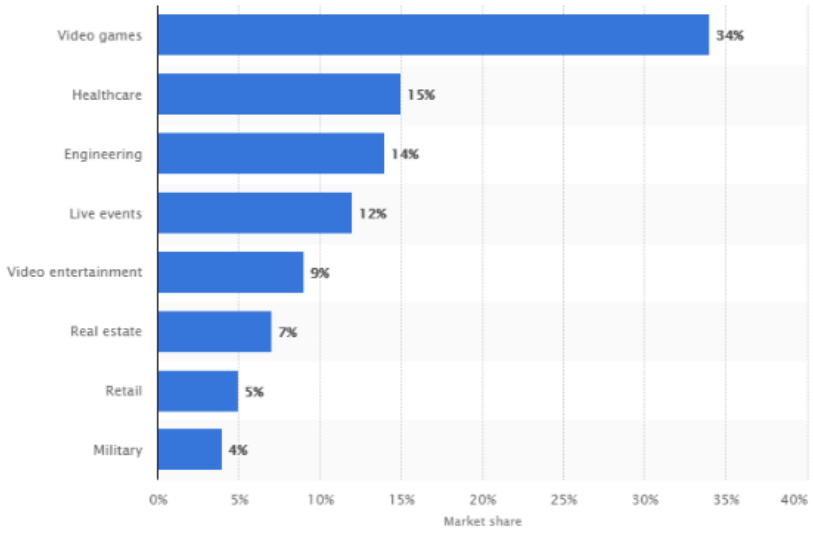
Augmented reality: The devices – now and in the future

There are number of devices out now that use AR. Most of these are aimed toward businesses and work, but the consumer stuff is just around the corner (2020). Some of these apps are mentioned below:

Microsoft HoloLens: “The big daddy”, HoloLens was the most advanced AR device out there. There's also the promise of consumer AR headsets just around the corner. HoloLens has seen use by companies and developers, and it's also capable of working in the same apps as Windows Mixed Reality headsets for some AR-VR collaboration.

Everysight Raptor: Everysight has built augmented reality devices for the military and put them to use to build a pair of AR glasses for cyclists. The Raptor uses its smartphone-like internals to give you directions and information on your ride. There's also a camera for you to take action cam-like shots of some particularly exciting moments.

By 2025 the healthcare revenue from augmented and virtual reality will be around $5 billion and some technology insiders expect to see the most advancements of AR technology in the healthcare industry. The travel industry also has a lot to gain from the AR boom as 84% of consumers all over the world would be interested in using AR as part of their travel experiences and 42% believe that AR is the future of tourism. Retailers have a heady AR future, since 71 percent of respondents to a survey said they'd shop even more at stores that offer AR features to customers. Forty percent would pay for more a product that was part of such an experience. AR might be just fun for now, but the technology as a serious future.



This graph shows the market share of each segments/areas in Augmented Reality

7. Business Roles in Augmented Reality

Manufacturing: The technology, with its potential to digitize the product prototyping in 3D, makes it easier to access and understand the prototype. The business leaders can easily make the right decision and their team can act effectively. This increases the speed of the process along with the efficiency rate, which ultimately enhances the overall experience and profit generated.

Education: AR technology is making a difference in the education business vertical in two ways – by engaging users and by making the concepts interactive. By incorporating gaming elements into the classroom, AR is providing an exceptional experience for both the teachers and students. It is encouraging them to turn a boring class into a jaw-dropping experience and learn complicated concepts easily via 3D AR modelling.

Healthcare: AR technology is disrupting the world of healthcare. The technology is breaking down the complex medical concepts into interactive 3D forms. This way, it is empowering the medical experts to describe everything easily to their patients and trainees.

Marketing: AR is adding life to the static marketing mediums. It is enabling the marketers to include 3D animations, video and target-based additional information into their AR-based storefronts, brochures, posters, t-shirts, flyers, and billboards.

Fashion: Augmented Reality is transforming the fashion and retail industry in multifold. It is providing personalized assistance to the online and offline shoppers and helping them choose the right product comfortably and easily.

Travel: From hotel room booking to transportation, planning events and outings, and booking a table at a restaurant, augmented reality is helping in everything to make your traveling hassle-free and memorable. The technology is helping the travellers access the information written in pamphlets and other sources easily by converting it into useful, spoken conversation. It is offering 360-degree tours to the guest rooms, restaurants, meeting facilities, and other places to the customers.

Food and beverage industry: The technology is making it easier for the end users to get a detailed information of the ingredients and nutritional value of every food item they have ordered. It is presenting the dish recipes in innovative ways, which is encouraging the chefs to experiment and enhance their skills. Apart from this, the technology is playing a significant role in the customer marketing.

8. Early adopters

If you ask most people about augmented reality, their experience is probably more along the lines of Pokémon Go than it is corporate training. But the combination of digital information and the real world isn't just for mobile entertainment, but a real solution for learning at work. Before it's dismissed as a development still far off the future, you should know that some industries have been all too happy to adopt augmented reality as a tool for better learning. Three specific industries are leading the charge for augmented reality as a learning tool:

Healthcare: One of AR's main benefits is the ability to manipulate objects that are not real. For example, a surgeon could hone her skills with a new technique on an augmented reality human heart model before performing the procedure in real life. Medical students are also using AR to practice in a low-stakes environment to become more proficient and confident.

Oil: Oil rigs are notoriously dangerous environments, with an offshore worker mortality rate that is seven times the U.S. average, according to the CDC. To protect their employees, oil companies are utilizing AR applications to instruct and teach safety and emergency protocol in the most authentic settings and scenarios possible.

Military and Border Patrol: When the stakes are high, personnel are more likely to panic and make a mistake, especially if they've never experienced a risky situation before. Augmented reality works as a way to train military for dangerous situations that they could experience in the field. The result is better-prepared personnel who know the steps to take because practice made perfect in training. Border patrol is also using AR as a way to practice a number of different situations to test and evaluate their reactions.

Healthcare, oil, and military aren't usually the first industries to go all-in on new tech. They're huge entities and revolution is often sluggish at best. But these three industries stand to gain the most from augmented reality because their employees face life-or-death situations every day, which is likely why they've been the first to jump on the AR train.

9. References, web links

http://www.thegraffter.com/en/tecnologia

https://www.realitytechnologies.com/augmented-reality/

https://www.smartinsights.com/marketing-planning/marketing-models/pestle-analysis-model/

https://www.theseus.fi/bitstream/handle/10024/134963/Jaatinen_Kinnunen.pdf?sequence=1

https://www.linkedin.com/pulse/opportunities-barriers-augmented-reality-ar-retail-kiran-kumar-p-

https://www.pocket-lint.com/phones/news/108961-5-biggest-barriers-augmented-reality

https://www.wareable.com/ar/everything-you-need-to-know-about-augmented-reality

https://hackernoon.com/predictions-for-the-future-of-augmented-reality-63c7b8c9d794

https://www.clickz.com/10-ways-your-industry-uses-augmented-reality/214953/

https://www.iqvis.com/blog/5-emerging-trends-in-the-augmented-and-virtual-reality-markets/

https://elmlearning.com/the-early-adopters-of-augmented-reality/