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Kyoung Swearingen, Scott Swearingen

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Article Title: Designing ‘Wall Mounted Level’ - A Cooperative Mixed-Reality Game About Reconciliation

Author Name: Kyoung Lee Swearingen, Scott Swearingen

Abstract:

‘Wall Mounted Level’ is a cooperative mixed-reality game that leverages multimodal interactions to support its narrative of ‘reconciliation’. In it, players control their digitally projected characters to navigate across a hand drawn physical sculpture as they collaborate towards a shared goal: finding one another. The digital and physical characteristics of the game are further reflected in the ways in which players interact with it, by making use of digital input devices and physical ‘touch’. This paper discusses the design choices that were made for creating the varying modes of engagement and the motivation behind player collaboration in ‘Wall Mounted Level’.

Article Text:

The game begins with a cut scene of the two player-characters having an argument with one another. Shortly after, it resolves to the ‘next day’ where the players take control of the characters to reunite them under the guidance of supporting audio and visual cues. The fractured landscape doubles as a metaphor for the characters’ internal struggle as they navigate it trying to reach one another. The space is composed of interiors and exteriors that reveal and conceal not only the characters, but also obstacles that are meant to be avoided. These obstacles are the remains of the argument that took place ‘the day before’, and need to be navigated around as they patrol the environment. More so, they also reveal in some cases the path that players must take, and should be considered carefully as they make progress. Additionally, lights will turn on as you enter buildings to help guide you, as do the NPCs which are scattered throughout the environment. In ‘Wall Mounted Level’, knowing the position of the other player (your goal) is just as important as knowing where your own character is. We decided to connect the characters visually with a digital string that also turns red when either one of them touches an obstacle. This visual language parallels the coordination of the players themselves who are also connected to one another.

The game environment is a hand drawn cityscape that was laser-cut and assembled into a paper sculpture. Serving the metaphor of the characters' internal struggle, we decided to further fragment the sculpture and create a deeper relief out of it. Other materials that we considered for the construction of 'Wall Mounted Level' included cardboard, chipboard, wood, and acrylic plexiglass, but ultimately, we favored the inherent quality of paper as a tangible, vulnerable, interactive medium.



Figure 1. 'Wall Mounted Level' (24"x36", laser-cut illustration board and paper). Sitting on an easel in front of projector. Testing dimensions and footprint of entire setup. November, 2017.

All of the digital elements are projected onto 'Wall Mounted Level' using projection mapping and other compositing techniques. As characters move through interior spaces, we mask them by projecting black pixels onto a sorting layer in front of them. At the same time, windows and doors light up in a sorting layer behind them to indicate which building they are currently located in. This helps the players keep track of their own location as they move throughout the level. However, because the level was no longer flat, single-exposure projection was not a suitable

option given the range of depths. Using the software Isadora [1] allowed us to project multiple exposures at the same time, and corner-pin them independently. This provided us the flexibility to further fragment the level and provide us with greater agility in designing it.

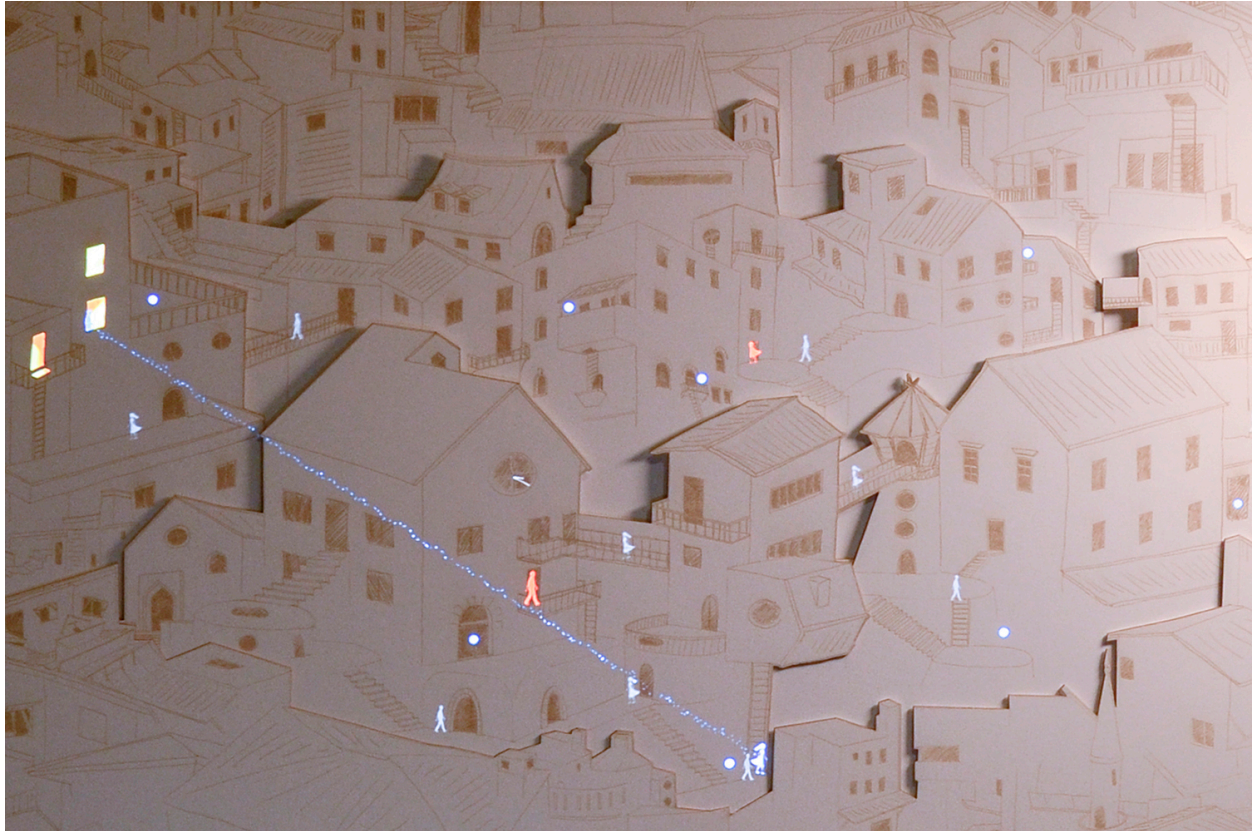


Figure 2. ‘Wall Mounted Level’ (24”x36”, laser-cut illustration board and paper). In-game close-up of relief sculpture, with game elements projected onto it. November, 2017.

The modes of player interaction parallel the sculpture itself in terms of digital and physical engagement. Digital interactions account for lateral movement as each player steers their own character through the environment using an analog stick. On the other hand, moving up and down ladders and transitioning between floors requires players to touch one another and complete a ‘Makey Makey’ [2] circuit that they are connected to, which in turn sends the appropriate input message. However, this input message is shared between both players and will affect them equally if they are in valid positions (e.g. at the top of a ladder, or at the base of a stairwell) when the message is sent. Employing digital and physical interactions in this manner also provides opportunities for both synchronous and asynchronous collaboration. Similar to the

physical quality of the sculpture, the verbal communication and physical coordination that takes place between the players is especially important to us in terms of human-facing interactions as it extends the narrative of ‘reconciliation’.



Figure 3. ‘Wall Mounted Level’. Showing player interactions and use of touch. November, 2017.

Our motivation for creating ‘Wall Mounted Level’, was to embrace tangible surfaces as mediums for digital games to exist in, and for the interactions between players to occur in person.

Throughout its development, ‘reconciliation’ served as the underlying narrative and concept that drove aesthetic choices, gameplay, and the interface not only between the players and the game, but between the players themselves. It was important to us that the game required the physical presence of the players to embolden the collaboration between them. This aided in establishing a deeper connection between the players and the game world itself which is a tangible, physical object.

Through the creation and testing of ‘Wall Mounted Level’, we discovered that its most compelling characteristic was the collaboration that it fostered. We play-tested with various players and the game uniformly ended with hugs, high-fives and smiles between players whether they were friends, couples, or strangers. In conclusion, ‘Wall Mounted Level’ is a cooperative multiplayer game that uses mixed-reality to support its narrative, interactive, game-play, and aesthetic elements to promote multimodal collaboration between its players.

References and Notes:

1. ‘Isadora’ is an A/V processing engine that we employed for projection mapping.

[https://en.wikipedia.org/wiki/Isadora_\(software\)](https://en.wikipedia.org/wiki/Isadora_(software))

2. ‘Makey Makey’ is an invention toolkit that allows everyday objects to easily interface with computers. https://en.wikipedia.org/wiki/Makey_Makey

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Glossary:

NPCs: Non-player characters that are neither the player nor the enemy. They are benign.