

# Trends in Japan

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# Leave Your Chores to a Robot

## Development of Housekeeping Robots Accelerates



The Home Assistant Robot. (C)IRT Research Initiative, The University of Tokyo

Researchers at the University of Tokyo are integrating information technology and robotics to develop robots that can perform household chores. Their work on the Information and Robot Technology Research Initiative, or IRT, has already resulted in public demonstrations by some housekeeping robots.



The Kitchen Robot. (C)IRT Research Initiative, The University of Tokyo

At its public demonstration the robot performed such tasks as operating a washing machine and mopping the floor. First off, it picked up a tray of dishes and carried them from the dining table to the kitchen sink. Then it demonstrated its ability to use a washing machine by grasping a shirt hanging over the back of a chair and taking over to the washer. At that point, however, it was unable to pinpoint the location of the button to open the washer's lid. It did not give up, though; it retreated momentarily and made two or three further attempts before succeeding in opening the lid. When mopping the floor, meanwhile, the robot deftly moved a dining room chair with its right hand while using its left to mop under the table. Thereafter it resumed using both its hands to mop the areas free of furniture.

# Turning Thoughts into Pictures

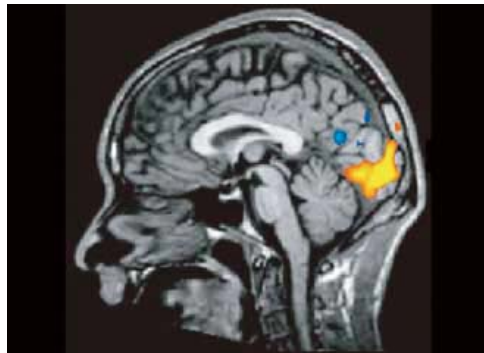
## Innovative Process Recreates Images from Inside the Brain



A test subject enters the fMRI machine.  
(C) ATR

A group of Japanese researchers led by the Advanced Telecommunications Research Institute International (ATR) has developed the world's first procedure for recreating images processed by the human eye based on analysis of blood flow inside the brain.

The process developed by the ATR and its research partners involves showing test subjects simple black-and-white images and using data on the blood vessels in the subject's brain to recreate the viewed image on a ten-by-ten grid of pixels, each of which can be either black, white, or gray. If, for example, a subject is shown a white square centered on a black background, an indistinct yet similar image is recreated on the grid based on the patterns formed by the blood vessels in the subject's brain. This method allows for a wide range of images to be recreated without cataloging numerous images in advance.



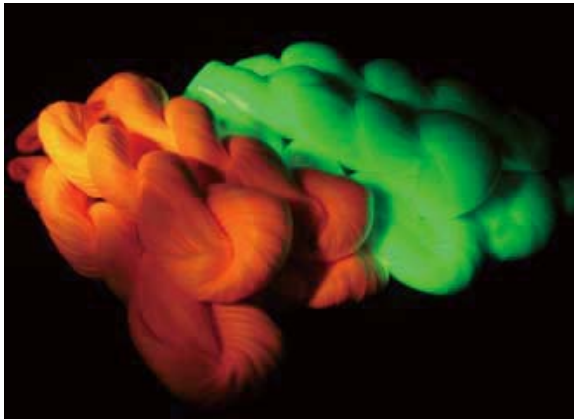
An image from the analysis of blood flow changes. (C) ATR



The pictures shown to the subject (top row);  
the images recreated based on blood flow data  
(bottom row). (C) ATR

The new technique has tremendous potential for applications in fields besides imaging. In the area of brain-computer interface (BCI), for example, it is anticipated that it will help humans manipulate machines and devices using nothing more than their thoughts. It also opens up the possibility that scientists may one day be able to turn our thoughts and dreams into visualized pictures.

## Groundbreaking Research Produces Highly Functional Silk



Fluorescent raw silk  
(C) National Institute of Agrobiological Sciences

The world's first silks exhibiting fluorescence and other pioneering properties have been successfully developed as a result of transgenic silkworm research conducted by Japanese researchers. The feats were achieved by scientists at the National Institute of Agrobiological Sciences (NIAS) in cooperation with other organizations, including Toray Industries, Inc. and Tokyo University of Agriculture and Technology. The functional fibers, which are expected to have wide-ranging applications, are an extension of the institute's success in achieving the world's first genetic modification of silkworms in 2002.

The fluorescent silk threads have great potential for use in the fashion industry, and there is expected to be considerable demand for them from producers of high-end apparel. To promote this new material, NIAS displayed a dress, jacket, lamp shade, and other prototype products made with fluorescent silk at an autumn 2007 trade show in Tokyo. An increasing number of inquiries has been received from manufacturers and designers in the fashion business.



The raw silk under natural light  
(C) National Institute of Agrobiological Sciences

# Digital Camera Goes 3-D

## A New Era in Digital Photography

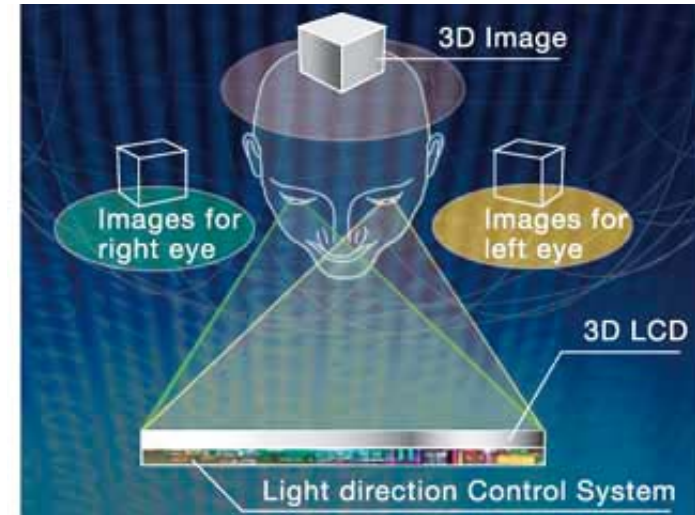
A Japanese camera maker has developed the world's first compact digital camera featuring a three-dimensional image system that allows three-dimensional still and moving images to be viewed with the naked eye.



3D Photo & Movie Camera Technology.  
(C) FUJIFILM Corporation



3D Photo & Movie Camera Technology.  
(C) FUJIFILM Corporation



3D Viewer Technology. (C) FUJIFILM Corporation

The new 3-D system can also shoot and reproduce two-dimensional still and moving images by using just the left or right lens. The company expects that it will eventually be possible to use the left and right lenses for different functions. This would mean that wide-angle and telescopic 2-D images could be taken at the same time, or that 2-D videos and 2-D photographs could be taken simultaneously. "The 3-D world is beginning to expand, as witnessed by the increase in movie theaters that can show 3-D images," notes a member of the system's developing team. "We hope to use our photo technology to further enrich the world of 3-D."

## Autonomous Rice Transplanter Uses GPS System



(C) National Agricultural Research Center

Rice is the staple food of Japan and the nation's most important crop, and it is planted all across the country at the beginning of summer. Unlike in the past, this is rarely done by hand these days, with rice transplanters that are ridden by people in broad use. But the environment surrounding Japanese rice production is changing as the number of people working in agriculture declines. In order to adapt to this new reality, scientists and engineers are working closely to develop rice planters that can function with minimal operation by human.

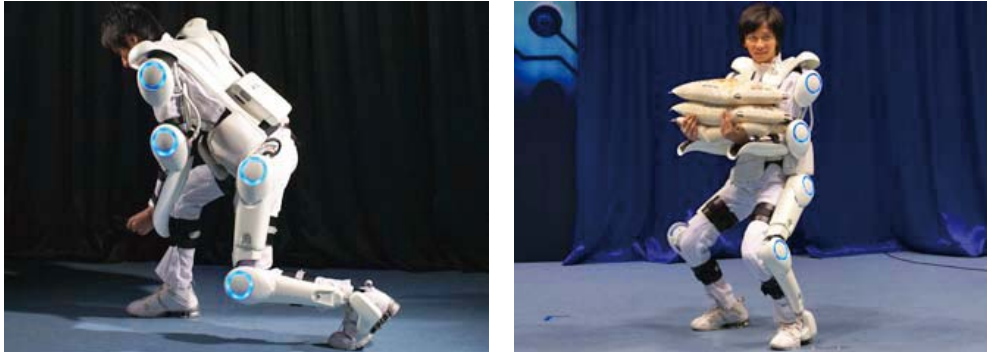
The autonomous rice transplanter developed by the National Agricultural Research Center works, and it uses the Global Positioning System (GPS) in combination with an onboard position sensor. To be able to plant rice without a human operator onboard, the machine has to recognize the location and shape of the field. GPS is used for this, with the operator entering data for the four corners of the paddy into the machine's computer prior to planting.



(C) National Agricultural Research Center

# Robot Suit To Enter Mass Production

## Device Expected to Help Movement of Humans



(C) Prof. Sankai, University of Tsukuba / CYBERDYNE Inc.

Japan is a world leader in robotics, and in October 2008 a Japanese company will become the first in the world to begin mass-producing a robot that assists humans in moving their limbs.

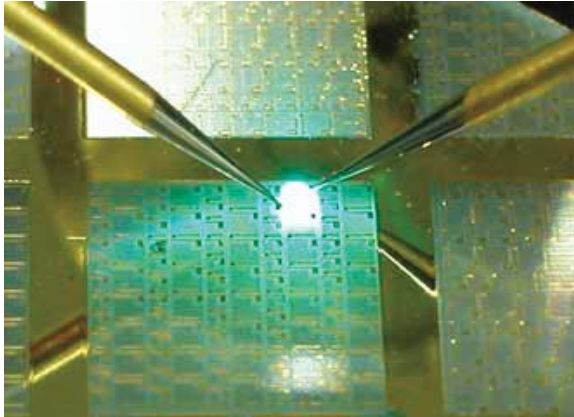
When a person wearing Robot Suit HAL picks up an object that weighs 40 kg, he/she feels as if it weighed only a few kilograms. Robot Suit HAL is therefore expected to have a wide range of applications, such as assisting carers, helping people with physical disabilities to move, and assisting people performing jobs that require a great deal of physical strength. In order to facilitate the commercialization process, Professor Sankai and others formed Cyberdyne Inc. in 2004. In October 2008, the company plans to move into a factory currently under construction that will allow them to manufacture up to 500 suits a year.



(C) Prof. Sankai, University of Tsukuba / CYBERDYNE Inc.

# Broadening The Led Color Spectrum

## New Diode Can Produce White and Intermediate Colors

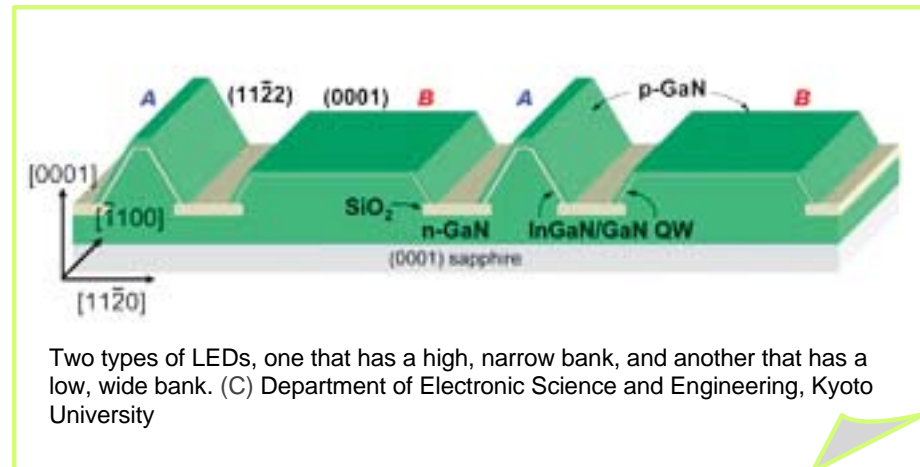


This LED is capable of producing white light and a variety of colors. (C) Department of Electronic Science and Engineering, Kyoto University

Kyoto University and Nichia Corp., which is known for its light-emitting diodes, announced in January 2008 that they had successfully developed a revolutionary LED capable of emitting a variety of colors of light, including white and intermediate colors. The breakthrough was announced in *Applied Physics Express (APEX)*, an English-language scientific magazine published in Japan.

The research team has created two types of LEDs, one that has a high, narrow bank, and another that has a low, wide bank. The LED with the high, narrow bank emits red light from the top of the bank and blue from the side. The LED with the low, wide bank emits yellow from the top and blue from the side.

By changing the ratio and position of the two different structures of LEDs, red, blue, and yellow light can be produced and combined in various ways, making it possible to produce white light and intermediate colors.



Two types of LEDs, one that has a high, narrow bank, and another that has a low, wide bank. (C) Department of Electronic Science and Engineering, Kyoto University