

# Wizard of Oz Sketch Animation for Experience Prototyping

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## ABSTRACT

Designers sketch during ideation because sketching enables rapid, concrete exploration and communication of concepts. But while sketches excel at expressing ideas, they cannot easily convey the experience of what it would be like to use the sketched design. To enable sketch-based experience prototyping, we developed Ex-A-Sketch, a Wizard of Oz animation system which turns whiteboard drawings into remote controlled projected animations in a matter of minutes. This paper describes a five step *sketch-snap-select-link-play* framework for enabling wizard animation of hand drawn scenes. A *mash-up architecture* integrates commercial design tools into Ex-A-Sketch to leverage designers' existing expertise.

## Keywords

Sketching, Wizard of Oz, Experience Prototyping

## INTRODUCTION

Sketches and prototypes are epistemic artifacts: they help designers explore possibilities and survey design spaces. One increasingly important concern for designers of products, services, and installations alike is the kind of experience that users will have with their designs. Experience prototypes evoke first-hand insight through direct engagement with prototypes [2]. Experience is intricately interwoven with interaction that develops over time. Because of their static nature, sketches alone are poor artifacts for evoking experience. Wizard of Oz methodologies on the other hand can be effective experience prototypes as they allow for designer-controlled simulation of interaction.

Ex-A-Sketch introduces wizard control to turn whiteboard sketches into animated experience prototypes (see Figure 1). The system combines whiteboard capture with popular software design tools (Adobe Photoshop and Macromedia Flash) and a physical bi-manual control panel to enable design teams to rapidly simulate experiences. One or more team members become *experiencers* who walk up to and interact with dynamic sketches while another team member acts as the *wizard* or *sketch jockey* who observes the experiencers' actions and manipulates the sketch animation to reflect how the imagined design would respond.

Ex-A-Sketch was motivated by fieldwork at a museum for interactive technology exhibits. Exhibition designers there lacked a way to develop experience prototypes without expensive physical construction. Additionally, a daylong workshop by the authors of [2] at our institution showed

that dynamic artifacts are especially potent evokers of experiential understanding.

## SKETCH-SNAP-SELECT-LINK-PLAY

In this section, we describe the framework underlying the Ex-A-Sketch model and our current implementation.



SKETCH

Designers first sketch a scenario they wish to animate. Because large-scale drawing surfaces invite group discussion and participation, we use a 12'×8' whiteboard wall assembled from three inexpensive Melamine tile board sheets.



SNAP

Next, designers digitize their completed sketch. In our implementation, images are captured by a ceiling-mounted digital still camera with 8 megapixel resolution. Image capture is triggered by a physical button mounted next to the whiteboard. After capture, an algorithm corrects perspective distortion in the camera image.



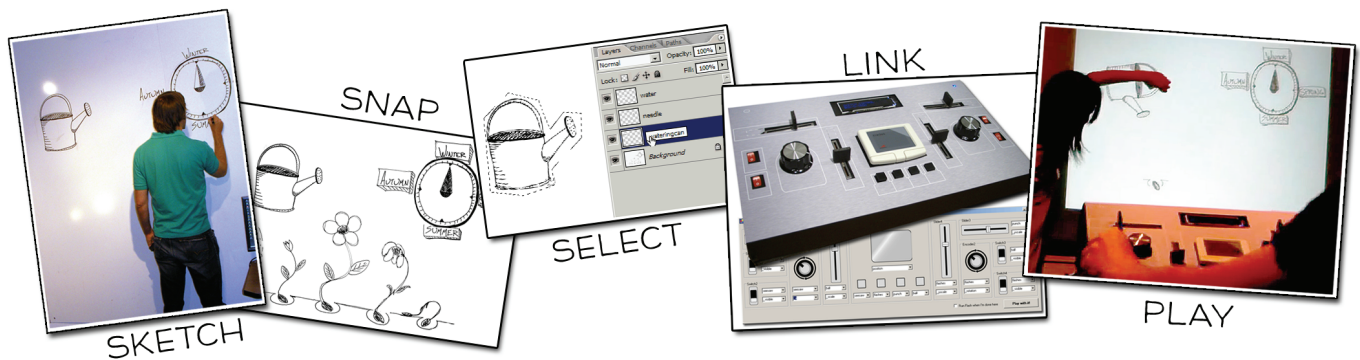
SELECT

The designer then segments the digitized sketch into objects of interest (*e.g.*, the hands of a clock). Each moving part in the animation becomes a separate object. The selection task is done in Photoshop—designers create separate layers containing individual objects and name the layers. While slower than automatic recognition, manual selection has important benefits: there are no recognition errors to correct, no limited graphical vocabulary to adhere to, and the created parts are guaranteed to match the designer's intent. For a large number of designers, Photoshop constitutes a lingua franca and selection is a core skill they are likely familiar with. Designers can also leverage Photoshop functionality for routine image operations to touch up their sketches prior to animation (*e.g.*, level correction). We export names and layers from Photoshop for subsequent steps with a JSX extension script.



LINK

The designer now links the individual sketch parts to controls on the physical Ex-A-Sketch control panel. A GUI offering a virtual representation of the panel allows designers to assign a sketch part (using the Select step layer names) and a transformation to each control. For example, the rotation of the hand on a clock can be assigned to the right rotary knob of the panel. Supported transformations are visibility, alpha value, translation, rotation, scaling, and stepping through individual frames of a flipbook-type animation—these transformations cover the set of critical animation operations identified in [3]. The panel features mirror-



**Figure 1.** Designers can turn whiteboard sketches into wizard-controlled animations using Ex-A-Sketch's five step process.

symmetric bimanual controls: four sliders, two continuous rotary encoders, and four rocker switches, as well as a touchpad in the center for 2D position control of sketch entities. Buttons underneath the touchpad temporally multiplex use of the touchpad between four different clips. A text LCD screen at the top of the panel provides feedback which sketch entity is linked to the touchpad.



Finally, the digital sketch is reprojected onto a large vertical surface. Objects within the sketch can now be moved by the sketch jockey by manipulating the control panel inputs. We implement animation by programmatically creating and executing Macromedia Flash files using the JSFL Javascript extension classes for Flash. Designers do not have to be proficient in Flash—the creation happens transparently. However, they are free to further modify the Flash file and introduce more complex animations along non-linear paths using Flash's tweening functions. Such advanced animations can again be linked to sliders or knobs on the control panel.

In our implementation, skilled designers can move through the entire workflow from sketch to play in approximately three minutes for simple animations.

### RELATED WORK

Prior work in sketching applications has focused on sketch segmentation and recognition [1, 4, 7] and the dynamic simulation of sketches [5]. Ex-A-Sketch differs in its approach: it favors designer control over algorithmic smarts. Most similar is K-Sketch, which allows recording of animation using GUI input [3]. However, Ex-A-Sketch targets real-time control instead of record-and-playback animation. Tools that explicitly support Wizard of Oz for rapid prototyping of interaction designs have been developed for particular ubicomp domains, e.g., augmented reality applications [6]. We contribute the novel application of wizard control to sketch animation with a dedicated bimanual control panel.

### FUTURE WORK

We have not yet evaluated Ex-A-Sketch formally with designers. However, we demonstrated a prototype to museum professionals who were enthusiastic about Ex-A-Sketch as a design tool and also as a potential exhibition in

its own right. Deploying Ex-A-Sketch as a walk-up installation will impose a different set of constraints—the high-ceiling mash-up architecture would have to be replaced with tailored functionality that does not presuppose knowledge of 3<sup>rd</sup> party design tools.

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