NUI-Marbling

Marina Sparvoli
UFABC

Santo André, SP, Brazil
marina.sparvoli@ufabc.edu.br

Candy Tenorio
UFABC

Santo André, SP, Brazil
candy.tenorio@ufabc.edu.br

Mario Gazziro
UFABC

Santo André, SP, Brazil
mario.gazziro@ufabc.edu.br

João Paulo Gois
UFABC

Santo André, SP, Brazil
joao.gois@ufabc.edu.br

1. INTRODUCTION

Natural user interface (NUI) can be defined as human-computer interaction systems in which the user employs intuitive actions based on the human behaviour. Common examples of NUI interfaces are those ones that use multi-touch screens, gesture and sound recognition systems, and painting tablet devices. Paper marbling is a painting approach in which the artist uses proper tools – as combs and brushes – to interact with the paints deposited on an aqueous surface, producing thus marble-like paintings. These paintings are then transferred to an absorbent paper, which are used, for instance, as book cover. In this work, we present a computational marbling system that incorporate NUI to ease the generation of marbling patterns.

2. PROCESSING AND DESIGNING

The NUI-marbling system was designed to be capable of producing results in real-time and a friendly user interface with support to graphics tablets and multi-touch screen.

The user-interface, presented in Figure 1, provides the main marbling options in one single window. Namely, the system is composed of two regions: the design area, where the artist paints her digital marbling patterns; and the painting toolbar, which offers tools employed by the artists and to adjust the marbling simulation. User input is done by a graphics tablet model Wacom PTK840 with 12×8 inches (Figure 2).

Our marbling system requires heavily processing and data exchanges between the user interface (paint rendering and processing input devices) with solver of the Navier-Stokes equations. Specifically, the process to create a marbling relies on:

- The preparation of system to receive the paint by the artist;
- The computation of the domain transformations and of the fluid density;

- The configuration of the graphics objects;
- The computation of the fluid flow simulation;
- The conversion of the fluid flow simulation to textures;
- The generation of the gradient colour paint;
- The displaying of the final result.

Specifically, the domain simulation is discretized into a Cartesian two-dimensional grid, where the velocity field and density field are stored in shader textures. Since fluid flow simulation is executed on the GPU, there is an interaction among all the shader programs (for rendering and also for the fluid simulation) used to provide a real-time feedback to the user.

Our NUI-marbling system provides a support to GPU-based multilayer paints ensure that the distinct paint colours inserted by the artist are preserved. It is a property of the traditional paper marbling ensured by our approach.

The artistic results are presented in Figures 3 to 6.

4. ACKNOWLEDGMENTS

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5. REFERENCES

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Figure 1: The interface of the application.

Figure 2: Natural interaction with a graphics tablet.

Figure 3: Two-Hearts painting.

Figure 4: Sakura blossom.

Figure 5: Tulips.

Figure 6: Chocolate Art Lady.