●Growing Stage

IT

(Fiscal Year 2002-2004)

Tsukuba Science City Area

Development of Intelligent Information Technology to Support Urban Life

Tsukuba Center, Inc
2-1-6 Sengen, Tsukuba City, Ibaraki 305-0047 JAPAN
TEL: +81-29-858-6000

Core Research Organizations

University of Tsukuba,
National Institute of Advanced Industrial Science and Technology (AIST)

Major Participating Research Organizations

Industry…Niigata Seimitsu Co., Ltd., Yamamoto System Design, Inc., Hitachi Engineering Co., Ltd. (current: Hitachi Information & Control Solutions, Ltd.), and others
Academia…University of Tsukuba, and Tsukuba College of Technology (current: Tsukuba University of Technology)
Government…National Institute of Advanced Industrial Science and Technology (AIST)

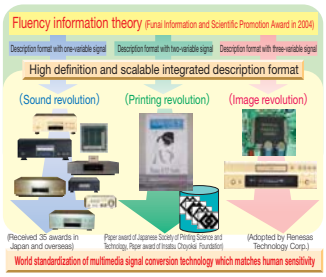
Main Results of City Area Program

1. Application of Fluency Information Theory to Next-Generation Multimedia Products

Signal conversion technology based on Fluency Information Theory was developed and applied to the manufacturing of advanced multimedia products, including high-quality world-class audio equipment, a dialogic DTP system with high resolution and scalability, and image-processing LSI for high-resolution TV.

These achievements have won many awards, including the 4th Funai Information and Scientific Promotion Award, the 30th Inoue Harushige Award, the Nihon Printing Society Paper Award, and the Print Asahi Association Prize, providing opportunities to hold independent sessions at international academic societies such as AUTM.

Moreover, technology based on Fluency Information Theory is highly regarded as the international de facto standard technology for multimedia systems.



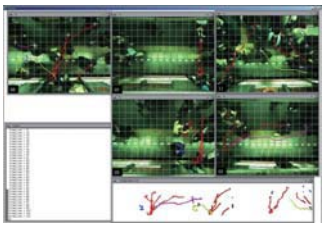
Multimedia revolution through fluency information theory

2.Development of a ubiquitous stereovision device (USVD)

We developed a USVD and submitted a patent application. The USVD enables the automatic and stable extraction of individual moving tracks from real-time scene images taken by stereo-cameras, and enables the automatic analysis of a large amount of time-series image data.

The attainment of the desired properties of the prototype USVD were confirmed by practical feasibility studies conducted at various sites, including a train-station platform, a railway crossing, and a retail store.

The USVD technology was transferred to collaborating enterprises, and contributed to the establishment of a venture enterprise in December of 2004.



Experiment of trajectory acquisition on the edge of the platform in Tokyu Toyoko Line Yokohama Station

Approaches after Completion of Project

The project described above has been succeeded by a new project promoted by a collaboration between Tsukuba University, the National Institute of Advanced Industrial Science and Technology (AIST), and the National Agriculture and Food Research Organization (NARO). The new research theme is “Development of a Ubiquitous Visual Information Surveillance System for Safe and Secure City Life.” This theme will conduct R&D into image-related IT with the aim of improving safety and security for city residents.

1. Progress in the adoption of Fluency Information Theory as the de facto standard for multimedia systems

In terms of the enhanced application of signal conversion technology based on Fluency Information Theory and its adoption as the de facto standard, practical LSIs for processing signal information for individual multimedia (e.g., audio, printing, video, TV) are being produced as part of an industry-academia-government cooperation. We also plan to establish a research-contract venture company based on this technology.

2. Development of intelligent surveillance systems based on a ubiquitous stereovision device (USVD) and other technology

Feasibility experiments regarding USVD were performed over a period of 6 months at the Aichi Expo site, confirming the effectiveness of USDV. Cooperative research has begun with several companies regarding the application of USVD technology to next-generation surveillance systems. In addition, efforts are underway to (1) develop a cubic higher-order auto-correlation (CHLAC) algorithm that enables the automatic detection of anomalous events, and (2) apply this algorithm to intelligent surveillance systems.

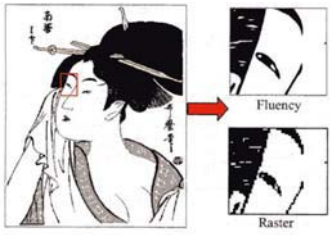
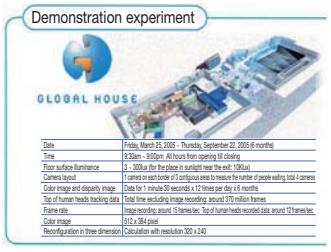


Image enlargement process

Enabling high resolution enlargement of DTP image



Demonstration experiment at EXPO 2005 Aichi

●Growing Stage

IT Nanotech Materials

(Fiscal Year 2002-2004)

Osaka/Izumi Area

Nanostructure Photonics and its Application

Osaka Science & Technology Center
(Technology & Information Promotion Dept.)
1-8-4 Utsubohonmachi, Nishiku, Osaka City, Osaka 550-0004 JAPAN
TEL: +81-6-6443-5322

Core Research Organizations
Osaka Prefecture University, Osaka University,
Technology Research Institute of Osaka Prefecture

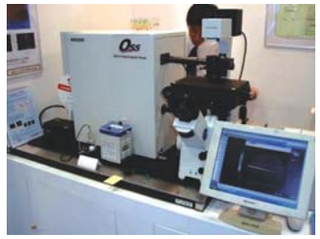
Major Participating Research Organizations
Industry…SANYO Electric Co., Ltd., OLYMPUS CORPORATION, Konica Minolta Technology Center, Inc., and others
Academia…Osaka Prefecture University, Osaka University
Government…Technology Research Institute of Osaka Prefecture, National Institute of Advanced Industrial Science and Technology (AIST), Osaka Science & Technology Center

Main Results of City Area Program

1. Establishment of fabrication technology for an anti-reflection structured surface
We established the technology to produce optical parts with low reflection using a super-precision mold. Optical parts with low reflection rates (as low as 1%) for the full range of visible light were successfully fabricated by molding optical resin using a die with a nano-structure surface. This made it possible to produce high-performance and low-cost optical components without the need for conventional dielectric multilayer coating. We expect to improve image quality by applying this technology to optical lenses for digital cameras and other devices.


Anti-reflection structured surface
(patterned part, 50 x 50 mm; SANYO Electric Co., Ltd.)

2. Development of spectroscopic measurement technology for ultrafast phenomena (ultrafast optical spectrogram scope)
To measure the chemical reaction process in the femtosecond range, ultrahigh-speed optical communication signals, and the reactive process of fragile biomaterials such as cells and protein, we developed technology with the following characteristics: 1) high sensitivity (1 fJ or less), 2) single shot, and 3) simultaneous imaging in the time and wavelength domains. Using this technology, a photochemical reaction process involving a cyanic organic pigment was successfully measured in the sub-picosecond range. Application of this technology to microscopes and optical communications technology will advance research into biological and molecular chemistry and optical communications technologies.


Ultrafast optical spectrogram scope
(prototype with microscope)

Approaches after Completion of Project

1. Development and promotion of practical technology for fabricating an anti-reflection structured surface
A technology was established for fabricating a die by micro-machining the metal surface directly, which rendered electroforming technologies unnecessary. As a result, the curvature accuracy of the lens surface was improved, and the fabrication cost of the metal mold was reduced. New techniques for the fabrication of nanostructures on heat-and light-resistant glass are being investigated as part of the NEDO project (next-generation optical control material/element technology project), which began in FY2006. This technology will contribute to the production of optical glass parts used in high-quality digital cameras, LCD projectors, and blue laser optical components, etc. To popularize this technology, we currently provide product samples and training in the use of the technology to corporations.


Photograph taken using a lens with an anti-reflection structured surface
(provided by Konica Minolta Technology Center, Inc.)

2. Development of an ultrafast optical spectrogram scope
To apply this technology to devices for measuring various material properties, a joint project was established with a private company to select items suitable for commercialization among the technologies developed to date. A second collaboration with a private company is engaged in promoting the development and patenting of standard signals, and is applicable to a broad range of applications.

●Growing Stage

Nanotech Materials

(Fiscal Year 2002-2004)

Kumamoto Area

Development of a Biocompatibile Microsensor (Smart Microchip), Analysis of Biological Information by integrating Nanotechnology and Biotechnology, and Development of a Biocompatible Microsensor with Data-Sending/Receiving Functionality and an Individual Recognition Function

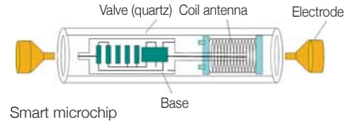
Kumamoto Technology and Industry Foundation
2081-10 Tabaru, Mashiki-machi, Kamimashiki-gun, Kumamoto 861-2202 JAPAN
TEL:+81-96-286-3300

Core Research Organization
Kumamoto University

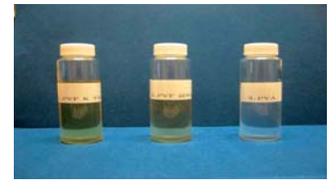
Major Participating Research Organizations
Industry…NISSEIDENSHI CO., LTD., Arao Corporation, CHISSO CORPORATION MINAMATA, and others
Academia…Kumamoto University
Government…Kumamoto Technology and Industry Foundation

Main Results of City Area Program

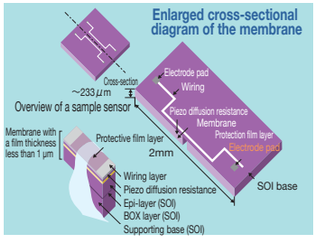
1. Development of a biocompatible microsensor (prototype) having various functions, including physiological data transmission/reception and biological/physiological measurement
Biological/physiological measurement is extremely important in animal experiments.
In particular, an important future goal is measurement methods applicable to animals in an unrestrained state. The R&D undertaken as part of this project developed a membrane-type pressure sensor and electrode-type sensor for measurements of heart beat, among other uses. We succeeded in developing a biocompatible microsensor with an electrode-type heart-beat sensor. We also succeeded in developing a biocompatible coating agent for microsensors embedded in the living body of experimental animals.



Smart microchip


Biocompatible coating materials

2. Development of a network-type MEMS workshop
With the cooperation of institutions and enterprises in the Kumamoto area involved in the development of a small-sized membrane-type pressure sensor, we held an “MEMS Workshop” with the network of small-lot/ more much variety was completed. In this regard, sensor devices, including ultra-small pressure sensors that require microprocessing, are currently ready for production.



Pressure sensor

Approaches after Completion of Project

1. Development of a living-body adaptive-type microsensor (smart microchip) equipped with living body information analysis, sending/receiving, and identifica tion functions
Ongoing research aims to advance the findings of the Development Stage (2005) from experiments involving non-human animals to those involving humans, using smart microchips with an integrated circuit, antennae, extracting/processing systems for physiology data, instrumental systems for a hypodermically embedded sensor system, materials for pasting and parts for bio elements and ultra small and highly sensitive sensors. By combining these technologies, we aim to develop a “Next-generation Biological Information-Processing Chip for Human Movement and Physiological Data.”

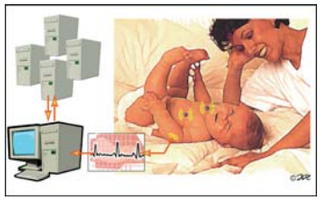


Image of the Development Stage of the "Development of Next-generation Living-Body Information-Processing System"

2. Promotion of different research fields, especially the integration of engineering and medical sciences
The “Research for Intelligent System Technology in Kumamoto” (RIST) project, which has the aim of solving problems in the field of medical services, was established following the “Medical and Engineering Collaboration Study Conference” to inspire new technologies with the potential to be developed by member enterprises and researchers. Therefore, RIST plays an essential role in building a firm foundation for ongoing academia–industry–government collaborations in various research areas.

3. Development of a Three-dimensional Lithography Method
We sought to develop a “Three-dimensional Lithography Method” as a new technological component of the “City Area Program at the Development Stage,” and ultimately produced a new microcoil.
This technology represents an advancement in the maskless-lithography method currently being developed as part of the project titled “Collaboration of Regional Entities for the Advancement of Technological Excellence” that preceded the “City Area Program.”
This is expected to be an important future technology in the field of semiconductor research.