

## ~Technology allows sensorless realistic haptic feedback~ NEXTY Completes Real Haptics Demo Machines

NEXTY Electronics recently has become a member of the Real-Haptics Engineering Council, which is organized by the Keio University Haptics Research Center at Keio University. By doing so, NEXTY Electronics is now able to offer modules and other supports incorporating “real-haptics”, technological IP owned by Keio University.

Real-haptics makes it possible to sense at a distance the hardness, softness, elasticity and other characteristics of objects, as well as gently grasp soft and delicate objects, all of which were previously difficult to achieve. In addition, this technology enables systems to be built at extremely low cost for its sensorless technique.

Together with NEXTY System Design Corporation (“NSD”), a joint venture between NEXTY Electronics and Toshiba Electronic Device Solutions Corporation, we will offer customers real-haptics engineering support in their development of products and systems.

### About the Real-Haptics Engineering Council

Official name: Real-Haptics Engineering Council

Organizer: Keio University Haptics Research Center (Keio University)

Address: Shin-kawasaki, Saiwai-ku, Kawasaki-shi, Kanagawa

Established: 2015 (NEXTY Electronics has been a member since May 2019)

Purpose: To serve as an industry-academic council operated by Keio University that focuses on launching new businesses that use real-haptics.

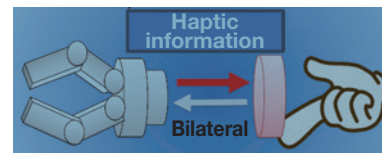
### What is Real-Haptics Technology?

Real-haptics is a world-first future technology brought to life through research by Professor Kouhei Ohnishi of Keio University. The technology communicates, reproduces, scales and preserves the sense of touch of the human hand, and the technology's basic principles have been patented by the University.

#### Real-haptics' strengths

Real-haptics enables optimal movements by combining position and force control. By digitizing force sensation, transmitting it to a remote place, and finely controlling the amount of force used, robots can be imparted with gentleness, dexterity and fineness of control.

An additional strength of real-haptics is that it is extremely low cost because it does not use any sensor devices.



Digitize and return the tactile sensation of object to human operator

#### About haptics

The sensation that allows humans to immediately feel whether an object is hard like iron, soft like a sponge, or elastic like a balloon just by touching it.

#### Comparison of Current Technology With Real-haptics

Object	Robots using current technology (only capable of stiff movements)	Robots using real-haptics
Baby chick	Can only grasp with a fixed amount of force, consequently the chick gets away	Gently grasps the chick so it cannot get away
Shortcake	Squashes the shortcake because it cannot grasp it gently	Grasps the cake with the appropriate amount of force by determining its hardness and condition

### Our Goals

With the severe labor shortage accompanying Japan's shrinking population coming to the fore as a social issue, the number of robots that will replace humans in performing time-consuming tasks is set to increase. Furthermore, it is predicted that if the world's major factories are fully automated, we will see nearly 50 billion robots, or five times the global population, doing the jobs of humans by 2050.

As the robotics market continues to grow, real-haptics is the technology that will enable robots to gently grasp soft objects, a vital factor in these machines' evolution. By synergizing our network and information resources with NSD's technological strengths, we will support customers with planning, development, design, manufacture, sales and business creation related to the next generation of robots for factory automation, collaborative applications and service. We will also play a part in the further development of robotics technology and solving related social issues.

## What Real-haptics Can Achieve

### 1. Enable actions to be performed from anywhere

Real-haptics allows a worker to feel an object by touch even from a distance, allowing tasks to be performed in harsh environments that require haptics.

### 2. Make actions visible

Real-haptics can decipher the experienced actions of a craftsman, converting tacit knowledge into explicit knowledge, and passing those expert techniques on to unskilled people.

### 3. Make actions super-human

By using amplified haptic data, tasks can be performed where a large force is controlled with a small one. This allows humans to perform tasks that require power and speed beyond what they are physically capable of.

### 4. Make objects visible

Quantifying touched objects allows their states to be known, enabling performance of tasks that confirm whether objects have been inserted or pressed into place.

### 5. Make actions into content (from IoT to IoA\*)

By creating a library of actions as mentioned above in 1-3, specifying times and actions in cyberspace, and installing into an object, it is possible to reproduce the required actions when needed

※IoA: Internet of Actions. A concept that is attempting to open the way to completely new fields of application where the actions of humans and robots are gathered together and exchanged over a network.



## NEXTY Electronics Completes Its Own Demo Machines!

We developed demo machines supposing single and triple-axis robots that allow users to experience real-haptics.

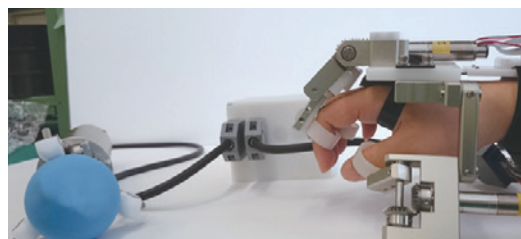
### Single-axis Robot



■ Holds objects by moving two fingers simultaneously with a single-axis motor.

Holds fragile items, like a potato chip, without breaking them

### Triple-axis Robot



■ A robot arm with three fingers, each with three independent joints. It grasps objects by moving each finger individually.

Firmly grasps an elastic blue ball

**Contact NEXTY Electronics to sign up for a demo.**

## About NEXTY System Design Corporation

A joint venture between NEXTY Electronics Corporation (51% share) and Toshiba Electronic Device Solutions Corporation (49% share).

With around 60 employees, the company's primary business is automotive electronics software. It is working to achieve further growth while enhancing its engineering resources with a view toward more wide-ranging software development.

NEXTY System Design is also involved in joint development activities and providing engineering support as a core member of the Real-Haptics Engineering Council.

Company website: <http://www.nxt-sys-design.co.jp/>

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