

# Designing public touchscreen display system for iSchool community

Shaopeng Zhang  
School of Information Sciences  
University of Pittsburgh  
135 North Bellefield Avenue  
Pittsburgh, PA 15260  
shz26@pitt.edu

Wei Jeng  
School of Information Sciences  
University of Pittsburgh  
135 North Bellefield Avenue  
Pittsburgh, PA 15260  
wej9@pitt.edu

## ABSTRACT

This project aims to design and develop a public touchscreen display system for the School of Information Sciences at the University of Pittsburgh in order to provide research talks, events, announcements, job postings and other useful information to local community members. The motivation is to let students of the iSchool embrace information and experience technology in their daily environment and help them to understand the connection among people, information, and technology. Based on the project context and user requirements, target features were defined and design guidelines were formulated. A prototype was developed and then evaluated through usability testing and observation to validate the features and guidelines. Results show that the system has met users' requirements and conforms to the context of the iSchool. This article provides some insights into designing a public touchscreen display system for educational institutions such as this iSchool.

## Categories and Subject Descriptors

H.3.5 [Online Information Services]: Web-based services; H.5.2 [User Interfaces]: User-centered design; I.3.6 [Methodology and Techniques]: Interaction techniques

## General Terms

Design, Human Factors

## Keywords

Touchscreen, iSchool, interface design, interaction design, evaluation

## 1. INTRODUCTION

The School of Information Sciences at the University of Pittsburgh is a member of the iSchools Caucus, an international consortium of Schools which engages in a broad range of interdisciplinary research and offers a variety of degree

programs [6]. Connecting people, information and technology is at the core of the academic and research programs at iSchool. It would be of great educational significance to let the iSchool students to embrace information and experience technology in their daily physical environment. Public interactive displays or computerized public kiosks are growing more affordable and offer new opportunities for ubiquitous placement in work environments [2, 5]. If properly designed, they can also foster social interaction and collaboration, thus build cohesion in the community.

Driven by such motivation, we started to design and develop a system for the touchscreens installed in the school lobby. We first analyzed the project context and collected requirements from various representatives of the potential users. We then defined target features and formulated design guidelines. After the prototype was developed, usability testing was undertaken and then a pilot test was conducted using the touchscreen. Results showed that the system was well-designed in its architecture, interface, and interaction. This design and testing experience contributes several insights into designing public touchscreen display systems for educational institutions such as an iSchool: (1) Make the content easy to maintain; (2) Raise user's awareness of the system and push information to the user; (3) Design an intuitive interface; (4) Enable content sharing and recommendation (5) Engage the community in design process.

## 2. REQUIREMENTS

We first analyzed the project context. Unlike organizations which have abundant resources and staff to dedicate to a specific project, educational institutions usually have fewer resources to devote to advanced devices or long-term system maintenance. For example, public displays often use screens larger than 22 inches, whereas in the iSchool we have to use the existing 17-inch touchscreens. Instead of professional IT services, such systems in iSchool are often developed by students and face the risk of deterioration when the students graduate or leave the school.

Another factor we have to consider is the content and functionality demanded by the iSchool members. We sent out email questionnaires to 321 people in iSchool and got 58 responses from students, faculty, and staff. We identified the six most sought-after content elements: (1) research talks, (2) news, (3) events, (4) posts from iSchool, (5) job information and (6) hours and building directory. From the feed-

back, most users would like to see the system mirror the paper posters but in a more effective manner. However, the touchscreen itself cannot let a user take away tangible information. Therefore, we had to develop a new approach to fulfill these requirements.

### 3. TARGET FEATURE

Given the project context and requirements gathered from users, we defined the following target features to provide effective functionality.

(1) *Maintainable content.* With limitations on staff and resources, public display systems are at risk of deterioration and elimination. The system architecture must guarantee to fetch and display up-to-date information in a self-updating approach. The content should be easy to maintain by people who did not develop the system.

(2) *Sharing and recommendation.* Traditional paper posters often have strips of contact information that can be torn off, which can be considered to be a bookmarking function. With more advanced technology, the bookmarking function can be extended to a sharing function among multiple users. In addition, the system can proactively represent the popularity of the content and encourage people to vote for the content they are interested in, which can be seen as a recommendation function. Based on Misanchuk's definition, community are people who share and generate knowledge in a mutually supportive and reciprocal manner [3]. Sharing and recommendation features can further foster social interaction and collaboration among iSchool members.

### 4. DESIGN PRINCIPLE

To ensure that the system enables users to perform tasks efficiently, we formulated the following design guidelines

(1) *Raise user's awareness and push information to the user.* User's awareness is a critical path to the initial engagement and further interaction. Over time after excitement of the launch has faded, a public display system runs the risk of fading into the environment and losing user awareness. In order to encourage people to cross the threshold to "focal awareness" and to move on to "participation" [4], the system must proactively push information to the user instead of waiting for the user to retrieve information from the system.

(2) *Provides intuitive interface and smooth interaction.* The design of the interface is crucial for an untrained user under time pressures to perform his/her task successfully. Besides common computer interface guidelines, there are several guidelines related to touchscreen public displays : (a) design controls in the proper size and consider the offset from fingertip to actual clicking point in order to reduce error-hit; (b) increase scrolling distance to avoid repeated clicking on scrolling buttons, thus reducing user's fatigue; (c) use bright background to avoid mirror reflection; (d) assign graphic symbols (e.g. icons, background textures) to different categories of content to assist the user in distinguishing between them; and (e) make time-consuming functions run in the background and return feedback to improve the speed of tasks.

(3) *Engage the community in design process.* The designers should engage community stakeholders throughout the entire design process. It is recommended that the design

workspace be public accessible, and focus groups be organized on a regular basis.

### 5. PROTOTYPE

In light of the defined target features and design guidelines, we developed a prototype to validate the features and guidelines. Here are the details about the implementation.

In order to make content maintainable as noted above, we selected RSS feeds as the primary source of information. They are from existing Web systems, some of which were developed by students in our school, as shown in Figure 1. For the news and job information sections, we integrated multiple RSS sources using Yahoo! Pipe Web service. To enable iSchool members to post announcements on the screen, we set up a blog at Blogger.com, and then fetch the RSS feed from it.



Figure 1: List of events fetched from CoMeT system developed by iSchool students

To enable the sharing function, we implemented a service which allows a user to email interesting content to himself/herself or to other people. We implemented the recommendation function by adding a "like" button which shows a floating tip saying "N people like it" and enables the user to vote for interesting content, as shown in Figure 2.

As shown in Figure 3, when the screen is in idle, slides rotate, showing current events, research talks, job postings and announcements in order to push valuable information to the user and raise their awareness of both the system and upcoming events.

The touchscreen can only recognize a left single-click. We implemented special controls to accommodate such limitations while remaining consistent with common interfaces. For example, one click on up/down button in the scrollbar would smoothly scroll up/down 40% of the viewing field. Navigation from list view to the detail view was also presented with sliding effects to give the user a sense of different layers. We also made appealing icons to facilitate a better understanding of system. To speed up the interaction, functions such as email and like which can take several seconds

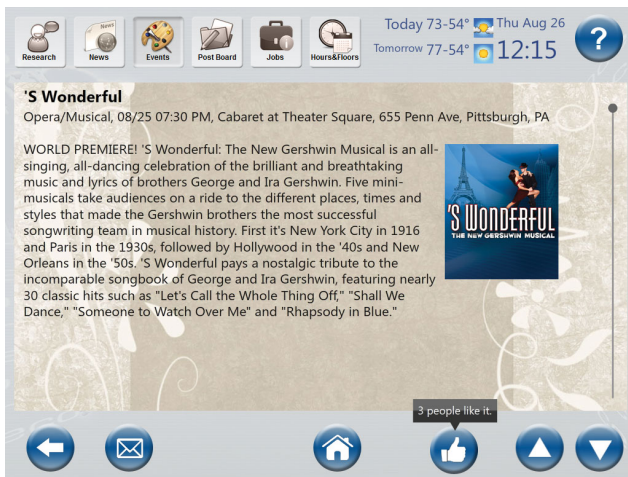


Figure 2: An event detail page with like button showing 3 people like it



Figure 3: Animated sliding show in idle mode

run in the background, and a floating tip would show up later to indicate the process result, such as “email sent”.

## 6. EVALUATION

When the prototype had been developed, we conducted a usability test with tasks including view, email, and like with six users. While the results showed that the user easily learned to use the application and performed their tasks with no difficulty, some minor issues did arise. For example, some users pointed out that our cultural events were not listed “latest first”. Some users were not aware of the device limitation and were performing behaviors such as flick-to-scroll and pinching on pictures. But they switched to the right controls immediately after they found it was not working. All users in the test expressed positive attitude towards the system and eagerness to see the system working in real place.

Before the official launch of our system, we ran a pilot test lasting one week during the working hours in the iSchool.

We silently observed the behaviors of the passers-by to figure whether and how much they engaged with the system. We counted 126 people passing by the touchscreen. 25 of them interacted with the application. 49 of them noticed or carefully observed the application but did not interact with it. 52 of them did not notice the system. The observation revealed that the system itself raised a fair amount of awareness in the passers-by.

## 7. CONCLUSION & FUTURE WORK

We believe that the system has met users’ requirements and conforms to the context of the iSchool. It can easily be maintained, and it can provide valuable information to the local community. It can catch the attention of passers-by and encourage them to interact with the system. The functionality of the system enables the community members to share and recommend information with each other, therefore fostering social interaction and collaboration. This article provides some insights into the design and development of public touchscreen display systems for organizations with limited resources. Our system lets people, information, and technology converge to help students to better understand the study of information sciences. More importantly, our work sets up a new paradigm for iSchools to extend educational landscape beyond classrooms.

Future works include more evaluation to enhance functionality and usability. Moreover, students, faculty, and staff may have preference over different categories of information. They also have different schedules at the iSchool. Therefore, it is an interesting topic to make the displaying content adaptive to crowd preference according to different time of the day. In addition, the system would be more intuitive and intelligent, as would be made aware of the user’s identity and push the information based on his/her personal preference, which would further refine social interaction and collaboration among community members.

## 8. ACKNOWLEDGMENTS

This project was supported through School of Information Science at University of Pittsburgh. We are grateful to our sponsor Dean Ronald Larsen, advisor Dr. Peter Brusilovsky, Danielle Hyunsook Lee and Kelly Shaffer for their valuable advisory and suggestions.

## 9. REFERENCES

- [1] H. Brignull and Y. Rogers. Enticing people to interact with large public displays in public spaces. 2003.
- [2] A. D. Christian and B. L. Avery. Digital smart kiosk project. pages 155–162, 1998.
- [3] M. Misanchuk and T. Anderson. Building community in an online learning environment: cooperation and collaboration. April 2001.
- [4] B. Moggridge. *Designing Interactions*. MIT Press, Boston, MA, 2007.
- [5] D. M. Russell, C. Drews, and A. Sue. Social aspects of using large public interactive displays for collaboration. volume 2498, pages 663–670, 2002.
- [6] A. Wiggins and S. Sawyer. Intellectual diversity in ischools: Past, present and future. February 2010.