**Yamakawa LAB.**

[High-speed Robot Beyond Human]

Department of Mechanical and Biofunctional Systems

High-speed Flexible Robotics

Department of Interdisciplinary Information Studies
Department of Mechanical Engineering

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**High-speed Robot System**

Our laboratory has been developing high-speed robot system including high-speed vision, high-speed image processing, sensor network and sensory feedback. For example, we developed a high-speed robot hand which can perform speed of $180^\circ / 0.1s$.

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**Human-Robot Interaction**

By using a high-speed vision and a high-speed robot hand, we have constructed super low-latency and real-time human-robot interaction system. As concrete tasks, we have achieved Janken (rock-paper-scissors) robot with 100% winning rate, human-robot cooperation, assistance system and enhancement of human motion.

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**Dynamic Manipulation**

We focus on flexible object manipulation which is considered to be difficult to perform robots, and we aim to achieve dynamic and high-speed manipulation of flexible objects. In the previous researches, we achieved one-handed knotting of a flexible rope and dynamic folding of a cloth using a high-speed robot hand system.

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**Intelligent Transport Systems**

We investigate sensing technologies for vehicles through high-speed, high-accuracy recognition of the vehicle and its surrounding environment using high-speed vision. For example, we are developing systems for vehicle’s posture estimation and localization by capturing and analyzing proximate road surface.

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**High-speed Sensor Network**

We have developed a measurement system that can capture and process 1,000 images per second and are studying how to detect and stably track multiple objects in a large area. The features of high speed and networking make it possible to observe the dynamic motion of objects with seamless spatiotemporal information.