

RESEARCH AND DEVELOPMENT

Aiming to Improve the Business Value through Development of Advanced Technology

The OKI Group actively develops cutting-edge technologies with the aim of contributing to building “a safe, secure and comfortable society” as an important theme for R&D. We designate the important areas of technology for “a safe, secure and comfortable society” as “sensing,” “smart network,” and “data mining.” We are further advancing the integration of OKI’s traditional strengths of media processing technologies and optical signal processing technologies with OKI’s ability to build basic systems.

Furthermore, we are pouring effort into innovation development that will connect the fruits of research and development with new business value, aiming for the creation of new businesses.

1. Research and Development for OKI’s Safe, Secure and Comfortable Society Vision

The ICT foundation for a safe, secure and comfortable society is formed by organically connecting the technologies of “sensing,” “smart network,” and “data mining.” Our efforts in these technological areas include the following.

Sensing

OKI successfully developed optical fiber sensing technology that detects the distributions of strain and temperature variation from subtle changes in optical signals propagating through optical fiber. The technology can be used for infrastructure health monitoring via embedded optical fiber sensors as well as fire detection and other tasks. This technology will contribute to next-generation social infrastructure along with existing imaging and radio sensing technologies.

Smart Network

OKI developed the world’s first 920MHz band wireless multi-hop network technology with enhanced power efficiency and capability of accommodating both large- and small-scale systems. This versatility allows various sensors and equipment to be connected to networks regardless of the environment. This technology can potentially be integrated with data mining technology for use in the structural monitoring field.

Data Mining

OKI is developing data mining technology to find and utilize hidden “meaningful information” from among an expansive environment of diversified information and information on people’s activities conveyed via networks after obtained from sensing, as well as from text information in various locations.

2. Research and Development Leveraging OKI’s Strengths

OKI has strengths traditionally in media processing technologies for audio and video and optical signal processing technologies, and is able to compete on a global level in these areas.

Aiming for Audio and Video Technologies that Provide More Comfort

OKI developed the Area Sound Enhancement System with multiple directional microphones positioned surrounding the targeted sound pickup area to capture sound exclusively from that area. The technology makes it possible to capture clear voices in a specified area in conference rooms, offices, and other environments where several people may be talking at the same time. The technology can also have applications for voice recognition in high-noise conditions such as in cars. In addition, through the fusion of video coding technology and sensing technology, OKI is developing technologies that provide more comfortable sound and video, such as surveillance cameras that retain high-resolution data only of the faces of people in video images.

Aiming for Further Development of Optical Signal Processing Technologies

In order to realize further improvements in energy conservation and compactness, OKI is working to develop new optical signal processing technology for next-generation optical access networks with a view to the coming 5G and the IoT era.

3. Development of Basic Technologies for the Future

The accumulation of technologies that we develop will become the foundation that supports OKI’s future businesses. In particular, OKI is researching usability technologies, quantum cryptography technologies, and recognition technologies. Usability technologies are indispensable to terminal equipment that we have many years’ research experiences. Quantum cryptography technologies will enable the realization of indecipherable encoding when everything in society becomes interconnected and security turns to be more important. Recognition technologies, also, is necessary to replicate human intellectual functions.

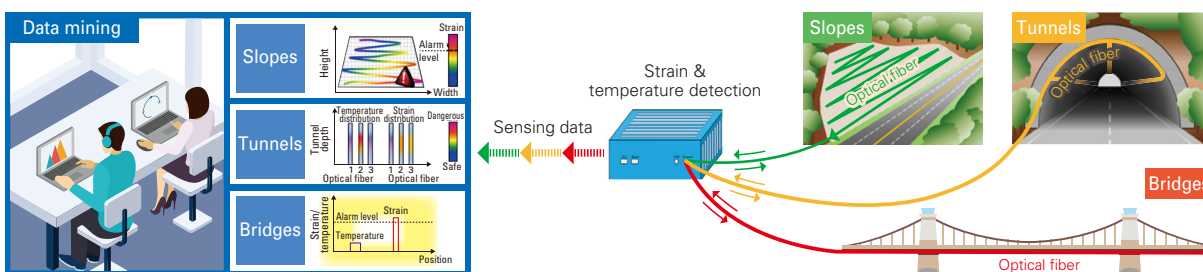
TOPICS 1

Optical Fiber Sensing Technology Enables Precise, Real-time Monitoring of Large Structures

OKI developed optical fiber sensing technologies that enable real-time fire detection and health monitoring of large structures such as bridges and tunnels.

Optical fiber sensing technology is a distributed measurement technology that detects the location and degree of strain in structures as well as temperature changes from optical signals in optical fiber attached to structures. Existing measuring instruments for optical fiber sensors are expensive with lengthy measurement time requirements, ranging from tens of seconds up to several minutes, limiting applicability and preventing broad adoption.

To address this, we successfully achieved simultaneous sharp reductions in costs and measurement times (a hundredth of previous spans) by introducing a new measurement method via an optical detecting unit that serves as the core optical fiber sensor. As a result, phenomenon that had been difficult to measure, such as real-time distributed measurement of dynamic strain in large structures, becomes a low-cost project. In addition, distributed measurement of multiple structures with one measuring instrument is performed repeatedly, so we expect costs to be further reduced.



Comment from the Technical Engineer

A major strength of the optical fiber sensing technology is that it can comprehensively grasp the status of structures without using a large number of sensors. Capitalizing fully on this strength of this technology, we are working to develop data mining and reliable sensing technologies that can accurately grasp the status of large structures such as bridges and tunnels that are seen as an aging risk given their long service record.

TOPICS 2

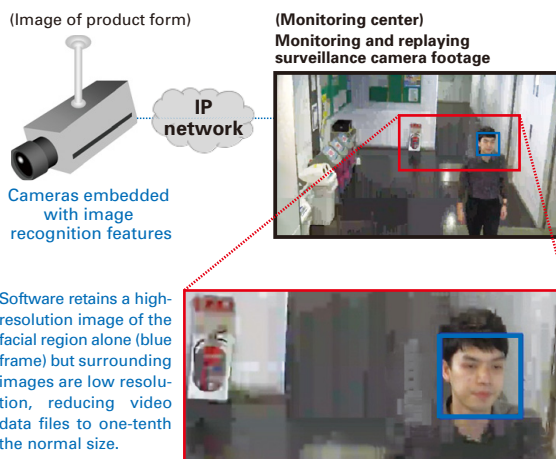
"Intelligent Surveillance Camera" Limits High-resolution Data to Facial Area, Reduces Transmission Load

OKI is developing an intelligent surveillance camera with new functions achieved via the fusion of its proprietary image recognition technology and video coding technology.

The installed base of surveillance cameras to prevent crime, etc. has increased in the past several years, and these surveillance cameras have shifted to digital from analog formats. As a result, multiple locations can be monitored remotely via high resolution video but the resulting flood of video data has led to ballooning costs for communication lines and storage.

To address this, we developed software that detects the faces of people captured in surveillance camera video and reduces the size of video files to a tenth of their normal size with only data for the facial region retained high-resolution. We aim to launch an "intelligent surveillance camera" embedded with this software as a product soon. Furthermore, we will strive to expand the range of applications and add even more value to our products by introducing functions such as facial recognition and vehicle recognition.

"Intelligent surveillance cameras"



Comment from the Technical Engineer

We created new value with the development of an "intelligent surveillance camera" that combines two notable technologies, image recognition and video coding. The Face Sensing Engine (FSE) is based on image recognition technologies we developed, and OKI has worked on video coding for many years. I was impressed with how interesting it is to fuse together elemental technologies, along with the depth of the well for elemental technologies.