

DENIM: An Informal Tool for Early Stage Web Site Design

James Lin, Mark W. Newman, Jason I. Hong, James A. Landay

Group for User Interface Research, Computer Science Division

University of California, Berkeley

Berkeley, CA 94720-1776 USA

+1 510 643-3043

{jimlin, newman, jasonh, landay}@cs.berkeley.edu

ABSTRACT

DENIM is a system that helps web site designers in the early stages of design. DENIM supports sketching input; allows design at different refinement levels—site map, storyboard, and individual page; and unifies the levels through zooming. The design of DENIM was informed by a study of web site design practice, in which we observed that web site designers design sites at the levels of refinement mentioned above and that designers sketch at all levels during the early stages of design.

Keywords

Web design, Zooming User Interface (ZUI), Sketching, Informal, Pen-based Computers, Rapid Prototyping

INTRODUCTION

DENIM is a system to assist designers of web sites in the early stages of information, navigation, and interaction design [3]. It is an informal pen-based system that allows designers to quickly sketch web pages, view them at different levels of detail, create links among them, and interact with them in a run mode.

The design of DENIM was largely influenced by an ethnographic study of professional web site design practice [4]. Two of the major findings were:

- Designers usually sketch on paper during the early stages of design. To support this, DENIM's primary mode of interaction is sketching.
- Designers sketch at three different levels of detail: *site maps*, *storyboards*, and *individual pages*. DENIM unifies these views through *zooming*.

We built DENIM using the Java 2 SDK version 1.3, on top of SATIN [1], a toolkit for building programs using informal pen-based interaction.

THE DENIM USER INTERFACE

DENIM has one window (see Figure 1) with three main areas. The center area is a canvas where the designer can create web pages, sketch the contents of those pages, and

draw arrows between pages to represent their relationship to one another. The canvas is of infinite size, and the designer can pan the canvas in any direction.

On the left is a slider that reflects the current zoom level and allows the level to be set. There are five levels: overview, site map, storyboard (Figure 1), page, and detail. The middle three levels map directly to the most common representations of web site designs that we observed during our study of web site design practice.

The bottom area is a toolbox that holds tools for drawing, panning, and erasing.

As part of our effort to support pen interaction in DENIM, we use pie menus instead of pull-down menus for executing commands, and gestures for issuing common commands. In DENIM, gesturing means holding down the button on the pen's barrel while drawing a shape.

INTERACTING WITH DENIM

Using DENIM consists of creating and editing pages, linking pages together with arrows, and testing the design in Run mode.

Creating and Editing Pages

In DENIM, web pages are accompanied by a label that represents the name or description of the page. The labels remain the same size throughout all the zoom levels, so that they are always readable.

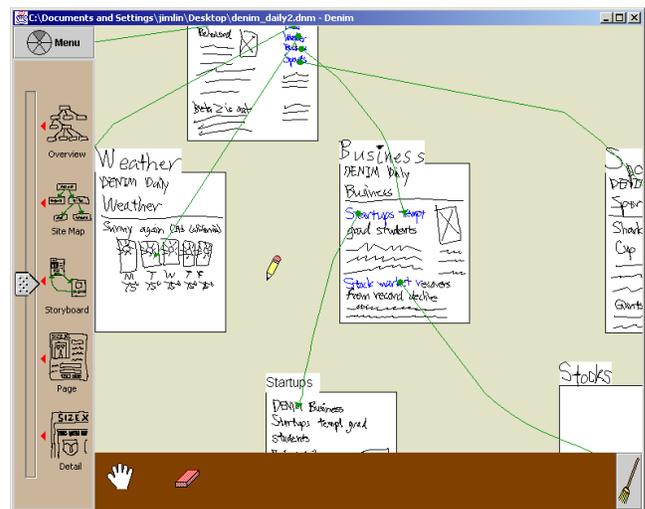


Figure 1. The DENIM user interface in Storyboard view.

There are three ways to create a new web page in DENIM:

- Write some words on the canvas while in site map or storyboard view. A blank page is created with those words as its label.
- Draw a rectangle, which is converted to a page with a generic label.
- Insert typed text by gesturing a caret, and then type in the page's label.

Designers often create and organize labels to construct an information architecture, before any page-level details are sketched. Later, the designer can zoom into storyboard or page view and sketch inside the pages. If the designer writes letters inside a page by hand, DENIM will group the letters together into words, and words into phrases. This grouping makes it easier to create hyperlinks.

Arrows

An arrow between two pages represents a relationship between those pages. We provide *organizational* and *navigational* arrows.

Organizational arrows are used to represent a general relationship. For example, the designer may want to show that the concepts between two pages are related, or that the end-user tends to go from one particular page to another, but the designer does not want to fill in the details at this time. These arrows are generally created early in the design process, during the information architecture phase.

A navigational arrow specifies a *transition* from one page to another. The source of a navigational arrow represents a hyperlink in a web page.

To create an arrow, the designer draws a stroke between two pages. Organizational arrows start on one page and end in another. This creates a *gray* arrow from the source to the destination. Navigational arrows start on a specific object on one page and end in some other page. This creates a *green* arrow from the source to the destination. When creating a navigational arrow, any organizational arrows from the source page to the destination page are removed. As additional feedback, the source of the navigational arrow becomes blue, turning the source into a hyperlink.

Run Mode

After a number of pages have been sketched and navigational arrows drawn between them, it is possible to preview the interaction by entering Run mode. By opening a pie menu over a page and selecting File→Run, a separate DENIM browser window opens up with that page. The designer can then navigate through the design like in a web browser, by clicking on the hyperlinks in the page and using the Back and Forward buttons. With Run mode, designers can test the interaction with a site that they are designing without having to create a full-fledged prototype.

EVALUATION AND FEEDBACK

We informally evaluated the sketching aspect of DENIM with seven participants, five professional web designers

and two non-web designers [3]. The evaluation yielded positive comments, subjectively rating high on usefulness and fair on usability. We found that the participants were enthusiastic about DENIM's concepts and would like to use such a system in their work.

Since then, we have posted three beta versions of DENIM on the web¹ for web site designers to download and evaluate. In the seven months after the second beta version, DENIM has been downloaded over 1000 times. We plan to do a follow-up questionnaire to discover how people are using DENIM, what they like or dislike about it, and what features they want in the next version.

FUTURE DIRECTIONS

In addition to the questionnaire, we are planning to do a long-term study of designers using DENIM to see what features they use and how it affects their work practices.

We are also working on ways to better analyze the usability and effectiveness of a web site designed in DENIM. One approach we are taking is adding the ability to export a DENIM design as a set of HTML pages, which can be posted to a web server that anyone can access. We are also creating a tool that will log a user's path through a web site and then display a visualization of the path data.

We have devised and partially implemented extensions to support the design of more sophisticated web interfaces as well as traditional GUIs [2], including methods to allow designers to specify their own reusable components. These components can be as simple as a new kind of widget or as complex as a template for a web page. We plan to continue implementing and studying these extensions in the future.

REFERENCES

1. Hong, J.I. and J.A. Landay. SATIN: A Toolkit for Informal Ink-based Applications. To appear in Proceedings of *User Interfaces and Software Technology: UIST 2000*. San Diego, CA, November 5-8 2000.
2. Lin, J. A Visual Language for a Sketch-Based UI Prototyping Tool. In Proceedings of *Human Factors in Computing Systems: CHI 99 Extended Abstracts*. Pittsburgh, PA. pp. 298-299, May 15-20 1999.
3. Lin, J., M.W. Newman, J.I. Hong, and J.A. Landay. DENIM: Finding a Tighter Fit Between Tools and Practice for Web Site Design. In Proceedings of *Human Factors in Computing Systems: CHI 2000*. The Hague, The Netherlands. pp. 510-517, April 1-6 2000.
4. Newman, M.W. and J.A. Landay. Sitemaps, Storyboards, and Specifications: A Sketch of Web Site Design Practice. In Proceedings of *Designing Interactive Systems: DIS 2000*. New York, NY. pp. 263-274, August 17-19 2000.

¹ <http://guir.berkeley.edu/denim/>