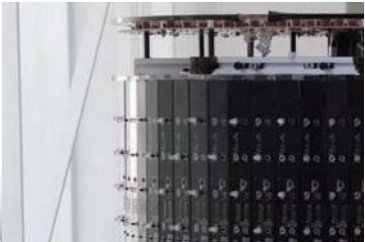




>>> Tactile Sensor



Slip Sensor <<<



>>> Proximity Sensor

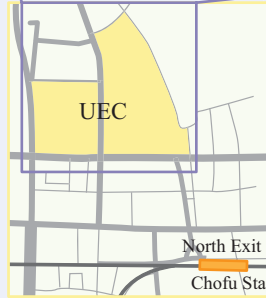
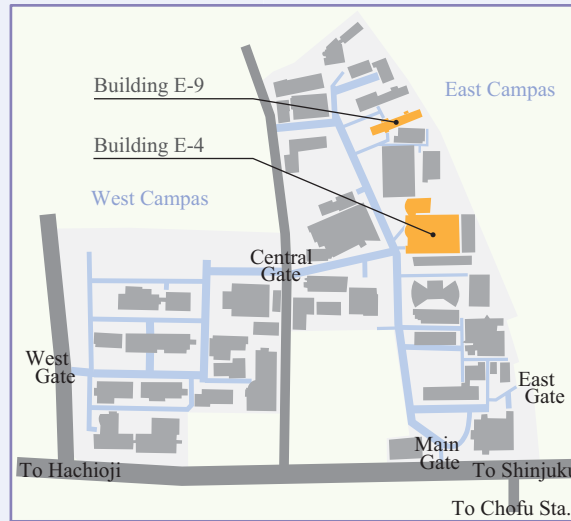


Mechanism <<<



>>> Tactile GUI

Access



Office : Building E-4 5F 515
Lab : Building E-4 1F 116
Building E-9 2F 201

■ Five minutes walk from Keio line Chofu station.

Shimojo Laboratory

The University of Electro- Communications
Faculty of Informatics and Engineering
Department of Mechanical Engineering and Intelligent Systems

Address : Building E-4 5F 515 1-5-1
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SHIMOJO LABORATORY

The University of Electro-Communications
Department of Mechanical Engineering and Intelligent Systems

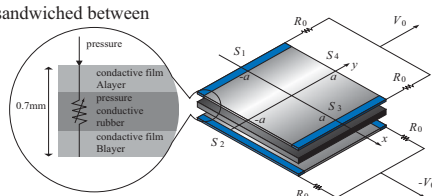
Shimojo Laboratory is a mechatronics laboratory studying on intelligent robot systems based on high-speed sensing technology of tactile, slip and proximity sensors we developed. Furthermore, our research interest also includes the use of our characteristic sensors as advanced human interfaces for music playing and other creative works.

Tactile sensor & Slip sensor

CoP Tactile Sensor

The sensor, constructed of a pressure conductive rubber sandwiched between two sheets of conductive film, is able to detect the center position of the load distribution and the total load.

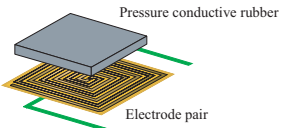
Due to its flexibility and scalability, this sensor is attachable to entire surface of a robot body.



- Point 1 Thin, Flexible, Lightweight, Reduced Wiring
- Point 2 High Response Speed (1ms)
- Point 3 Freeform Surface Attachable

Slip Sensor

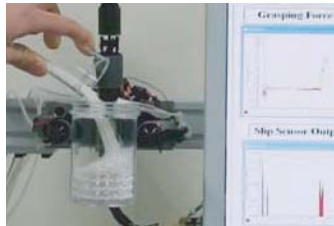
A pressure conductive rubber takes on unique resistance change when it's loaded a shearing force. We found this property for the first time in the world. It enables to develop high-sensitivity slip sensor with simple structure.



- Detect a initial slip
- Simple structure and information processing

Tactile Feedback Robot Hand

CoP tactile sensor and the slip sensor on the robot hand fingertips realized humanlike dexterous object grasping. Using the high-speed tactile feedback information the robot hand is able to keep a firm grip on a object without slipping.

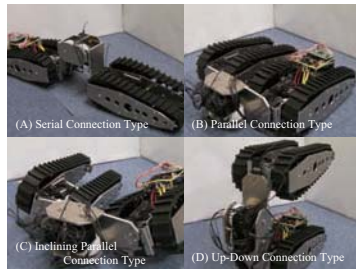


Mechanism

Connected Tracked Robot

The multiple transformable rescue robot with 2DOF-joint mechanism. By means of transformation its mobility and range of operational area is extended.

- Serial Connection Type
Realizing high step-climbing capability
- Parallel Connection Type
Excel in maneuverability
- Inclining Parallel Connection Type
Accomplish inside of pipes or outer surface of pipes
- Up-Down Connection Type
Advantage in mobility in narrow spaces



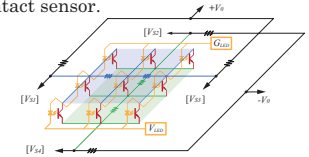
Proximity sensor

Net Structure Proximity Sensor - NSPS

Uniquely integrated reflective photosensor array detects an approaching object center position and distance. We have applied NSPS to various of robot systems and human interface as the fast response noncontact sensor.



- Point 1 High Response Speed (1ms)
- Point 2 Reduced Wiring (6 wires)
- Point 3 Freeform Surface Attachable



i-Carrier



Intelligent omni-directional mobile robot "i-Carrier" is developed with the aim of the porter robot which is able to support load carriage safely in a crowded place such as an airport, a factory, etc.

Omni-Directional NSPS

By Mounting NSPS on the robot lateral face, the robot is able to move in complicated environment avoiding humans and dynamic obstacles.

Omni-Ball

"Omni-Ball" which is formed by two hemispherical wheels realize the high-mobility omni-directional vehicle.



Intelligent Robot Hand

Proximity information plays a significant role in adaptive grasping tasks. NSPS mounted on the palm and fingertips fills the gap between vision and tactile sensor.

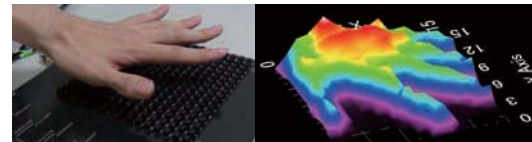
- Tracking and grasping fast moving object
- Proper grasping posture control appropriate to object shape



Distributed Proximity Sensor

We also develop the proximity sensor detecting reflected light distribution by measuring each light receiving elements output respectively.

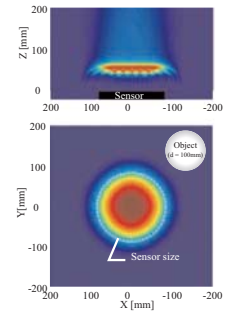
Size, Shape, Posture Detection



Ray-Tracing Simulator

Output characteristics of the NSPS depend on optical elements placement and directivity.

We aim to establish methods to optimize design parameters of the sensor via ray-tracing simulation.



Tactile GUI

Tactile Display

Recently graphical user interface(GUI) is widely adopted for information equipment. However, it is difficult for people with visual impairment to operate such devices. We developed intuitive tactile display with interactive operation, finger pressure input and raised dots output.

