

Robot Vision

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Abstract

Robots that coexist with and assist human beings require autonomic functions allowing them to perceive, decide and perform tasks by themselves in living spaces including homes. For that purpose, a function to recognize the shape or movement of an object in the surrounding environment in real time and in three dimensions as a human being would is essential. Fujitsu Laboratories is developing dedicated hardware that processes images from a stereo camera to make real-time 3D measurement and technology to make robots autonomous through 3D visual recognition.

Technology

Recognizing an actual living space where frequent changes take place requires the ability to process large amounts of image data in real time, and high-performance computers have been conventionally used for this. However, providing a battery-powered robot for practical use with this function poses the challenge of reducing its power consumption. We have developed a stereo vision LSI capable of high-speed basic image processing common to visual recognition functions such as 3D measurement, movement measurement and pattern recognition required of next-generation robots and achieved real-time 3D visual recognition processing at low power consumption.

- A total of 256 parallel processing arithmetic circuits are provided for high-speed processing of operations such as pattern matching and spatial filtering.
- An arithmetic circuit for image gradient covariance matrix is provided to allow extraction of about 2,000 feature points such as edges and corners at 30 frames per second.
- Low power consumption is achieved at approximately 2.7 W (at 200 MHz).

Application Examples

We are currently developing functions to allow a robot to autonomously and safely move to a specified place while avoiding people and obstacles, or to determine whether any person is in the surrounding environment and properly communicate with them by mounting stereo vision LSIs on robots.

