

# Hyper Panel System: Display System for Poster Layouts with Detailed Contents

Hiroshi Suzuki<sup>1(✉)</sup>, Akira Hattori<sup>2</sup>, Hisashi Sato<sup>1</sup>,  
and Haruo Hayami<sup>1</sup>

<sup>1</sup> Kanagawa Institute of Technology, Atsugi, Japan  
{hsuzuki, sato, hayami}@kanagawa-it.ac.jp

<sup>2</sup> Komazawa University, Setagaya, Japan  
hattori@komazawa-u.ac.jp

**Abstract.** In this paper, we propose a hyper-panel system that can display a poster layout with detailed contents. This system combines the features of a tablet terminal, a paper-based poster, and I/O devices. We developed a peculiar device that we named the viewpoint tags. It can get axis of the devices on a paper poster by using super sonic sensor. We explain the concept of the proposed system and verify the effectiveness of this system, which was confirmed by using a prototype.

**Keywords:** Poster · Digital signage · Tablet PCs · Interaction · HTML5

## 1 Introduction

A large number of digital signage products [1, 2] that utilize large displays and replace posters of paper media, which cannot display dynamic information, have been seen in recent years. Digital signage distributes billboard information via a network, and details of such displayed information can be changed dynamically according to location or time zone. Studies have also been conducted on systems that allow the display of interactive information suitable for specific viewers [3, 4] by equipping such signage with devices such as optical cameras or touch panels, in addition to studies that conducted trials for displaying information that responds to the items and degree of interest of the viewer [5, 6]. However, such digital signage that uses large displays not only requires installation work of a large scale that increases introduction costs, but also requires substantial expense for the operation and the maintenance of the system. These signage systems are used only at some locations, such as airports, railway stations in urban areas, and large-scale commercial facilities, for precisely such reasons. Therefore, this paper proposes a Hyper Panel system, a hybrid-type digital signage system that combines tablet terminals, which are rapidly becoming popular, with paper media. This system features the ease of capturing an entire medium, a characteristic of paper media, with the convenience of having tens of thousands of people receiving information, as well as the distribution of information and the provision of interactive information, which are the advantages of digital technology, because this system combines paper media with tablet terminals. This system also provides further reduction in weight compared with digital signage systems that use large displays, and improvements are expected with regard to convenience related to installation and operation.

## 2 Hyper Panel System

The Hyper Panel system proposed by this paper treats content featured on a poster as hyper-link anchors that allow the interactive display of digital information from intended content on the display of a tablet terminal. Coordination with paper media that have conventionally been used as a means for displaying information is considered important. A contrivance that requires no devices, such as embedding NFC tags or placing markers on the side of the paper media, will be realized. More specifically, a user employs a special device to acquire coordinate values (viewpoint tags) of a poster in order to view digital information, such as still images and video images, on a mobile terminal in possession of the viewer, which is linked to a network.

A variety of applications can be considered for the provision of information using a poster, such as merchandise descriptions, tourist information, or navigational guide at an exhibition venue. It must be possible to set digital information in a clear manner and at arbitrary positions in order to ensure that flexible responses can be implemented to accommodate the uses or content of the posters. The configuration diagram of the system that considers such aspects is shown in Fig. 1.

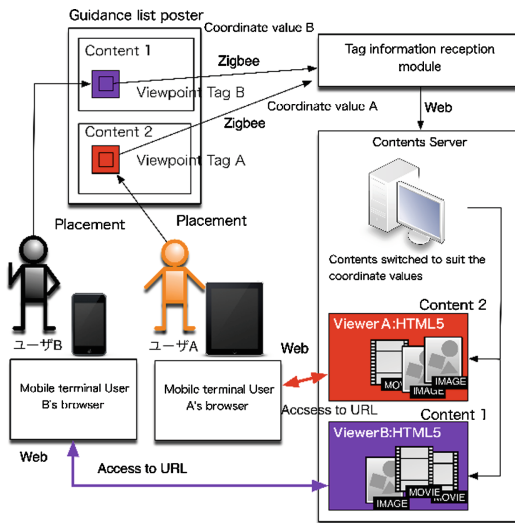


Fig. 1. The configuration diagram of Hyper Panel System

## 3 Prototype Implementation

A set of prototypes was implemented in order to evaluate the concept of the proposed Hyper Panel system. The implemented prototypes are not intended for actual use, but they are equipped with minimally required performance in order to evaluate the system's concept.

### 3.1 Viewpoint Tag

Viewpoint tags are implemented as devices for acquiring the coordinate values of the poster. Two units of Ultrasonic Range Finder are used to acquire coordinate values. Reflection plates approximately 3 cm wide are installed around the frame for mounting the poster in order to allow ultrasonic sensors to measure distances. The ultrasonic sensors are then mounted on the viewpoint tags to measure the respective distances to the frame. Let us consider the distance from the center of the tag to the left section of the frame as the X-axis, and the distance from the center of the tag to the upper section of the frame as the Y-axis, as shown in Fig. 2. A steel plate is placed under the frame, and neodymium magnets are installed on the backside of the viewpoint tags in order to secure such tags on the poster when pasted vertically. Thus, placing viewpoint tags at arbitrary locations on the displayed poster is possible, similar to placing magnets on a whiteboard.

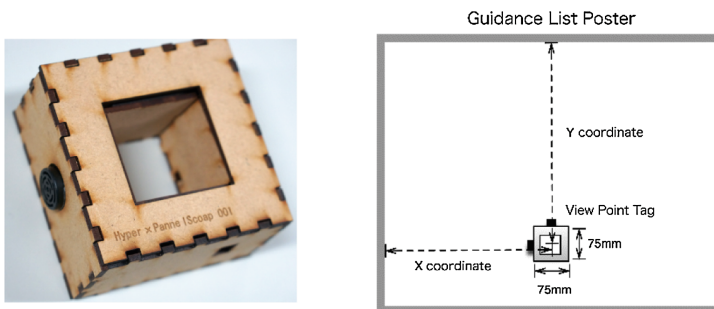


Fig. 2. Image of View Point Tag

### 3.2 Tag Information Reception Module

The purpose of the tag information reception module is to acquire the coordinate values of multiple viewpoint tags, and store the values in a historical database via the Web. Zigbee, a wireless communication standard, was adopted for the communication of viewpoint tags with the tag information reception module.

### 3.3 Viewer

The viewer for the respective viewpoint tags can be accessed by entering its URL on a browser screen. Since jQuery is used by the viewer to acquire digital information, content such as movies and static images can be switched dynamically. jPlayer [12], which supports a variety of browsers, was adopted for movie playback on the viewer. A coordinate acquisition button is located on the upper left section of the viewer screen and the position information can be updated to the latest by pressing this button.

## 4 Evaluation Experiment

### 4.1 Test Outline

An evaluation experiment for the system was conducted using the implemented prototype system and a poster. A total of 37 male and female test subjects participated in the test, ranging in age from late teens to forties. In the experiment, an examiner briefly explained how the system is used, and the test subjects were asked to place viewpoint tags on arbitrary locations on the paper in order to view the digital information. The test subjects were then asked to install viewpoint tags at arbitrary locations and view the digital information. After experimenting with the system, the test subjects were presented with a questionnaire in order to survey their responses. The survey questions are listed in Table 1.

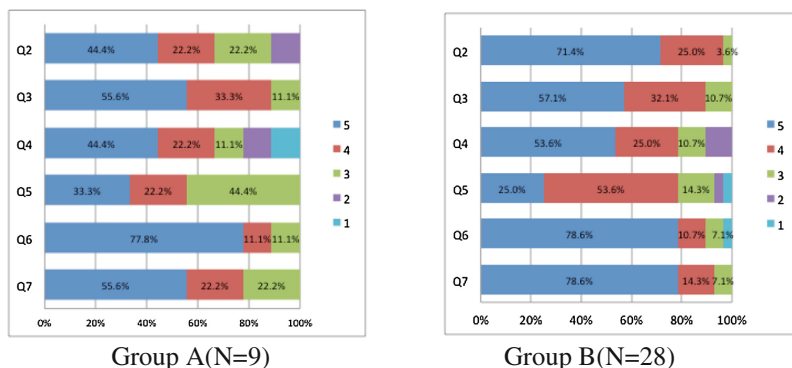
**Table 1.** Questiones Items

Q1	Are you familiar with the operation of a smartphone?	(1)Familiar	(2)Not familiar
Q2	Were you able to understand how to use the Hyper Panel?	(5)Could understand	(1)Could not understand
Q3	Did you think you would like to operate the Hyper Panel?	(5)Agree	(1)Do not agree
Q4	Were you able to operate the Hyper Panel in the ways you wanted to?	(5)Could operate	(1)Could not operate
Q5	Were you able to understand the poster content?	(5)Could understand	(1)Could not understand
Q6	Was the Hyper Panel useful as supplemental information for the poster?	(5)Was useful	(1)Was not useful
Q7	Would you like to use the system in the future if it becomes popular?	(5)Would use	(1)Would not use

### 4.2 Experiment Results

The test subjects were divided into two groups, B group with proficiency in the operation of a smartphone, and A group without such proficiency, categorized based on the responses received for Question 1 of the questionnaire survey. The tabulated results are shown in Fig. 3. The combined result for score 5 (understood) and score 4 was 66.6 % for Group A with regard to system comprehension, as addressed by Question 2. On the other hand, the result for Group B was 96 %, i.e., a high degree of understanding. This leads us to believe that this system can be understood extremely well by those who are experienced with, and proficient in, smartphone operation. With regard to interest in the system as addressed by Question 3, the combined result of score 5 and score 4 was 88.9 % for Group A and 89.2 % for Group B, showing that approximately the same level of evaluation was achieved with both groups. This leads us to believe that this system evokes interest, regardless of the extent of proficiency in the operation of smartphones. With regard to system operation as addressed by Question 4, Group B evaluated the operation slightly higher than Group A. This is believed to be a reflection of the proficiency in the operation of smartphones on the results of the questionnaire. However, because over 60 % of the test subjects in Group A selected score 5 and score 4 as their response to this issue, this system is considered as one that can be operated sufficiently well even by those test subjects unfamiliar with the operation of smartphones.

With regard to poster comprehension as addressed by Question 5, there were variances among the results from Groups A and B, which is believed to indicate that the test subjects felt that details cannot be conveyed properly based on what is featured



**Fig. 3.** Answer ratios

on the paper of the poster alone. On the other hand, high evaluations were achieved from both Groups A and B with regard to the functions that supplement the poster, as addressed by Question 6. Such results lead us to surmise that the system complements effectively the information provided by the poster. With regard to the possibility of using the system should it become popular in the future, approximately 90 % of the test subjects in both Groups A and B indicated that they would, indeed, like to use the system. Therefore, it is evident that the test subjects were receptive to this system, those who were not proficient in the operation of smartphones, and those who were, based on the results described above.

### 4.3 Results and Considerations on Free Descriptions

No test subjects were bewildered by the installation of viewpoint tags or by viewing digital information, and all able to view that digital information in which they were interested by moving the viewpoint tags. In particular, the method for switching the content provided on mobile terminals by relocating the physical tags appeared to provide a fresh sensation to the test subjects, and many indicated their impression on this as being an experience they have never encountered before as a method for acquiring information. An opinion was also expressed that this system facilitates information viewing with superior perspicuity because the static images and videos related to the content featured on the poster can be viewed while simultaneously looking at the poster. This is believed to occur because of the effect generated by facilitating the simultaneous viewing of the content featured on the poster and the detailed information provided on a mobile terminal.

## 5 Conclusion and Future Issues

This paper proposed a Hyper Panel system that facilitates viewing digital information relevant to the layout on posters of paper medium. Furthermore, a set of prototypes for viewpoint tags and viewer was implemented based on the proposed system. The results

of the experiment that involved the use of the prototypes led us to believe that we were successful in providing a new method for viewing information using the proposed system that combines paper media and information technology. The results of the survey conducted after the experiment also indicated that the same level of receptiveness as that of the test subjects proficient in the operation of smartphones was achieved with the test subjects that lacked such proficiency. However, in its current condition, the system is still in the initial stage of concept formulation, and many issues remain that must be resolved before implementation for practical use on street corners.

## References

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