Sushi Train Interface: Passive and Interactive Information Sharing

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Abstract. We proposed sushi train interface as a novel information sharing method to have users notice everyday information in a natural manner. In the interface, information rails are projected on ceilings or walls, and information dishes go around on the rails. Users interact with the information rails using remote pointing devices. We constructed a prototype as a proof-of-concept and implemented pointing methods by a camera device and a smart laser pointer. The both methods are expected to be used for interacting information rails.

Keywords: sushi train, information sharing, pointing method, passive attitude, smart laser pointer

1 Introduction

Up until a decade ago, physical bulletin boards had been a primary information sharing method for groups at offices, schools, and so on. Now it is changing to digital information sharing systems as their alternatives. Their primary advantage is that people can access information from everywhere. However, their chances are limited to the time when people operate computers or electric devices. Moreover, people must check them intentionally. This is disadvantage as compared to physical bulletin boards usually installed in such places that people naturally notice.

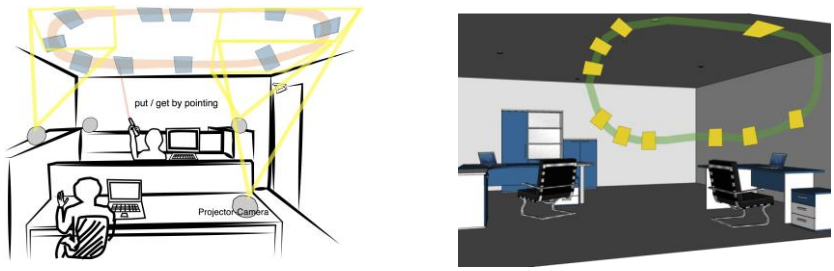
Therefore, there is the necessity of a new information sharing method which can be used by users with a passive attitude. Watanabe proposed a new visual interface focusing the advantage of passiveness [3]. It is intended to show useful information in idle times on a PC. However, it might be a small amount of time to look such information on PCs considering the whole time of their daily life.

Our proposal is to share information with the style of sushi train (or rotating sushi bar) in real space. One reason of sushi train's popularity is that people can find their favorite dishes easily in a passive attitude by watching moving showcase (i.e. sushi trains). So we applied the model of sushi train to information sharing and constructed a prototype as a proof-of-concept. In the prototype, information rails are projected on

ceiling and walls, and information dishes go around there. People interact with the information rails using remote pointing devices.

2 Sushi Train Interface

The concept of sushi train interface is shown in Fig. 1. We assume the target environment is a typical office environment and there are some coworkers using PCs on their desks in the environment. Many dishes to carry information (= information dishes) on circular rails displayed on the ceiling using projectors (Fig. 1(a)). Such dishes might carry a schedule of the group, a circular notice, a task instruction, a menu of company cafeteria, a party information, and so on. As another form, information rails can span multiple planes as shown in Fig. 1(b). A user can notice dishes that the user might have interests from a distant place. Then, the user can see such a dish closely when they pass near the user. If the dish is really needed by the user, the user can pick the dish up to one's own environment by pointing with methods (finger gesture, some pointing device, and so on). Circular rails are suitable for information sharing with a passive manner because dishes appear again in a continuous manner even if the user missed to check them.



(a) Basic Concept of Sushi Train Interface (b) Extension to Multiple Planes

Fig. 1. Concept of Sushi Train Interface

3 Prototype

We constructed the prototype of sushi train interface. The prototype consists of two projectors, two PCs, a digital still camera (Android-powered COOLPIX S800c), a high-speed camera (DITECT HAS-L2), and two smart laser pointers developed by us. As for the software modules of the prototype, SushiController displays information rails and dishes with projectors, InteractionManager deals with 'put' and 'get' interaction by exchanging messages using network, and RailEditor designs the rail layout based on 3D measurement of ceilings and walls.

Fig. 2 shows the example of information rails projected by a single projector. Multiple projectors can also be utilized in the prototype. SushiControllers in differenct PCs cooperatively generate a single view by stitching images of multiple projectors. A user can get and put information dishes using some pointing methods. As for such methods, we employed a camera based interaction method and a laser pointer based interaction method.

Fig. 2. Sushi Train Interface: Information dish go around on a ceiling

3.1 Interaction Using Cameras

This method is to point a location in information rails through a view finder of a camera. A user puts information onto the rails and gets information from the rails with a camera device. The location specified by the camera is calculated by homography between a live image camera and a corresponding internal image bitmap data in SushiContorller. This is the same method as described in [2]. As for the user experience, the user points a location in the information rails and press shutter button (Fig. 3). By this operation, the user places information on the rails in the "put mode" and gets information from the rails in the "get mode".

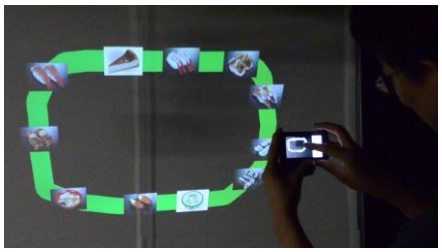


Fig. 3. Sushi Train Interface: choosing an information dish by a camera

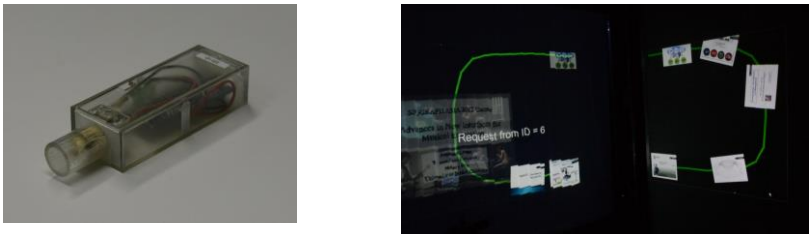
3.2 Interaction Using Smart Laser Pointers

The interaction method with cameras is a little awkward because people usually don't aim cameras at ceilings. As a more intuitive pointing method, we employ smart laser pointers, which has the ability to encode ID with blinking pattern. A global high-

speed camera recognizes the gesture and identifies the device. We combined some methodologies for laser pointer interaction proposed so far, such as [1].

By making a circular stroke, a user can select an information dish inside the circle. Then InteractionManager detects the gesture and the ID, and sends the selected dish to the digital device linked with the ID.

We constructed a smart laser pointer using an Arduino Micro and a LED laser module with a case fabricated by a 3D printer (Fig. 4(a)). The global camera captures the strokes of laser pointers with 100 FPS and the 3-bit ID encoded in blinking pattern and a gesture are recognized with in 240 msec. Fig. 4(b) shows the selection of an information dish using a smart laser pointer.



(a) Prototype (b) A dish selected by a gesture

Fig. 4. Smart Laser Pointer

4 Conclusion

We proposed sushi train interface as a novel interaction method to share information in a group. The method can effectively utilize huge display areas of ceilings and walls. Users can feel a sense of unity of the environment by sharing same information presentation through real space. We also proposed two pointing methods to interact such information. We haven't any quantitative evaluation, but smart laser pointer has more natural style to point information and it is also advantageous to know which information others have interests in. As for future work, it is useful to employ some concepts of real sushi train and reflect them to the interface (e.g. changing contents color based on the freshness of information).

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