

..... I/O Brush

The World as a Palette

I/O Brush is a physical paintbrush that allows artists to “pick up” colors, textures, and movements directly from their everyday objects/environment, and immediately draw with them on a digital canvas. *I/O Brush* looks like a regular physical paintbrush but has a small video camera with lights and touch sensors embedded inside. Outside of the drawing canvas, the brush can pick up color, texture, and movement of a brushed surface. On the canvas, artists can draw with the special “ink” they have just picked up from their immediate environment. *I/O Brush* invites an artist to build her own paint box by taking elements from her world, and then to create a portrait with her personal paint box as the system automatically records the process. Eventually, the system allows the artist to share with the audience both the portrait and stories that represent the process behind the portrait. The *I/O Brush* system has two components: the brush and the drawing canvas. The brush houses a small CCD video camera in its tip with supplement light bulbs around it. Spring-based flexible/bendable touch sensors that resemble the property of brush tips are also embedded inside the brush. When the brush touches a surface, the lights around the camera briefly turn on to provide supplemental light for the camera. During that time, the system grabs the frames from the camera and stores them in the program. Also, woven into the brush tip are 150 optical fibers. Once the “ink” is captured, the fiber optics light up, i.e., the brush tip is lit up, to indicate that the brush has picked up ink from that surface. Currently, *I/O Brush* has three modes for picking up ink: Texture, Color, and Movement. The Texture mode captures a snapshot of the brushed surface, which consists of one frame. The Color mode computes the RGB values of all the pixels in the captured frame and returns the most common RGB value so that the artist can draw with a solid color. The Movement mode grabs up to 100 consecutive frames of the brushed surface and lets the artist draw with the movement. When the artist moves the brush across the canvas, the system drops off the successive frames, but the end of the stroke shows the captured 100-frame animation in a loop. For example, the artist could brush over a surface with a stripe pattern for a couple of seconds. S/he could then paint with that moving ink to apply a 'scrolling' stripe design on the canvas. Or, the artist could brush over his/her own blinking eye with the brush, and apply that 'blinking-eye' ink to paint the eyes of a cat on canvas. The paint in all three modes is masked to appear as a round-shape and its translucency level is set to a slightly lower value so that the artist can layer ink like watercolor by quickly moving the brush, or paint with thick color by slowly moving the brush. The brush allows the artist to paint with the same ink indefinitely until s/he picks up different ink. For the canvas, we currently use an LCD screen with a built-in graphics tablet. The coil of the pen tip is embedded inside the *I/O Brush's* tip to allow the system to detect the presence or absence of the brush on the canvas. Once on the canvas, the brush lets the artist draw with that special ink s/he has just picked up. The brush strokes artists make on the canvas are linked to the movies that document where the artist had picked up that particular material so that the portrait can take both artist and audience back through the journey and reveal the stories behind the special palette of colors.