NOTE

Overview of TOYOTA MOTOR CORPORATION's G-BOOK Service and FUJITSU TEN's Engagement with its Special In-vehicle Terminal

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Abstract

The automobile world is witnessing the popularization of in-car information provision services that utilize the Internet. NISSAN's "CARWINGS" service reached practical use in February 2002, followed by Honda's "internavi premium club" and TOYOTA's "G-BOOK" in October of the same year.

Upon receiving an order for a special in-vehicle G-BOOK browser for the 2003 commercialization of TOYOTA's G-BOOK service, FUJITSU TEN developed the browser jointly with FUJITSU LIMITED, and perfected it for commercial production.

The basis for the G-BOOK browser was FUJITSU LIMITED's proprietary Internet browser. This was developed into the G-BOOK browser by ① modifying the user interface component so as to suit it for in-vehicle use (providing functions to restrict the range of control operations and moving picture displays during travel in the interest of driver safety), and ② adding a "navigation linkup component" that links information acquired from the G-BOOK Center with the navigation functions.

This paper gives an overview of the G-BOOK service and presents the functions and features of this newly-developed browser for receiving such service.

1 Introduction

Recent years have seen in-car information provision services enter full-fledged use in the automobile world. Such services assist drivers with linking the positional information furnished by car navigation systems.

Currently operational are TOYOTA's G-BOOK service, NISSAN's Car Wings service and Honda's Internavi service.

TOYOTA MOTOR CORPORATION launched its G-BOOK Center in October 2002 and subsequently began running information provision services aimed at cars, cell phones and PCs. It is now proceeding to expand its services by exploiting the G-BOOK Information Center as an information portal site for automobiles.

This technical note gives an overview of the G-BOOK service and describes FUJITSU TEN's part in developing the special in-vehicle G-BOOK terminal commercialized in 2003.

2 Overview of the G-BOOK service

The G-BOOK service provides a continuous connection between the driver and the G-BOOK Center during driving, for the driver's safety, enjoyment, and convenience. The concept of G-BOOK service is illustrated in Fig. 1.

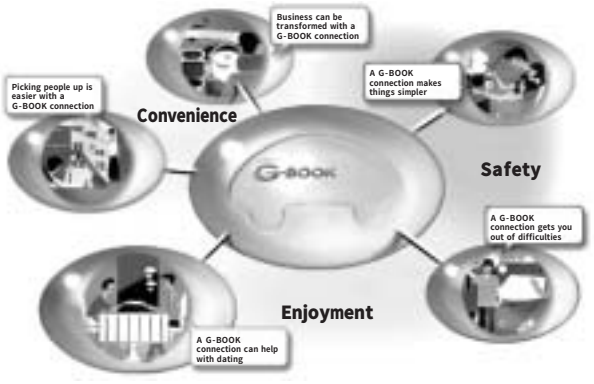

Fig.1 G-BOOK concept

2.1 System Overview from the Center to the in-vehicle terminal

Fig. 2 is a schematic outline of the G-BOOK service and its system configuration. The in-vehicle equipment receives content transmitted from the G-BOOK Center, via a DCM (Data Communication Module) or the user's cell phone. Also, the G-BOOK terminal is able to share information with a PC, portable terminal, cell phone or similar via the G-BOOK Center.

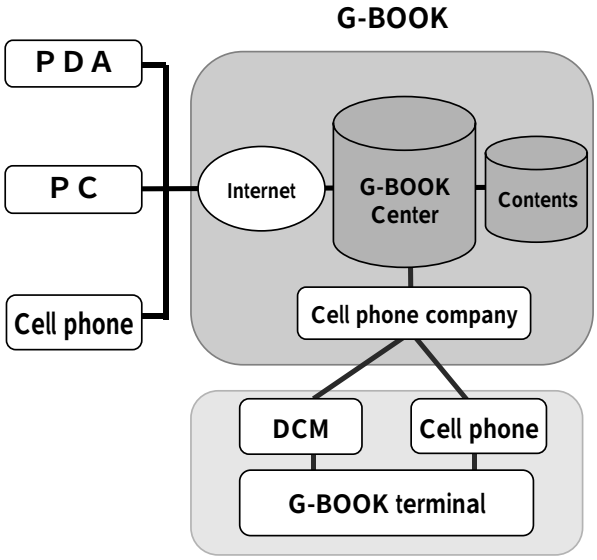

Fig.2 Outline of G-BOOK service and system

2.2 Overview of G-BOOK services

The services that G-BOOK provides can be classified into 6 categories. Each category is briefly described below in turn.

①Live navigation

This service enables drivers to check out the latest hot and topical places using their navigation systems, and to set them to destinations from the place search.

②Information

This service provides various information that users need to know at any time, such as news, weather forecasts, stock markets and bank account information. Such information can be searched and displayed in real time. What's more, it can be simultaneously read out by a synthesized voice.

③Entertainment

This service permits enjoyment of games, horoscopes and similar entertainment inside the users' cars.

④Communication

This service enables users to send and receive e-mails from their home or office etc., and exchange information with friends on messageboards.

⑤Safety and security

A variety of services are available in this category, including road service introduction, parked car position checking and insurance information.

⑥E-commerce

This service makes "GAZOO" online shopping available from the users' cars.

2.3 Using G-BOOK inside a car

G-BOOK has the following functions to enable the above services safely and easily in the car.

①MY REQUEST

MY REQUEST permits information to be requested

by means of simple operations even while driving. It also enables requested information to be read out by synthesized voice and displayed on maps in the form of icons. This function provides for safe use of the in-vehicle terminal during while driving.

②Vocal command

This function enables the use of vocal commands to give instructions regarding G-BOOK content and functions. This promotes safe use of the terminal while driving, as it reduces the need for manual operations.

③Operator support service

This enables users to contact an operator at the Center hands-free. The operator can be requested to make the in-vehicle terminal's settings or search the information, etc., and will transmit the results to the terminal. This permits simple utilization of G-BOOK even by persons unaccustomed to operating the in-vehicle terminal.

3 G-BOOK browser functions

3.1 G-BOOK content display function

The G-BOOK browser has a function for displaying the content broadcast from the G-BOOK Center. Content is displayed on an HTML basis, and various manipulations of the displayed content are possible, such as highlighting buttons by touching them; jumping to other content pages, etc. (Refer to Fig. 3).

Fig.3 G-BOOK content

3.2 Synthesized voice functions

On receiving specially formatted text data with intonation indications from the G-BOOK Center, the G-BOOK browser can read such data out via voice synthesis. Such read-outs can be implemented automatically, and with the browser can jump automatically jumping on to read out another content automatically after vocal recital item or items as soon as it has finished the first one. Thus this function can, for example, be used to have the browser recite read out multiple news items from different pages consecutively (Refer to Fig. 4).

Fig.4 Display while 1st item is being read out

3.3 Navigation linkup functions

①G-memorized locations

G-memorized locations are available for downloading from the G-BOOK Center. These memorized locations can be searched to find facilities in the neighborhood of a user's current location or destination, etc. Facilities (locations) found through such searches can be displayed on maps. New additions can also be made to the memorized locations (refer to Fig. 5).

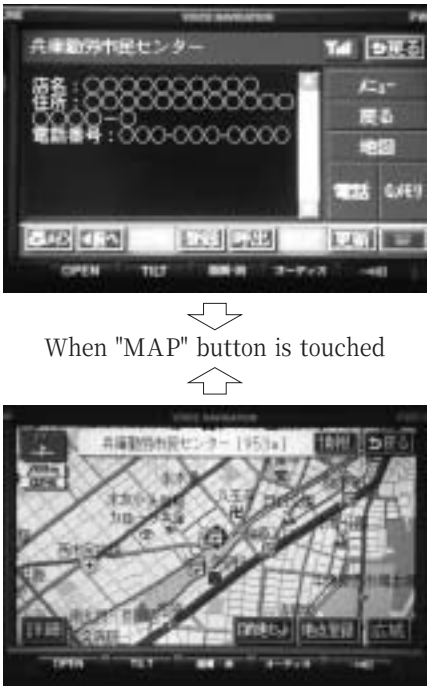

Fig.5 Displaying of memorized locations on navigation map screen

②Destination setting

Facilities located in searches of the Center can be set to as destinations in the navigation system.

3.4 Automatic accessing function

This is a function whereby the terminal automatically accesses the G-BOOK Center according to a schedule that is set by the G-BOOK Center in advance. To users this will seem as though information is being received automatically from the G-BOOK Center.

3.5 E-mail transmission/reception functions

These permit e-mails to be sent from and received by the in-vehicle terminal. The terminal does not have a mailbox. Rather, the system employs mailboxes for individual users which are installed at the G-BOOK Center, in a manner similar to web e-mail setups. E-mails can be read out using the "voice read-out functions" described in 3.2 above.

Fig.6 E-mail screen

3.6 Restrictions on displays and operations while driving

These functions restrict the range of browser displays and operations that are possible while driving. The purpose is to ensure safe driving by blocking displays of movies and content images that might distract the driver (Refer to Fig. 7).

〈When the vehicle is stopped〉

〈When the vehicle is moving〉

Fig.7 Function for restricted displays during travel

4 FUJITSU Group's engagement

In conjunction with FUJITSU LIMITED, FUJITSU TEN developed a browser for the G-BOOK service commercialized in 2003. This browser was based on an Internet browser developed by FUJITSU LIMITED, with the features listed below.

①It introduces an "Abstractive Platform" that permits it to be easily installed to diverse CPUs and operating systems.

②It introduces a "Browser Construction" which enables it to easily accommodate various different display resolutions, supported languages and text codes, etc., to match to the specifications of the installed equipment.

More detailed descriptions of these features are given below.

(1) Abstract platform

Broadly speaking, the G-BOOK browser's software is divided into a browser core component and a G-BOOK specific component. "Abstract" platform layers for absorbing the parts that are platform-dependent have been introduced to serve as the lower-layers of these components. This makes it possible for the software built on the abstractive platform layers to be developed without regard to differences between platforms. In the present development we installed the browser in 4 different types of platforms simultaneously.

(2) Browser Construction functions

The newly-introduced "Browser Construction" enables the browser to easily accommodate the differences in display resolution, supported languages and text codes among different equipment. It further permits additions of new setting functions and changes to display resolutions, etc.,. Fig. 8 gives a schematic of Browser Construction, and Table 1 lists the customized functions that it provides.

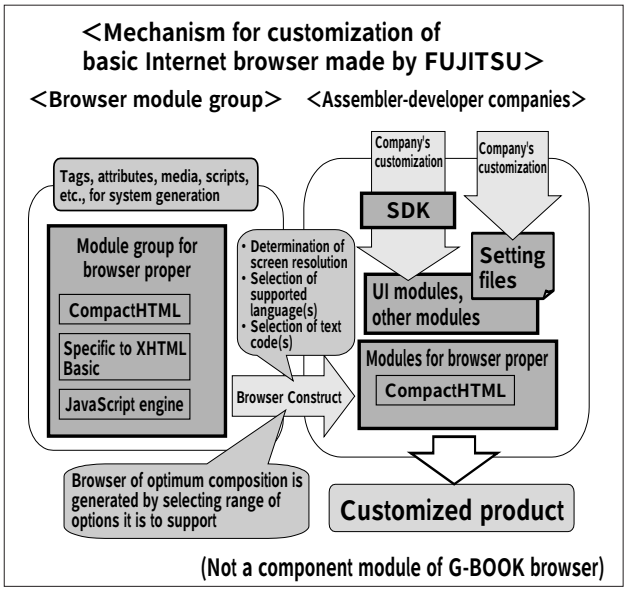

Fig.8 Schematic of browser construction

Table 1 Function for customization with browser construction

File name	Content of customization
SML file	Alteration of browser's screen configuration
Configuration file	Specification of various data required for browser's operation ・Number of histories, etc., that can be stored ・Amount of memory used ….
Default preference file	Specification of standard values for data alterable from the browser ・Homepage URL ・Size of displayed text
Dialog resource file	Specification of dialog box sizes, and of character strings displayed inside dialog boxes
Message resource file	Specification of message box sizes and types, and of character strings displayed in them
Menu resource file	Specification of options displayed in pop-up menus

5 Future endeavors

The G-BOOK browser still has the following 2 main issues:

①In order to assure driver safety, there are restrictions on the extent to which the browser can be used while driving (control operation restrictions). Such restrictions mean that the information provided while driving is also restricted.

②The volume of communication between the Center and the in-vehicle equipment needs to be reduced.

Regarding ① we will examine vocal control of the equipment by means of voice synthesis and voice recognition, plus control methods that permit a more flexible approach for the operation restrictions while driving.

Regarding ② we will study ways of reducing the procedures used for communication between the Center and the in-vehicle equipment, plus efficient utilization of caches.

6 Conclusion

We will be introducing various kinds of software to match future market trends.

For instance we are looking at expanding the browser's service capability in new ways such as: ① screen design with sophisticated texture and sensibility appeal; ② updating or adding the in-vehicle equipment's applications from the Center ③ upgrading the user interface in line with ② and ④ introducing mechanisms for software version management.

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・ Registered trademarks
"G-BOOK" FUJITSU TEN LIMITED
"CARWINGS" Nissan Motor Co.,Ltd.
"internavi premium club" Honda Motor Co.,Ltd.
"GAZOO" Toyota Motor Corporation

Profiles of Writers

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Entered the company in 1989. Since then, has been involved in the development of the G-BOOK browser since 2001, through the development of displays for automobiles. Currently in the G System Integration Department of Engineering Division 1 Business Division Group.

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