

Clean Choice

A Virtual Reality Project for CAVE2, Affordable and Clean Energy

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CCS CONCEPTS • Interaction Design, Human-computer Interaction, visualization, Environmental Design

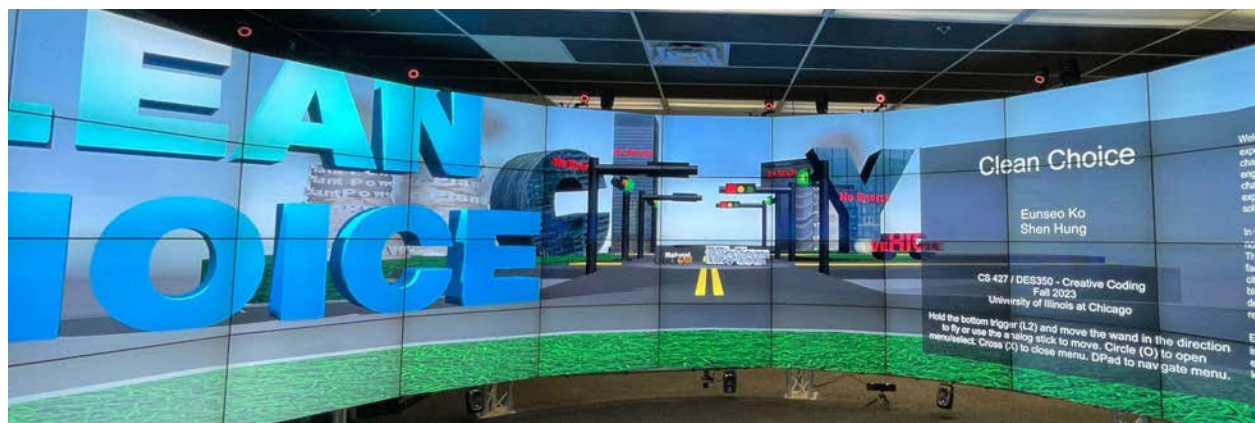
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ABSTRACT

Advocating for clean and affordable energy choices amidst the global warming crisis through research of the problem and creating a solution through first-person human perspective interaction design. This was done through Virtual reality (VR), this experience stimulates the problems and effects of renewable energy, as well as how to affordably make choices on the directions to solving one of the most timely relevant problems the world is facing. The ideation of this project was achieved through the integration of computer science and design for the advocacy of the United Nations (UN) sustainable development goal of affordable clean energy through Virtual Reality Design(VR).



1 INTRODUCTION

We all know the current state of the planet with its climate change and how poor choices of continually using forms of non-renewable energies like fossil fuels, greenhouse gasses along natural gasses have been negatively impacting our environment. Although we want to make our environment a more sustainable place with renewable energy costs a lot of money, therefore, our goal is to show that the use of affordable clean energy can be achieved by spending and investing money on building renewable energy resources to transform the environment to make it a more sustainable and eco-friendly place.

Clean Choice is an innovative and immersive virtual reality experience designed to raise awareness about the critical environmental challenges our planet faces due to the use of nonrenewable energies. In this engaging game, players embark on a transformative journey to combat climate change and create a sustainable future. Clean Choice empowers players to explore the consequences of our energy choices and discover the impactful solutions that lie within our grasp. In Clean Choice, players can dismantle the old, polluting forms of nonrenewable energies by tossing coins, symbolizing financial investments. This action not only eradicates greenhouse gasses and pollution but also facilitates the creation of sustainable, eco-friendly environments. The once-dark cityscape blossoms into a vibrant landscape, teeming with life—lush greenery, blossoming flowers, and the soothing sounds of nature. Clean Choice demonstrates that with collective efforts and informed decisions, we can rejuvenate our planet, making it a haven for future generations. Embark on this transformative adventure in Clean Choice and discover the immense impact of your decisions. Will you embrace renewable energies and contribute to a sustainable future, or will you ignore the call, leaving our planet to suffer the consequences of inaction? The choice is yours.

2 RESEARCH

Given the current situation of our planet, it is apparent that the average temperature has risen exponentially, and that action must be taken. According to research, it's been said that “2022 was the sixth-warmest year on record based on NOAA's temperature data [1].” This means that the planet is deteriorating now and it's affecting humans, animals, and the whole planet. One of the most common causes of climate change is the burning of fossil fuels for energy causing global warming. However many energy resources such as Hydropower, Wind, Solar, and Biomass can be used as sources of renewable energy, Solar energies can be used actively and passively[4]. An example of passive use of solar energy would be something as simple as using sunlight for lighting or a solar oven. Solar energy can be used actively through mechanical technology such as solar panels [2], Wind can be used as sustainable energy through windmills and turbines. Hydropower can be used as sustainable energy through the use of dams. Burning Biomass can be used as a source of energy just like fossil fuels. Currently, renewable energy is slowly rising every year with solar energy contributing to the increase the most [3].

2.1 Problem

Our environment is currently in a crisis, and the main reason is the burning of fossil fuels

for energy. One effect of this is global warming. On top of the fact that fossil fuels are harmful to the environment, and although renewables can be the solution, raw materials, and installation costs are expensive. This makes the average person hesitant to make the change. Furthermore, forms of renewable energies are also limited which means they aren't sustainable enough for the long-term future of our environment.

2.2 Solution

However the good news is that there are many sustainable sources of energy such as Hydropower dams, Wind turbines, Solar panels, and Biomass that can be used as sources of renewable energy. These resources are all-natural and can be taken advantage of to create energy. This would reduce gas emissions, and reduce costs for electricity, and these sources would ultimately be good for the earth in the long run. Despite the rising raw cost of materials and installation, renewable energy is slowly rising every year with solar energy contributing to the increase the most, according to the World Economic Forum and International Energy Agency renewable energy installation broke new records in 2021, expected to rise by 8% in 2022, and solar is expected to account for 60% of the in global renewable capacity this year [5].

3 PROJECT CONCEPT

The Initial concept is that the average person will be in the lobby then a path with an oil sign will be presented which represents the path to nonrenewable energy, through that path there will be a step-by-step journey of what it's like to experience the production of nonrenewable energy. There will be four steps regarding the path to experiencing nonrenewable energy. Step one energy will be producing the energy of the fossil fuels by throwing them into the fire, step two will produce greenhouse gasses, and step three climate change will occur, which will result in the last step of the ecosystem collapsing due to the increased temperature which will be visualized with a red colored sky. Then a short prompt of facts about nonrenewable energy will pop up and end this path. After this, the viewer will return to the lobby with a path that has a recycle sign that represents renewable energy which has the step-by-step experience, step one, the viewer will build a system by pushing a button that represents purchasing and buying the system which will include wind turbines, water dam, the solar panel etc. This will result in renewable energy production, which then ends with a cleaner outcome representing bright colors, animals, and trees, once again a short prompt regarding facts about renewable energy will pop up and end this path.

The final concept is that in Stage 1 When the player enters the polluted city the lights will turn off through this interaction the player realizes that there's no energy and energy needs to be created. Through interaction with fossil fuels, players realize it's creating nonrenewable energy and producing greenhouse gasses in the city. As the player moves forward, the player will be reminded of the problem. This will be enabled through teleportation to a city that uses renewable energy. After entering Stage 2 through teleportation the player enters the path, and the player hears the requirements to make an eco-friendly city. Players see the coins and toss them on the old forms of nonrenewable energy and tossing coins shows that in order to access forms of renewable energies it costs money and it's only available through purchasing. Through the result

of the player's choice, the city is changed to an eco-friendly city. After that, the sky and nature will gradually turn bright to indicate a less polluted environment. Then a question statement will be asked to the player “Will you choose to embrace renewable energies and contribute to a sustainable future, or will you ignore the call, leaving our planet to suffer the consequences of inaction? The choice is yours.”

STORYBOARD

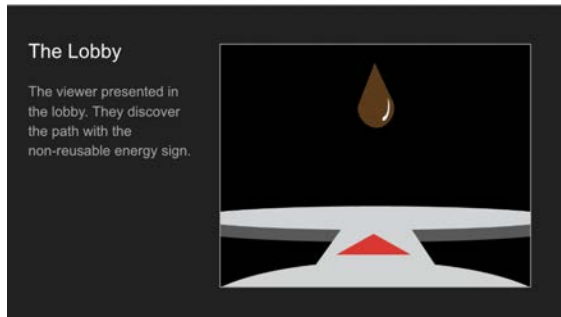


Figure 3.1



Figure 3.2

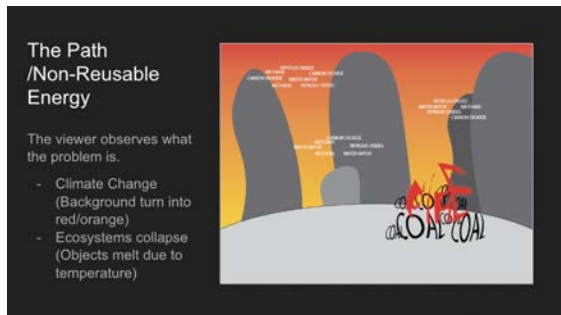


Figure 3.3

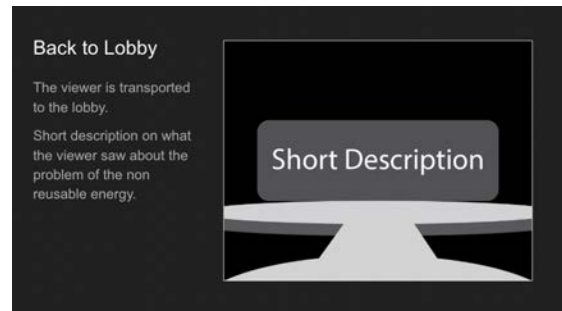


Figure 3.4

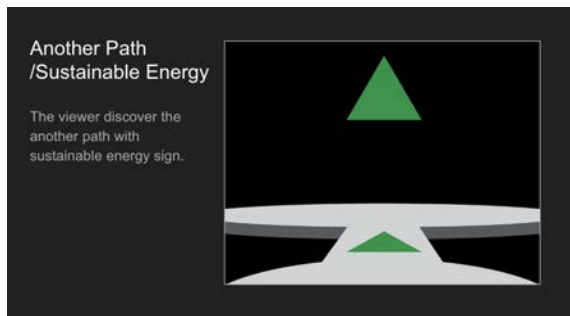


Figure 3.5

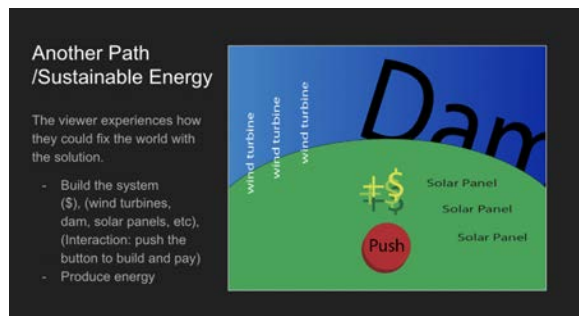


Figure 3.6

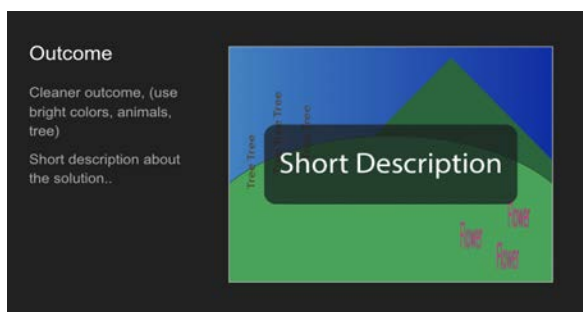


Figure 3.7

4 UNITY DEVELOPMENT

Before creating any development in unity a storyboard was made for our ideation, theater-like improvisation was held in class to express our idea of interaction. When developing the game in Unity it was required that all interactive game objects were in typography and had to be in 3D. To bring our ideas to life in a 3D space, we used the Maya 3D rendering software to create models and Adobe Illustrator to generate typography elements. The development process in Unity required a collaborative effort, with one team member focusing on 3D model creation and the other on coding. This division of tasks facilitated a more efficient workflow, allowing each team member to contribute their expertise. When it came to creating scenes in unity, during the earlier stages of the project members of the group created one non-renewable scene, and another scene that was a renewable scene throughout the project group meetings were held, feedback was given by professors and teaching assistants and changes were made. Firstly through our feedback, we needed to make the scene more cohesive with the same aesthetic, we had one group member keep the official project file, and a Google Drive folder was used to upload project files as well as project material for development, and meeting times were held between team member to work on the project together.

4.1 TYPOGRAPHY

When choosing typography we decided to use the typeface Helvetica Bold due to the thick stroke, it looked industrial for the polluted city and when changed into 3D typography on Maya the thick and bold element allowed us to create game objects that stood out in the game because our main game objects were powerplant, hydropower dam, wind turbines, and a solar panel which was the main focus, these models heavily relied on Helvetica Bold, the choice of only choosing one typeface throughout the project allowed for a cohesive aesthetic.

5 CHALLENGES

Although this project was an exciting project to do, Our team encountered a significant learning curve in the Unity development phase as both were graphic design majors without coding experience. Software like Unity game engine and Maya was very new and unfamiliar to us. There was a lot of learning that needed to be done and it seemed as if the time provided in class was not enough for us, and outside work was heavily used to create a presentable work. Another challenge was creating code for interaction, although we designers were taught to code for web design with code languages like HTML, CSS, and perhaps Javascript. Therefore C# was a completely different code language that was exposed to us to create interactions. To overcome these challenges a lot of help was needed from our teaching assistant, professors, and our own personal researches. However, as novices in coding, introducing C# as a programming language presented a unique challenge. Overcoming this hurdle demanded extensive assistance from teaching assistants, professors, and personal research endeavors. Despite the difficulties, the iterative feedback loop, regular team meetings, and shared learning experiences helped us create cohesive scenes with a consistent aesthetic and fostered a deeper understanding of the coding intricacies involved in interactive game development. Overall, the Unity development phase served as a transformative learning experience,

highlighting the importance of collaboration, perseverance, and adaptability in acquiring new skills within the realm of coding.

6 RESULTS



Figure 6.1 The path to the nonrenewable energy city



Figure 6.2 The breakdown of nonrenewable energy



Figure 6.3 Shows the outcome of the breakdown With renewable energy resources



Figure 6.4 Shows more forms of renewable energy resources



Figure 6.5 Overview of the problem's solution



Figure 6.6 Open-ended question for the player

6.7 EXHIBITION

After the completion of the development, an Exhibition was held at the EVL in Cave2. Through the Exhibition, we were able to present our project to representatives from the International Business Machines Corporation (IBM), attendees from the Museum of Science and Industry, classmates, computer science faculty members as well as design faculty members. Final feedback was given by attendees and professors.

8 CONCLUSION

Overall despite the challenges, it was the experience of the project that was very rewarding to work on. Being able to advocate for an important cause and using interactive design to not only learn new skills but also learn more about the crisis on our planet and how choices make a difference regarding the future of our planet, although our project is small it is something special because it teaches us the value of action and advocating for change. Additionally, It's fascinating to be in a challenging and innovative space, and it's interesting to see how other groups were able to approach the problem of their projects in an innovative way to create solutions.

ACKNOWLEDGMENT

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