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Architecture 2.0; Representing the architectural future with new technologies

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May 2020

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Abstract:

Emergent digital technologies, such as Virtual Reality (VR), Augmented Reality (AR), Social Media, coding, and robotic technology, provide users with a new way of processing architectural designs. These tools help to explore and enhance the architectural design process to create a powerful link between the design and idea through testing and calculation. With the advancement as well as productive innovations of these technologies, people in the not so distant future will find these platforms instrumental to the design process. For these systems to become innovative, designers must push the field to become more responsive, and not just to the environments that they help. More importantly, designers need to be sensitive to the users of said spaces. In other words, pioneers of these innovations must incorporate feedback from the physical aspects of a project as well as the cultural contexts of the user rather than solely relying on conventional or analytical processes of a project. While designers have their way of working and developing projects, it would be very beneficial for them to learn these new types of techniques and technologies since their prominence within the field of architecture will continue to grow and expand. The knowledge of these new tools will continue to change the way architecture is thought and produced. The potential of new technologies to develop designs and spatial configurations that are perceivable by our sensory system could potentially uncover a latent domain of spatial aesthetics that architects can experiment with, develop, and harness.

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As the world continues to evolve and develop new technologies to make daily life more comfortable, how can these advancements be refined and employed throughout the field of architecture? The incorporation of Virtual Reality, Augmented Reality, Social Media, and other types of advancements such as robotics and coding, could lead architecture down a new revolutionary path. These tools help design exploration, enhancing the development of ideas with new capacities for testing and calculation. With the advancement of these technologies, people in the not so distant future will find these platforms instrumental to the design process. Within the field of architecture, to enable these systems to become fully innovative, designers must push the field to become more responsive, not just to the environments which they build. More importantly, they need to be responsive to the users of said spaces. In other words, pioneers of these innovations must incorporate feedback from the physical aspects of a project as well as the cultural contexts of the user rather than solely relying on conventional or analytical processes of a project.

One method for incorporating this physical and cultural context into a project is the implementation of Virtual Reality to the design process. Virtual Reality is not a new concept or tool in the world of design; however, architects and designers are in the beginning stages of incorporating this method into their workflows. There are several promising aspects that Virtual Reality can have when developing a project. For my Virtual Places Architectural studio, we incorporated Virtual Reality into our design process from the initial stages allowing us to experience the spaces we are creating in real-time. This method will enable us to analyze and discuss what is working in these spaces and gives us real-world feedback on how the users of these spaces will be able to act and react to our designs. This technology takes design iterations and transforms them into computerized reality. Although these experiences are not set in "reality," the knowledge gained by experiencing

Fig 1. Concourse Interaction Render, Virtual Spaces Studio

the physical relationships between spaces will improve the design process leaps and bounds to create a specific experience by engaging with the user's senses and perceptions. An advantage I've learned first-hand from my usage of Virtual Reality is how much it helps improve communication between the designer and the audience; its applications can also be used to spot inconsistencies and flaws within 3d models. The technology has grown to the point where individual experiences have begun to expand to multiple users, having the same adventure simultaneously, these advancements help with giving more feedback at a faster rate to develop the project further. The benefits that VR creates for the design process could be immense if more designers start to emphasize the usage of this technology in their design proposals from the beginning of the conceptual stages. The combination that Virtual Reality encompasses, such as full immersion into designed spaces, spatial awareness, and depth of interactivity, enables a far more creative, efficient, and connected design process.

Fig 2. Concourse Entrance Interaction Render, Virtual Places Studio

This new method of adding Virtual Reality to the design process has benefits for the development of a project; however, from experience, there needs to be a more seamless unification of separate programs when utilizing Virtual Reality. Far too often, in my experience designing for both the Virtual Places Architectural Studio and the New Realities in Representation courses, the transition from diverse drawing and modeling software such as Rhino to Unreal or Gravity Sketch to Unreal became quite a frustrating endeavor. Perhaps that is due to my initial unfamiliarity with the Unreal program. However, other software such as Enscape has

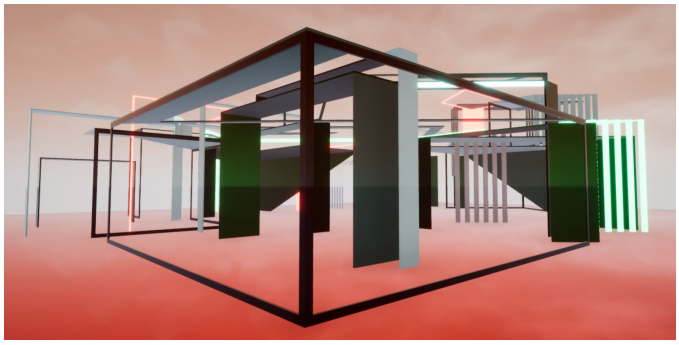


Fig 3. New Realities in Representation, VR Development

made it reasonably easy to utilize its Virtual Reality system. Enscape makes it simple for a new user to maneuver around their designed spaces while keeping the same level of quality for the overall project. At times while maneuvering through space in Virtual Reality, the experience itself can feel quite stagnant. By this assessment, I mean, the lack of motion while shifting in space or while teleporting to a separate moment fails to capture some of the physical aspects of the design. Instead of having a user maneuver through space, it might have been simpler to have a user teleport from experience to experience.. The outbreak of COVID-19 has hindered my time becoming more familiar with these methods and practices. However, the time I was able to immerse myself within the VR technology has opened up a new avenue that I would not have experienced if I had not been fortunate enough to take these specific courses.

Even though I see Virtual Reality as a critical tool to advance the field of architecture forward, I feel Augmented Reality will have a more noticeable impact on how we represent architecture in the near future. The limitations that accompany Virtual Reality are what make Augmented Realit a more appealing alternative. Virtual Reality is stationary and is a computer-generated simulation or a recreation of a real-life environment or situation. AR, on the other hand, is mobile and has far greater capabilities for layering 3d geometries and models atop an existing reality to make it more meaningful through the ability to interact with it. By incorporating this interactive element into AR, digital components can be blended into the real world in such a way that they enhance one another while also being distinguishable from one another.

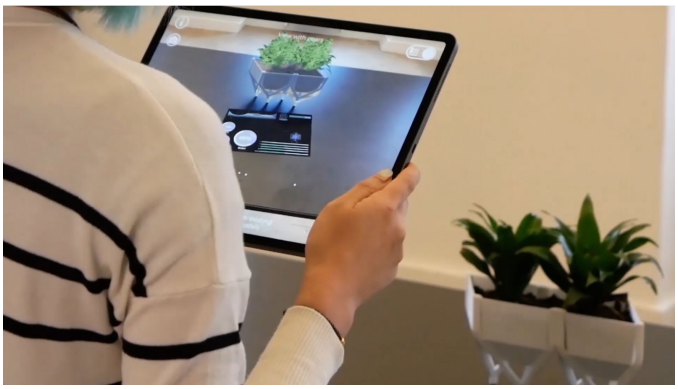


Fig 4. Augmented Reality Overlay Testing, Agriget

My first encounter with Augmented Reality as a design tool was a summer studio taught by Biayna Bogosian. We implemented Augmented Reality in exploring how to showcase and represent certain aspects of the project to our audience. Augmented Reality was utilized as an overlay and teaching tool in the projected

design: one which would help users familiarize themselves with caring for a single piece of vegetation independently. This vegetation care system had been employed using Augmented Reality to overlay specific data such as soil quality, moisture, and weather about each plant on top of our designed planter.

Augmented Reality can also change how local governments and communities converse about the kind of urban development they would like to see within a community. This implementation of AR in the project made us look at how this technology could push our project and, at the same time, give the user the most relevant data for weather, soil, moisture, etc. for the vegetation to thrive in their unique urban environment. The AR portion of the project helped us visualize what a user's experience would be like interacting with our vegetation care system. Being able to overlay digital content onto real-world imagery could have long-lasting positive ramifications for the realm of architectural design. The potential for Augmented Reality to become more immersive beyond the representation of projects could have a lasting impact on how architecture is discussed.

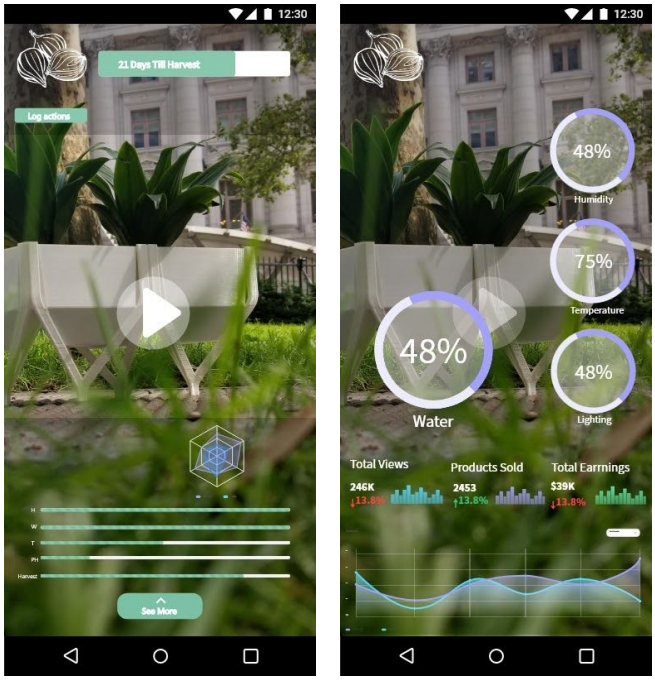


Fig 5. Augmented Reality App Overlay, Agriget

There are a few drawbacks to Augmented Reality; one being how privacy is being distributed and utilized. Since Augmented Reality is the collection, analysis, and redistribution of different types of data through the application, the user's privacy and security can be threatened since the AR technology sees is whatever the user sees. This method can lead to AR collecting an abundant amount of personal information about who the user is and what they are doing, even more intensely than what social media platforms implement. Also, in my experience developing the AR component for the Agriget project, the technology

seemed to be very delicate, and at certain times would not work at all, though I speculate that this was due to the software being relatively new while we were developing the project. Since this project was completed, I've used the same software on multiple occasions, and it seems the company has done a great job stabilizing these issues.

Though these issues are serious, I still see this technology as the next big step of representation in architecture. The development and deployment of Augmented Reality helped us look at new avenues for public interaction, leading the design team to consider adding a social media aspect to link different people from different parts of New York City with one another. The introduction of social media is significant for the question of how to reach the critical masses. Given the widespread use of social media in the present and future, the connection of designers around the globe could lead to the field of architecture taking leaps and bounds, inspiring not only the current generation but also the designers of the future.

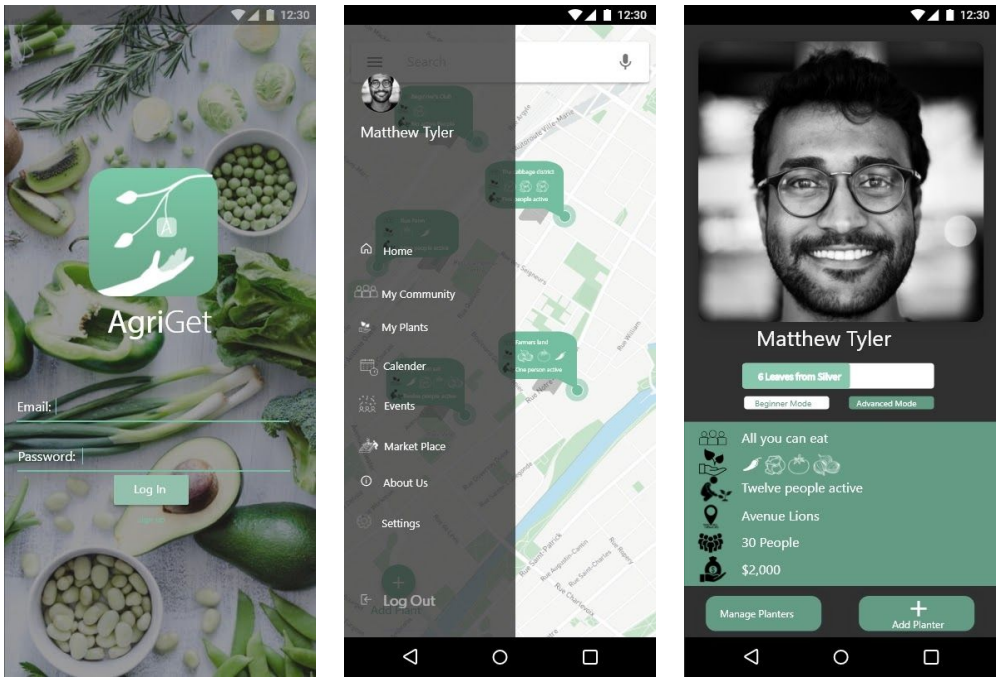


Fig 6. AgriGet Social Media aspect

With each passing generation, more and more people are beginning to live out their lives on social media, and in real-time, the lines between reality and social media are starting to blur. To understand how this process is taking place, I felt peering outside the field of architecture was necessary. I dove into the world of Communication and Anthropology to see just how society is being conditioned by the social media lead world and how the

knowledge I gained could be utilized in Architecture. A question that continues to interest me is how will new digital applications and technology influence and further push the limits of design and architecture? After taking these courses, I feel that I have a better understanding of how social media and, more specifically, how algorithms are developed and deployed. Because social media, in regards to design, brings with it a sharing capability that face-to-face interaction does not, I believe the usage of social media could help inform architecture.

Social media has the capacity with the information gathered by their algorithms to help make an architectural space vastly improved. By default, social media algorithms are the determining factor deciding which content to deliver a user based on their behavior. These algorithms learn the more a person keeps utilizing the platform; an example of this would be the algorithms on Twitter put posts from your closest friends and family front-and-center in your feed because those are the accounts you interact with most often. Building on this concept and applying the help of social media and their algorithms, occupied spaces could collect user data, which could then utilize the data that's been gathered to dictate certain architectural features to help the current occupants of the space. Using the data collected by these social media algorithms could have a significant impact on how that specific person experiences said space. I think, as a designer, it is imperative to be looking into the future and be on the lookout for advancements, especially when it comes to mobile devices that allow for a user's information to be utilized to develop and improve designs. Thinking outside the box and

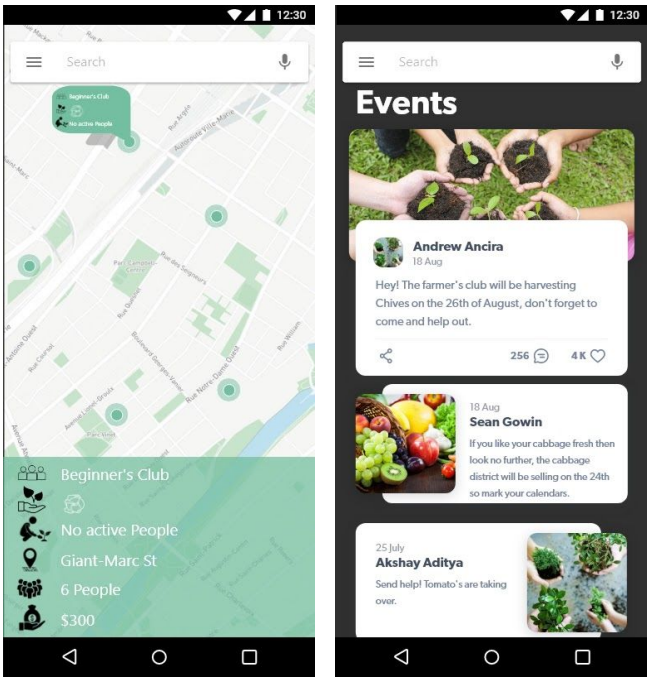


Fig 7. AgriGet Data collection component

looking at how a designer could use such technologies to help improve the field of architecture should be on the minds of all designers.

Although the implementation of data gathered by social media is something I think is essential, I feel there could be specific issues concerning privacy and how these algorithms are programmed. While these algorithms are supposed to be non-bias, unfortunately, that does not go for the person who is developing said algorithms. One aspect that I am grateful for in taking a New Media + Society, as well as a Computing Cultures course, is how to look at technology and how it influences society from different perspectives. While I strongly feel the user's data could be used for good intentions when it comes to advancing architectural design, I do see how some may feel uneasy about willingly giving up their data. Some may see the incorporation of social media algorithms in design as leading to more avenues of diversity and choice, but that may get lost. These algorithms tend to emphasize more of what we frequent instead of what's new and exciting. That is one troubling aspect of implementing the data collected by these social media algorithms. As society becomes more accustomed to and reliant on this algorithmic process, the more lasting impact it could have on what we define as our taste or our style.

Fig 8. Code developed for the Autonomous Motion

I have discussed the effect of Virtual Reality, Augmented Reality, and social media, but new advancements in robotics will have a lasting impact on the world of architecture. I gained this knowledge through first-hand experience taking a Cyborgs, Robots, and Architecture course in the Fall of 2019. While taking this course, I was introduced to how technology will specifically affect the built environment and how it has an effect not only on how a person experiences space but how it affects how a person acts and reacts due to the

technology implemented in a particular space. While I may not be the best coder myself, I saw the benefits of learning how to code. My goal for the final project in this course was to create an autonomous system that would be able to move depending on how close a person would get to the sensors installed on the project. After countless hours of trial and error, I finally achieved the code I had been striving to accomplish. Seeing the project work brought to mind how this could be adapted to a larger scale. The symbiotic nature of robotics and coding could morph into something similar to kinetic facades. Robotics, but more specifically, coding could a have dramatic impact on how space is being used and could be used. Depending on certain variables, these factors could lead to architectural elements that change dramatically. This process could lead to flexible spaces, which could give the users more choices of how to occupy said space instead of buildings just being static monoliths. This method could be implemented in natural disaster areas or be used in other facets of everyday life to create spaces for different people with different needs.

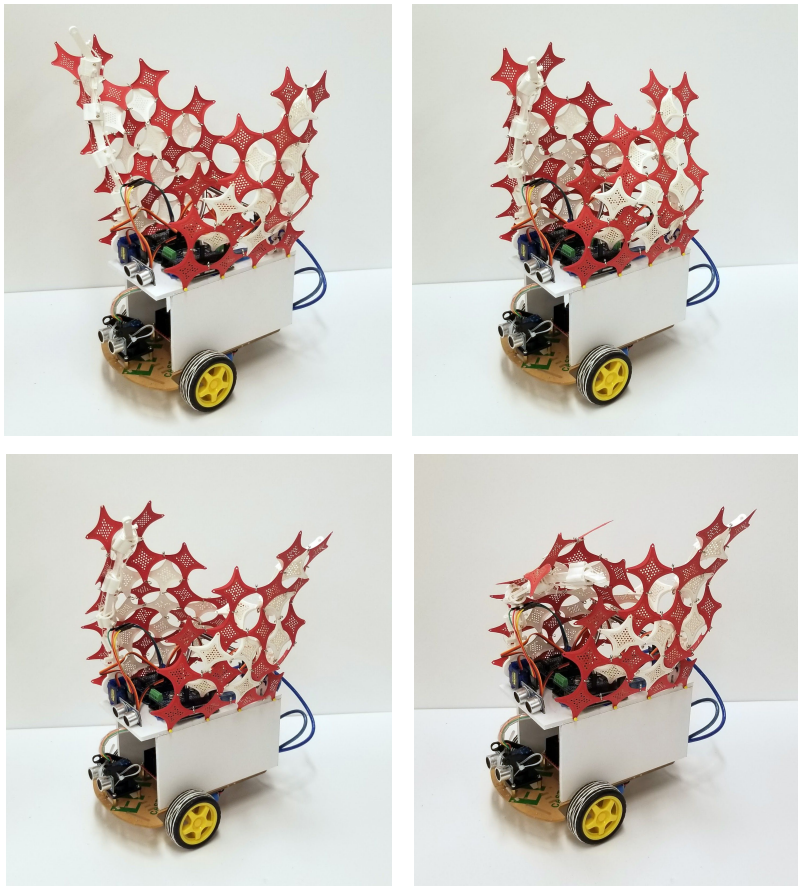


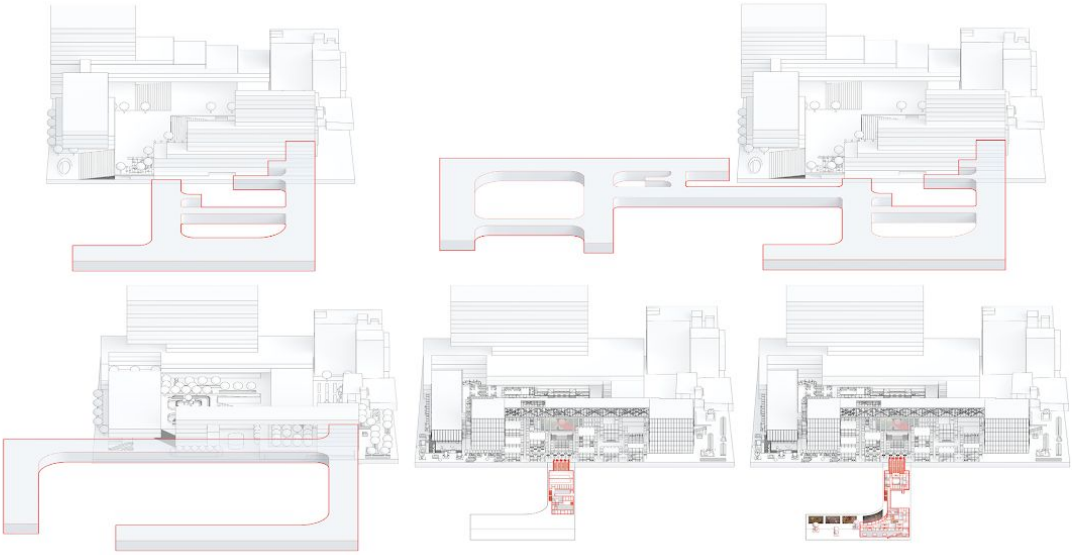
Fig 9. Cyborgs, Robots, & Architecture, Autonomous Movement Sequence Final

Though my time at Cornell University was short, I had the luxury of learning about aspects of architecture about which I had no prior knowledge. While there, I was able to fully immerse myself within these technologies to polish my design process further and hopefully push the field of architecture forward. While

designers have their way of working and developing projects, it would be very beneficial for designers to learn these new types of techniques and technologies now since their prominence within the field of architecture will continue to grow and expand. The knowledge of these new tools will continue to change the way architecture is being thought of and produced in the not so distant future. The potential of new technologies to develop designs and spatial configurations that are perceivable by our sensory system could potentially uncover a latent domain of spatial aesthetics that architects can experiment with, develop, and harness.

Virtual Places Design Studio

Concourse Iteration Diagram



Market Iteration Diagram

Virtual Places Design Studio

Skywalk Iteration Diagram

Central Room Iteration Diagram

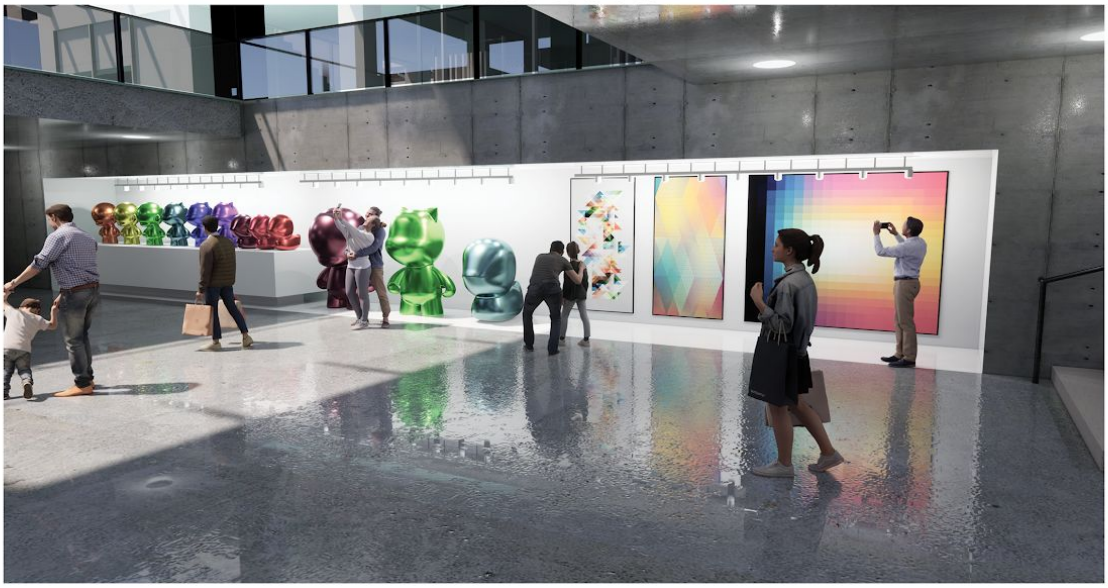
Virtual Places Design Studio

Concourse Render

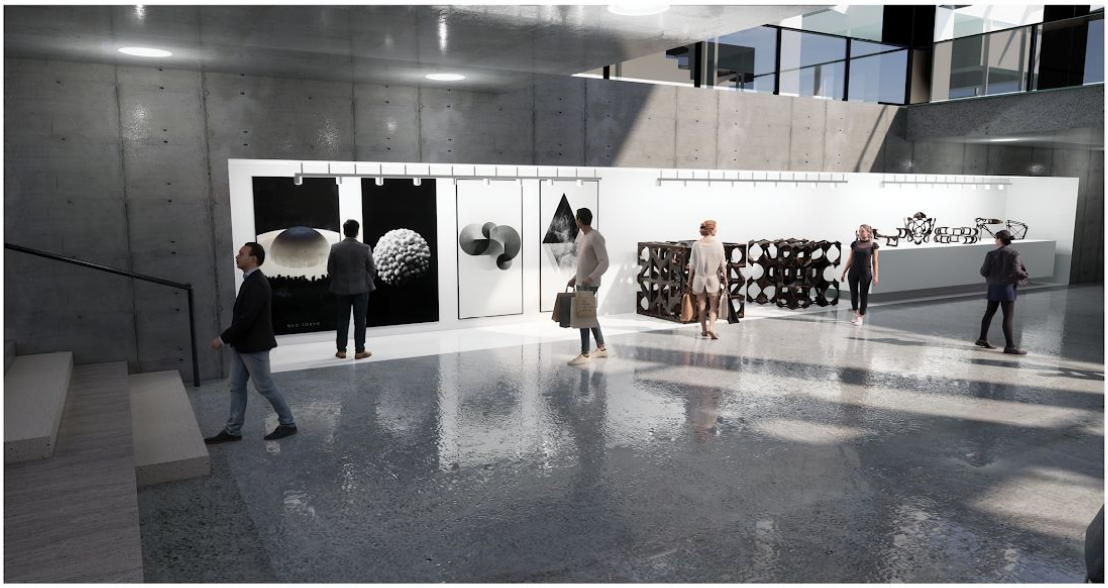
Concourse Render

Virtual Places Design Studio

Concourse Entrance Render

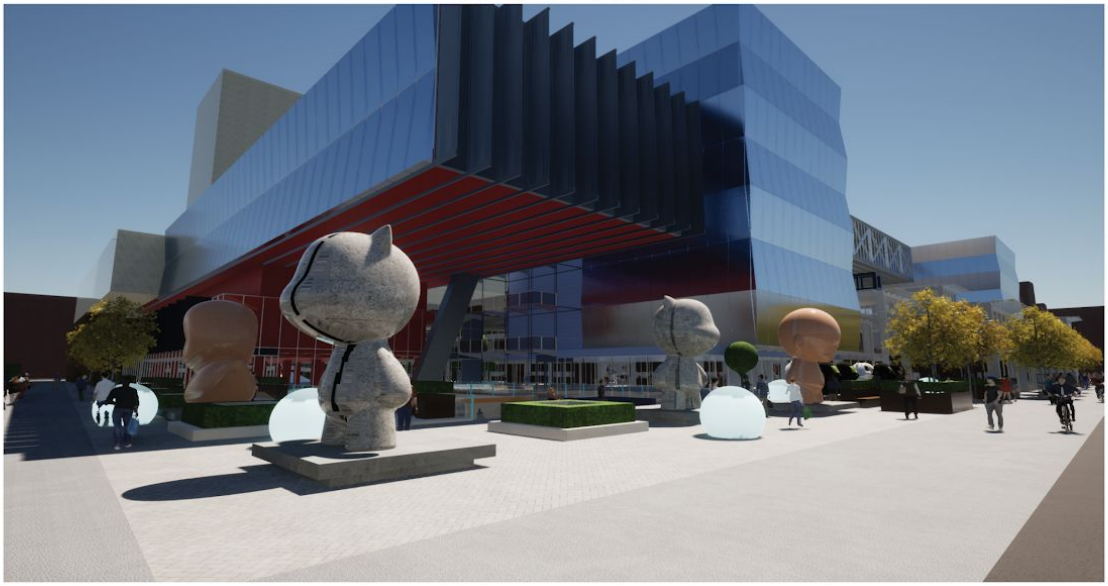


Concourse Entrance Render



Virtual Places Design Studio

Southwest Entrance Render



Market View Render

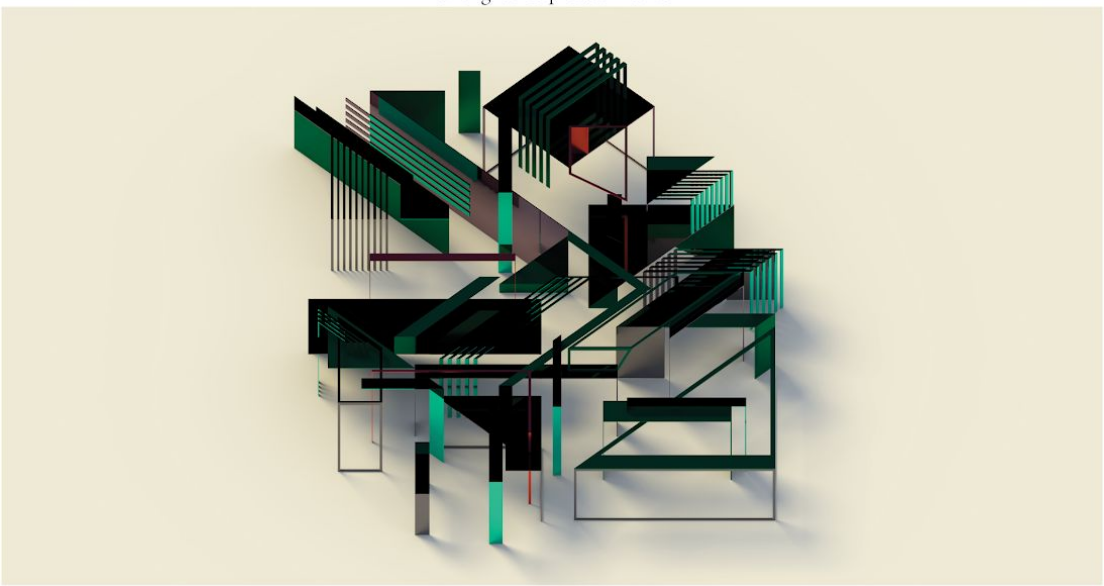
Virtual Places Design Studio

Central Room Render

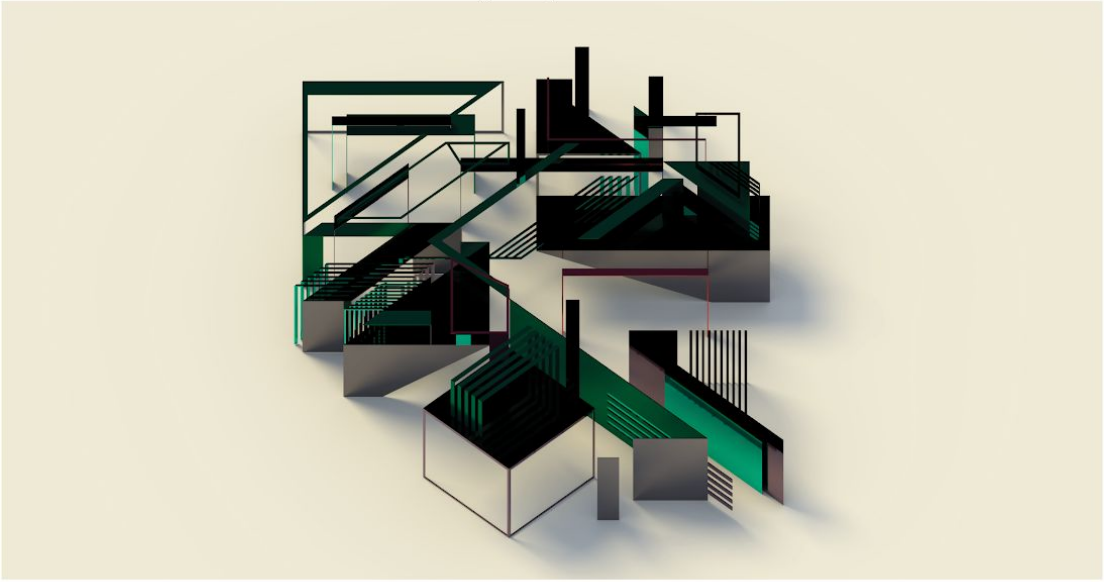
Skywalk Render

New Realities in Representation

Painting Reinterpretation Render

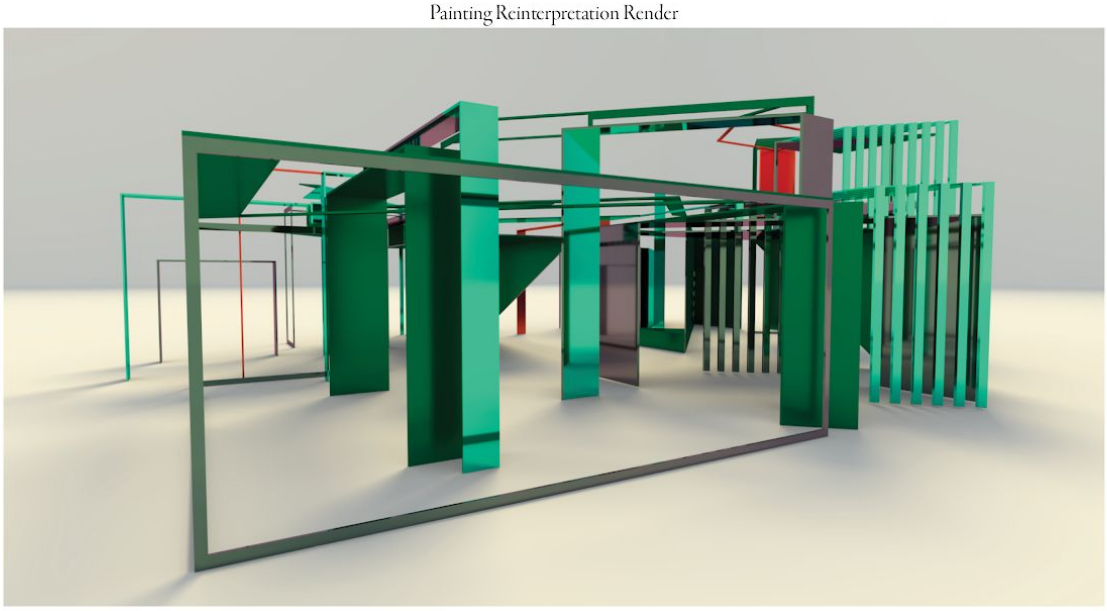


Painting Reinterpretation Render



New Realities in Representation

Painting Reinterpretation Render



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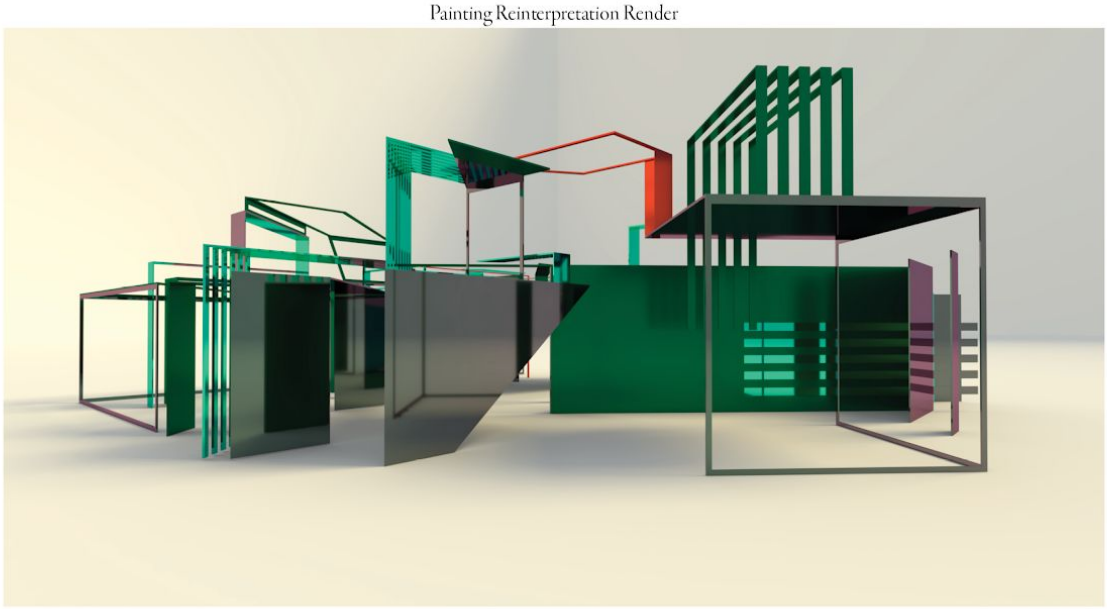
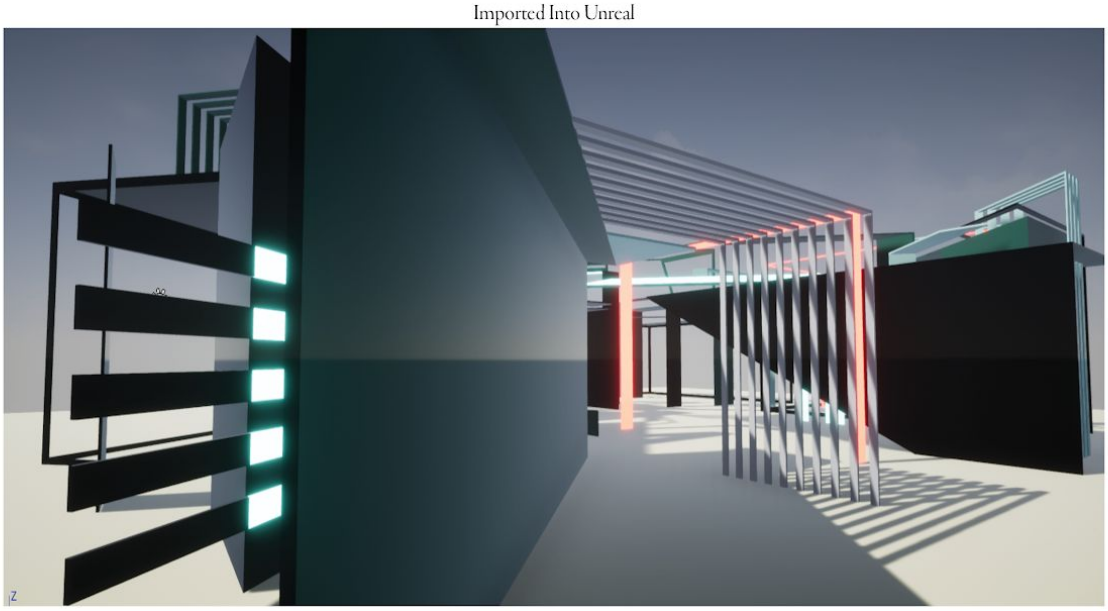


New Realities in Representation

Imported Into Unreal



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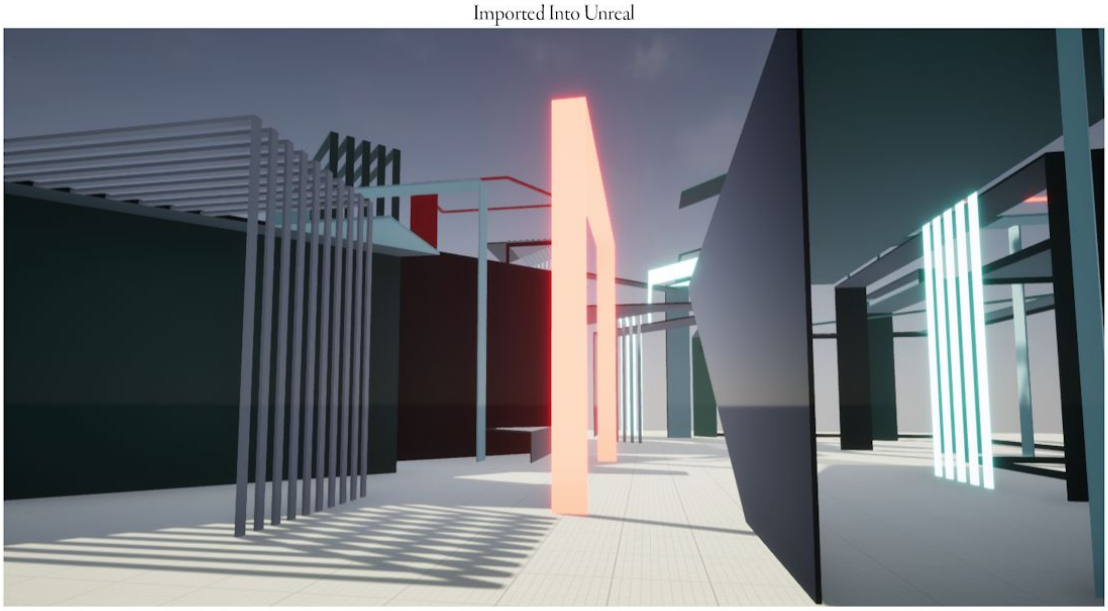
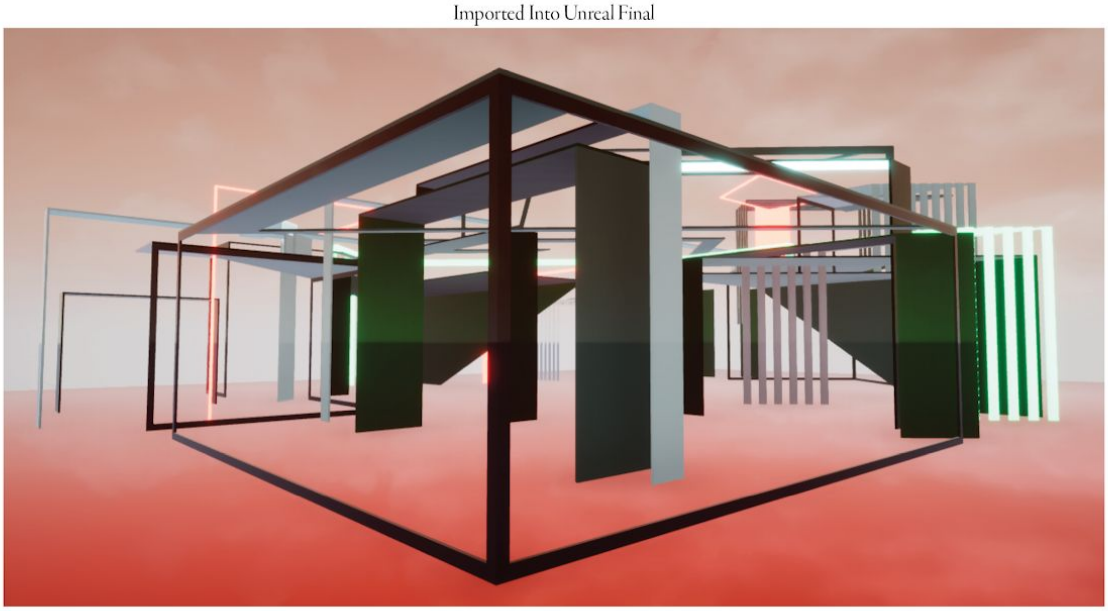


New Realities in Representation

Imported Into Unreal Final

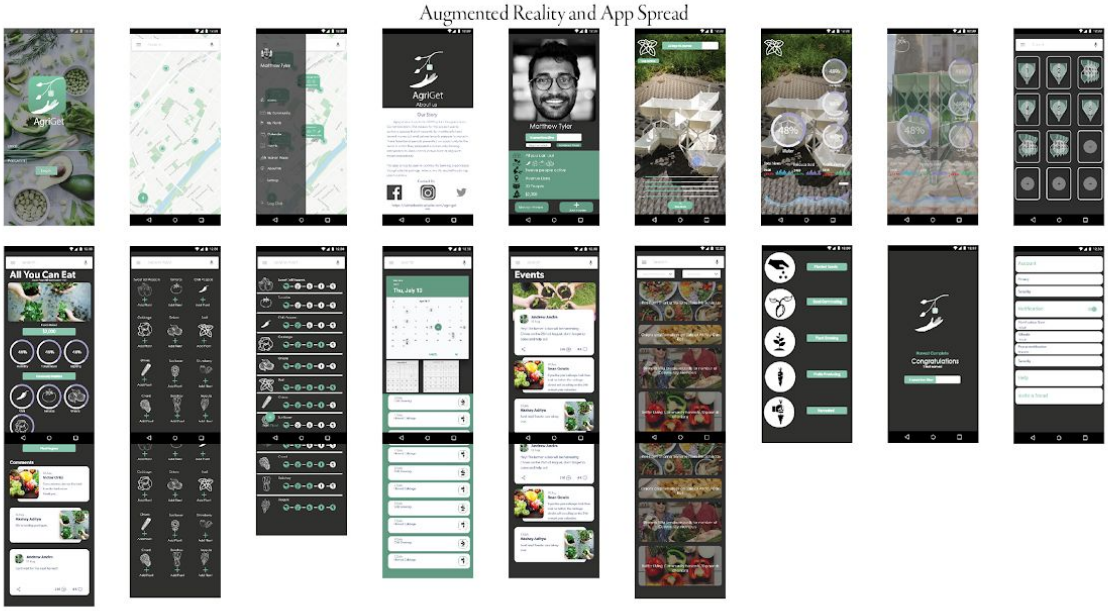
Imported Into Unreal Final



AgriGet

Workflow Diagram

Augmented Reality and App Spread



AgriGet

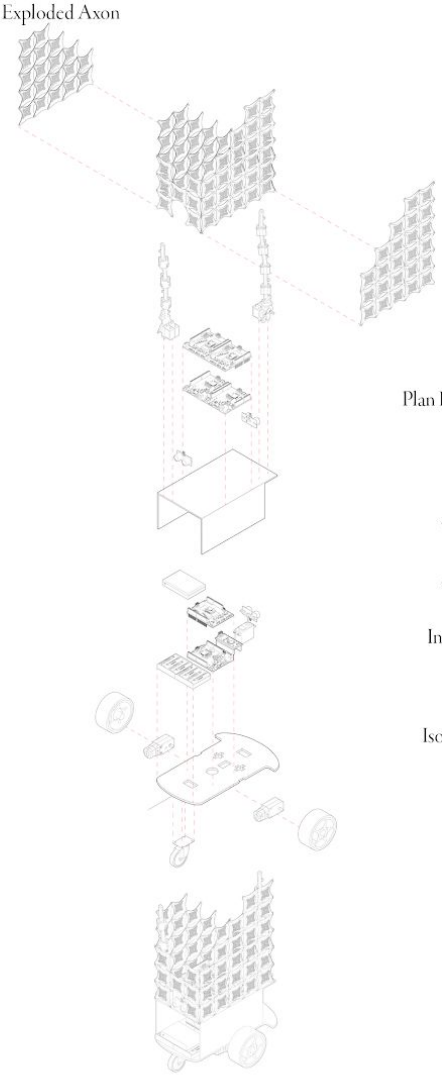
AgriGet Aggregation and Dispersion Render

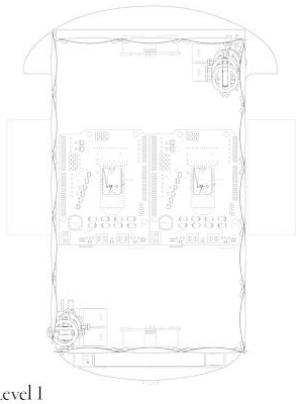
AgriGet Aggregation and Dispersion Render

Cyborgs, Robots, & Architecure

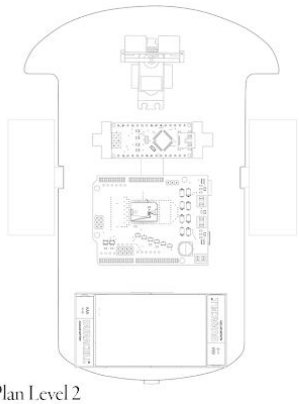
Final Drawings and Images_C-137

Exploded Axon

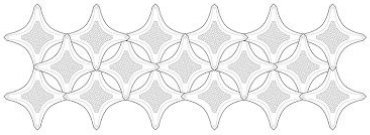




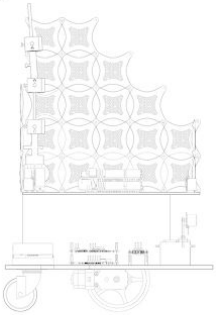
Plan Level 1



Plan Level 2

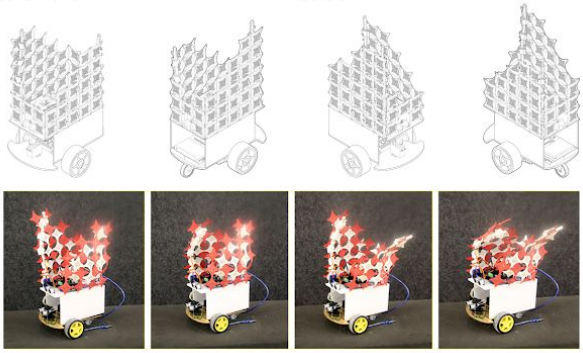


Interlocking System



Isometric Views

Section



Works Cited

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Ancira, Andrew. Fig 2. Render of Andrew Ancira's Virtual Spaces Studio Final Project. 21 April 2020. Author's personal collection.

Ancira, Andrew. Fig 3. Photograph of Andrew Ancira's New Realities in Representation Midterm. 8 March 2020. Author's personal collection.

Ancira, Andrew. Fig 4. Photograph of AgriGet's Augmented Reality Function. 24 July 2019. Author's personal collection.

Ancira, Andrew. Fig 5. Photograph of AgriGet's Social Media Function. 24 July 2020. Author's personal collection.

Ancira, Andrew. Fig 6. Photograph of AgriGet's Social Media Function. 24 Ju;y 2020. Author's personal collection.

Ancira, Andrew. Fig 7. Photograph of AgriGet's Data Collection Function. 24 July 2019. Author's personal collection.

Ancira, Andrew. Fig 8. Photograph of Andrew Ancira's Cyborgs, Robots, & Architecture Code Development. 18 Dec. 2019. Author's personal collection.

Ancira, Andrew. Fig 9. Photograph of Andrew Ancira's Cyborgs, Robots, & Architecture Final, C-137. 18 Dec. 2019. Author's personal collection.