

# Body Brush

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## Abstract

Body-Brush is an immersive real-time body-driven human-computer interactive environment. With an innovative motion capture and analysis system using frontal infrared illumination, Body-Brush turns human body into a dynamic brush. The environment is able to capture 3D human motion and transform the motion data into a rich variety of 3D visual forms.

## 1 Introduction

Body Brush is a real-time body-driven immersive environment, which is achieved with the development of a low-cost computer-vision-based motion analysis system using frontal infrared illumination, and an innovative graphic rendering software that maps the body motion gesture-path-energy to the colour-form-space visual attributes. It captures 3D human motion and transforms the motion data into a rich variety of 3D visual forms visualized through a stereo projector. Figure 1 shows the schematic conceptual design of Body-Brush.

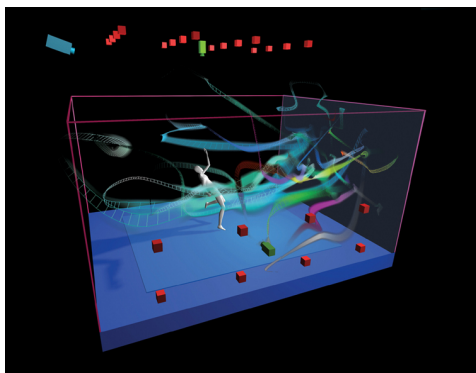


Figure 1. Body-Brush Interface

Through a systematic study of the relations between the human body movement and the visual art language, Body-Brush turns the human body as a whole into a dynamic brush. Since users are not required to wear any specific sensor devices or receive any prior training to use the man-machine interface, Body-Brush enables users to interact intuitively with the machine and control the rich variety of visual output in synchronization with the body motion.

By computing in real-time the mathematical centres of the body, the motion speed and acceleration, the gestural spatial dimensions, and the body trajectory, the user can create as well as animate 3D drawing and painting in a virtual 3D canvas. The same set of motion data can also be transformed to simulate a multitude of sculptural forms and architectural spaces. As a result, the sketch in the real space by this body-as-the-brush is transformed into the shaping of the 3D virtual visual space.

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## 2 An Innovative Interface for Artistic Expression

By working side by side with artists and dancers, the Body-Brush has been transformed into a new interface for artistic expressions. (1) New painting and sculpting tool: Professional visual artist can use this intuitive interface to create rich 2D, 3D or animated visual artworks and polish the visual presentation with the user-friendly GUI. (2) Augmented dance stage: Since the tracking system can be easily adapted to stage lighting, stage setup, and dancers' costume, the Body Brush interface can augment the performance stage with real-time interaction between dancers, the visual output and the machine. Figure 2 and 3 show photo-documentary from the event "Six Dances Interacting with Body-Brush" in 2003 January. (3) Therapeutic and Educational Aspects: Body-Brush can be applied in art therapy for facilitating children to explore the relationship between their body and the visual expressions.



Figure 2-3. Real-time augmented dance stage

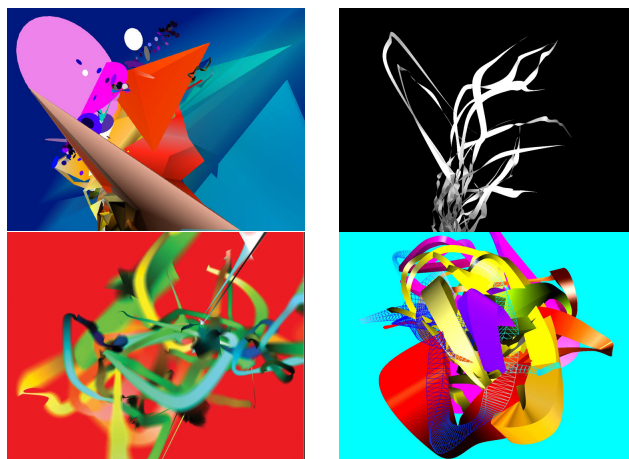


Figure 4-7. 3D Pictures created by audience using Body-Brush