



Persistent Virtual Graffiti

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Introduction

Persistent Virtual Graffiti (PVG) is a project to enable messaging and creative expression to take root in an Augmented Reality setting. It allows users to publish a painting on a real world wall that will be displayed to other users if they walk past that same wall and look at it through our app. Graffiti is a divisive subject given a growing disparity of viewpoints, aesthetic sensibilities, and preferences of people all living in the same area. PVG lets sharing ideas, messages, or art be nondestructive yet still public, and trivially simple to filter out art that isn't to one's taste.

Currently, there are platform bound graffiti apps but the artwork vanished when the session ends, and there are cross platform messaging apps, but no persistent AR writing / messaging app across iOS and Android devices. ARKit and ARCore both use different systems to store world anchors to 'remember' rooms but Apple's will not work with Google's and vice versa. Our system is platform agnostic and enables the focus to stay with the users and their content. With millions of colors to draw in and support for a billion devices, PVG is in a good position as AR becomes more widespread.

Our Solution

Our solution can be broken down into several components:

- Each creation is saved as a list of circles instead of an image file in order to save space and time.
- Users submit planes as they look around
 - Planes are used to help identify their location
- Creations and planes are not uploaded directly to database
 - They are first sent to a homemade proxy server where they are processed and validated
 - Once approved, the creations are sent to the database
 - The server sends artwork to the user accordingly, and the client displays the creations.
- Recreating creations requires three-dimensional math
 - Artwork is stored in the artist's original coordinate system.
 - When a user retrieves art, the app ensures that the coordinates of the user are compatible with those of the original art

The Tech Stack

- Unity
 - Unity provides a foundation for Augmented Reality. It created a framework that allowed us to raycast and create planes in the world
- MongoDB
 - MongoDB is a schema-less database. This attribute makes it fast, which was necessary for the application

Future Work

Prior to commercial release, we plan on improving the app in the following ways:

- Add an account management and payment system
- Refine the room recognition system.
- Increase precision and accuracy of where artwork is returned
- Add Wi-Fi trilateration to increase the accuracy of the GPS
- An improved UI

Significance

- Cross-Platform, persistent Augmented Reality App with user generated content
- Non-destructive form of graffiti
- More expression and higher accessibility than regular graffiti
- Less fumes
- Millions of colors to choose from, not just the colors of the spray cans you brought with you
- Creative new way to communicate with friends
- A cheap way for artists to gain a lot of exposure for their artwork



References

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Acknowledgements

This research is supported by:

- The Trinity College Department of Computer Science