

Specific Initiatives in Technology R&D

Casio consistently pursues resource and energy savings in order to promote a sustainable society and preserve the global environment, and its R&D aims to foster new lifestyles.

Development of Radio-controlled Watches and Antennas

To produce radio-controlled watches with superior design, it is necessary to miniaturize the high performance antenna as much as possible. As these types of watches are increasingly being made with the antenna built into the metal casing, it has become particularly important to decrease the antenna size without reducing the reception sensitivity. However, with the current "cut-and-try" designs, antenna miniaturization is reaching its limit. Furthermore, since radio-controlled watches use long wave radio signals, which prevent the use of high-frequency antenna analysis tools, original technology development is needed. By using magnetic field simulation that facilitates an antenna design for optimal speed and efficiency, Casio is developing technologies needed to produce radio-controlled watches that are more compact and highly sensitive than ever before.

Fuel Cells—A Next-Generation Source of Clean Energy

Further environmental considerations are needed for portable devices. In anticipation of future needs, Casio has researched environmentally friendly micro-energy sources for mobile devices, including solar cells.

Casio is already developing the clean energy technology of the future, namely fuel cells. With this kind of energy source, the hydrogen contained in fuels such as methanol is extracted and made to react with oxygen in the air, thereby generating electricity. By replenishing the fuel whenever it runs out, it is possible to operate a device continuously without the need to recharge. As the interchangeable fuel cartridges are made of PET plastic or aluminum for easy recycling, there is less environmental impact compared to conventional batteries. Additionally, since these fuel cell cartridges can be used continuously for four times longer than conventional rechargeable lithium ion batteries and enable device weight to be halved, the performance of mobile devices will significantly improve.

In order to achieve both the compact design and high performance required for cutting-edge mobile devices, Casio has developed its own reformer using semiconductor processing technology. This has enabled the miniaturization of the reformed fuel cell, which people thought could never be incorporated into mobile devices because of its size.

An academic presentation was made on the test system for this technology in the autumn of 2006. In the coming months and years, Casio will continue its R&D with the aim of achieving the practical application of reformed fuel cells, thereby enabling the development of more environmentally friendly mobile devices.

Best paper award at an international microwave conference

At the Asia-Pacific Microwave Conference (APMC) held in Yokohama in December 2006, an employee of the Core Technologies R&D Division at Casio Computer Co., Ltd., received the APMC 2006 Prize. APMC is the one of three major microwave conferences held worldwide. The prize is awarded to an outstanding paper presented at this conference that is considered to present advanced microwave research. The recent winning paper described the theory and development of simulation technology relating to more efficient design of antennas for radio-controlled timepieces.

Message from the prize winner

It has been a fantastic experience for me to present Casio technology to researchers from all over the world. I would like to thank Casio's Timepiece Division for its considerable support. I want to continue contributing to the development of Casio.



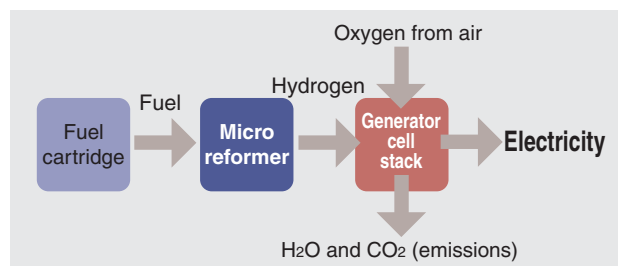
Kazuaki Abe
Core Technologies
R&D Division



Fall 2006 Demonstration Model



Basic mechanism of fuel cell

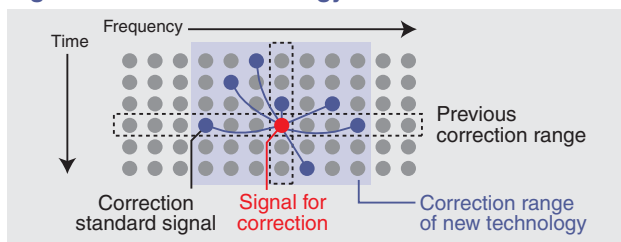


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Cellular Phone and Wireless Technologies

One Segment (1-Seg) broadcasting for mobile devices began in Japan in April 2006. Programming can be seen in various places across Japan, and new uses for the service are being devised. Casio has been working on developing technology that enables proper reception of 1-Seg broadcasts even in places where the signal is weak. The research has achieved not only analysis and correction functions for frequency and signal strength, but also time axis analysis. Another technology was created to minimize the Doppler deterioration that occurs due to building reflection or when moving at high speed on a Bullet Train (figure below). Finally, Casio succeeded in designing the most sensitive receiver module in the industry by selecting the optimum combination of antenna and RF device, and setting and executing optimal conditions for reception on mobile devices.

Signal correction technology



W51CA cellular phones with built-in, high-performance receiver modules

Authentication and Security Technologies

Casio has researched and developed a number of core technologies related to information security. In the area of biometrics, it has conducted R&D of fingerprint input devices and fingerprint authentication algorithms. The devices are able to obtain high-quality images of diverse fingerprints, and the authentication algorithms can handle fingerprint images of greatly varying quality. Casio has also developed original encryption algorithms and tailored them for various Casio products, including in its business products, along with fingerprint authentication technology.



Rakuichi BX200: A device incorporating Casio's own fingerprint authentication technology. An optical fingerprint sensor is a standard feature on the side of the LCD monitor.

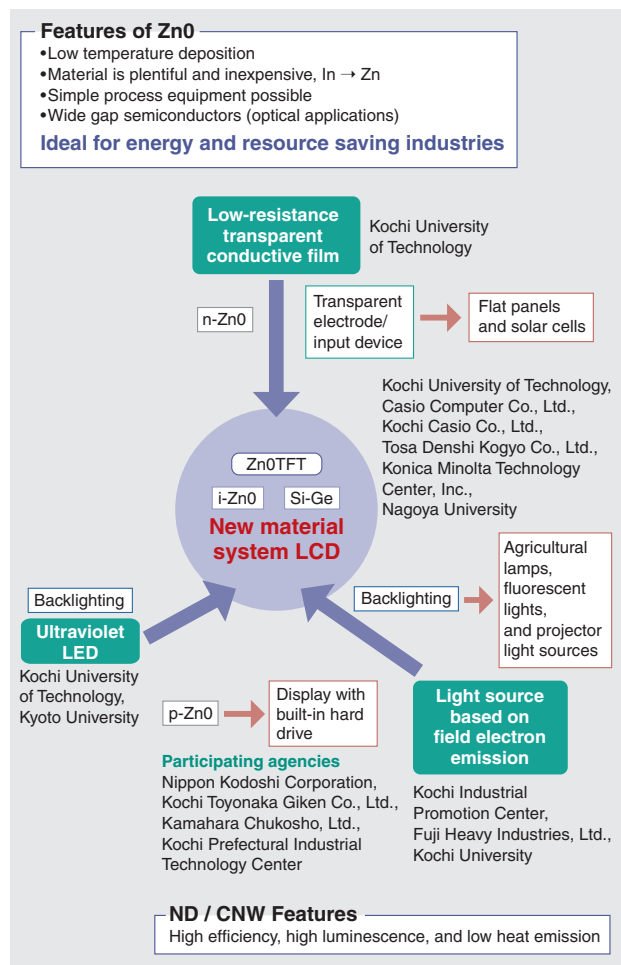
Casio Collaborates with Kochi Prefecture on Government Program for Technological Excellence

Since 2003, Casio Computer Co., Ltd., and Kochi Casio Co., Ltd., have been participating in a program called "Collaboration of Regional Entities for the Advancement of Technological Excellence" being promoted by the Japan Science and Technology Agency and Kochi Prefecture.

This research program is being carried out at Kochi University of Technology and other universities with the participation of local companies, and aims to develop new technologies which foster new regional industrial activities.

There are several research themes, but the primary one involves developing new transparent conductive film materials, which are indispensable for the production of LCDs. It is expected that the demand for transparent electrodes will be ever greater for flat panel displays, including liquid-crystal, plasma and EL devices, and touch panel applications such as car navigation systems, game consoles, and cellular phones.

Links between research themes



* See page 45 for R&D information on materials used to replace the rare metal indium.