

Easy-To-Use Augmented Reality in the Mobile Industry: An Internship Experience 121212

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## **Executive Summary**

This report details the work and research I have completed over the past few months with BUNDLAR. This company is a startup located in startup incubator 1871. BUNDLAR is currently developing their augmented reality mobile app that will launch in the near future. Over my time with them, I helped with market research. My research was focused on the Augmented Reality industry and performing competitive analysis on other AR companies. With this research, I was able to provide BUNDLAR with valuable recommendations and insights that helped shape their development around the target audience and industry. In addition, I also focused on performing quality assurance testing on a beta version of their mobile app. Because I was part of their target audience, I was able to provide valuable feedback on my user experience and report any problems and difficulties I experienced. Through my internship, I wanted to help BUNDLAR with releasing their easy-to-use AR platform. In this report, I will focus on my experience, business project, and key learnings.

#### **Business Context**

Augmented Reality (AR) is an emerging technology in which digital content-videos, images, or animated 3d models-is placed on a real world object through the means of a smartphone or tablet. Essentially, AR can enhance objects in the real world through multiple sensory modalities, including visual, auditory, haptic, somatosensory, and olfactory. This interaction between digital content and a real world object is known as an AR experience. To trigger an experience, a marker in the real world such as a unique object, code, or location must be pointed at by a camera. In order for a response to be created on a device's screen, an asset such as audio, video, image, or 3d model must be present. Once a device registers the real world object, the virtual assets can appear on the screen. AR seamlessly interweaves this virtual experience with the physical world so that it can be perceived as an immersive experience by users. In contrast to another popular technology known as Virtual Reality, AR does not completely replace a user's real world environment. This allows AR to alter a user's perception of a real-world environment instead of simulating a completely virtual one. With the help of this technology, information about the real-world can become interactive and enriched (Heppelman et. al).

The main value of AR technology is its ability to immerse contents of the digital world into a user's perception of the real world. This has great commercial use for companies and their marketing purposes. AR has the ability to take printed material and physical advertisements and enhance them. For example, a clothing company can create an AR experience where product information and links appear on a user's device when a user points their camera at the product on a printed material. This enhances printed material and gives customers the opportunity to receive more information about a company's product. Such an advertising technique can also attract more customers who would enjoy using this feature. Companies such as Coca-Cola have even partnered with AR companies to enhance their advertisements and make it more interactive for watchers. An AR can even be triggered from markers on TV's, laptops, or other devices, meaning that a marker works as long as it is viewed in the physical world. This means that TV and websites ads can also be enhanced by AR. Advertisers can take advantage of this ability when deciding to add AR functionality to their ads (Heppelman et. al).

In addition, AR can also enhance various operations of a company. An important focus of many companies is learning and development of their employees. Companies have actually



enhanced training through use of Augmented Reality. This allows them to better simulate a work experience through digital immersion. For example, some hospitals train their surgeons using AR to simulate a surgery. Another example are manufacturing companies that train their employees by equipping them with AR so that they can receive more information about parts and equipment when they point their device at it (Heppelman et. al).

AR has also started to become introduced to the gaming industry. A well-known example of such a game is Pokemon Go which was created by Niantic. This game takes characters from the popular franchise Pokemon and brings them to the real world with AR. When a player walks around the real world with their mobile device, Pokemon will pop up on their screen that they can capture. This game was released in 2016 and has made about 3 billion dollars in revenue and has millions of downloads. Niantic has become a leading Augmented Reality developer and one of the most successful mobile app makers in the industry (Boland 2020).

BUNDLAR's platform makes it easy for companies to integrate innovative AR technology into their communications and marketing to benefit customers and employees. They deliver an easy-to-use content management system (CMS), API, data analytics reporting, and mobile app platform. BUNDLAR's technology simplifies the process of incorporating revolutionary AR into corporate and industrial initiatives. Their mission is to create an easy-to-use AR platform that enables companies to provide an impactful experience to their customers and increase sales, engagement, and results. They hope to achieve this by focusing on a Software as a Service (SaaS) platform and CMS that allows anyone to create, view, and brand their own Augmented Reality experiences. BUNDLAR's AR technology is unique from its competitors because it "bundles" AR experiences into packages that users can load onto their platform app on-demand. Because bundles can be downloaded locally in this way, AR experiences and interactions are instantaneous. This means that a user can enjoy their AR experiences without relying on an internet connection, making this experience more reliable, immediate, and stable. BUNDLAR takes this revolutionary technology and integrates it into their app framework and image recognition software, allowing for instantaneous experiences that rivals other AR apps on the market (BUNDLAR 2020).

In addition to the mobile app, BUNDLAR has a content management system (CMS) that allows for unlimited potential for AR experiences. The CMS serves as a website where users can create and upload their own AR assets. As long as the user has an image marker they would like to use, the system takes care of connecting the asset they created to the marker. Because of this do-it-yourself technology, a user does not need a lot of knowledge to create their own AR experience. In addition, the system can add advanced functionality that can be used by companies for their professional branding purposes. After creating an experience, it will be stored in a "bundle" that will be saved to the cloud. The user can then deploy the experience to their mobile device and test it for themselves. All in all, this process is made to give any user the opportunity to create their own AR experiences (BUNDLAR 2020).

BUNDLAR also provides more options for companies and institutions that will use this software and technology for their professional branding. They have three tiers of subscriptions that target users based on their goals with using the app. Although each of the tiers allow for low-cost entry and access to the platform app, BUNDLAR provides a more complete platform for enterprise clients. The three tier, essentials, professional, and enterprise. The essential level provides access to the AR platform for client-specific bundle of AR experiences. The



professional level has increased features and functionality for those who require custom styling and branding. The final level, enterprise, allows access to the full functionality of the platform app and includes more training and consulting features. API and analytics are a facet of all three of these levels. It tracks every interaction made between a user and AR experience. Customers are allowed to choose their analytics package based on whatever fits their needs. For example, a user who is using it for entertainment purposes would not need analytics. In contrast, a business utilizing this software would want to see more information about who is interacting with their experience (BUNDLAR 2020).

In the past, BUNDLAR has teamed up with academic institutions to provide them with their AR technology. One college that they partnered with was Arizona State University (ASU). Colleges have various marketing materials that they distribute such as printed brochures, and emails. With BUNDLAR, they can add AR experiences to these materials to enhance the experience for the user. For example, ASU added AR to their brochures that they hand out to prospective students. When users aim their mobile device at the brochure, they will be able to interact with videos, links, and audio related to the college. This allows them to view more information about the college and interact more with the brochure. The black and white ink on paper can transform into an immersive experience for viewers. BUNDLAR plans on working with more institutions in the future to help them add AR into their marketing materials (BUNDLAR 2020).

In the future, BUNDLAR hopes to release their platform app to the market. Because of the various similar apps that are already on the market, they must work towards making their app unique from the competitors. Although their "bundle" technology is already a revolutionary advancement in the industry, they still must make sure that their user experience is different than the competitors. This requires research on the target market, industry, and the competitors. In addition, they must have testers that can give feedback on the user experience. For this reason, market research and app testing were a large focus of my internship with BUNDLAR.

### **Business Project Description**

My work with BUNDLAR revolved around their AR platform app that they will be launching in the near future. At the start of my internship, I was first introduced to the company's AR technology. I found this technology very interesting, and immediately saw the great potential in their product. I was excited to work with their technology and help them with the development of their platform first. One of my first tasks was to research the AR industry as a whole. I was asked to research AR companies that were being invested in. This helped me understand who the key players were in the industry, and how BUNDLAR's technology compared to theirs. I came across other startups who had a similar platform, and gained great insights into which companies were doing well in the market versus the ones that were not doing as well. I found it interesting how tech giants such as Apple, Facebook, and Google, were acquiring smaller companies that they could put towards their own AR technology.

Although this research gave me an introduction to the AR industry, there was still a lot of valuable information I could provide to BUNDLAR.



An important aspect of my research was performing competitive analysis on BUNDLAR's competitiors. I was given specific companies that BUNDLAR wanted more information on these applications and how they work. To complete this, I would download these apps and try them out like a regular user. However, I specifically detailed my user experience and any problems I found in a google doc. A screenshots of such research can be found below:







I would create my own AR experience, using my own marker, with the apps of these competitors, and then give feedback on the interface, functionality, and my overall user experience. I repeated this for significant competitors of BUNDLAR. This provided them with



valuable information about the features and functionality of their competitors. Also reporting any complaints I had with these applications helped them consider their own design and how they could improve it for their target audience. Because I was part of their target audience, I was able to provide important insights and feedback on other AR platforms that would help shape the development of their own platform. After testing out these various competitors, I was tasked with compiling information I collected about the features of these applications. BUNDLAR introduced me to their investor deck and showed me the parts of this deck. I learned that the investor desk is important for attracting investors for the company. The best way to attract investors is to show that your product is unique or provides something different than the competitors. I also learned that one of the best ways to compare the features of similar products is with a competitive analysis matrix. Essentially, a competitive analysis matrix is a diagram in which companies are compared based on various factors of their products. This can show potential investors how your product is different from what similar companies are doing in the market. For this reason, I learned how to create a competitive analysis matrix and then filled it in with the information I gained from testing the AR apps of the various competitors. A screenshot of the competitive analysis matrix I created for BUNDLAR's investor deck can be found below:

	CMS Platform	Training	Custom Branding	Creation Tool	Web XR	Tools for End User	Photo- Booth	Tours, Treasure Hunt
BUNDLAR	V	V	V	V	*coming soon*	V	V	V
Facebook SparkAR	✓			<b>√</b>		<b>✓</b>		
Snapchat Lens Studio	<b>√</b>			<b>√</b>		<b>√</b>		
Google ARCore	✓			<b>√</b>				
Apple ARKit	✓			<b>√</b>				
Niantic								
Blippar Studio	✓			✓		✓		
8th Wall	<b>√</b>	✓	✓	<b>√</b>	✓	✓		
Zappar	<b>√</b>	<b>√</b>		✓	✓	✓		
KP9 Interactive WorldCAST	V			<b>√</b>		<b>√</b>		
threekit			V					
Tactic Studio			<b>√</b>					
NexTech ARitize								

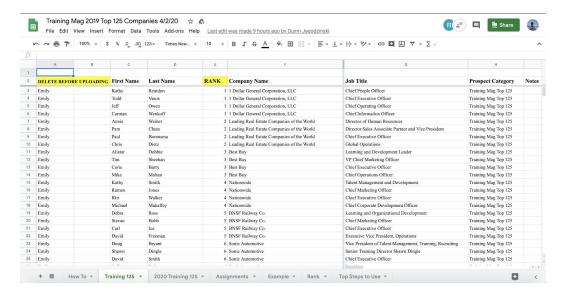


# **Competitive Analysis**



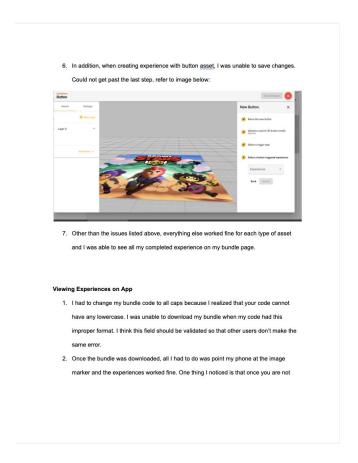
	Creation Tool	Web XR	Custom Branding	CMS Platform	Training	Tools for End User	Photo- Booth	Tours, Treasure Hunt
BUNDLAR	· ·	·	•	•	·	·	<b>V</b>	~
MetaVRse					~			
Zappar	<b>~</b>	~		<b>✓</b>		<b>~</b>		
ThreeKit					~			
Gravity Jack					~			
Tactic Studio	~	~	~					
Blippar	~	<b>~</b>		~		<b>~</b>		
KP9 Studios	~	~		~		~		
8th Wall	~	<b>~</b>	~	~	~	<b>~</b>		

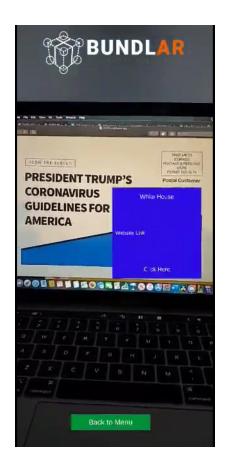
After completing the competitive analysis, I was introduced to an important resource of BUNDLAR. Something that BUNDLAR wants to focus on with their platform app is training and development within a company. They believe that their technology will be useful in enhancing these company's methods. To help them with finding companies focused on training, BUNDLAR is referring to Training Mag 125. This resource is an organization that ranks the top 125 companies in the country with the best training programs. I was tasked with compiling a spreadsheet of four possible contacts from each company from the list. Finding contacts for these companies will help BUNDLAR in the future when they contact potential companies that might be interested in buying their augmented reality platform. You can find a screenshot of this spreadsheet below:





In addition to market research, another facet of my work with BUNDLAR was performing quality assurance testing on the beta version of their mobile application. After working with the apps of the competitors, I finally got to test out BUNDLAR's app. I was given a beta version of the app for testing purposes. I went through a specific use case and detailed my user experience and any issues I had. I gave my insights on the user interface and how intuitive the application was. This was all documented in a google doc and many screenshots were taken to show what my user experience looked like. I was able to provide valuable feedback to the developers on the app and suggestions I had for improvement. Screenshots of my feedback and the app itself can be found below:





#### **Business Project Research**

The key business question for this project was, how Augmented Reality can become easy-to-use and available to a wide range of needs. BUNDLAR's mission is AR made easy, and they hope that anyone can create their own AR experiences with the content management system. Mobile AR is a developing field that will boom in the near future. Performing research on the steps being taken by the AR community to achieve an AR ecosystem helps BUNDLAR in developing their own platform app. By critiquing and evaluating their competitors, I can give feedback that will help guide BUNDLAR in their own development. Analysis of the functionality, interface, and user experience of these apps will guide BUNDLAR in what they



need to add or improve in their app. As a high school student, I am the perfect person to test such an app because I am a large part of their target audience.

The main two methods I used to provide insight to the research question are market research and user testing. Market research on a broad scope consisted of learning about the AR industry and the innovations being made. Specifically, I was researching BUNDLAR's competitors in the mobile AR market and how their apps compared to BUNDLAR's own platform app. A main resource of my research was investor information from websites such as Crunchbase. This information gave me insights to which AR companies were being invested in. Although I was given a list of the company's competitors, I was also able to give recommendations on other companies I felt were relevant. A lot of knowledge was gained by directly testing the apps of these competitors and by reporting my personal experience and thoughts about the app. This feedback was relevant to BUNDLAR in developing their own app. I reported most of my research in a google doc, but the way I displayed and presented this information was through a competitive analysis matrix. This matrix is a diagram that illustrates a comparison between similar products based on certain criteria. In this way, I was able to display my research in a way that would look presentable in an investor deck.

User testing consisted of testing out the AR platforms of BUNDLAR's competitors and also performing quality assurance testing on BUNDLAR's own platform. To complete this research, I would use these platforms just as any regular user would. However, I would detail every step of my user experience, highlight the features, and point out any problems I had. This qualitative analysis gave me first-hand experience with testing what these applications could do. Although the features of these platforms could be found on their websites, I was able to gain more specific objective criticism of the user experience that these applications provide. For example, if I found a problem in creating my own AR experience in one of these apps, reporting this to the BUNDLAR developers would guide their creation of the platform to ensure that the AR experience avoided such problems. In addition, because I embody a large portion of AR's target audience, I was able to provide subjective feedback on what I thought of these applications and whether I found them intuitive.

I gained insights into the potential of the mobile AR industry. Impressively, AR is projected to make more revenue than VR by 2023. This means that the industry has a large expected growth rate that will revolutionize the way we immerse ourselves with technology. Over \$3 billion dollars were made globally by Mobile AR in 2018, and this revenue is expected to grow. Compared to other emerging technology such as VR, and wearable tech, AR has the highest expected revenue (Shelley 2020). The big players in AR are Apple and Facebook who have their own platforms, ARKit and SparkAR respectively. According to investor information, these companies have been acquiring smaller startups (Crunchbase 2020). Although Google does not have its own platform, it relies on Android phone maker partnerships to grow its platform, ARCore. In the past few years, Mobile AR revenues have been dominated by Pokemon Go. However, AR's installed base in mainstream apps may take over half of Mobile AR revenue by 2023. Furthermore, the AR industry is expected to be worth \$72.7 billion by 2024. For this reason, BUNDLAR has immense potential that benefits from the growth of the AR industry (Merel 2019).

In addition, I learned about the key players in Mobile AR. Although Apple and Facebook's platforms will likely dominate the industry, smaller startups have also been making strong movements. Some of these startups include: Blippar, Zappar, KP9 Studios, Niantic, 8th



Wall, and Tactic Studio (CB Insights 2020). I gained knowledge about the functionality of these apps. This gave me viable insights into what features the key players in the industry had and the target markets of such apps. Reporting back these feedback to the BUNDLAR developers helped them in shaping their development of their own AR platform. Being able to subjectively compare themselves with their direct competitors will help them when they launch later this year. Through all of this research, I learned what features can make BUNDLAR more easy-to-use and intuitive than its competitors. In addition, I was able to point out features that would make BUNDLAR unique and better than its competitors.

Although the overall project ran smoothly, there were specific conditions that caused the project to have to be adjusted. The main limitation was that the COVID-19 pandemic made it impossible to go to 1871 in the past few months. This meant that I missed out on interacting directly with the company. However, I was able to overcome this by working remotely on the rest of my tasks. The main work I completed from home was quality assurance testing on BUNDLAR's beta version of their platform. I was able to report back key feedback to the company. Even with the difficulty that the pandemic has created, I am satisfied with the work that I have completed towards my business project.

# **Business Project Key Learning and Recommendations**

I gained skills through this business project and by immersing myself with the startup culture. One main skill I gained is learning how to perform market research and evaluate investor information. I realized how important market research is for a company when they are developing their own product. There must be a specific target audience and need in the market for a product to do well. Otherwise, it would just be a clone of one of its competitors. I learned that the best way to perform market research is to test out the products of the competitors yourself. This gave me insights into how these apps work and suggestions I had to improve them. I also learned how to display the market research I performed through a competitive analysis matrix that would be used in an investor deck. Immersion into the professional work environment of a startup helped me gain networking, communication, and workflow experience. I became immersed into the back-ends of how a startup operates and thoroughly enjoyed the environment. Networking with other people in the company and others in 1871 helped me expand my network and improved my networking ability. I also gained technical skills such as learning how to perform QA testing, front end development, and learning how AR works.

I was able to perform a lot of research towards how BUNDLAR could effectively introduce their easy-to-use AR platform to the market. However, through evaluation of the competitors and BUNDLAR's own app, I have a few recommendations. One thing I noticed is that all of these competitors had the same basic purpose and functionality. They all were able to take a target marker and allow users to create their own AR experience. However, this made all of them very similar and I did not feel like there was something unique that these applications could provide in comparison for each other. The special thing about BUNDLAR is their "bundle" technology in which AR experiences are packaged and saved to the cloud for use without a consistent internet connection. I did not notice this feature being highlighted in other AR applications. For this reason, I believe that BUNDLAR should really push forward this feature. It is something that will set them apart and show that they can bring a unique feature to the market. In addition, I think BUNDLAR should focus on bringing AR to a specific facet of



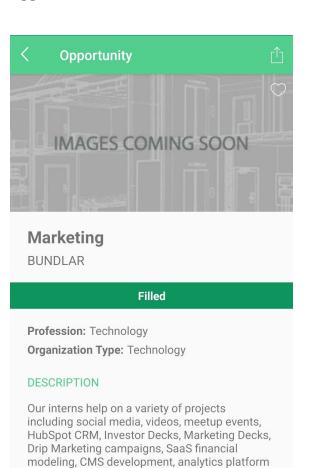
the economy as a whole. I know that in the past they have focused on institutions, museums, and expos. However, with their new BUNDLAR platform app, I think that in addition to these, they should focus on targeting training and development within a company. If they can prove that their technology will help companies improve in this department, they will find great value there. Another sector that BUNDLAR should target is advertising. Integrating AR into advertising of clothing brands or grocery stores has still not been evident in the market. If BUNDLAR can prove that their technology can improve sales of these types of companies, they would receive great sales. The main challenge will lie in proving that AR technology is more than just a gimmick. AR may be flashy and cool at first, but if it doesn't provide value to a company and increase their sales they will not invest in it. However, I believe that AR's ability to connect physical objects to links and videos on the internet may provide value to customers who would like to receive immediate information on specific products. Overall, I see great value and potential in BUNDLAR's AR platform and hope that my project will help their app become successful.

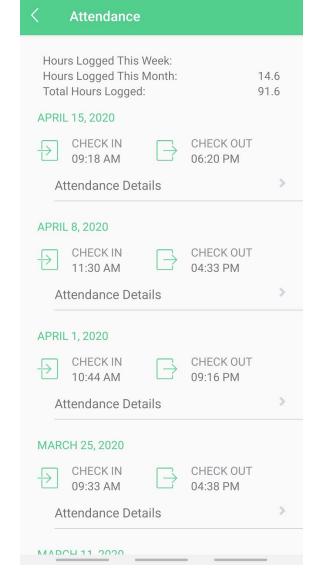
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# **Appendices**





# Request to Pursue

development, new product development

assistance, competitive analysis and more.

