SEVERAL QUALITATIVE OBSERVATIONS ON INDEPENDENT BLIND SHOPPING

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Abstract

Several qualitative observations made during a field study of independent blind shopping are discussed.

Introduction

ShopTalk (Figure 1) is a prototype of a system designed to assist visually impaired shoppers with finding shelved products in modern grocery stores [1]. ShopTalk uses verbal route descriptions to guide shoppers through large areas of the store – store entrance to an aisle, one aisle to another aisle, and an aisle to a cashier lane - to the general area of a product. Once the shopper believes they are close to the target product they use a barcode scanner to scan barcodes which are used by many store inventory systems and are placed on the front of the shelf below the product. As the shopper scans these barcodes, ShopTalk issues verbal instructions describing the how to locate the exact location of the target product.

ShopTalk was tested in a field study with 10 participants [1, 2]. The experiment was conducted in Lee's MarketPlace, a local supermarket, during regular business hours beginning at 9:00 PM. Each participant was asked to shop for three different products with each located in a different aisle. All participants repeated this run five times and were able able to find each product during every run, a 100% success rate. During the experiment a number of qualitative observations were made regarding the participants, the way they used ShopTalk, and how they interacted with the store environment. In this paper, we discuss these observations and some implications.

Product Search Techniques

Participants were given training on how to use ShopTalk, yet some developed their own techniques for locating the shelf barcodes. Participant 1, for example, felt items on the shelves in order to help localize herself in each aisle instead of using the barcode scanner. By her fourth run, she had learned to feel for the bags of marshmallows which were located next to product 1. Participant 3 used touch to help establish how far a product was located from the aisle entrance. During her first run, she judged distances by running her fingers along the length of the aisle's shelf and then used this estimate in the remaining runs. Participant 8, who also felt the edges of shelves, learned that the shelf section next to product 2 was curved, as opposed to the predominately flat edges in the majority of the store, and used that as her landmark.

Product 1 was located near the end of aisle 9 towards the rear of the store. When following ShopTalk's route instructions, participants were guided by verbal instructions from the entrance of the aisle at the front of the store. Two participants independently developed a technique of walking the entire length of the aisle to the very end, and then backtracking a few feet to find the product. Participant 8, who reported only being able to see light and dark, was able to find product 1 easily on her first run. She stated that she counted steps resulting in an accurate distance estimation.

Several participants seemed unaware of how their canes, dogs, and shopping baskets extended beyond their personal space. For example, participant 4 held his cane and the basket while scanning barcodes. While concentrating on scanning, he appeared unaware that his cane and basket were hitting items on the shelf. While no items were knocked off the shelves, the possibility existed. Two other participants seemed unaware that products were often stacked on one another. In some instances, they would select the bottom product instead of the top product.

Store Environment

Several observations were made regarding the supermarket environment Late evenings, when testing occurred were the time when shelves were restocked. Employees wheeled large carts with boxes around the store. The carts would often stay in one spot for several minutes while employees placed items on shelves. If an employee noticed that a participant needed to pass a cart, they would move the cart. During one series of runs, one employee did not notice the participant. The participant, blocked from entering an aisle, went to the next aisle, proceeded to the back of the store, and entered the desired aisle from the other end even though ShopTalk's instructions did not mention this route. This was an example of how ShopTalk acts only as a guide, while still enabling a shopper to use his everyday navigation skills to solve unexpected problems.

To promote sale items, the store stacks cases of the on-sale products in the aisle. These and other promotional displays were both advantageous and problematic. The experiment's third product was located after one such large stack of cans of spaghetti sauce. Several participants were observed searching for this stack to help them locate the product. However, such displays are unreliable landmarks as they appear and disappear as a result of volatile promotion tactics. These stacks can also be unstable. Two participants accidentally hit the stack of spaghetti sauce, each knocking one can to the floor. The end of the aisles where large product displays are placed provided similar

challenges due to the height differences among different displays. Participants would occasionally nudge items in these displays as they walked by.

Ergonomics

The experiment revealed some ergonomic issues with the device. The most common issue brought up during informal discussions was that there was a lot of equipment to manage. In addition to a cane or dog, the participant had to manage a barcode reader, a shopping basket, and press buttons on a keypad located on the shoulder. One participant noted that in a real shopping situation she would also have to manage her preschool children. As a result of these comments, miniaturizing the hardware is a priority for future ShopTalk versions.

Participant 1 had another disability which gives her limited use of her left arm. This caused her to put more effort into handling all objects than the other participants who could use both hands. Another issue was that she required more effort when scanning barcodes. Most participants used both hands to find the barcodes, sliding one hand along the shelf feeling for the change from metal to paper, and using the other hand to operate the barcode scanner. Participant 1 was able to use the scanner successfully, but she appeared to spend more effort than other participants aligning the scanner with the barcodes.

Summary

Since these observations are qualitative, we must be careful in generalizing them. Nonetheless, they are informative and will be used to help guide the next iteration of ShopTalk. In particular, robust product search techniques exhibited by several participants will be used to enrich current verbal directions. Observations on the store environment are important for making visually impaired shoppers better aware of what takes place in modern supermarkets.

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References

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[2] Kulyukin, V., Nicholson, J., and Coster, D. 2008. ShopTalk: Toward Independent Shopping by People with Visual Impairments. Technical Report USU-CSATL-1-04-08, Computer Science Assistive Technology Laboratory, Department of Computer Science,

Utah State University. April 15, 2008.

Figure

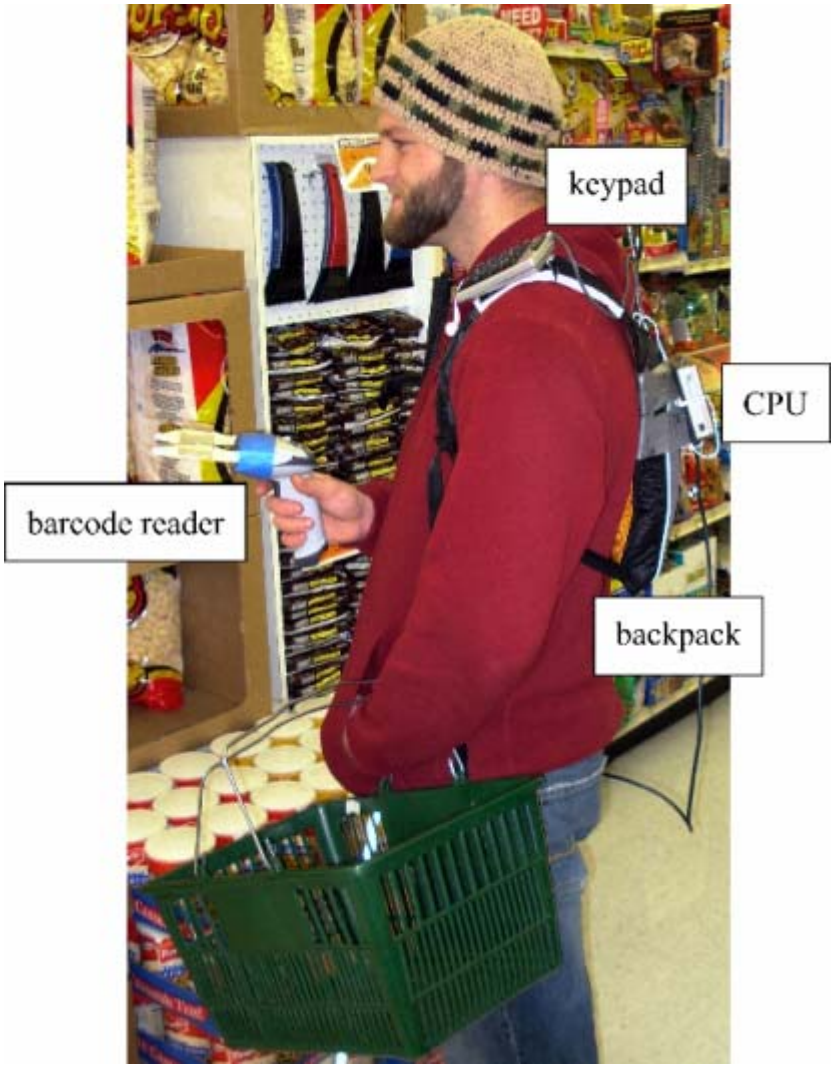

Figure 1. A view of ShopTalk's hardware.

Image description: A user is shown wearing ShopTalk. He is holding a barcode scanner and carrying a shopping basket. He is wearing a backpack. A computer is attached to the backpack's back, and a numeric keypad is attached to the backpack's shoulder strap.