The Community Game Development Toolkit

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ABSTRACT

The Community Game Development Toolkit is a set of tools that provide an accessible, intuitive work-flow within the Unity game engine for students, artists, researchers and community members to create their own visually rich, interactive 3D stories and immersive environments. The toolkit is designed to support diverse communities to represent their own traditions, rituals and heritages through interactive, visual storytelling, drawing on community members' own visual assets such as photos, sketches and paintings, without requiring the use of coding or other specialized game-design skills. Projects can be built for desktop, mobile and VR applications. This paper describes the background, implementation and planned future developments of the toolkit, as well the contexts in which it has been used.

CCS CONCEPTS

• **Human-centered computing** → *Virtual reality*; • **Applied computing** → **Fine arts**.

KEYWORDS

prototyping/implementation, manipulation, virtual reality

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1 INTRODUCTION

The Community Game Development Toolkit (CGDT) is a set of tools created by Daniel Lichtman that make it accessible and intuitive for students, artists, researchers and community members to create their own visually rich, interactive 3D environments and story-based games, for VR and screen, without the use of coding or other specialized game-design skills. Developed as a framework within the Unity game design engine, the toolkit is intended to be used by members of diverse communities who may not have experience with computer programming, 3D modeling or other technical game-design skills. CGDT allows users to easily create scenes using their own photos, drawings and other 2D artwork, and create interactivity using built-in game components, without the use of code. CGDT aims to make 3D virtual world-building more accessible to a wide range of people. It places a special emphasis on supporting diverse groups of students, artists, researchers and other community members to represent their traditions, rituals and heritages using a quick, intuitive and visual approach to game design.

1.1 Existing Tools for 3D Composition and Game Design

A number of other platforms, apps and frameworks also aim to make game design accessible for screen and VR formats. One such example, designed at Yale University, is the Verb Collective [1], a framework for Unity that encourages users to explore "the material properties of the worlds they create" and the fundamental elements of interactivity by introducing a repertoire of verbs, or actions, that can trigger other actions within a scene. PlayMaker [3], by HutongGames, introduces a high-level visual scripting interface for creating fully developed games in Unity. TiltBrush [2], by Google, allows users to produce graphical 3D paintings in VR space. CGDT is unique among these projects in its focus on intuitive visual scene composition and the development of interactive visual narrative for absolute beginners.

2 BACKGROUND

Lichtman developed the CGDT in the context of teaching game design classes in the New Media Art program at Baruch College, City University of New York. The classes had no coding prerequisites and most students had no previous experience with computer programming. Lichtman developed the toolkit in order to create a framework in which students could immediately begin a process of composing visually-rich, interactive scenes using their own creative assets. Baruch College has an extremely diverse student body. Through a series of assignments, students made use of the toolkit's intuitive, visually-focussed and open-ended work-flow to explore and share representations of their own cultural traditions and heritages that turned out to be surprising and exciting to the classroom community. These creative works may have been more challenging to express using more traditional fine art techniques, especially for the majority of students who were not artists. Working with the CGDT in this context established a focus on developing a tool to make game design and the creation of interactive visual narrative accessible to members of diverse communities who have little background in coding, game development or art.

3 IMPLEMENTATION

CGDT is a downloadable framework of scripts and example assets that the user installs within a standard Unity project, supported by a comprehensive set of documentation and step-by-step tutorials. Toolkit functionality is organized around the use of 2D images,

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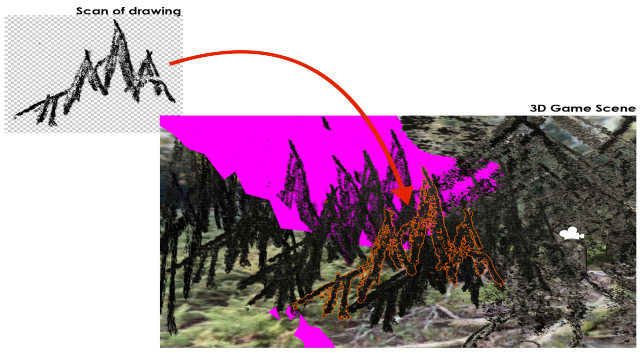

Figure 1: Adding a drawing to a scene in Unity using the Community Game Development Toolkit

such as photos, drawings and paintings, ready-to-use assets such as a first person player-character, and pre-coded scripts for creating basic interactivity such as scene changes.

To create vibrant visual scenes that draw on a community's own visual styles and cultural references, CGDT users follow a set of tutorials that demonstrate how to select portions of photos, drawings or paintings, and create transparent PNG images. When imported into Unity, CGDT automatically applies the correct settings to the image, which can be dragged directly into a scene (Figure 1). Using basic object manipulation techniques in Unity, users can combine numerous images to create a rich, vibrant 3D scene using 2D visual assets. To create 360-degree skyboxes, users take 360-degree photos using freely available software available for smart phones, and import the resulting JPEGs into their project and apply them to their scene. Users can also import sound recordings and attach sound files to specific objects in the scene to create spatially-located sound. While these functions are already supported by the Unity environment, the toolkit provides scripts to automatically process and apply the correct format to imported assets, and easy-to-follow tutorials that make these processes accessible to community members with no previous experience in Unity.

Users make use of pre-made game objects and scripts to create interactivity. For example, to create a first person character in their scene, necessary for gameplay, the player drags a pre-configured first-person player object into the scene. To create a scene change, the player simply drags a pre-coded script to a specific object in the scene, and selects a scene they would like the player to be transported to when they pass through the object. These elements create the groundwork for creating larger scale linear, or non-linear (for example choose-your-own-adventure) visual narrative.

In order to demonstrate the above-mentioned functions, CGDT includes a wide range of sample assets, and fully assembled sample scenes, accompanied by a tutorial for how to get started using the toolkit using example assets.

3.1 Current Development

Currently, all scene editing is done in Unity, using Unity-provided tools for manipulating objects; users do not experience the scene as a first person player until they enter Unity's 'play mode', in which they can play, but not edit the scene. To make scene editing more intuitive, and viewable in real-time, we developed functionality that allows players to move, rotate and scale objects while playing the scene as a first-person player. Changes made while playing are saved, and automatically loaded each time the scene is played. As a result, users are now able to see exactly how changes to the objects in the scene affect the overall look from within their scenes, without having to switch between editor and play-mode. Furthermore, this process creates an approachable workflow for absolute beginners to Unity, minimizing the need to interact with the Unity interface.

We also developed functionality for exporting, playing and editing scenes on a Meta Quest 2 VR headset, making use of components from the Oculus Integration package for Unity. This will allow users to experience their 3D compositions and visual narratives, as well as edit scenes in a VR space.

3.2 Current and Recent Examples of Toolkit Usage

CGDT is currently or has recently been used to teach game design at Baruch College and New York City College of Technology, CUNY and Winona State University and used in workshops at Antioch College. The toolkit has been presented and used in workshops at numerous conferences including iDMAa at Winona State University (2021, 2022), SLSA at Purdue University (2021, 2022), Museums Without Walls at the Museu sem Paredes (2022) the Show Don't Tell Symposium at Culture Push (2021) and the New Media Caucus Showcase at the College Art Association Conference (2021). CGDT was also recently used by Teresa Braun, Ayodamola Okunseinde, June Bee, and Zelong Li as part of their art project, MetaEternity.

4 FURTHER DEVELOPMENTS

In addition to in-game editing and fleshed out VR capabilities for the toolkit, we hope to develop a web-based platform for sharing projects developed with the CGDT. The goal of the platform would be to provide examples and inspiration for the kind of creative virtual world-building that can be accomplished with the toolkit. Furthermore, the platform would seek to build connections between the various communities and user groups that use the toolkit, and to provide a robust platform for members of diverse communities to share and explore their rituals, heritages, customs and traditions through accessible 3D world-building.

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