

Wearable Unified Communication for Remote Tour Guide and Interpretation Services

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Abstract

NEC has developed a remote system to provide tour guide and interpretation services to foreign tourists in their native languages. This system was made possible by combining wearable computer and unified communication technology, enabling two-way real-time visual and audio communication even while foreign tourists are on the move. Field tests were performed at “specified ubiquitous districts (tourism-oriented country)” in Kyoto as certified by the Japanese Ministry of Internal Affairs and Communications, in order to evaluate viability from the standpoints of technology and service.

Keywords

wearable computer, unified communication, remote tour guide service
remote interpretation service, tourism innovation

1. Introduction

In 2003 the Japanese government set forth a policy to “increase the number of foreign tourists visiting Japan to 10 million by the year 2010” by launching the Visit Japan Campaign. Whereas the number of foreign tourists visiting Japan was only 5.21 million in the year 2003, through the joint efforts of the government, travel companies and tourism organizations, this figure increased to an all time high of 8.61 million in 2010. To increase this even further, the government has set goals for reaching 15 million in 2013, and 25 million in 2019.

While the number of foreign visitors to Japan continues to rise, it is also true that there is a shortage of tour guides in Japan who have sufficient foreign language skills and also possess broad knowledge of Japanese geography, history, culture and economy.^{*1}

Having been commissioned by the Kyoto Industrial Support Organization 21, NEC developed the Tele Scouter remote tour guide system by combining wearable computer and unified communication^{*2} technology, in order to support tour guide activities and provide foreign tourists with authentic Japanese-style hospitality. Tele Scouter is a terminal unit that

combines a head-mounted display developed by Brother Industries, Ltd., with NEC’s wearable computer technology.

The remote tour guide system which harnesses the capabilities of Tele Scouter, provides sightseeing guidance and interpretation services by enabling foreign tourists and off-site tour guide operators to engage in two-way visual and audio communication. NEC performed field tests at “specified ubiquitous districts (tourism-oriented country)”^{*3} in Kyoto as certified by the Japanese Ministry of Internal Affairs and Communications, in order to evaluate the viability of the system in terms of technology and service.

2. Outline of Field Tests

We implemented field tests for the remote tour guide service and remote interpretation service in Kyoto during Feb. 22-24, 2011. We enlisted 24 foreign tourists as monitors (12 Chinese-speaking, 12 English-speaking). Four staff (2 Chinese-speaking, 2 English-speaking) from Toei Kyoto Studio Park also took part as operators of the remote tour guide system. **Fig. 1** depicts the service image for the field tests.

^{*1} According to the Japan National Tourism Organization, 15,371 interpreter guides (individuals who accompany foreigners and supply sightseeing guidance in foreign languages) were registered as of April 1, 2011.

^{*2} Achieving effective communication by integrating various communication tools such as telephone, email, teleconferencing and video chat.

^{*3} Ministry of Internal Affairs and Communications program to use Japan’s leading-edge ubiquitous networking technology and telecommunications to develop world-leading services, apply field tests, and establish Japanese initiative based “new models” capable of worldwide deployment.

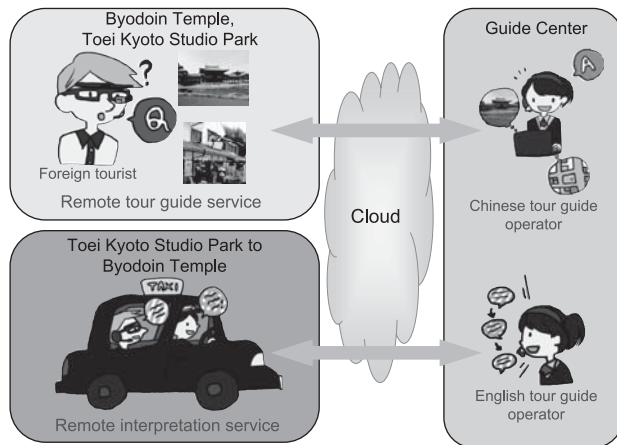


Fig. 1 Remote tour guide & interpretation service image.

2.1 Remote Tour Guide Service Field test

The remote tour guide service field test was performed at Byodoin Temple and Toei Kyoto Studio Park. At Byodoin Temple, the tour guide operators offered the foreign monitors walking route guidance and explanations for various facilities through two-way conversation, based on the images sent to them by the wearable computers. Furthermore, guidance took place while explanatory content for the Phoenix Hall was being shown on the head-mounted displays of the foreign monitors.

At Toei Kyoto Studio Park, the tour guide operators guided the foreign monitors as they walked along the key tourist spots on the park (e.g. Fountain Plaza, Nihonbashi, Edoya) by showing various contents (gift information, maps, event information, etc.) on the head-mounted displays (**Photo 1**).

2.2 Remote Interpretation Service Field Test

The remote interpretation service field test took place while in transit from Toei Kyoto Studio Park to Byodoin Temple via taxi. The taxi route went along major sightseeing spots such as Kyoto Gyoen National Garden, Nijo Castle, and Nishi-Honganji Temple, en route to Byodoin Temple. The foreign monitors boarded their taxis wearing their Tele Scouters, and the remote tour guides interpreted the conversations between monitors and taxi drivers (Chinese to Japanese, English to Japanese) (**Photo 2**). The foreign monitors used their handheld microphones to ask the driver questions in their own native language, while the video and audio feed from these scenes



Photo 1 Scene from remote tour guide field test (Toei Kyoto Studio Park).



Photo 2 Scene from remote interpretation field test.

were relayed to the remote tour guide operator via wearable computer. The tour guide operator in turn interpreted the conversation while watching the visuals. The foreign monitors asked many questions about the history and characteristics of various sightseeing spots they visited or passed by while in transit, as well as shops in the vicinity.

3. Outline of Remote Tour Guide System

The remote tour guide system was developed on the con-

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cept of enabling foreign tourists wearing the Tele Scouter to be guided by an off-site tour guide operator with the same presence as if the guide was really there, without having to carry or operate any equipment.

The system is based on video conference software that allows remote operation of the video image on the head-mounted display. The operator screen was customized (**Photo 3**) for the remote tour guide, the bit rate and frame rate were optimized for usage on mobile networks, and sightseeing contents were added to the software. The system was then installed on a virtual server, allowing the provision of the service through cloud computing.

The remote tour guide system is comprised of the Tele Scouter (head-mounted display and wearable computer),

WiMAX mobile router, XGP compatible Wi-Fi router, remote tour guide server, notebook PC (for tour guide operator), etc. (**Fig. 2**).

As for the network, we used WiMAX by UQ Communications Inc. (at Byodoin Temple and in the taxi) and WILLCOM CORE XGP by WILLCOM Inc. (at Toei Kyoto Studio Park) for the wearable computer, and optical-fiber internet connection for the tour guide operator's notebook PC.

The equipment "worn" by the foreign monitors is comprised of the Tele Scouter, headset, and mobile router (**Photo 4**). The head-mounted display shows visual information superimposed on the real life scene (**Photo 5**).

The taxis were equipped with Tele Scouter, speaker, handheld microphone, and WiMAX Wi-Fi gateway. To keep the tour guide operator from becoming dizzy or sick while watching the moving video feed from the taxi, the eye camera was

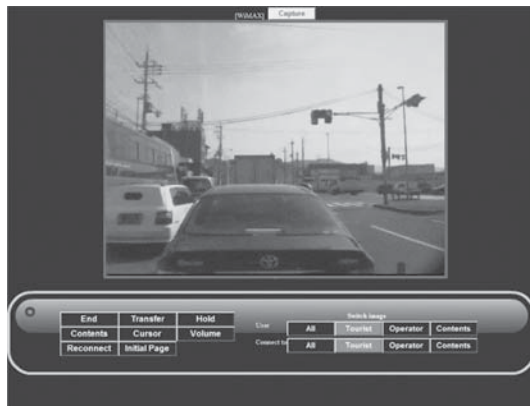


Photo 3 Operator screen for remote tour guide system.

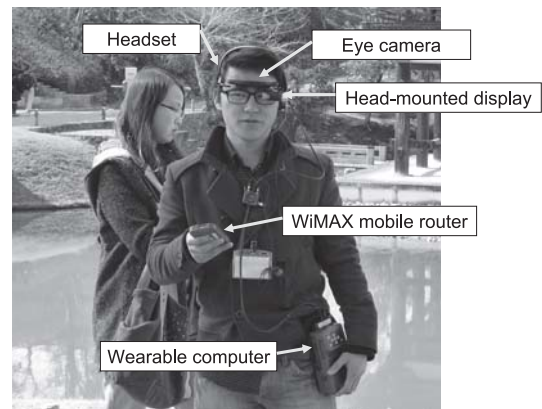


Photo 4 Foreign monitors wearing Tele Scouter.

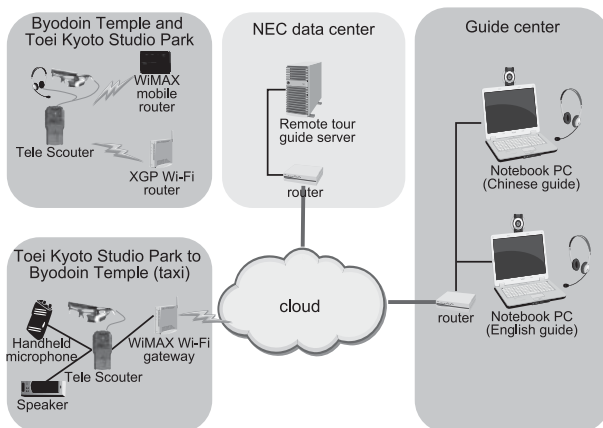


Fig. 2 Overall configuration of remote tour guide system.

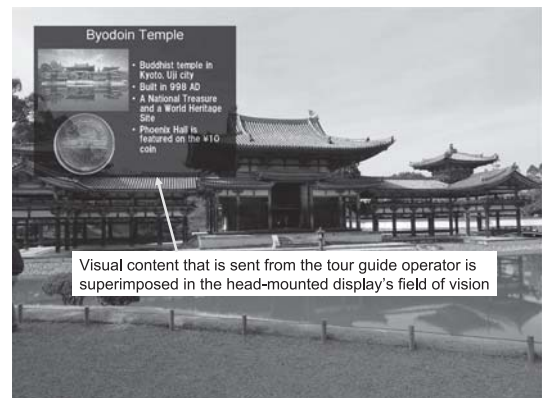


Photo 5 View from Tele Scouter (image).

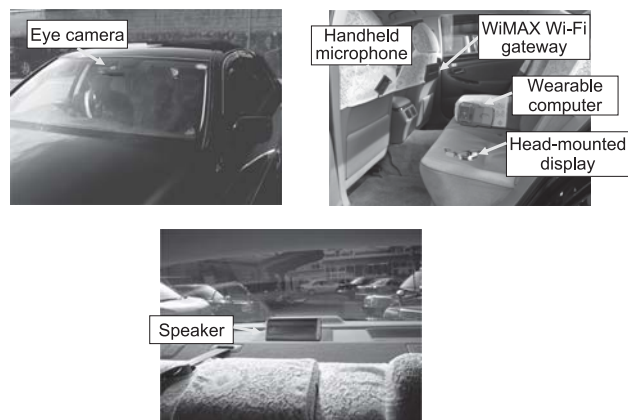


Photo 6 Equipment installed in taxi (image)

removed from the head-mounted display and affixed to the taxi's rear view mirror during this field test (**Photo 6**).

4. Field Test Results

(1) Service model

The foreign monitors were asked to fill out questionnaires after the field tests. Results showed that the remote tour guide service and remote interpretation service were viable, and by sharing the same field of vision, it was possible to provide high-grade guidance service to the user. For instance, during the remote interpretation field test, when a foreign monitor pointed at some building and asked "What is that?", the tour guide operator could go beyond a direct translation and phrase answers in a way that better matched the mood of the moment, based on the image of the building being transmitted from the eye camera.

PSM ^{*4} (Price Sensitivity Meter) analysis of suggested pricing for these services showed that the optimal price point was 1,000 yen for the remote tour guide service, and 1,600 yen for the remote interpretation service (**Table**).

(2) Remote tour guide system

Comparing the customer satisfaction levels, we saw that the remote tour guide system came out lower than the services. The foreign monitors commented that the head-mounted display and wearable computer were too heavy, the head-mounted display would slide down, it was difficult to move, and the text of the visual contents was difficult to read, etc.

Table PSM analysis of suggested price for remote tour guide/ interpretation service.

Service name	Optimum price	Marginal cheapness price	Marginal expensiveness price	Indifference price
Remote tour guide	1,000 yen	625 yen	1,900 yen	1,143 yen
Remote interpretation	1,600 yen	917 yen	2,875 yen	1,500 yen

Based on this feedback, NEC greatly improved the fit and visibility of the head-mounted display, and developed a smaller and lighter wearable computer, thus reflecting the results of the field tests back into the products.

5. Conclusion

This paper discussed the field tests performed for the remote tour guide system which combines wearable computer and unified communication technology. In the future, we intend to promote these remote tour guide and interpretation services not only in Japan but also overseas.

^{*}WILLCOM and WILLCOM CORE are trademarks or registered trademarks of WILLCOM Inc.

^{*}WiMAX is a trademark of the WiMAX Forum.

^{*}Wi-Fi is a registered trademark of the Wi-Fi Alliance.

^{*}All company and product names appearing in this article are trademarks and/or registered trademarks of their respective holders.

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Author's Profile

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^{*4}Analytical method for determining the price of products and services from the consumer's perspective.

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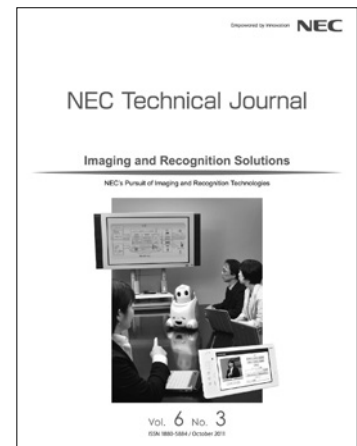
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