

Measurement and Control Systems

New Deployments of Measurement and Control Systems

MURAI Michio

Trends in Measurement and Control System Equipment and Future Outlook

TAKAYANAGI Yoichi / TARUIISHI Hajime / MIZUTANI Masamichi

Toshiba distributed control system (DCS) have shown remarkable development through the application of state-of-the-art technologies since the introduction of our TOSDIC™ in 1975. In particular, we have been promoting the integration of controllers, which are the core of the system, used in various fields. We achieved the integration of controllers for instrumentation and electrical control with the process control station (PCS) controller of the CIEMAC™ (TOSDIC™-CIE for overseas markets) computer, instrumentation, and electric control (CIE) integrated control system in 1989, followed by the integration of process automation (PA) and factory automation (FA) control with the Integrated Controller V-series in 1999. We have now developed a new controller platform aimed at the integration of controllers in the power system field.

Development of New Industrial Controllers

KUSAKABE Hiroyuki / TOKO Makoto / UMEDA Yuji

Toshiba has developed the Unified Controller nv series, new industrial control equipment which are the core components of control systems used in various fields including general industry, social system, and power plant. Reliance and safety have been achieved in these controllers through the use of high-reliability components and the speeding up of execution and transmission performance. Furthermore, maintainability and robustness have been improved by a fully remote input/output (I/O) configuration and a double loop duplex with a high-speed serial bus. In addition, the expansion of applications and integration with existing systems have been realized by inheritance of the program language in accordance with IEC standard 61131-3, the engineering tools, and the TC-net™ 100 real-time network that are features of the conventional Integrated Controller V series.

Reliability Technologies of Industrial Computers

HARUYAMA Hitoshi / AZUMA Takao / GOTO Tatsuya

Industrial computers must provide uninterrupted operation 24 hours a day, 365 days a year, while offering high reliability for stable operation. Although their basic hardware configuration is equivalent to that of a general-purpose computer, the design standards and margins of industrial computers are modified in order to improve the reliability. Moreover, since they often operate in an adverse environment, both appropriate thermal design and parts selection are important to secure stable long-term operation. Toshiba has achieved improved reliability by incorporating the reliability technologies described above into various models such as the FS5000 industrial server equipped with the Intel® Xeon® processor, which is our highest level industrial computer; the CP10 small embedded computer; and the FA3100A model 8010 industrial PC equipped with a WindowsNT® 4.0/Industrial Standard Architecture (ISA) bus, which can handle legacy systems.

Latest Field Measurement Technology

KANEKO Hiroyuki / NAKAMURA Takaki / KIKUCHI Hiroshi

Sensors used in the field for various manufacturing processes can be classified into quantitative sensors and qualitative sensors according to the objects of detection. Examples of quantitative sensors include sensors of gas and liquid flows, pressure, level, and temperature, while examples of qualitative sensors include water quality meters such as density meters. Toshiba's main products in the industrial sensor market are electromagnetic flowmeters and microwave density meters. In order to improve the maintenance of microwave density meters, we have developed a new insertion type meter whose antenna is easy to disassemble. Moreover, the new model adopts PROFIBUS, the globally popular fieldbus for digital communication of process control.

Thickness Measuring Technologies for Steel Rolling Lines

OKUMA Shigeyuki / OBARA Satoshi / NISHIKAWA Masamitsu

Technologies to measure the thickness and form of steel, copper, aluminum, and so on are essential to verify rolling control theory in a steel rolling line and to improve the quality of the products and productivity of the rolling control process. Toshiba has been developing special measuring devices for rolling based on customers' requirements for more than 50 years since the introduction of the β-ray thickness gauge in 1955. Recently, there have been many requirements for the quality assurance of hot rolling and control accuracy of cold rolling in China. In Japan, emphasis is placed on achieving accuracy on the order of mm for measurement from the edge of the metal sheet and realizing compact equipment with multiple functions. We are developing and manufacturing products to meet these requirements and satisfy customers' needs.

Monitoring and Control of Buildings, Roads, and Airports

ISAHAI Yuji

Toshiba monitoring and control technologies have been widely introduced in various forms of social infrastructure such as buildings, roads, and airports. In the field of buildings, a major issue is to reduce energy consumption without diminishing the amenity of users. On the other hand, roads and airport facilities have a strong need for technologies that enhance the safety and security of automobiles and aircraft operations. We have developed monitoring and control technologies responding to the needs and challenges of contemporary society. We will continue to fulfill our responsibility by further refining and improving our technologies.

System Concept and System Solutions of Next-Generation Total Integrated Control System

KOIKE Tatsuro / SUGIMORI Hisayoshi / NEGISHI Yasunori

Flexible and highly efficient operations are strongly required in various general industrial fields such as manufacturing plants for chemicals, paper, iron, materials, and foods. Toshiba Mitsubishi Electric Industrial Systems Corporation has been supplying many types of system solutions based on customers' requirements and state-of-the-art technologies. Our new instrumentation engineering tools, which are based on a computer-aided design (CAD) editing system, have documentation management and project management functions to facilitate easy utilization of the control system applications. Optimal energysaving operation using by the model-driven proportional-integral-derivative (PID) control system and the optimum server are breakthrough solutions for conventional energy-saving activities.

Advanced Control Systems for Steel Plants Utilizing High-Performance Technologies

SAWADA Naotada / TEJIMA Mitsunobu / TANAKA Seiichiro / KONO Shinya

Highly advanced technologies are being used for steel rolling plants in order to manage the huge volume of process data required for high-speed control response and precise product quality. The control system of such plants must therefore offer both high performance and excellent functionality. In addition, consistent standardization throughout the system, from engineering to commissioning at the site, is indispensable to ensure the high quality of the control system and to contribute to the stable startup of plant operations. Toshiba Mitsubishi-Electric Industrial Systems Corporation is supplying control systems for steel plants that can handle both high added value and standardization technologies, thus providing maximum benefits to the user.

Feature Articles

Magnetoresistance Effect Based on New Principle in NiFe Nanocontacts

OHSAWA Yuichi

Toshiba has developed a fundamental technology for read heads for hard disk drives having a recording density in the terabit per square inch (Tbpsi) class. The new technology is based on the magnetoresistance (MR) phenomenon through magnetic nanocontacts manufactured by our original fabrication process and our original MR measurement methods. An MR ratio as large as approximately 140% was successfully achieved by a test element formed in sputtered nickel-iron (NiFe) thin film at room temperature.

By applying this technology to actual read heads, it will be possible to improve the data transfer rate and power consumption compared with tunneling MR heads using a magnesium oxide (MgO) barrier, which are currently being developed as next-generation read heads.

Distributed Antenna System for Indoor Coverage of Mobile Phone Base Transceiver Stations

YAMASAKI Yutaka / YOSHINO Tadayuki / MASAKI Katsumi

As mobile phone services advance from the 3rd generation to the 3.5th generation, data transmission rates are increasing and service contents are changing to predominantly data communication applications such as website browsing. Users' requirements are consequently expanding, particularly to indoor use anytime and anywhere.

Toshiba has been supplying a variety of indoor coverage systems that distribute a base transceiver station signal to antennas for mobile phone operators. We have now developed a distributed antenna system that is capable of extensively expanding indoor service areas while at the same time realizing greater stability of quality as well as downsizing.

Multimode Doherty Power Amplifier Module for Mobile Terminals

KATO Takayuki / YAMAGUCHI Keiichi / KURIYAMA Yasuhiko

Improvement of the power-added efficiency (PAE) of power amplifiers for mobile terminals is indispensable for calls of long duration.

Toshiba has developed a 4 mm-square miniaturized Doherty power amplifier module for wideband code division multiple access (W-CDMA) mobile terminals. The PAE of the Doherty power amplifier module has been improved from the theoretical PAE of a Class B amplifier; that is, from 21% to 36%. Furthermore, multimode operation corresponding to the uplink of W-CDMA and orthogonal frequency division multiplexing (OFDM) signals for future mobile communication systems has been realized on the Doherty power amplifier module.

Electrical Equipment for N700 Series Shinkansen Train

YOSHIDA Kenji

The N700 series Shinkansen for the Tokaido Shinkansen Line and the Sanyo Shinkansen Line was put into service on July 1, 2007. Toshiba supplied electrical equipment for the mass-produced N700 series trains to Central Japan Railway Company and West Japan Railway Company as a core manufacturer from the beginning of the project.

The N700 series trains have been constructed with state-of-the-art technologies, and our electrical equipment has contributed to the realization of this fast, economical, and comfortable Shinkansen series.

System for Analysis of Rumor Information on Bulletin Board Sites

ANZAI Takanori / SAKURAI Shigeaki

Many rumors and speculations concerning enterprises and their products appear on the sites of bulletin board systems (BBS). It is possible to gain an understanding of the trends in users' requirements and points of dissatisfaction by analyzing such information. With their recent increase in social influence, BBS can also be the source of class actions and other movements. It is therefore important to observe BBS sites at all times and check the rumor information that they contain in order to be prepared for future risks.

To meet these requirements, Toshiba has developed a rumor information analysis system that analyzes rumors related to specific companies and products and reports the analysis results.

FlexClient™ Enabling Secure Environment for Client PCs

UCHINO Masashi / FUNAKI Ryoichi / ENDO Takahisa

With the remarkable progress of their performance and functionality, PCs are now used in various situations including the business world. However, there are numerous security risks in terms of managing the hardware, software, and data on PCs. Thin client systems for mobile computing have a limitation in that the mobility of the client devices degrades performance and functionality. There is a need to create a safe client environment without compromising the capabilities of the PCs. Toshiba Solutions Corporation has developed FlexClient™, a new client security system that makes best use of standard PCs in and out of the office. When the PCs are connected to a LAN in the office, FlexClient™ makes them boot from the network using a centralized, Internet Small Computer System Interface (iSCSI)-based storage and prevents the PCs from storing data on the internal disk drive. When the PCs are offline in a mobile environment, it provides a secure way of using the internal disk drive. Data on the disk are managed from the server. We have deployed FlexClient™ in our systems, allowing us to manage security risks in an Information Security Management System (ISMS)-compliant business environment.

Frontiers of Research & Development

Large-Scale Distributed XML Database Management System

Compressed Cryptosystems on Algebraic Tori