Instructional Software for Sighted Guides of Visually-Impaired Travelers

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Abstract

This paper describes an instructional software package of sighted guide techniques to assist visually-impaired travelers. The software has the following features:
(1) The techniques have been developed based on practical experiments and consultation, and are safe and comfortable even for persons who have recently lost their sight.
(2) The software user must choose the correct guidance technique for each sighted guiding situation in order to obtain a good score. Moreover, the user can learn these techniques through the virtual experience of sighted guiding.
(3) The software has an editing function, allowing the software administrator to easily revise the content.

   Not only helpers but also persons with no direct contact with the visually-impaired can learn the sighted guide techniques while playing the software for entertainment.

   In this presentation, we present an outline of the software and its functions, with a demonstration.

1. INTRODUCTION

Almost all the information that humans receive from outside is in visual form.   Visually-impaired persons (VIPs) encounter not only many inconveniences but also many dangers in their daily lives due to the lack of visual information about their environments.

The following factors make it very difficulty to walk independently without visual information [1]:
(1) Blindfolded humans veer off from a straight line when walking (known as the "veering tendency")[2].

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(2) Blindfolded humans cannot move directly away from curved obstacles (known as the "square-off effect")[3].
(3) Sound localization is difficult.
(4) It is difficult to hear previously heard information again.

While some VIPs can go out independently, they need long and various kinds of practice, as well as experience of moving around in the actual world.   However, such trained VIPs cannot be as safe as sighted persons, and they experience a great deal of psychological stress while walking independently[4].

In order for a VIP to be able to go out safely, sighted guidance is required.   It is necessary and efficient to use a sighted person not only to ensure safety and reduce the psychological stress on the walker, but also for the VIP to get an accurate grasp of the environment, to improve walking efficiency, and for exercise and relaxation.

However, even with a sighted guide, accidents occur, such as the VIP falling from stairs or from station platforms.   These accidents can happen even if the sighted guide is a family member or someone intimate with the VIP.   One of the main reasons for these accidents is the sighted guide does not have skill in guidance techniques.

In order to solve this problem, we have studied the safety guidance techniques used by the non-profit organization (NPO) for VIPs called "Shirogame".   We developed some software [5] for people to enjoy learning about guidance techniques via the internet, and have also improved it for more comfortable playing.

The feature of the software is that the guidance techniques themselves are the products of long experience and an enhancement study.   The most important feature is the method of teaching guidance techniques via computer, which is visually exciting and dynamic.
The software has the following advantages from the player's point of view.
1) The player can intuitively learn guidance actions from a real action movie.
2) The software poses questions at every key point in the course of a guidance action.   Thus, the player explicitly learns these key points, rather than just forming some vague understanding.
3) The software sometimes presents inappropriate guidance actions on purpose, so that the player experiences moderate levels of tension and to retain player involvement.   In these situations, the player must direct the software to try again.   This feature promotes positive learning in the player.
4) The player can enjoy the software like playing a game because the software shows the player's score for correct answers.
5) As the software is programmed in Java-language, players can access the software via the Internet.

2. SIGHTED GUIDE TECHNIQUES FOR SAFELY ASSISTING A VIP

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It is a matter of great urgency that guides acquire the sighted guide techniques to safely assist VIPs. Books on sighted guide techniques are available, but they are not so popular on the general market. Also, because the contents are inconsistent, readers may be puzzled over which technique to choose.

As a group of walking trainers for VIPs, staff at welfare centers, and engineering researchers, we have started to refine the sighted guide techniques provided in [6], through experiments and consultation.

Independent blind travelers can be assisted by persons who are not familiar with sighted guide techniques, because the travelers can protect themselves by using long white canes. Furthermore, because travelers often establish their own walking style or have preferences about how to be guided, they can instruct a guide on the most appropriate sighted guide techniques for them while walking with a guide.

Based on these factors, we have improved the sighted guide techniques for assisting persons who have recently lost their sight. We established "Shirogame," a non-profit organization (NPO), in November 2001, and we have been conducting experiments and closely studying safety-guidance techniques with the NPO.

In the experiments, we had subjects without any knowledge about VIPs or about the purposes of the experiments wear eyemasks, and guided them with little oral information in several settings. These settings included, for example, taking a seat, passing through doors, ascending and descending stairs, and getting on/off a bus. The sighted guide techniques have also been improved [7], in order to safely guide a VIP according to the movements of a guide.

3. SOFTWARE FOR LEARNING SIGHTED GUIDE TECHNIQUES

We have developed some software to learn sighted guide techniques in an enjoyable way via the Internet. The following merits of using this Internet-based learning software are expected;
1) A player can learn the sighted guide techniques at anytime from their own home. Thus, the number of people familiar with such techniques will increase.
2) We can gather many comments and questions from the various view points of the players, and reply to them using the FAQ format. This will help to improve and standardize the techniques.

3.1 Specifications
(1) Programming language
The software for learning the sighted guide techniques is written in Java. The reasons for this are as follows:
1) Compatibility for networks; There are rich class libraries for Java on the Internet, the safety of

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an object-oriented language, and the light burden on the client computer.

2) Platform independence; Java programming is independent of system hardware and operating system.

3) Reducing server burdens; Applets written in Java are stored on the server computer, and these are transmitted to the client computer on request to run on the client's web-browser.

(2) A variety of typical settings

The software has ten typical settings;

1) Taking a seat, 2) Negotiating narrow spaces, 3) Passing through doors, 4) Using an elevator, 5) Ascending and descending stairs, 6) Getting on/off a bus, 7) Getting in/out of a taxi, 8) Getting on/off a train, 9) Using an escalator, and 10) Lavatories.

(3) Layout of the screen

There are three kinds of screens for the software.

1) Screen 1: Main image only.

2) Screen 2: Main image, plus a multiple-choice type question with four possible actions.   The player of the software selects one of four possible actions in response to the situation.

3) Screen 3: Answer and comment.   The player can check on the reason why the selected action was correct or not, and know his current score.

3.2 Outline of the flow of the software

1) Select one setting from the 10 typical settings available, as mentioned in 3.1(2).

2) A sequence of images is displayed up to a key image for the guidance techniques, in the Screen 1 format.

3) The key image and a question with four possible actions are shown in the Screen 2 format.   An example is shown in Fig.1.
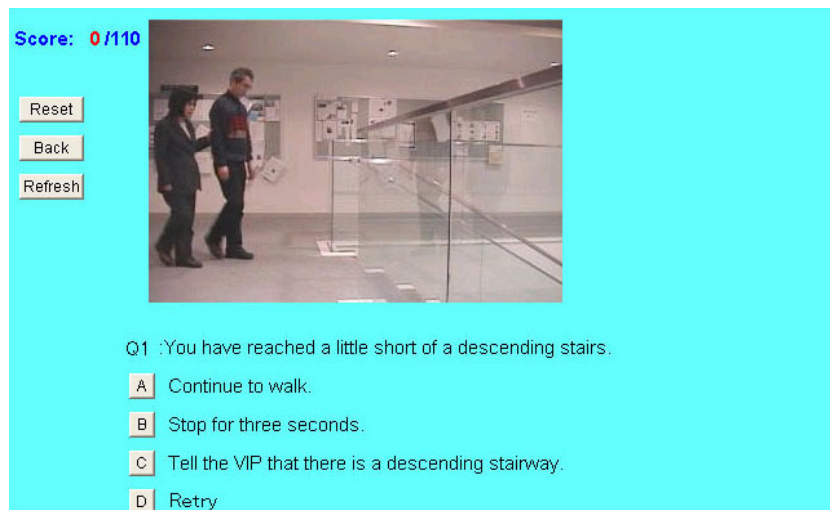

Fig.1: An example of Screen 2.

4) If you select an inappropriate action, a comment is presented in the Screen 3 format, and 5 points

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are deducted from the score.   Figure 2 shows an example.
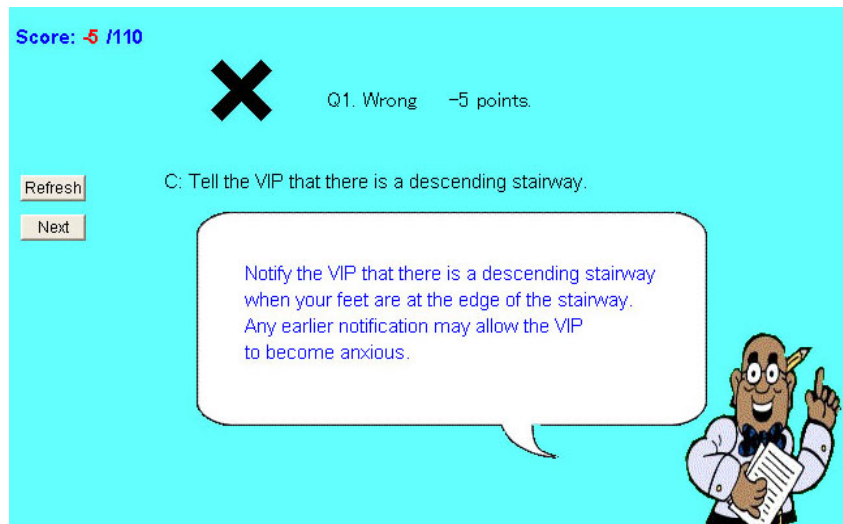

Fig. 2: An example of Screen 3, with comment for an inappropriate selection.

5) If the player presses the "Next" button, the software returns to Screen 2, as described under 3) above.

6) When the player selects the correct action, a comment is displayed in the Screen 3 format, and 10 points are added to the score, as shown in Figure 3.   The program then continues from stage 2) above for the next sequence.
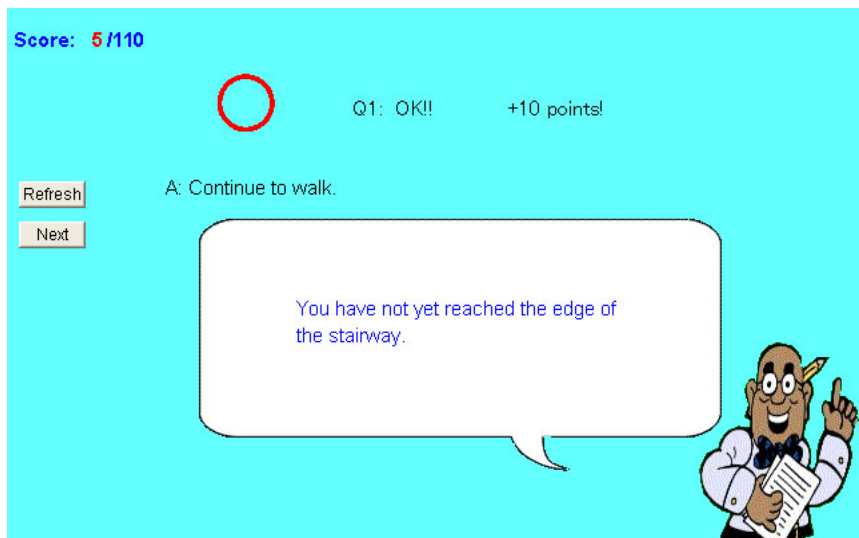

Fig. 3: An example of the Screen 3 format with a correct choice.

The software repeats through stages 2) to 6) until the last correct action is selected.

4. DISCUSSION

The interest of the players is retained because some of the questions are rather tricky, so that even people with some confidence in sighted guidance will sometimes chose an inappropriate action.

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In addition to VIP helpers, VIP family members and persons with direct contact with VIPs are able to learn sighted guide techniques by playing the software for entertainment.

Some of the people without contact with VIPs have remarked that "because the software taught me a lot about VIPs, everyone should try the software."

Knowledge about sighted guide techniques obtained only by playing the software is not enough to actually assist VIPs, because it is not easy to draw on such knowledge.   However, people who do not have such basic awareness of sighted guide techniques cannot guide VIPs safely.   We expect that people with this knowledge can easily learn to actually guide VIPs by attending a practical course.

Someone with such basic knowledge about where they, as a sighted guide, should stop, will be much safer than someone without even this awareness, when asked to guide a VIP.

Even with narrow-band communication, such as 32kbps, all of prepared images are shown, by selecting a menu for the narrow-band.   It can be performed by using linked images with reduced quality.   And most browsers have sufficient cache memory to temporarily store browsed images and provide prompt display of the images on a second trial of the software.

5. CONCLUSION

We have proposed some training software for helpers to acquire sighted guide techniques to assist VIPs, especially those who are not accustomed to walking with a sighted guide.   The software runs on the Internet, and people can enjoy playing the software in order to get a good score.   We hope that many people will enjoy playing this software, and we shall continue to refine it based on the player feedback in terms of its utility, interest and also the effectiveness of the sighted guide techniques themselves.   We also hope that the number of people with knowledge about sighted guide techniques will increase.

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