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Special Reports I

ITS Application Systems

*Aiming at the Growing ITS Market

EHARA Minoru

*Trends in ITS Application Systems

SOGABE Masami MASUDA Hiroshi CHIKAHISA Iwao

Almost a decade has passed since Japan, the United States, and Europe started to develop intelligent transport systems (ITS) as the world's major players in this field.

Currently, the environment of ITS is greatly changing. One reason is that ITS has evolved from the era of R&D and entered the era of deployment and business.

Another reason is that the information technology (IT) revolution is significantly influencing ITS systems and technologies.

This paper first describes the recent trends in ITS as seen in the strategies and activities of the three major players, then secondly explores the many new possibilities for ITS brought about by the Internet, and finally discusses future directions that will give birth to a growing ITS market.

*Pedestrian Information Support System

UENO Hideki SHIBATA Yasuhiro OHNO Akifumi

It is said that intelligent transport systems (ITS) will revolutionize society in the 21st century, and they are expected to become a social system in the near future supported by advanced digital network communications technology.

As part of the ITS project, we have developed the "Amagi-Yugashima Town Human Navigation System®." This system is not limited to home and office use, but also realizes convenient communications for pedestrians available "to anyone, anytime, anywhere."

*Physical Distribution Information Systems Applying ITS Technologies

ARAKI Kuniyuki

About 90 % of domestic cargo transported in Japan is carried by truck. Truck transportation has therefore been significantly contributing to the country's economic development. Recently, however, the environmental problem of exhaust gas emissions has come to the forefront, leading to the need for an improvement in truck transportation efficiency. The improvement of cargo transportation efficiency is being promoted by ministries and agencies related to intelligent transport systems (ITS); namely, the Ministry of Construction, Ministry of International Trade and Industry (MITI), Ministry of Transport, Ministry of Posts and Telecommunications, and National Police Agency.

Toshiba has developed a physical distribution information system for household electric appliances and a recycling physical distribution information system for discarded household electric appliances applying ITS technologies, utilizing the supplementary budget of MITI for fiscal 1998. These systems will form the basis for future models.

*On-Demand Bus Development toward Advancement of Information Technology in Bus Operations

KOKUBO Hiroto KOJIMA Fumio MUROYA Yasuo

In order to resolve the various problems involved in public transit, especially public transit bus services, there is great demand for means that provide highly convenient transportation facilities corresponding to the rapid growth in the elderly population and that promote the improvement and application of convenience in public transit services.

As a measure to vitalize public transit use, a project focusing on on-demand bus services is being undertaken. This project is actively adopting the technologies of intelligent transport systems (ITS), which are expected to provide good cost-effectiveness. Comprehensive measures will be implemented to arrest the decline in public transit in order to assure the permanent availability of affordable means of transportation.

*Intelligent Multi-mode Transit System (IMTS)

NAKAZAWA Shinichiro

The Intelligent Multi-mode Transit System (IMTS) is a medium-scale bus transportation system in which buses incorporating the latest technologies of intelligent transport systems (ITS) are equipped with automatic driving and automatic collision prevention functions.

Toshiba has taken charge of the safety (block control) system which ensures safe driving of buses, as well as the control system which carries out smooth and effective operation planning, operation control, and monitoring.

*ITS Application--First Step in Automated Cruise System

MASUDA Hiroshi MIZUTANI Mami KIMURA Masahiro

"System Architecture for ITS in Japan" released by the five government bodies related to intelligent transport systems (ITS) defines user service 7, "Automated cruise." In order to establish technologies that realize, in particular, sub-service 62, "Parking automatically in a parking lot," we developed and conducted experiments on the Advanced Parking Assistance System and an automatically controlled micro car.

It was confirmed that the Advanced Parking Assistance System is able to support the driver in parking in a marked space by means of a path planning algorithm and advanced human-machine interface, and that the automatically controlled micro car can drive automatically in a designated area.

*Second Car System in Residential Area Using ITS/EV

SUZUKI Katsuyoshi MURAMOTO Toshiaki NAKAMOTO Toshiaki

It is necessary for public transportation systems to be used more to reduce traffic congestion and environmental pollution as well as to make community life more convenient. In order to realize this, we participated in the development of a new transportation method applying the characteristics of the electric vehicle (EV) and intelligent transport systems (ITS); that is, a second car system in a residential area using ITS/EV. This is a system in which inhabitants of a suburban residential area jointly use EVs as second vehicles. The system employs several ITS technologies such as navigation, certification by IC card, and so on.

To verify the possibility of actual use, we conducted an experiment using housewives in the Tama New Town area as monitors. As a result of this experiment, we confirmed that sufficient demand exists for such a system depending on its operation. We will study the commercialization of the system from now on.

Special Reports II

Visual Supervisory Control Systems Integrated with Multimedia

*Supervisory Control Systems in the Internet Era

INOUE Shinichi

*Trends in Visual Supervisory Control Systems Integrated with Multimedia

MASAKI Toshio KARASAWA Takashi

Information technology, including Internet-related technology, has been progressing in the open, global market. The areas of application have expanded to include multimedia such as voice and images, networks, and information processing. Toshiba has already achieved many actual results and received high evaluations in the field of visual monitoring systems. Now we have developed a visual supervisory control system which unifies camera monitoring image information and numeric data, such as that obtained from sensors and telemeters, on a network and integrates multimedia information on a World Wide Web server. This system is contributing to the maintenance of public infrastructure.

*Supervisory Control System for River Management Facilities

ITO Yasuyuki NEMOTO Hiroyuki WAKAMATSU Kunio

The installation of optical fiber in river basins is progressing rapidly, and demand is arising for the advancement of river management operations. Toshiba has recently commercialized a system that integrates river information system technology, closed-circuit television (CCTV) video acquisition and distribution technology, and network technology, and performs remote supervision and control from a terminal of an overall river, including river management facilities such as sluices, floodgates, etc. which have conventionally been individually supervised and controlled from multiple terminals. We have installed the system at the Sendai Works Office of the Ministry of Construction.

Among the features of this system are the fact that information can be shared simultaneously on several PCs connected to the network, without limitations on the location, by using Internet protocol (IP) technology for multimedia information on sites such as river information data and image data, as well as the adoption of a Web browser system.

*Generic Middleware Applying Object-Oriented Method

AMAMIYA Takao KANEKO Takumi NODA Kazuo

Generic middleware is a complete component ware for information communication systems using JavaBeans. It has been developed as a middleware to build visual supervisory control systems. This middleware provides a method to build a system by combining software components through a GUI tool without any source coding. System configuration using generic middleware matches object-oriented analysis well, and provides the benefit of enhanced customer satisfaction.

*Wide Area Video Surveillance System Using World Wide Web Technology

YAMAGUCHI Shuichi

Today's video surveillance systems require an ever larger coverage area to increase the amount of information gathered with a smaller labor force. This paper describes a multiple-node wide area video surveillance system based on World Wide Web (WWW) technology. WWW technology increases the flexibility to expand and modify the system and simplifies user operation with an easy-to-use interface. It also preserves the responsiveness of conventional systems to surveillance equipment manipulation commands.

*EM2000 Embedded Multimedia Server/Client

TAKAYASHIKI Ryuichi

The embedded multimedia server/client (referred to hereafter as "EMM server/client") is a LAN-compatible product used for configuring an IP network integration system. Such systems are now rapidly expanding. With the capability to compress real-time visual data by JPEG and to transmit a maximum of 30 frames per second as its main functional features, the EMM server/client uses a mainframe that complies with CompactPCIh standards and is equipped with PCI slots for interface expansion. By inserting accessory devices such as a contact I/O connector and a serial interface card into these slots, the EMM server/client can be applied to a wide range of systems including camera control, in-house monitoring control, and ISDN connection.

Using the EMM server/client as the core product, further system development is expected in the future by increasing the varieties of interface cards available as well as improving their performance and quality.

*MC5000 Fiber-Optic High-Speed PTZ Camera

SHIMURA Hideyuki SUZUKI Hiroaki SUZUKI Hisanori

From the standpoint of devising easier methods of installation and promoting better harmonization with the environment, the market demand for monitoring cameras that serve as the terminal units for closed-circuit television (CCTV) and industrial television (ITV) systems used for visual monitoring and communication is becoming increasingly oriented to smaller and lighter models.

Our efforts to respond to these growing needs have been successfully materialized in the form of our newly developed model MC5000 fiber-optic high-speed PTZ (pan tilt zoom) camera. This monitoring camera is a product composed of various units including the color camera, a zoom lens, camera case, rotator, and optical transmission unit. By downsizing each of these components and integrating them wherever possible, we were able to succeed in making the overall size of this new product much smaller than the preceding models.

The MC5000 fiber-optic high-speed PTZ camera is designed to be capable of transmitting visual and control signals directly, without any relay, for distances of as far as 40 km away, using a two-core optical fiber. With conventional systems, it has been very difficult and therefore quite costly to perform real-time monitoring operations for remote locations. On the other hand, the outstanding performance of the MC5000 allows users to significantly reduce the total cost of such operations, while at the same time taking advantage of its greatly improved reliability that is unmatched by any other previous models.

*New Telemeter/Alarm Supervisory Control Equipment

TANAKA Kazuyuki NARITA Takeshi MOMOSE Akira

The intensity of natural phenomena such as wind, rain, and snow has a significant effect on the living environment. It is therefore important to collect information on such natural phenomena and supply it to people living in mountainous areas and in the vicinity of rivers. A telemeter system collects information from telemeter observation stations on rainfall water levels and river depth levels and performs supervision from a remote office. A water discharge alarm system provides warning information before the discharge of water from a dam.

We have unified the telemeter system and water discharge alarm system into a new system. The new telemeter/alarm supervisory control system offers high reliability and operability, supports the specifications of the former systems, and enables expandability such as by a LAN.

Feature Articles

*Visual Inspection System for Semiconductor Chips

IMI Satoshi

Accompanying the downsizing of information devices, the use of mounting systems in which semiconductor chips are directly bonded to the substrate has spread. The necessity of inspecting for dust and cracks on semiconductor chips has consequently been increasing.

We have developed a visual inspection system in collaboration with Topcon Corp. and Asia Electronics Inc. This system detects defects at a sensitivity of 5 micrometers, with an inspection time of 14 minutes (for a 6-inch wafer). With a newly developed image-processing algorithm that rejects misalignment noise by repositioning in the local area, we attained a rate of judgment coincidence with human inspection of 99 % or more.

*Development of Nursing Care Insurance Support System GUI Using Iterative Design

KUWABARA Yugo NAKAHARA Michihiro KONDO Masafumi

User interfaces for products and systems should be easy to understand and use. Because communications between users and computers are exchanged via graphical user interfaces (GUIs) for products and systems using computers, the design (the planning of communications and screen design) of GUIs has a great impact on the ease of understanding and use. Toshiba's adoption of "iterative design," in which the process of making trial products of prototypes and gathering users' evaluations is repeated in the development of GUIs until we are sure that there are no problems, gives us the capability to develop better GUIs for products and systems within a shorter period of time.

In order to develop a support system for authorization of the necessity of nursing care in the wake of the introduction of the nursing care insurance system from April 2000, we first conducted task analysis, user surveys, and prototyping. We then repeated the evaluation of the responses and solutions through the iterative design process, provided suitable layouts, and developed "ALWAYS J," which is a more visually presentable and easier to use system.

*Evaluation Technique for Irradiated Materials Using Advanced Positron Annihilation Spectroscopy Method

KANO Fumihisa KAWAI Akio

With the increasing demand for light water reactor plant life extension, more accurate nondestructive analysis of material degradation is required in order to evaluate the integrity of plant component materials. We have developed the advanced positron annihilation spectroscopy (PAS) method for the materials of a reactor pressure vessel (RPV), based on the conventional PAS method that has been used for the study of point defects in crystals.

In the development process, the focus in terms of hardware was placed on the gamma-ray measurement system. In terms of software, the measurement procedure was carefully determined to reduce the noise level, and the evaluation parameter was properly defined based on the degradation mechanism of the material. As a result, the highest accuracy is obtained independently of the measurement conditions. This is considered to be a great advantage for nuclear reactor components, which are occasionally highly radioactive.

Utilizing the new system, we analyzed the degradation of simulated model alloy of RPV steels and found that the new parameter Sf obtained by the advanced PAS method had a good correlation with the parameter obtained by the mechanically destructive test method.

Techno Notes

*Batteries

Epoch-Making Toshiba Technologies

*10. Fluorescent Lamp