Tangible Viewpoints:
Physical Navigation through Interactive Stories

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ABSTRACT

Over the centuries, stories have moved from the physical environment (around campfires and on the stage), to the printed page, then to movie, television and computer screens. Today, using wireless and tag sensing technologies, researchers and storytellers are able to bring digital stories back into our physical environment. The Tangible Viewpoints system explores how physical objects and augmented surfaces can be used as tangible embodiments of different character perspectives in an interactive tale. These graspable surrogates provide a direct mode of navigation to the story world, a means of bridging the gap between cyberspace and our physical environment as we engage with digital stories.

Keywords

Tangible interface, interactive narrative, collaborative storytelling, physical interaction, multiple point-of-view.

INTRODUCTION

Across the centuries, scientific research and technological innovation have enabled the development of new mediums for creative expression and storytelling. However advancement in technology alone is not enough – the path that leads to a stable artistic medium begins with a period of experimentation, during which researchers and artists work to uncover the creative potential of the new technology. Equipped with an understanding of past conventions and a vision for the future of art, these "new medium pioneers" gradually define an expressive language suited to the emerging delivery channel. As such, we have seen stories transition from the physical environment (around campfires and on the stage), to the printed page, then to cinema, television and radio, and finally onto our computer screens.

These days, in many art institutions and research labs around the world, artists, designers, storytellers, computer

Figure 1. The graspable objects in Tangible Viewpoints.

scientists, and engineers are working together to create new types of interactive story experiences. Breaking free from the fixed nature of more traditional expressive and narrative mediums, and putting greater emphasis on the dynamic quality of the experience, their pieces undermine the notion that artworks must be centered on a single "author". But merely including the opportunity for interaction into their systems by no means guarantees an engaging narrative experience for users. As artist/researcher Stephen Wilson points out, "The same careful design and artistic inspiration will be necessary to make the processes of interactivity themselves key artistic or conceptual elements." [9]

In the Interactive Cinema and Tangible Media groups at the MIT Media Laboratory, we are exploring how screen-based digital stories can be brought back into our physical environment. This paper introduces Tangible Viewpoints, an interface for multimedia storytelling that explores how physical objects and augmented surfaces can be used as tangible embodiments of different character perspectives in an interactive narrative. The graspable surrogates provide a direct mode of navigation to the story world, helping to bridge the gap between the realms of bits and atoms within the field of interactive storytelling.

This paper begins by providing a context for the research from the perspective of tangible interfaces and multiple point-of-view stories. We then give an overview of the Tangible Viewpoints functionality and discuss how the system has been used for collaborative storytelling and exploration.

CONTEXT AND RELATED WORK

The Tangible Viewpoints system combines the use of tangible interface technology with a multi-viewpoint approach to storytelling. We believe that these two elements are synergistic and can work together to give users compelling and coherent interactive story experiences.

Tangible Interfaces

When developing a story for a new delivery channel, it is important to consider both the form and environment in which it will be conveyed to its audience. As human beings, we have developed sophisticated skills for sensing and manipulating our physical environment, most of which are not employed by traditional GUIs (graphical user interfaces). When we interact with a keyboard or mouse, we focus on the screen and the scale of the screen, often losing sight of the architecture or environment around us.

Tangible interfaces are rooted in our physical surroundings, employing objects, surfaces and spaces as embodiments of digital information. As such, they can afford natural physical interactions with digital stories. They can turn multimedia storytelling into a cooperative and social experience by allowing multiple users to interact with the same story, in the same space, and at the same time.

The idea of using tangible components to tell interactive stories is far from new. Physical objects and environments (props and sets) can play an important role in both improvisational theatre and oral storytelling. Within the digital domain, a number of systems have been developed that explore the use of tangible controls for interactive stories. Examples include the Triangles interface [3], the genieBottles project [4], and the TOONS project [5].

Multiple Viewpoints

In his book *Actual Minds, Possible Worlds*, Jerome Bruner writes: "Perhaps the greatest feat in the history of narrative art was the leap from the folktale to the psychological novel that places the engine of action in the characters rather than the plot." [1, p.37] Tzvetan Todorov makes a similar distinction between what he terms *apsychological* narratives (plot-centered) and *psychological* narratives (character-centered) [8].

Alternating between different character perspectives as a story unfolds is a common technique in literature and film. It allows readers or viewers to gain access to characters' thoughts and experiences, and to use them as a contextual lens for understanding and interpreting the events in the story. In interactive storytelling, multiple character
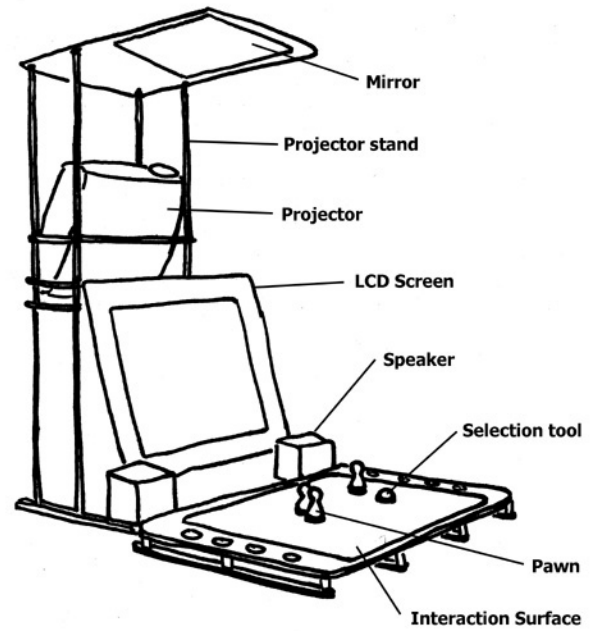

Figure 2. Diagram of the Tangible Viewpoints setup.

viewpoints can be used as a strategy for structuring user interactions into coherent story experiences. By allowing viewers to select the viewpoint, a single story space can turn into a myriad of story experiences, each one tailored to the preferences of a particular individual or audience. Moreover, the notion of multiple viewpoints reflects our increasingly global society that keeps us constantly aware of the many different cultures and perspectives on life. By reshaping the stories we live by and capturing these many different viewpoints, we can keep evolving and redefining how we think, play and understand our lives.

There have been a variety of interactive works based on multiple points-of-view. A few notable examples include the early videodisc-based piece entitled *A Different Train of Thought* [6], an interactive story modeled after Greek theatre entitled *Tired of Giving In* [7], and the evolving documentary *New Orleans: A City in Transition* [2].

SYSTEM OVERVIEW

The Tangible Viewpoints system uses wireless graspable pawns to navigate through a multiple viewpoint story. When a pawn is placed on the interaction surface, the story segments associated with its character's point-of-view are projected around it in the form of small images or text titles. A small lens-like object serves as a selection tool for viewing the story content. By gliding this selection tool over particular story segments, users can playback their associated story content on a nearby monitor, causing the narrative to advance and new segments to become available. The story content in Tangible Viewpoints can consist of various types of media (video, audio, images,

Figure 3. User interacting with *The Diner* story.

text), and as such can present character development, action and location with as much complexity as any scene of a film or chapter of a book. An aura is projected around each pawn to give a visual representation of the prominence of its character's viewpoint in the current telling of the story. Changes in the story space (i.e. when the story moves forward or there is a shift in character perspective) are reflected by dynamic changes in the projected graphics.

The narrative structure used in Tangible Viewpoints supports character-driven stories. As the story unfolds, the system gathers information about which characters a user has been interacting with, and makes decisions about what segments to present next based on this knowledge. If the user focuses their interest on a particular character, the system narrows the story's scope as it progresses, resulting in greater depth in that character's story. In contrast, a user who spreads their focus between all three characters will get a much broader story.

When two pawns are touched together on the interaction surface, the system displays only the portions of story that are relevant to both characters. In this way, users can examine relationships between the characters and see how their individual stories or perspectives relate to one another.

STORYTELLING WITH TANGIBLE VIEWPOINTS

The first story created for the Tangible Viewpoints system is entirely text-based. It is a short multiple viewpoint narrative piece entitled *The Diner*, which tells the story of three characters from different walks of life who meet at a diner in a small coastal town early one morning. Each character's experience of this encounter is different, shaped by their unique personality and perspective on life. By exploring the three viewpoints, users can gain access to the thoughts and feelings of the different characters, effectively seeing the story through each one's eyes. *The Diner* is a relatively conventional multiple viewpoint story created by a single author. Much like William Faulkner's short novel

As I Lay Dying or Kurosawa's film *Rashomon*, it presents a set of carefully tailored character perspectives that fit into an overarching storyline.

The Diner served as a testing story during the design and implementation stages of the project. By having a set of story content ready at an early stage, we were able to pursue an iterative design process, gathering feedback from users in our laboratory, and progressively refining the interface and narrative engine during the development process. These early observations enabled us to confirm that the physical layout of the interaction surface and the system's ability to support the manipulation of multiple pawns at once make Tangible Viewpoints a good platform for collaborative story exploration.

Inspired by the collaborative nature of the interface, we decided to conduct a storytelling workshop at the Boston Museum of Science's Computer Clubhouse. The goal was to see how Tangible Viewpoints could be used to capture the differing narrative perspectives within a given community. Three participants were selected to collaboratively author personal stories for the system. All participants were teenage boys attending high school in Boston.

The workshop participants began by defining a structure for their story. They decided on a documentary style narrative that would chronicle one day in each of their lives in Boston. Their individual story threads would progress from morning through evening, and would overlap at times when the boys' activities coincided (for instance in the lunchroom at school, or at the Computer Clubhouse). Each participant used a digital camera to take still images over the course of one day. The images were then organized, edited as needed, and added to the story database. The participants also provided voice-overs for their images.

The Tangible Viewpoints system was set up in the Clubhouse environment for the entire duration of the workshop, and other members from the community were free to interact with the system and view the stories created by workshop participants at any time. In order to give viewers some content to interact with as soon as possible during the workshop, the stories were loaded into the system at an early stage in the production process. The stories were then progressively refined over time by editing the images, adding new ones, adding voice-overs, tweaking the meta-data, and re-ordering the clips. In this way, the storytelling process became a collaborative and iterative activity. By seeing their stories running in the system while they were still working on them, the boys could determine what changes needed to be made and could get suggestions from their friends during the production process.

Like the story creation process, the story viewing was mostly a collaborative activity. Clubhouse members would gather around the system in groups and interact with the

stories together. They would frequently chat about the stories as they interacted, pointing things out to each other, and working together to explore the stories using the pawns and selection tool.
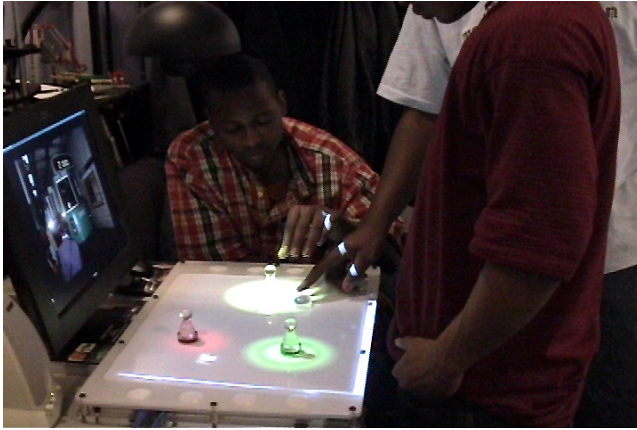

Figure 4. A group of boys interacting with the Tangible Viewpoints system at the Computer Clubhouse.

CONCLUSION

The Tangible Viewpoints project suggests a new direction for digital storytelling that incorporates multiple point-of-view stories with a tangible interface platform. The physical pawns act as handles on the character perspectives in an interactive narrative. Their movement on the interaction surface provides users with a direct mode of navigation to the story world.

The narrative piece created at the Computer Clubhouse gives a preliminary taste of the type of stories that can be told with the Tangible Viewpoints platform. Both the process of story creation and the final stories produced by workshop participants reflect many of the broad trends in contemporary interactive art. Adaptive, evolving and collaborative, these types of stories challenge the notion of a single "author" in the creation of artworks. Moreover, they shift viewers from their traditional role as passive story consumers into a role of collaborative story explorers. We believe that platforms like Tangible Viewpoints can help us capture the many different perspectives of contemporary life, allowing us to better understand society, our experiences, and ourselves.

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