Metamorphosis – Digital Puppetry application for XPT 2010

Ali Mazalek
mazalek@gatech.edu

Michael Nitsche
michael.nitsche@gatech.edu

with
Paul Clifton, Andrew Quitmeyer, Firaz Ahmed Peer

More information about the emBodied Digital Creativity (BDC) project

We are applying to participate in the 2010 XPT workshop with a digital puppetry project. Digital puppetry is seen as the control of a virtual character with the help of physical/ tangible interfaces. Because our project grew out of our work on interfaces for digital puppetry, this application will consist of two parts: first we will provide a short description of the technology we want to use; second we will suggest a theme for which we want to use it. We are not suggesting that we should be the sole directors or artistic directors for our performance – or necessarily even the performers – but would love to work together with an artist or a small team of artists to develop a suitable project and explore our medium further.

Our system for digital puppetry

Through the combination of puppet design and technology, we have created a puppet that transfers the puppeteer's actual body movements on to a virtual 3D character in real time. After researching different types of puppets with respect to how they relate to the puppeteer's body movements, we designed a hybrid puppet using elements of full-body puppets and rod marionettes that provides direct mapping of the puppeteer's body movements onto a digital character rendered in 3D.
The puppet is approximately two and half feet tall and proportioned similar to a person. It is constructed with wooden bones and uses potentiometers as sensors for the joints. The puppeteer wears the puppet on his torso. Straps suspend the puppet from the shoulders; a belt holds the bottom of the puppet's spine against the puppeteer's torso, and the puppet's feet attach to the puppeteer's thighs, just above his knees, using velcro straps. The puppeteer controls the arms by grasping the puppets hands and moving them. When the puppeteer walks, the puppet's knees and hips move along with him. When he waves, the puppet waves. These and other movements are captured using our sensors, sent to the computer, and translated on to a 3D character.
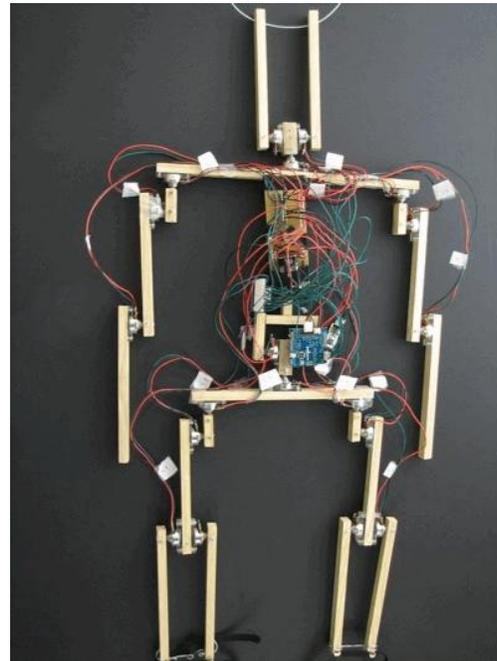
The computer runs a custom 3D engine, called Movie Sandbox, that interprets the data from the puppet

and translates it onto a virtual character. The engine and puppet setup gives us the capability to map the data on to multiple different characters. That means that the look and shape of the virtual puppet can be adjusted easily. In addition, we can also change the background and the scenery the character moves in. You can see the video of an early technical test here: http://synlab.gatech.edu/vdos/bdc-puppet.mp4 Please note that we have since improved the response, speed, and fluidity of the interface significantly. The image below shows our default environment and puppet – we can obviously change the form of puppet and 3D space to any design.
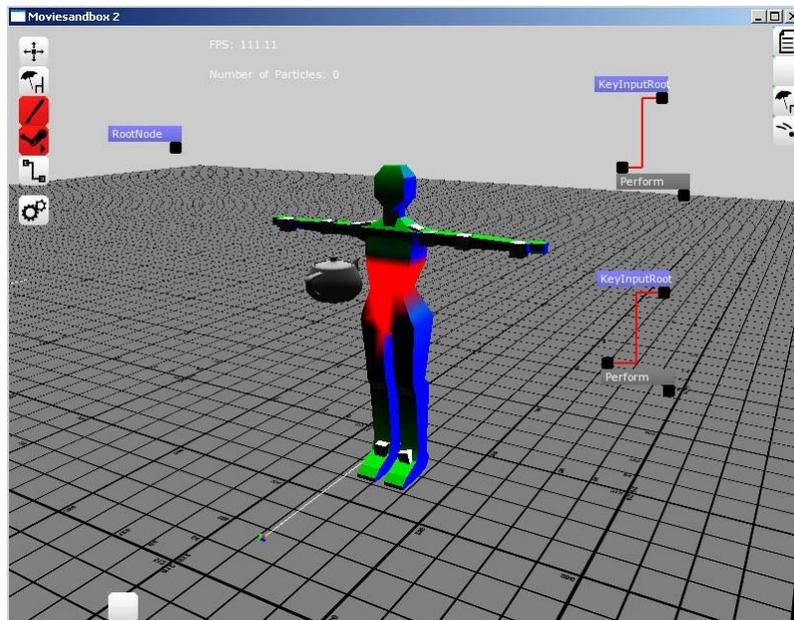
Future additions will allow us to have multiple characters in the scene and to record and playback animations, and blend prerecorded animations.
In summary, we have a stable, flexible, and hopefully sufficiently precise digital puppetry system. The system is portable (it runs on a laptop) and we can provide necessary equipment (e.g. projectors) if needed. We would like to explore a more artistic use of this system for XPT.

Theme for XPT - Metamorphosis

We have no experience in factual puppet show productions and look forward to work with more knowledgeable artists to develop our piece for XPT.
However, a specific theme we are interested in is the connection of the physical body to the virtual puppet representation, and we believe it would be fascinating to create a puppetry piece that deals with the transformation of either of those bodies.
That is why our suggested theme is that of the Metamorphosis and the change of bodies in the performance. Thus, we are interested in a possible adaptation of Kafka's *Metamorphosis*, or a comparable piece like Langelaan's/ Cronenberg's *The Fly*. The challenges that Kafka's hero Gregor Samsa has in controlling his new body reflect issues of body and puppet control:

> "He needed arms and hands to push himself upright. Instead of these, however, he had only many small limbs, which were incessantly moving with very different motions and which, in addition, he was unable to control."

With the help of digital technology, we could expand on this motif as it has been used in stage productions such as Steven Berkoff's play adaptation or Peter Kuper's comic versions.

However, we want to see our Metamorphosis suggestion predominantly as the outline of the area we would be most interested in and remain open to discuss other or related pieces with another artist/ team.

Our primary goal is to explore the artistic value of our original interface.

Related work

http://www.dramaofworks.com/kafka/index.html
http://causticcovercritic.blogspot.com/2008/09/kafka-comics.html
http://en.wikipedia.org/wiki/The_Metamorphosis