FAST TRASH

Fast Trash: Facilitating Textile Chemical Recycling Technologies Through VR

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ABSTRACT

The rapid rise of fast fashion, fueled by technological advancements, has brought about environmental challenges through rising greenhouse gas emissions and water waste due to textile overproduction. Chemical recycling emerges as a promising solution, redirecting discarded textiles away from traditional disposal methods and regenerating them into sustainable materials. Through the Fast Trash VR Project developed for the CAVE2™, typography is designed to provide the user a mock experience of the chemical recycling of used textiles. This VR seeks to educate users on the environmental impact of the fast fashion industry and promote a circular economy. The Fast Trash VR provides stakeholders with an alternative method to the insufficient mechanical textile recycling, a chemical recycling experience that envisions a future where the fast fashion industry thrives in harmony with the health of our planet.

KEYWORDS

Fast Fashion, Textiles, Pollution, Responsible Consumption, Chemical Recycling, Environmental Conservation

CONCEPT

Human-Computer Interaction (HCI)

INTRODUCTION

The fast fashion industry has taken an undeniably detrimental toll on our environment within the past decade. With the rise of social media and its capacity to push fashion trends at an exponential rate, the demand for certain clothing styles changes weekly.[1] To meet the demands of mass consumerism, many fast fashion retailers opt for cheaper materials that maintain low production costs despite the industry's rapidity. The most common textiles used are often human-made blended textiles fibers like polyester blends, which can take up to 200 years to decompose.[1] Cultivating other materials like cotton pose different environmental issues in their immense water waste, with around 215 trillion liters of water

consumed by the industry annually to meet superficial demand.[3] This surplus of textiles cannot typically be recycled efficiently because of its blended nature, as the technical process is often more costly and difficult than the simpler solution—to throw the textile waste into landfills. Either burned or stacked in piles at these landfills, the textiles continue to release toxic chemicals—accounting for around 4% of greenhouse gas emissions yearly—and microplastics into the environment, fueling climate change at an alarming rate. As current mechanical recycling solutions have proven insufficient in addressing the problem of textile overconsumption and pollution, our climate has made it increasingly clear that alternative methods of recycling must be implemented by major textile companies in order to slow this environmental disaster.

PROJET CONCEPT & IDEATION

Upon initial consideration of UN Sustainable Goal 12, to ensure sustainable consumption and production patterns, early storyboards displayed scenarios of educating the user/consumer about the negative environmental impact of commonly purchased clothing items, like a cotton t-shirt or pair of jeans. An overwhelming landfill was decided on as the setting to engulf the user by the excessive waste the industry produces. Initially, plans were made to emphasize an industrial landscape by implementing conveyor belts that would bring to the user clothing items to be scanned to receive a negative statistic. Improvisations of possible activities were acted out theatrically to explore the different possible actions and how intuitive they might be for a participant.[7] The preliminary solution in these storyboards presented the user with incentivized recycling of used textiles, which was redundant and insufficient in addressing the root of the overproduction problem.

Realigning our solution with Sustainable Goal 12, we decided upon highlighting chemical recycling as a solution that addressed textile waste patterns at their source. Modeled after chemical recycling systems created by companies like Worn Again Technologies, the Fast Trash VR engages the user in a process of depolymerizing used, blended-textile fibers that are typically non-recyclable, returning them to their original quality. It pushes for a circular economy, with special chemicals utilized to “clean, extract, separate, and regenerate virgin quality polyester and cellulose” for reuse in textile production.[9] To educate and facilitate partnerships with textile and chemical recycling corporations to combat the surplus of fast fashion through effectively recycling quality fibers, The Fast Trash VR mimics chemical recycling technology through simplified typographic interactions.

PLAYER JOURNEY

Figure (1): an environment full of big textile piles and user asked to burn them

In the Fast Trash VR project, as shown in figure (1), the user begins in a vast area cloaked in fog, filled with large, messy piles of unprocessed textiles. While walking along the path, they encounter a massive textile heap obstructing their way. A prompt appears, asking for the quickest solution: "Burn Pile?" the user must choose either "Yes" or "No." If they choose "Yes," the pile ignites, emitting fire and smoke. This option, though fastest, inflicts significant environmental damage and wastes materials in textile production. Opting for "No" results in two more textile heaps falling in front of the user, prompting the same question. Regardless of the choice, the user ends up burning the obstacles blocking their path.

Figure (2): everything set on fire and emission of toxic gasses

After burning the piles, the whole area catches fire, filling it with lots of smoke that causes serious air pollution. The user also gets close to some harmful gasses from the fire, floating around everywhere. This damage happens because of burning those mixed-up textiles. There's a big water waste issue linked to fast fashion too. To show users how much water is wasted making each piece of clothing, there are water jugs along the path. When users bump into these jugs, they'll hear the sound of breaking glass and see text showing how many liters of water were used to make each clothing item.

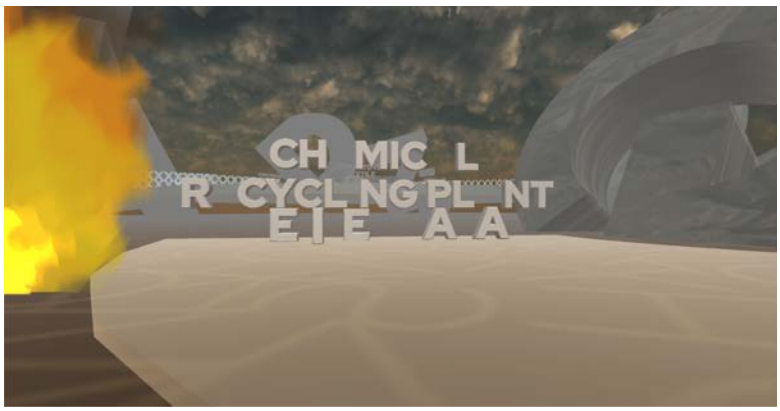

Figure (3): Filling the blank in in "Chemical Recycling"

The user faces a problem and needs to find a solution. They'll spot an incomplete word at the top and scattered letters on the ground. By physically filling in the missing part of the word to make it "Chemical recycling," they unlock a solution. Once the word is complete, it becomes slightly transparent, and all the smoke and fire vanish, preparing the user for change. Also, a platform appears that the user can climb onto, taking them to a higher spot to begin the chemical recycling process.

Figure (4): User separates the textiles from each other

When the user reaches the chemical recycling platform, they kick off the process by sorting the textiles. They'll find Polyester, Nylon, Cotton, Wool, Leather, all jumbled together. To tidy them up, the user grabs each type and sets it apart. Once the textiles are sorted, they move through an entrance to enter the next phase.

Figure (5): pushing the wrong letter to purify textile

As the user progresses to the next phase, some big piles of textiles in the background start falling because the user is successfully moving through the chemical recycling process. After sorting the textiles, the next step is to clean each one. Each textile is misspelled (like "leather") and has a wrong letter highlighted in red, showing the mix-up. To fix it, the user just needs to push the wrong letter, making the textile word correct and purifying the material.

Figure (6): spinning the wheel with textiles

Finally, the user arrives at the last stage, where the purified textiles are about to transform. Here, they'll see the purified textiles lined up next to a spinning wheel (similar to a water wheel). Turning on the wheel starts a loud spinning sound, and the user places each textile on it to begin rotating. As the textiles spin, they transform into smaller threads that will eventually make clothes. After a number of rotations, the spinning textiles vanish, and a piece of cloth corresponding to that textile (like a leather bag for leather) falls from above. When all the textiles have turned into purified clothes, the environment undergoes a total transformation.

Figure (7): production of purified clothes and transformation of the environment to be clean and eco-friendly

Once obscured by fog and dust, the sky now stretches overhead in a radiant clarity, adorned with light, billowy clouds where once heavy, dark masses loomed. The landscape, once cluttered with vast piles of unpurified textiles, now stands devoid of their presence, a testament to their complete disappearance. Chemical recycling has wrought a profound shift, preserving water resources and ushering in a new era of cleanliness and eco-consciousness. This surplus of water breathes life into a transformed habitat, evolving

into an oceanic realm where boats glide gracefully across the shimmering waters, a picturesque scene of sustainable harmony.

At journey's end, users grasp the enormity of their environmental impact. Choosing chemical recycling over quick burning has made a significant difference. It's preserved 4% of the world's yearly fresh water used in making textiles. This journey teaches the importance of not squandering textiles and finding ways to repurpose them, even when old. It's all about backing our environment for a better, cleaner world.

DEVELOPMENT AND TYPOGRAPHY

In order to properly relay the consequences of the fast fashion industry, large typography was implemented to signify big piles of textile waste and overwhelm the user. The font *Red Hat Display* is utilized for the typography in the environment, emphasizing the industrial scene through its bold, thick strokes. All the typography within the scene was treated with the texture of clothing items most detrimental to the environment, including polyester, nylon, cotton, leather, and wool. The font utilized for the specific clothing items the user interacts with is the *Speedy Casual font* italicized, chosen for its softer, curvy appearance to evoke a feeling similar to real life fabrics. The color palette is intentionally muddy and monotone to invoke the industrial mood within the VR. The platform is transparent and glass-like to make it stand out from the surroundings. We choose the wheel as an interaction for the third step because it is a historically recognizable tool that spins yarn fibers together. The final typography that is made as a result of placing the materials onto the wheel is in the typeface *Ninja,* chosen for its unique playfulness and malleable nature. Once all the tasks are completed the environment becomes clear and we see water signifying life and purity. The user is also greeted with a quote to inform them of their achievements.

PROJECT EXHIBITION

On Wednesday, November 8, 2023, the project's exhibition took place in collaboration with the international. An estimated forty people attended, including faculty members, guests, and IBM representatives. The project was designed and constructed for the University of Illinois Chicago's Electronic Visualization Laboratory, which hosted the exhibition. The CAVE2™ Hybrid Reality Environment is a virtual reality room-scale display that was invented by faculty and students there.

CONCLUSION

In conclusion, the Fast Trash VR project offers an efficient solution to the environmental issues produced by the fast fashion industry. In line with UN Sustainable Goal 12, ensuring sustainable production and consumption patterns, the Fast Trash VR’s setting immerses users in an overwhelming

textile landfill setting to educate about the industry's waste and engage them in the solution of textile chemical recycling. Through doing mock depolymerization of blended-textiles represented virtually through typography, users return used fibers to their original quality, breaking the linear mold of the textile industry to push for a circular economy. The Fast Trash VR empowers users to make a change to save the environment through effective implementation of textile recycling, and consequently, a more sustainable future.

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