A TANGIBLE ENVIRONMENT FOR ANIMATIONS CREATIONS

ABSTRACT

Storytelling is an essential activity in the life of children. By listening or sharing their stories and ideasthey give meaning to their world and practice their communication skill. Even though the compute were already present in the infantile world, there is to get between the software developed for theirs and the ones that really give voice for this little uses. This paper presents the Reactoon System: an authoring tool for building 2D animations for a tabletop with tangible user interface and multi-touch.

KEYWORDS

Storytelling, tangible interface, education, authoring tool, animation

1 INTRODUCTION

The computers have already been present in schools for several decades. They have become common objects in daily life. With them, a new area, the developer of educational software has been consolidated. It was not long that teachers realize that it wasn't enough copy the office model, with their *desktops* and applications such as spreadsheets and word processors. The particular features of the new environment, the classroom, required research and applications specific to this audience. Many studies have happened always seeking to improve the use of these technologies, enhancing and assisting the teaching-learning process and reducing the rejection rate of these new tools in the school environment.

Currently, research on tangible technologies offer new perspectives to the educational environment [4,7,8,12]. With a different way to access and display information, these technologies offer the user a more natural and intuitive interaction, using physical objects and even ours own body for manipulation of information. The tangible technologies are part of a large development area known as ubiquitous computing, where the computer is embedded in the environment, becoming invisible [9].

These new technologies not only seek to enhance and stimulate the teaching-learning process but turn it into something natural, that does not require prerequisites or much time to acquire its and allows the computer to play a less intrusive role in the classroom, bringing benefits to the teaching-learning process.

In this article, we present an authoring tool for creating 2D animation, developed at The Multidisciplinary Workshop on Interactive Media and Natural Interfaces that took place at the Instituto Nacional de Matemática Pura e Aplicada (IMPA) during the period of October and November of 2008. This workshop explored the development of new applications for a tabletop, and tangible and multi-touch interface.

We begin with a brief summary of tangible interfaces, then we mention some about storytelling and some related applications, we explained about the current implementation and performance of our system, and finally describe future actions on the development and research with a brief conclusion.

2 TANGIBLE INTERFACES (TUI)

Digital information is usually handled by physical input devices like a mouse or a keyboard and displayed on an output device such as the display. The "tangible interfaces" are designed to remove these devices from input / output creating new possibilities that mixes the physical and digital interaction[12].
Tangibles Interfaces are generally characterized by the union of controls and representations of digital information handled by physical objects and surfaces [12].

Research in this area has focused on new metaphores and approaches to interactions of the physical world with the digital, with applications in diverse areas as games, music, education and others. [6]

In a traditional interface, Graphics User Interface (GUI), there is usually a distinction between input and output. This is, in a GUI, a mouse is an input device and a monitor, an output device. On the contrary in a Tangible User Interface(TUI), this distinction disappears. In a tangible interface, the same device that can be used to enter the information can also be used to display it. When you have a tangible interface, the input is usually physical, whereas the output is digital [9].

Ullmer and Ishii [12] show some characteristics that distinguish a tangible interface:

- physical representations are linked to digital information;
- physical representations include mechanisms for interactive control;
- Physical representations are perceptually attached to digital representations;
- the physical state of the objects are associated with the state of the digital system.

3 STORYTELLING

Imagination lets children create their own worlds, their own stories, using objects of the toy box. Their toys and their stories connect their tangible world with their imagination world and stimulate their communication skill and creativity.

Storytelling is an ancient activity, which began with the need of mankind to keep their memories alive. The stories from generation to generation.

With the evolution of the technology changed the way to count stories. Books, movies, *cartoons* and novels are different ways to tell a story. With the media resources currently available, the activity of storytelling can be enriched with sounds, pictures, movies, text and even perpetuated with the use of a storage device.

The early grades, the activity of storytelling is used by the teacher to teach his students. In the case of children learning to read, many of these stories are told using resources such as paper, pencils and voice. The authorship of these students almost always boils down to a drawing on a sheet of paper, where he tries to convey his emotions and ideas.

Storytelling is an activity that encourages creativity and fosters communication, allowing the author to expose his ideas and feelings about things, people and the world. As authors, children expose their feelings and perceptions of the world, and when the richest resources are offered, this process of creation and communication can be more exciting and liberating

4 RELATED WORKS

The number of searches for technologies that support interfaces and tangible multi-touch has grown significantly in recent years. The educational field is seeking to incorporate new resources to education from these technologies in order to stimulate and strengthen the construction of knowledge. Some works in this area are summarized below.

RENATI: Recontextualizing Narratives for Tangible Interfaces

In a hybrid environment that uses oral narratives that combine non-generative art and immersive digital storytelling with tangible objects. RENATI consists of a series of three installations that are being developed using technologies and equipment and sensors [1].

Personal Digital Historian (PHD)

An interactive system that facilitates chating and sharing stories face-to-face in a digital tabletop. Users can select files stored digitally as photographs, video, documents and display them. The current table PHD was implemented using the DiamondSpin <http://www.diamondspace.merl.com/>, an interactive Java platform that allows multiple users working simultaneously on a digital table [11].

ARCHITALES

It is an interactive digital table surrounded by participants who share a narrative with a tangible interface and multi-touch[5].

Dolltalk

It's a toy that presents a tangible interface to encourage children to speak and act in their own stories. It simulates speech recognition by the capture of gestures and speech of the child. The toy records and then touches the history of the child [13].

5 OUR SYSTEM

The Reactoon was developed when we participated in the Multidisciplinary Workshop on Interactive Media and Natural Interfaces in IMPA during the period of October and November of 2008.

Participants developed applications for a tabletop (named "itable"), an interactive table (Illustration 1) built by the VISGRAF Laboratory for research on natural interfaces.

The authors development environment consisted of the tabletop (itable) and the engine reacTIVision by Music Technology Group at the University Pompeu Fabra, Barcelona.

The reacTIVision is a *framework* for computer vision, multi-source platform for building tables based on tangible interfaces that also support multi-touch. This *framework* has its own communication protocol, the TUIO. [2]

The TUIO is a protocol developed specifically for tabletops with tangible interfaces. This protocol defines the properties of control objects (fiducial markers), and finger gestures on the surface of the tabletop. It encrypts and transmits the attributes of tangible objects that are on the table surface. [3]

The framework also provides a library of fiducial markers that can be set on the basis of tangible objects, beyond the recognition of fingers and gestures. The developer can implement his system in Java, C + +, PureData, Max / MSP, SuperCollider and Flash. [2]

Our development environment consisted of Linux Ubuntu 8.10, Java 1.6, Eclipse 3.4.1., Processing 0157 Beta 1.4 and reacTIVision TUIO Simulator 1.4.

Approximately 90% of development was done in TUIO Simulator and the final adjustments directly on the table.

Illustration 1: itable built by the VISGRAF

5.1 REACTOON

Having in mind a young audience in an age range from 5 to 9 years, with little or no proficiency in the use of such tool, the Reactoon (Illustration 2)has been specially developed trying to meet the needs and expectations of these users in the production of their own stories.

With resources of sound and images and a natural interface, the teacher can easily monitor and guide the creative activity of their students without requiring prior knowledge of the use.

The main focus was the activity of production of animation, from of a natural interface that could make use of the tool intuitive and fast acquisition.

Reactoon is a tool for collaborative authoring with tangible interface and multi-touch through a natural interaction with physical objects and direct manipulation into their own hands. It enables the creation and editing of 2D animated shorts by users with little or no proficiency in use of tools of this type.

Learning mediated by tangible interfaces can allow the child to combine and recombine the known with the unknown, stimulating creativity and reflection [10].

The resources provided by the system are categorized in: library of scenarios, characters and object, commands module and scenes.

The libraries offer digital images linked to their respective tangible objects from fiducial markers.

The commands module enables easy interpretation of user actions by presenting simple and well known symbols . The physical objects which represent the commands are also identified by fiducial markers:

1. Record Images (Symbol: digital camera)
2. Record sound (Symbol: microphone)
3. Watch and Edit (Symbol: TV)

The scenes are small rectangular pieces, symbolized by a ribbon cutting film. These small pieces allow that the user to label in some way, using text, numbers or drawings, and associate the content they create the stored and represented in the piece. This feature was created so that the concepts of folders and files are not addressed. User has at his disposal the scenes recorded and identified by himself, and can he watch or edit them just by manipulating these small rectangles that represent the scenes.

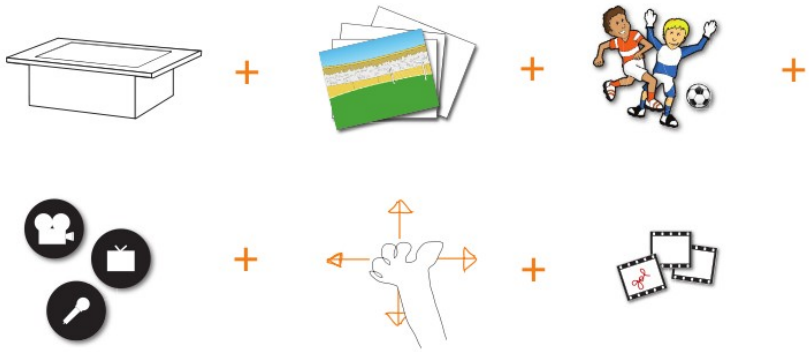

Illustration 2: System components

5.2 THE CREATION PROCESS

Even though the system is minimal, its few and simple animations features make many possibilities available to users.

Scenario. The user has at his the disposal small cards with pictures representing the scenario where the story will be told. To add the setting chosen in his story just put the card on the table surface. The system, in the background, will capture this scenario and display it on the table surface. Feedback is given as a sound warning that an action was performed.

Characters. Characters can be chosen by the user for inclusion in his history. The user chooses the character and his position in the predetermined scenario. The character is displayed on the table in the same position it was placed the concrete object which connects the digital. Feedback is given as a sound warning that an action was performed and the figure of the character is displayed in the table surface.

This character may ber scaled, translated and rotated by multi-touch interaction on the table.

Objects. Objects are also available to the user that can compose his scenario. For example, in a football field, the user can choose to put the ball in the scenario. The process of adding the object to the scenario is the same as adding a character. The features of scaling, translation and rotation are also available for the objects. Once again the sound is used as feedback to the user object is displayed on the scenario, on the table.

Delete. When the user want to delete a character or object he makes a small gesture of dragging your fingers on the object to be deleted. As when we clean a surface. This gesture recognition feature was added to the system so that we could try something new and possible in this type of environment and minimize the use of fiducial markers.

Save. To record a scene, the user must activate the action record. A small circle produced in acrylic and printed with a symbol that represents a camera is available to the user. Simply put this "camera" object on the table and wait 5 seconds, which are accompanied by beeps and flashes of light that changes from green to red, then his can start your scene.

The recorded scene can be repeated as often as the user wants. When you make a new recording, the current scene is totally erased. To store the scene to be used in the future it is necessary to record the scene object "scene".

Scene. When the user finishes animating a scene, he can save this scene for future use. Small rectangular pieces are available for the user to store this scene. Although only a representation with this application, the user needs no preconceptions about folders and files when saving a scene. The entire process is performed in the background, who need only identify through writing or illustration, the small rectangular piece that contains his recorded scene.

Record sound. Once his scene is recorded in the "scene" object, the user may wish to add extra sounds to his scene. For this reason, a small circle is available with a printed symbol representing a microphone. Simply place the object "Record sound" on the table, wait 5 seconds, which are accompanied by beeps and flashes of light that changes from green to red, and start recording the sound. All this happens without the need at any time of the user it opens a folder or file to perform this task.
All resources used are tangible objects that make a real connection with the digital. After recording the sound, the same is attached to the scene.

Play. After all the scenes are recorded, the user can watch these scenes one by one or choose from a series composed by him, seeing the result of all the scenes together. The scenes is made from the placement of objects in sequence "scene" on the table. The sequence in which "scene" objects are placed dictate the order in which the animation will be played.

The user has the freedom to assemble its sequence as he wishes, and he is always free to add, remove or change the sequence of scenes.

The whole process of creation is done collaboratively face-to-face with the manipulation of objects. Characters and scenarios are handled directly with the fingers.

Illustration 3: Creating an animation with the Reactoon

6 FUTURE WORK

This is an initial prototype. For this reason, we have not performed experiments with children. We believe that to this audience requires a more stable version, avoiding frustration with system errors.

We will work on a more stable version. At the some time, we will expand its libraries.

Some requirements were left to be implemented after we perform the tests with children, so that we can assess the project's progress and evaluate the reception of our audience.

A future research is the addition of gesture recognition that can further enrich the tool, allowing a more natural interaction. As the tabletop has a limited surface, the recognition of gestures can replace some of the fiducial we use today.

7 CONCLUSION

This paper presented the first prototype of the Reactoon System.

Reactoon is a project that explores the creation of digital stories with 2D animation in a digital table, with a tangible interface and multi-touch. The goal is building a bridge between the storytelling performed by children and their toy box and the digital world and its rich resources and advantages that so enchant this audience.

The application does not require that the user reads or writes, it uses a natural interface with tangible objects and multi-touch surface to simplily interaction and creation. With this interface, we excluded the keyboard and mouse commonly used in computers. The user can also watch the history of others or build new stories from the already created, not only performing a collaborative activity, but sharing ideas.

Whith the use of this technological resources in the classroom, teachers will provide their students a more interesting environment, stimulating learning from the student's interest in these resources. Teachers do not want letters students in the use of technology, but rather enhance their learning from them.

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