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 broadband technologies with OKI's ability to build systems.

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

01 Research and Development for OKI's Safe, Secure and Comfortable Society Vision

The IT 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 developed new sensing technology aimed at automating hammering tests used in tunnels and other concrete infrastructure. The new technology applies OKI's signal processing technology to automatically distinguish the degree of deterioration from the subtle difference in the acoustic impact echo signals created when tapping the concrete walls. The technology is step forward in imaging and radio sensing technology that will contribute to the advancement of next-generation infrastructure.

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. The 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.

02 Research and Development Leveraging OKI's Strengths

OKI has strengths traditionally in media processing technologies for audio and video and optical broadband 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. OKI is developing technologies, including video coding technology operable even on devices with limited processing capacity, to provide more comfortable sound and video.

Aiming for Further Development of Broadband Networks

In order to realize further improvements in energy conservation, OKI is developing new optical broadband technology for next-generation optical access networks to realize virtual networks with more efficient bandwidth utilization.

03 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.

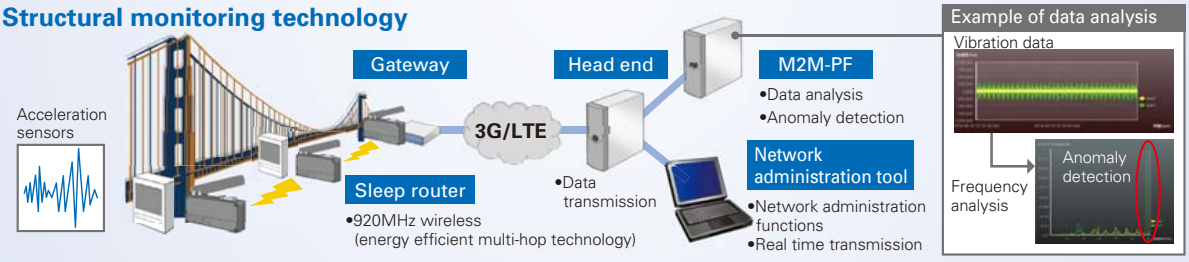
TOPICS 1

Structural Monitoring System Technology for Aging Social Infrastructure

OKI has developed structural monitoring system technology for use in remote monitoring of bridges, tunnels, and other social infrastructure for which aging is becoming a concern. Systems using sensor technology are in much demand as an inspection method for existing social infrastructure for their inspection accuracy and as manpower shortage solutions to replace the visual inspections or hammering tests usually carried out manually.

OKI has combined its energy efficient wireless multi-hop technology and MEMS sensor technology and created a system for collecting and analyzing structural vibration data to evaluate the structure's degree of deterioration. The system also reduces connection costs and enables real-time surveillance of multiple sites by applying a transmission method with lightweight and excellence immediacy between the data aggregators (gateways) and the servers used for data analysis (M2M-PF: Machine to Machine platform). Sensors have a wide range of application potential, including in the disaster prevention field for monitoring river, landslide, and other conditions.

Structural monitoring technology



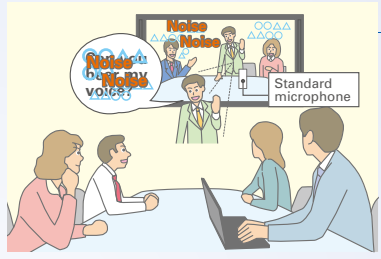
Comment from the Technical Engineer

One feature of structural monitoring systems is that the multiple sensors remain in fixed positions for a long time. We are working to develop power saving and energy harvesting technology to support the long-term use, sensor time synchronization technology to enable high-precision data analysis, and security technology to protect against incorrect connections and data leaks.

TOPICS 2

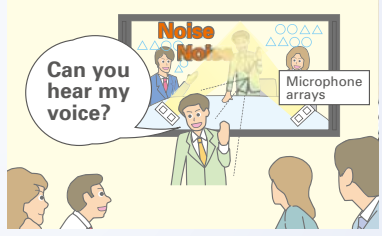
The "Area Sound Enhancement System" for Sound Pick-up in a Target Area

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. Microphones used in teleconferences between a group at one site and a remote site usually pick up the speaker's voice as well as all of the background noise, creating a constant concern that the discussion could be interrupted by an inability to hear the speaker. Even directional microphones including shotgun microphones and microphone arrays pick up noises in a direction of the target area. The Area Sound Enhancement System positions two microphone arrays with separate directionalities to intersect in the target area. The common sounds components that are picked up are identified as target sound and the other sound components are eliminated as noise. This configuration allows the speaker's voice to be heard clearly even in a noisy environment and enables smooth communications for teleconferencing and other remote communication systems.



Standard microphones

Background voices and noise make it difficult to hear the speaker's voice



OKI Area Sound Enhancement System

The speaker's voice is clearly heard even with background noise

Comment from the Technical Engineer

The Area Sound Enhancement System enables hands-free teleconferencing because it does not produce echo or howling. The system also conducts successive correction of the sound levels in the target area, so the speaker is free to turn and move around as long as he/she remains within the area covered by the microphone arrays, while talking without needing to be concerned about where the microphones are located. This is an example of the research and development we are doing in technologies that enable stress-free and comfortable speech communication.