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Special Reports

Advanced Audiovisual Technologies Creating New Markets

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Special Reports

Advanced Audiovisual Technologies Creating New Markets

*New AV Products and Technologies to Integrate the Broadcasting and Communications Networks

TANABE Masato

*Technical Trends in Digital Audiovisual Products

OGAWA Shigeo SAKURAI Masaru

Many new types of audiovisual (AV) products based on digital technologies have recently appeared on the market. Personal computer technologies are utilized in these products in many cases. Moreover, advanced semiconductor technologies enable complicated digital signal processing to be realized in an economical manner. The infrastructure of the digital world such as digital broadcasting and the Internet is making the birth of these products possible. New displays have also come out that are further activating the digital AV market.

This paper describes the latest trends in digital broadcasting, home networks, recording media, and displays.

*TransCube™10 Wireless Home Media Station

SATO Shigenobu SENOO Tomonori

Up to now, an antenna line has been necessary when watching television on a notebook PC, hindering the free movement of the PC. Moreover, if the notebook PC is operated during TV recording, the functioning of the CPU or hard disk drive (HDD) is interrupted and recording on the HDD is not properly performed.

Toshiba has developed the TransCube™10 system, which enables wireless transmission to a notebook PC in order to facilitate TV viewing. TransCube™10 was developed based on TV, PC, communication, and storage technologies.

*ep station™

IWAI Keisuke OKITSU Shinobu

In July 2002, ep Corporation launched a new interactive storage service using 110° communications satellite (CS110°) digital broadcasting. The ep service combines storage service and interactive communications service via the Internet, automatically storing broadcast programs and information on a hard disk drive (HDD) built into the receiver.

Toshiba has developed a broadcast satellite (BS) and CS110° digital broadcasting receiver with a built-in HDD called ep station™ (model EP-T100). This receiver has various original Toshiba features while meeting the ep service specifications.

*FACE™ 15ZLC7 LCD TV

MUTO Kazuhiro IZU Yuichi ISHIKAWA Masahito

Toshiba launched the FACE™ 15ZLC7 LCD TV on the Japanese market on May, 2002. This product features a newly developed LCD panel (high-brightness XGA panel) especially for TV use. Compared to conventional LCD TVs, the new panel offers superior picture quality that is close to that of a CRT model due to the adoption of original Toshiba technologies; namely, a novel antidiusion treatment for the display surface, and high-purity red, green, and blue filters. The new product accommodates the circuitry in its base, thereby achieving a thinner design for the panel section.

*GIGABEAT™ Portable HDD Audio Player

HOSHINO Kiyoshi MOROHOSHI Toshihiro IWASAKI Yuuji

GIGABEAT™ is a new digital audio player that supports playback of MP3, WMA, and WAV audio data. Approximately 1,000 audio data can be stored in its Mobile Disk (removable PC card hard disk), which has a capacity of 5 Gbyte. It is equipped with a USB 2.0 device port, which has much higher performance than USB 1.1. The audio data of a CD can be transferred from a PC to GIGABEAT™ in only 30 seconds. GIGABEAT™ can play more than 18 hours continuously thanks to its low power consumption design and advanced lithium-ion battery.

*Bluetooth™ Disk HOPBIT™

OHMI Takao KAWAGOE Seiji

The Bluetooth™ disk HOPBIT™, a hard disk drive (HDD) with Bluetooth™ wireless technology, saves data to a 5 Gbyte 1.8-inch hard disk. It can store almost 37 hours of MPEG-4 moving images or 1,000 pieces of music, but is small and light enough to slip into a shirt pocket. The integration of Bluetooth™ is expected to promote widespread use of Bluetooth™ disks, as it allows wireless downloads, uploads, and transfers among a wide range of Bluetooth™-enabled products including TVs, cellular phones, PDAs, PCs, and digital cameras. The Bluetooth™ disk enables users to capture and save data as diverse as TV broadcasts, music files or map information and download them to a PC or PDA, allowing access anytime to the stored data. The Bluetooth™ disk opens the way to wireless transmission across a wide range of digital products, and is expected to promote the development of wireless mobile networks.

*30 Gbyte/Side Rewritable Optical Disc Utilizing Blue Laser Diode

WATABE Kazuo

Optical discs such as CDs and DVDs are now widely used as recording media for personal use. With the recent introduction of broadcast satellite (BS) digital broadcasting services in Japan, people can now watch high-definition television (HDTV) at home. This is creating strong demand for a next-generation optical disc that is capable of extended recording of HDTV programs.

To meet these requirements, Toshiba has developed a rewritable optical disc system utilizing a blue laser diode. It has been experimentally confirmed that this system can store 30 Gbyte per side with the land and groove recording method and partial response maximum likelihood (PRML) signal processing technology. We will also move forward with standardization processes.

*Audio/Video Streaming Technologies and Demonstration System

YONEDA Hitoshi YAMADAJI Shinji OKUYAMA Takehiko

Since broadband Internet can easily transmit high-quality audio/video streams, there is increasing demand for broadcasting services utilizing this medium. Moreover, by connecting digital audio/video appliances via the Internet, they can easily communicate with each other by real-time or non-real-time audio/video streams. Audio/video streaming technologies will realize these new applications in digital audio/video appliances.

Toshiba has developed a system for demonstrating audio/video streaming technologies, and verified that real-time audio/video streams can be transmitted through a gateway connected to the Internet.

*Home Digital Content Protection Technologies

TANAKA Akio YAMAKAGE Tomoo MURATANI Hirofumi

Digital audiovisual appliances must protect copyrighted contents that are played and recorded on them. This paper describes recent encryption-based protection technologies and an emerging new information-embedding technology called the digital watermark.

Feature Articles

*Frequency-Domain Quantum Computer with Solid-State Structures

ICHIMURA Kouichi

Quantum computers promise to exceed the computational efficiency of classical computers by using fundamental and characteristic properties of quantum mechanics, such as superposition states and quantum interference. However, real physical systems necessary for practical implementation of quantum computers are still being sought.

Toshiba has proposed a quantum computer where quantum bits (qubits) are defined in the frequency domain and interaction between qubits is mediated by a common cavity mode. In this quantum computer, qubits can be individually addressed regardless of their positions. Therefore, randomly distributed systems in space such as ions in crystals, with which Toshiba has already succeeded in the formation of superposition states, can be directly employed as qubits.

*CS-700 Currency Sorter

UNO Teruhiko AOKI Takeshi KURU Ayumu

In January 2002, the euro was introduced as legal tender in 12 nations of the European Union. The circulation of this single currency across the euro zone presents the creation of a new market. Currency sorting systems in Europe were formerly customer-specific depending on the country, but now can be supplied in accordance with one unique standard. The market potential is now considered to be equal to that of the United States. Currency sorting in Europe requires the proper sorting of notes facing in four directions into a single orientation, inspection of the authenticity properties of the euro, and secure transport of the different sizes of notes.

The CS-700 currency sorter, recently developed and commercialized by Toshiba, applies a switchback mechanism, on-line strapping units, and a detector unit capable of sensing multiple currencies. This machine provides the most efficient solution to cash management.

*TC-net™ 100 Time-Critical Control Network and Its Application

UMEDA Yuji KOHNO Shinya OKANIWA Fumihiko

An industrial automation system consists of three layers of networks, in which the control network is positioned as the middle network. Deterministic data communications responses are necessary in this control network. Moreover, openness and low cost are required.

Toshiba has developed the TC-net™ 100 time-critical network in order to meet these needs and has constructed a network system that provides a reliable control network for an industrial automation system. The TC-net™ 100 enables system succession from the existing control network, and renewal of the user system can be easily implemented.

*“Thēra” Pocket PC with Integrated CDMA2000 1X Wireless Voice and Data

KAYATA Haruhiko INOUE Akifumi AMANO Masataka

Toshiba started to ship a pocket PC with an integrated CDMA cellular phone in May 2002. This is the world's first device with CDMA2000 1X communication capability, and enables the user to receive a call while listening to stereo music using earphones and surfing the Web. It has physical dimensions of 127.5x77.5x19.5 mm, and weighs 199g.

We studied three major areas in developing this pocket PC: (1) reduction of interference noise from the main control circuit board, (2) development of a compact wireless module, and (3) operability for data and voice communication.

*FePtCu Film for High-Density Magnetic Recording Medium

KIKITSU Akira MAEDA Tomoyuki AKIYAMA Jun-ichi

Thermal fluctuation has become a serious problem for high-density magnetic recording media. FePt ordered alloy, which has high magnetic anisotropy energy, has been attracting attention as a possible means of overcoming this problem. However, for this material to be used as a magnetic recording medium, it is necessary to reduce the ordering temperature from 600 °C to 300 °C. We have found that the addition of Cu to FePt reduces the ordering temperature. In fact, FePt thin film with higher anisotropy energy than that of conventional recording media can be produced by annealing at a temperature as low as 300 °C.

Precise experiments and an investigation of thermodynamics have revealed that the reduction of the ordering temperature is due to enhancement of the driving force of the disorder-order transformation. Cu dissolves into the FePt crystals and is placed at the Fe site of the ordered FePt phase.

*Refurbishment of Existing Pump-Turbines in Aging Pumped Storage Power Plants

MATSUMOTO Kiyoshi SUGISHITA Kaneo TEZUKA Kotaro

Pumped storage power plants can accumulate electricity and respond rapidly to the demands of the electric grid system. They have therefore played an important role in the stable operation of the electric grid system. However, some of these plants have been in operation for many years since their commissioning. Such aging plants can be refurbished using recently developed hydraulic design technology, thereby improving their hydraulic performance and contributing to the optimal operation of the electric grid system.

*Aplio™ SSA-770A Workflow-Oriented Diagnostic Ultrasound System with Imaging and Quantitative Technologies

YOSHIKAWA Noriaki

The Aplio™ SSA-770A diagnostic ultrasound system is on a new platform realized by developing the whole architecture from the front end (transducer and ultrasound transmitting and receiving parts) to the back end (signal processing and display parts). This system enables workflow based on the clinical examination and features various types of imaging technology to enhance the image quality and add new value to the diagnosis such as ultrasound contrast agent imaging, as well as application software that assists in diagnosis by quantifying the clinical data. The Aplio™ SSA-770A is useful for both clinical and research use.

Techno Notes

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