

Graffitis with Virtual Reality

Improving the accessibility of Graffitis with a VR headset

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ABSTRACT

Graffiti, like painting and sculpting, is an art form. Examples of it can be found in Ancient Greece and beyond, making it an old and prevalent art form as well. Despite these facts, it is highly stigmatized due to its association with vandalism. It also has some barriers to accessibility: not everyone is willing to paint over surfaces in their homes, and painting over the walls of other properties is, of course, illegal. On top of that, not every person can deal with the sprays and particles of graffiti cans.

However, it may be possible to reduce or even eliminate this stigma completely by using modern technology. What if people could safely paint graffiti in a virtual environment? And, in order to reduce the barriers between would-be painters and their graffiti, would it be possible to incorporate virtual reality? That's the proposal of this project: creating a virtual environment -with VR support- in order to allow users to paint graffiti without the usual concerns while, hopefully, reducing the stigma attached to this art form.

CCS CONCEPTS

- Applied computing - Arts and humanities - Fine arts
- Computing Classification System – Human centered computing – Human computer interaction – Interaction devices.
- Computing Classification System – Human centered computing – Accessibility
- Computing Classification System - Computing methodologies - Computer graphics – Graphics systems and interfaces.

KEYWORDS

Graffiti, Virtual, Reality, System, Program, Technology, Accessibility.

1 Perception of Graffitis

Graffitis, despite being an old art form, are widely perceived in a negative way, mostly due to their association with illegal activity. This applies in both academic and social contexts. While there is some research done with graffiti that appreciates it as an art form, it's easy to see that, at a cursory glance, the vast majority of research done on the topic relates to vandalism.

Graffiti is a broad term, and can range from scratched messages on a wall to colorful spray paints [1]. Nowadays, most people think of the latter when hearing the word. That style of graffiti, however, also presents some barriers to accessibility. A person needs a spray can and a surface to paint on, which already presents a few problems by itself. Painting in this manner can be difficult for some people, due to any number of reasons: a person may not have a surface they are willing to paint on, or be allergic to spray cans, or might lack the dexterity, and so on.

The goal with this project is to help users overcome these barriers to accessibility and hopefully improve the perception of graffiti. To this end, it makes sense to use modern technology: painting on a surface in a virtual environment where there is no risk to the user is likely to be more appealing than doing so in real life, especially if given the option to paint in a more realistic way, such as with virtual reality.

2 Using VR to improve the perception of Graffitis

For this project, a prototype was developed using Unreal Engine 5 [2]. This is a game engine with support for many different platforms, including common PCs, game consoles

and, of course, virtual reality. The prototype was tested on the Oculus Quest 2 and Windows PCs.

The first step was to create the virtual environment. A forest was decided upon, with a wall in the center to paint on. Then, the movement mechanics were implemented. A user can move about the world with keyboard and mouse controls, or teleporting controls when using the Oculus VR Headset. These control schemes are common in most first-person games, and were chosen for their ease of use.

Finally, the Graffiti function itself was implemented. Unreal Engine 5 can be programmed using C++ or “Blueprints”, which is a programming style in which the creator takes different modules and links them together, binding certain actions and inputs in a chain to create certain functions [3]. In this case, binding input buttons to the options for creating graffiti, undo-ing actions, changing colors and so on.



Figure 1: Example Graffiti in a test environment

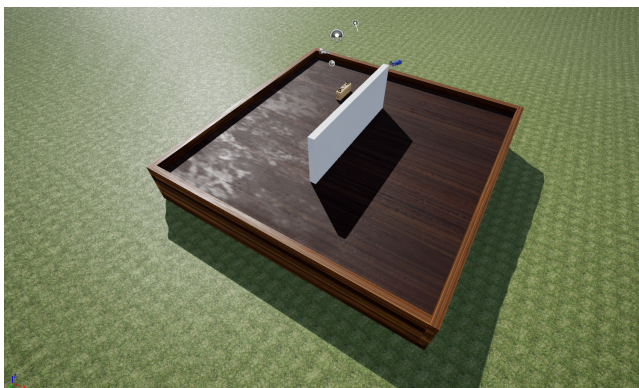


Figure 2: Forest Environment at an overhead angle

3 Testing and Future Work

To test the program, functional tests were performed on a PC to ensure that the environment, walking and graffiti mechanics were working properly. Then, to test the VR functionality from the perspective of new users, volunteers with the Oculus Quest 2 were asked to use the program and then grade their experience in a questionnaire, with each question asking them to evaluate certain aspects -such as the functionality, ease of use and atmosphere of the environment- from 1 to 5. An open question was also left for the participants to make suggestions. Both volunteers graded their experience positively, and one gave the suggestion of an online gallery for users to share their artwork with others.

If pursued, other future endeavors for this project may include:

- Multiplayer
- Support for additional platforms, such as game consoles or other VR headsets
- Additional environments, such as a beach or more fictional environments

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- [2] Epic Games. Unreal engine documentation. <https://docs.unrealengine.com/>
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