

Application Field Development of Dynamic Intelligent Systems by Using High-Speed Vision

From the speed of the human eye to the speed that machines can capture

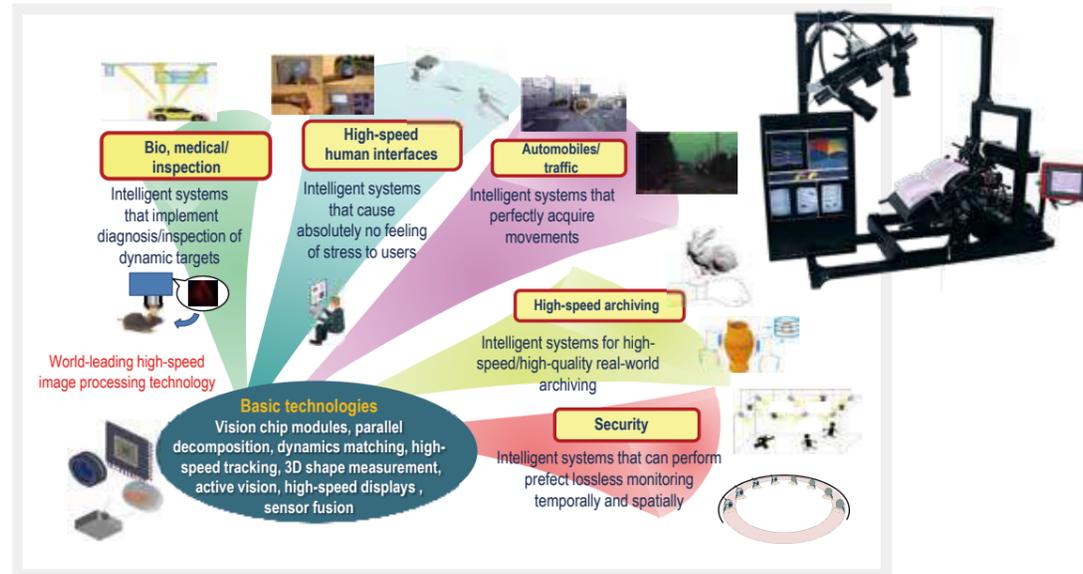
The conventional image processing speed is around 30 frames per second, which is a frame rate chosen to suit the speed of the human eye. To operate cars or robots more quickly and accurately, image processing speeds need to be increased to machine-capturable levels. However, this was difficult due to limitations in data readout circuits and processing speeds in scanning, which transforms images into electrical signals.

To solve these problems, we succeeded in developing an image processing technology that boasts incredibly high speeds. Based on this technology, we have both proposed and demonstrated intelligent systems such as a high-speed tracking device that can capture a flying object as if it were a stationary image, and a dynamic projection mapping system that tracks a moving three-dimensional object and projects video onto it.

Broad application potentiality, from high-speed interfaces to traffic

The objective in this ACCEL project is to develop this technology further and establish a common basis for high-speed image processing technology for a range of uses. It can also be used to construct optimal and unique systems in each field, including automobiles/transport and high-speed human interfaces. In addition, we hope to present a proof-of-concept demonstration of intelligent systems that complement and expand the capabilities of the human eye.

This research will advance intelligent systems that use visual senses far beyond human capability, integrating information and the real world and drastically changing the information environment surrounding us.



High-speed image processing technology

High-speed real-time image processing technology with speeds far exceeding standard frame rates. Using CMOS image sensors and compact parallel processing circuits allows processing at variable and high frame rates, even at overwhelming fast rates like 1,000 or more frames per second.



Research Director

Masatoshi Ishikawa

Professor, Graduate School of Information Science and Technology, The University of Tokyo

While many people associate photos or video with how beautifully the images can be shot, I focus on how quickly it can be shot and processed. So I have been researching ways to instantaneously provide feedback on shooting information and improve mechanical performance to unprecedentedly high levels. In this research, eliminating bottlenecks in the image processing speed will allow us to achieve high-speed imaging, transfer, and processing systems in a number of different forms, offering true real-time image processing in perfect step with subject movements.

In collaboration with Dr. Kishi, the program manager and a professional in the practical application of image processing technology, with whom I conducted joint research before this ACCEL project, I will further develop this high-speed image processing technology, demonstrate the functions and performance that make the impossible possible, and apply them to society.

I will construct an entirely new intelligent system by recognizing and controlling the real world in real time.

Program Manager

Norimasa Kishi

ACCEL Program Manager, Japan Science and Technology Agency

When I first learned of this research, I was stunned by being able to see things that could never be captured before. As the program manager, I am very keen to spread this world-leading technology, these ideas, from Japan to the world.

In this ACCEL project, I will work on the practical applications of high-speed image processing technology, based on the hands-on experience I gained assisting with research on practical applications for the bird's-eye view/around view monitors currently used in car navigation systems. Specifically, I will set the target values and provide smooth execution management for the POC of the intelligent system so as to reflect the demands of people in each of the various fields of application. In addition, I will promote strategies for practical use and open up application fields so that the technology can be used by as many people as possible in different fields.

An intelligent system that uses high-speed image processing technology can be expected to be deployed in business in multiple ways, making it the focus of much attention from a range of business fields.

This intelligent system, which goes far beyond human capabilities and makes full use of high-speed image processing technology, will bring innovation to the world.

PROFILE

MASATOSHI ISHIKAWA

1979: M.S. (Engineering), The University of Tokyo; 1979-1988: Industrial Products Research Institute (now National Institute of Advanced Industrial Science and Technology); 1989: The University of Tokyo; in current post since 1999. Field of expertise: Systems informatics. Research into sensor fusion, parallel high-speed vision, high-speed robots, etc. Ph.D. (Engineering)

PROFILE

NORIMASA KISHI

1978: Ph.D. (Engineering), Waseda University. Joined Nissan Motor Co. Ltd. Researched car electronics and intelligent automotive systems, and has a wealth of experience in practical applications for driving support systems.