

# **SOFTBOARD – A Web-based Application Sharing System for Distance Education**

Krishna K. Adusumilli, Bassem Al-Halabi and Sam Hsu  
CDIET, Center for Innovative Distance Education Technologies  
Dept. of Computer Science and Engineering  
Florida Atlantic University, Boca Raton, Florida, USA  
{cidet, kadusumi, bassem, sam}@cse.fau.edu

## **Abstract**

*The paper describes the development of SoftBoard, a Web-based application sharing system that provides a convenient writing and sketching tool in delivering instructions and conducting virtual office hours for distance education over the Internet. It is a Web-based shared environment where students and instructors can participate in exchanging information in real time effectively. Similar systems in the form of whiteboards exist today but are quite different from SoftBoard. A light pen can also be used with SoftBoard to provide a convenient way for creating non-textual contents freehand. Several experiments using different computer labs were conducted. Feedback from participants was very positive.*

## **1. Introduction**

It has been reported in the recent research papers that the current Internet is still not suitable for supporting collaborative tools that involves multi-way communication in real-time, such as audio/video conferencing and some advanced application sharing features [1]. However, the Internet can be used to a lesser degree to fulfill the needs of smaller application sharing systems that are not bandwidth intensive. SoftBoard is one such application sharing system designed to be used over today's Internet. Similar systems in the form of whiteboards exist but they are quite different from SoftBoard.

Most whiteboards available today work on a LAN/MAN environment or over the Internet but are not Web-based; i.e., they are not accessed through a Web browser. A whiteboard is typically part of some videoconferencing

software packages such as ClassPoint, NetMeeting, etc. It can be used on only those machines with these, to some extent costly and sophisticated, software installed. On the other hand, SoftBoard can be easily invoked from a standard Web browser. It is a Web-based shared environment where users can participate in exchanging the information in real time effectively. A light pen can also be used with SoftBoard to provide a convenient way for creating non-textual contents freehand. It is designed specifically for distance education purposes especially remote labs which were also developed at our center [6].

SoftBoard can be accessed from anywhere in the world by the users who are equipped with a standard Web browser and an Internet connection. Merely clicking on the link or button from a SoftBoard Web site will launch the SoftBoard program.

The rest of the paper is organized as follows. Section 2 introduces the structure of the SoftBoard system. It includes system model, GUI design, and the light pen feature. Section 3 describes some experiments using SoftBoard to conduct office hours. The last section concludes the paper.

## **2. SoftBoard system**

The SoftBoard system is a Web-based shared environment where students and instructors can participate in exchanging information in real time. To put it in simple words, SoftBoard is a Web-based whiteboard designed specifically for distance education. The features of the SoftBoard system include:

- An application sharing system that is entirely Web-based.

- Students need not install any software on their machines unless they use special hardware tools such as light pen for convenience.
- Can be accessed from anywhere with an Internet connection and a standard browser.
- Provision for the instructor to write free hand.
- Two-way communication is available.
- Can be accessed from any standard software platform (Macintosh, Windows NT/98/95, UNIX, etc.)

## 2.1 SoftBoard model

SoftBoard is modeled as a distributed collaborative system. A collaborative system is one in which multiple users engage in a shared activity, usually from different locations. In the large family of distributed applications, collaborative systems are distinguished by the fact that the users in the system are working together towards a common goal and have a critical need to interact closely with one another.

As a collaborative system, a SoftBoard system can be shared by multiple users on the Web to communicate with each other for activities including drawing figures freehand. The system keeps track of user identities and maintains a certain level of concurrency; i.e. the users in the system will interact with the system and with each other at roughly the same time. The basic framework of SoftBoard features a single server handling interactions among multiple clients. Each client has a unique identity, issued by the server and each client broadcasts messages to the server. The clients poll the server for messages in fixed intervals of time for any new messages. If a new message is found all the clients update themselves including the client which broadcast the message.

## 2.2 SoftBoard GUI Design

SoftBoard is designed with an aim to have a simple user interface and require lesser resources. The various components of the SoftBoard GUI are shown in Figure 1 below:

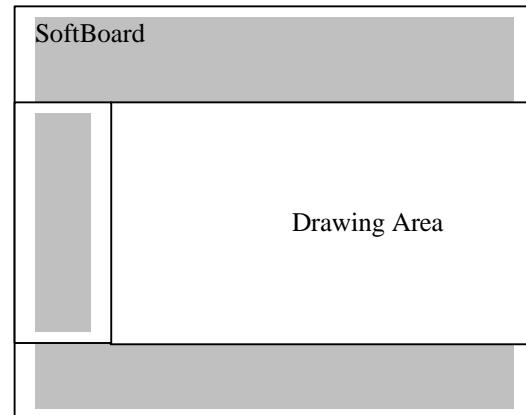


Figure 1: SoftBoard GUI layout

As shown in the figure, the SoftBoard GUI panel has three main components. The left component consists of various tool buttons like square, line, circle, etc. The larger component is the actual drawing area and the bottom component is the status and color choice menu

## 2.3 Light pen

The most useful feature of SoftBoard is the support for light pens. A light pen is a hand-held electro-optical pointing device which when being touched to or aimed closely at a connected computer monitor, will allow the computer to determine coordinates of the pointed location. The light pen provides computer users with a natural, easy to use alternative to traditional input devices, such as a keyboard or mouse. The light pen is used directly on the monitor screen and does not require any special hand/eye coordination skills. Pushing the light pen tip against the screen activates the switch, which allows the user to make menu selections, draw, paint, and perform other input functions.

The reason to support light pens in SoftBoard is that it allows the users to write free-hand more naturally than a mouse, especially the instructors. The input from the keyboard restricts the instructors to keying only alphabets or the symbols available on the keyboard, whereas with the help of a light pen they can illustrate deriving equations, drawing sketches or writing symbols in any language freehand using SoftBoard. Students engaged in the discussion can use mice.

### 3. Experiments and results

Some experiments were conducted to obtain feedback for SoftBoard from the students. The experiments mainly involved students using the SoftBoard simultaneously from different locations. A score of students participated in the SoftBoard testing and all students were able to access SoftBoard from various places. All the participants found SoftBoard easy to use and concluded that it's a very useful tool. The majority of the students also felt that the features available with SoftBoard are sufficient however some felt that more drawing features are needed.

#### 3.1 Experiments

Three different labs were used in the experiments. All the three labs have Windows /95/NT workstations. The instructor, who was located in one lab, used a light pen in the experiments. Student volunteers participated from the other two labs. Each student was asked to independently answer a questionnaire after using SoftBoard. The questions listed on the questionnaire include:

- Was SoftBoard accessible without any difficulties? (Participants logged in from different machines running different operating systems like Windows /NT/98/95, Unix, etc.)
- Did you find the SoftBoard easy to use?
- Do you think SoftBoard is a useful tool?
- Are the features provided in SoftBoard sufficient or are more features required?
- How do you rate the over all performance of SoftBoard?

A screenshot of SoftBoard being used by an instructor to illustrate Ohm's law, which was drawn using a light pen, to several students is shown in the following figure.

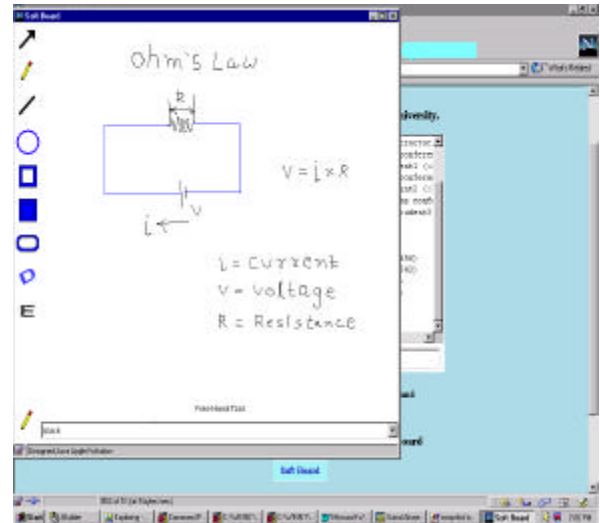


Figure 2: A screenshot of SoftBoard in use

#### 3.2 Experiments feedback

The overall feedback about SoftBoard was very positive. Some students made some extra comments and suggestions saying that the free hand sketching was difficult with mouse and also reported some flickering when there are too many drawing objects. Some even suggested that audio communication similar to Web phone could conveniently accompany the SoftBoard.

### 4. Conclusion

This paper discussed an application sharing system called SoftBoard. It is a Web-based system that can be accessed by users over the Internet for information exchange. A major feature of the system is its provision of a freehand writing and sketching capability with the use of a light pen. Several experiments using three distributed labs were conducted. Very positive feedback and constructive suggestion were received from student volunteers participated in the experiments. A major application of SoftBoard is for distance education. It comes very handy for illustrating examples that are difficult to deliver using the traditional keyboard or mouse.

## Reference

- [1] N. Sharada, S. Gangishetty, K. Adusumilli, S Hsu, "Application of Videoconferencing to distance Education: A Case Study with the ClassPoint software", SCI'99, World Multi-conference on Systems, Cybernetics and Informatics, Aug. 1-5, Pg 122-130, 1999.
- [2] ClassPoint, White Pine Corporation.  
<http://www.wpine.com/classpoint>
- [3] NetMeeting, Microsoft Corporation.  
<http://www.microsoft.com>
- [4] H. Abel-Wahab and O. Kim, "An Internet Collaborative Environment for sharing Java Applications", Information Technology Laboratory-NIST. *IEEE-Future trends in distributed computing*, Pg 112-117, Oct. 1997.
- [5] FTGData Systems Inc.  
<http://www.fastpoint.com/lightpen>
- [6] B.A. Alhalabi, M.K. Hamza, & S. Anandapuram, "Real Laboratories: an innovative rejoinder to the complexities of distance learning", the Open Praxis Journal of International Council for Open and Distance Education, UK Volume 2, 1998.