

## **The Patch Life: A Virtual Reality Project**

The Great Pacific Garbage Patch & Recycling Ocean Waste

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The Great Pacific Garbage Patch is a major issue still in existence today. People struggle to recycle as it is, not to mention this major cluster of garbage. Through the help of new VR technologies, our team created a space to demonstrate how helpful ocean cleanup would be to marine life, and the good that may come from recycling ‘waste.’ The research that went into this project massively helped our team to learn more about this phenomenon and to brainstorm what products and everyday objects could realistically be made from these materials. This paper focuses on the design process of the project overall and the challenges we had to overcome, as well as the solution we developed and how Virtual Reality may help to achieve these goals.

**Additional Keywords and Phrases:** Virtual Reality (VR), Design, Life Below Water, Creative Coding, Computer Science, Sustainable Development Goals

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### **1 INTRODUCTION**

Virtual Reality has been used in multiple ways, especially in gaming and more recently in business. It is a handy tool that can allow an individual designer or a group to create a space that consists of anything and everything. For this reason, Virtual Reality may be helpful in finding creative solutions for the Sustainable Development Goals. Our group specifically focused on ocean pollution and cleanup as a sub-topic of Life Below Water. Recycling is something that people struggle with globally, and too often does this impact the environment around us,

specifically oceans and marine life. Oil spills are way too common, and the Great Pacific Garbage Patch has remained in existence for far too long. Through Virtual Reality, we were able to design a solution to this issue that could realistically be accomplished.

### **1.1 Why Ocean Cleanup?**

The purpose of this project, as previously mentioned, relates to the Great Pacific Garbage Patch, a collection of marine debris in the North Pacific Ocean. It was first discovered in 1997, is composed of an estimated 3.6 trillion pieces of plastic, and measures about twice the size of Texas [1]. Approximately 1 million seabirds and 100,000 marine mammals are affected every year [1]. Our environment must be protected at all costs, and we should feel responsible for taking care of the planet. Trees are what allow us to breathe the oxygen that we do, and water is used in our daily lives in multiple ways. We drink it, we bathe with it, and it provides us with a lot of other things, such as electricity. Marine life should be important to us, too, in order to create a greener planet. Our goal is to encourage ocean cleanup and demonstrate how much can be made from recycled materials in order to benefit both the environment and ourselves.

## **2 OUR SOLUTION**

Our team struggled to find a solution for a bit. At first, we attempted to create a space that would simulate what being a fish in the Garbage Patch would be like, but it soon became clear that simply simulating something that already exists simply was not enough. We were tasked with coming up with a solution to the issue and implementing that into our project, and though it was a bit difficult at first, we stuck to what we knew best: recycling. Recycling may seem like a simple solution, but it works. And through our research, we discovered that these materials could actually be used creatively and intuitively to create art or even objects for everyday use.

### **2.1 The Design Process and Building the Virtual Environment**

After choosing our UN concept, we discussed possible directions on how to best visualize the gravity of ocean pollution and its effects on the earth and wildlife. While doing some research, we came across the Great Pacific Garbage Patch and immediately knew that it was what we wanted to focus on. At first, we wanted to simulate the life of a fish as it tries to navigate the polluted water to highlight the poor conditions the sea life has to live in. The deeper it would go, the more garbage would appear (Figure 1). However, we found that this direction did not pose a

solid solution. We decided to build on this idea and add facts about ocean pollution that would float around as the player navigated the space (Figure 2). This direction, too, lacked a provocative solution. As we researched more, we found that people were making sustainable objects with recycled materials retrieved from ocean waste. This was the direction we wanted to take. We continued researching materials and plausible objects, and created a showroom in our VR environment that would display such objects. We also refined our interaction as well. Instead of the player aimlessly navigating the space, we defined a concrete path for the player to move on. Additionally, we placed pieces of garbage that the player would have to pick up, emphasizing the act of cleaning up the oceans.

We created our assets almost entirely ourselves in Illustrator. Then, we imported them into Maya, where they were made into 3D models. And finally, we imported them into Unity, where we added textures and scripts to embed them into the environment and make them interactable. We also included some assets from the Unity Asset Store, such as the ocean top, light installations, and banners in the gallery.

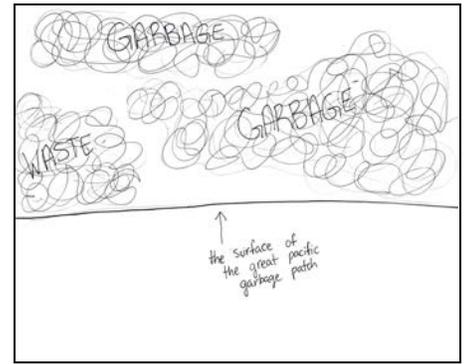
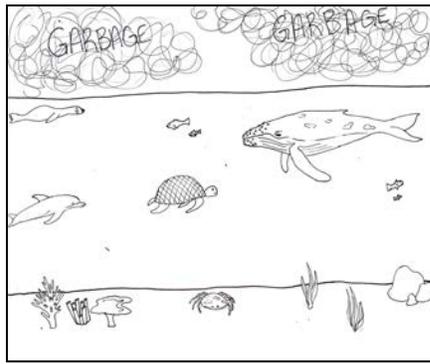
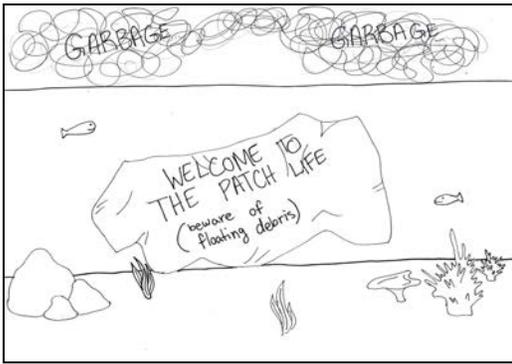
#### *2.1.1 Coding and Interaction*

In order to make our simulation interactable, we needed to add scripts. Since Microsoft Visual Studio is compatible with Unity, we used it as our IDE and coded in C#. None of us were familiar with C#, let alone the Unity specific keywords and functions, so there was a slight learning curve when it came to scripting. Our main interaction is garbage collecting. The participant goes down the path, colliding with the different pieces of garbage. Once a piece of garbage is “picked up”, some of the path walls disappear to signify the ocean getting cleared. At the end of the path, the participant reaches a console that teleports him/her to the gallery containing the objects made out of recycled materials.

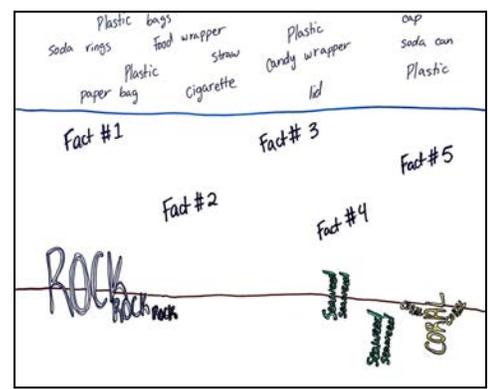
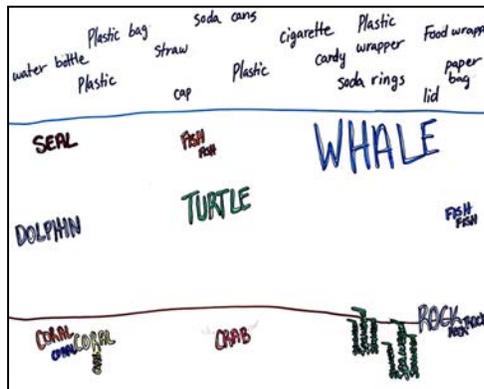
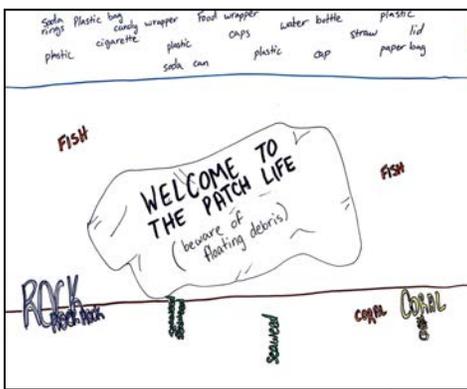
#### *2.1.2 Typography*

A major component to our project was typography. Along with using type traditionally (as a means to communicate messages), we also used type illustratively. The garbage pieces, sea life, and gallery creations are all made out of typography; the letters are distorted to create the shape of the intended object. The typefaces used are Futura PT Demi and Futura PT Regular. Because we would be distorting the type, we chose a font that would be easy to manipulate and still be legible. Originally, we made everything in Futura PT Regular, however we found that it was too thin on some objects and legibility became an issue.

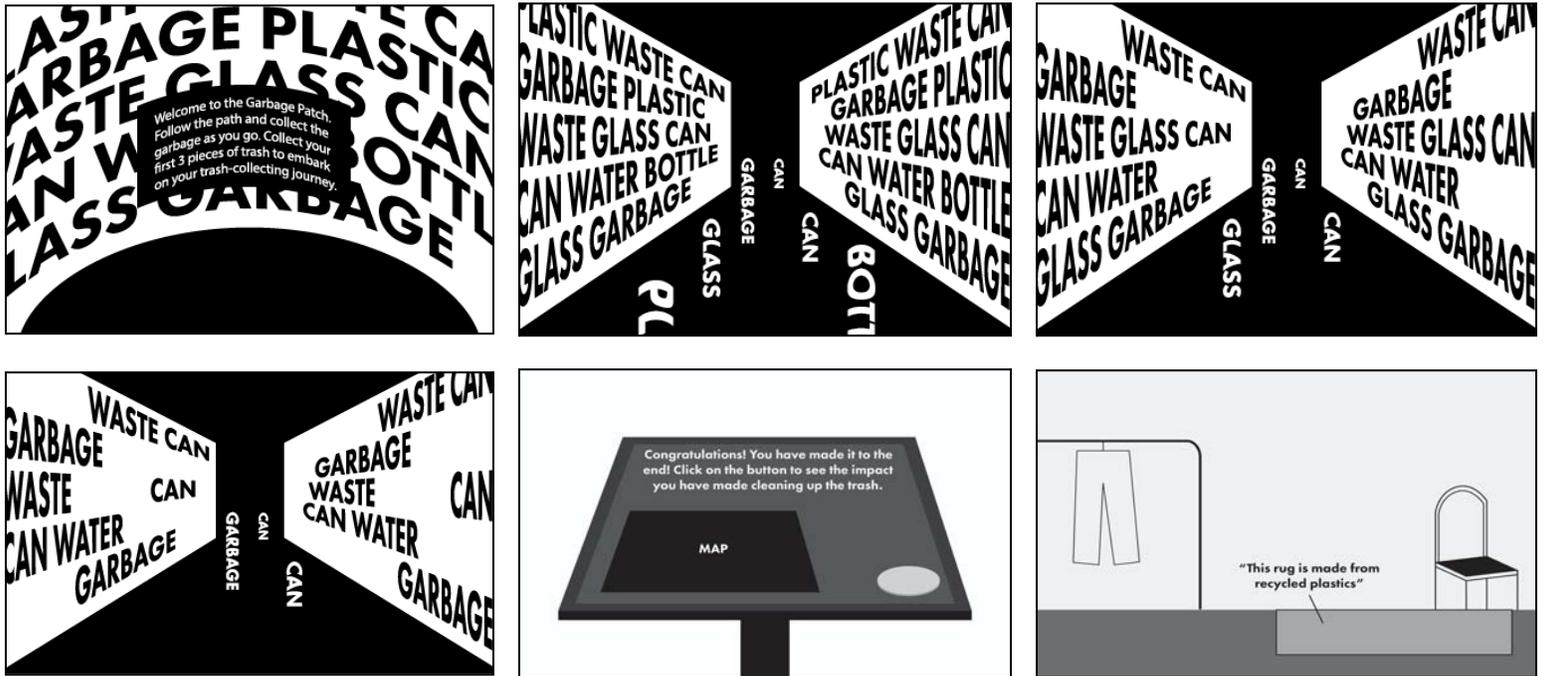
2.1 Figure 1. Early Sketches



2.1 Figure 2. First Ideation Storyboard With Solution



2.2 Figure 3. Final Storyboard



## 2.2 Why We Chose This Solution

Our solution called upon designers to take action and be a positive force against ocean pollution. As designers ourselves, we thought it would be fitting to draw those in our cohort and provide a creative outlet that has a deeper purpose. We wanted to demonstrate how the materials piling up in oceans can be used in a creative, yet beneficial way. Our solution not only shows the means through which ocean waste can be decreased, but also illustrates how we can use the garbage to create sustainable and useful objects.

## 2.3 Design Challenges

The biggest challenge the three of us collectively faced was working with software none of us had prior experience with. Adobe Illustrator, out of everything we worked with to make this virtual reality project come to life, was the only program we felt comfortable with. Autodesk Maya, Unity, Microsoft Visual Studio, and Plastic Gluon (for collaborative purposes) were foreign to us, so we felt a bit nervous going into the project and trying to make something happen. We also had never worked with such a large-scale device as the CAVE2 for project demonstration purposes. It was a bit time consuming having to work in Adobe Illustrator, export

files, work in Autodesk Maya, export files, and work in Unity. For scripting, we needed to use a programming language none of us knew. It felt a bit overwhelming due to the fact that we were learning the different tools and features of the software, so our progress was slow. As the weeks went on and we worked on the project more, we grew accustomed to the programs and adjusted accordingly. We persevered, and the outcome was worth the slow, and perhaps stressful, start.



## 2.4 Strengths, Weaknesses & Collaboration

Azka did the scripting and added the scripts to the objects for interaction. She also made the consoles and garbage pieces on the path. Jocelyn made collaboration easier and more seamless by configuring Plastic Gluon. She also worked on the ocean environment and the walls to the path. Amanie created the gallery objects and most of the sea life. She also sketched out the initial storyboards. The gallery was a collaborative effort between Azka and Jocelyn.

## 2.5 Conclusion

Ocean pollution is a global issue seen in today's society, and the Great Pacific Garbage Patch is only one of the ways in which it has manifested. Through the help of new VR technologies, our team created a space to demonstrate how helpful ocean cleanup would be to marine life, and the

good that may come from recycling ‘waste.’ The research that went into this project massively helped our team to learn more about this phenomenon and to brainstorm what products and everyday objects could realistically be made from these materials. This paper has summarized our design process of the project overall and the challenges we had to overcome, as well as the solution we developed and how Virtual Reality may help to achieve these goals.

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