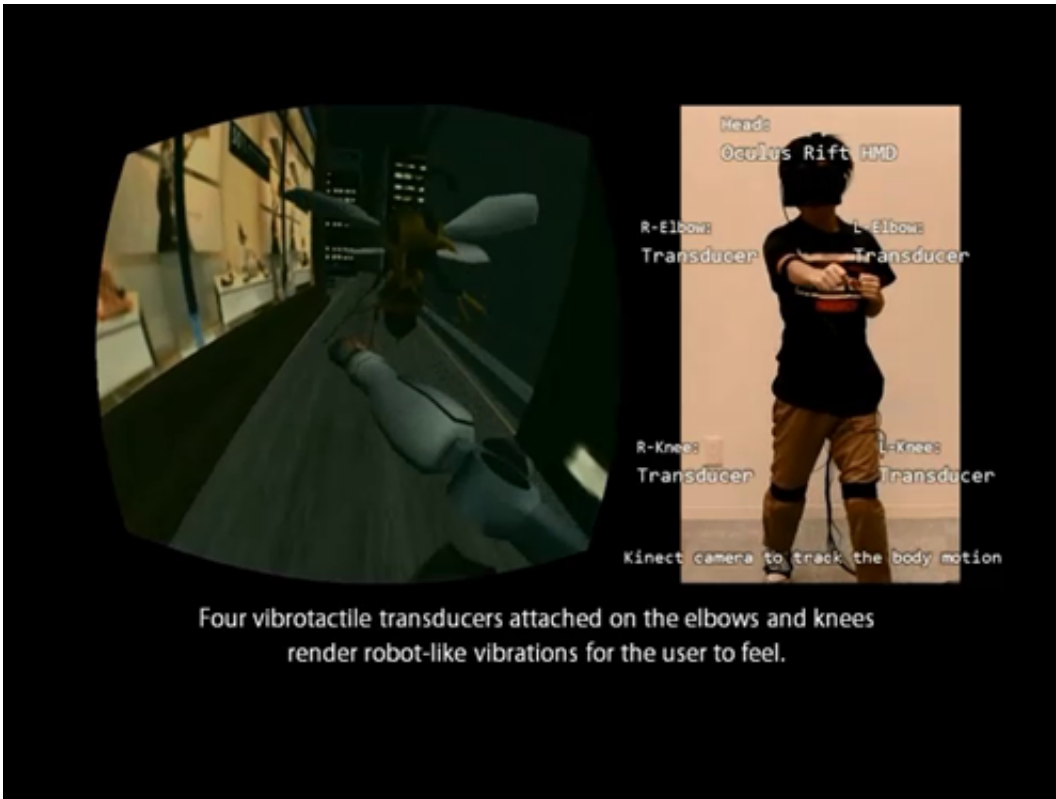


# Virtual robotization for human limbs

March 26 2015



Researchers at the University of Electro-Communications have successfully developed a robotization game system called Jointonation capable of simulating what it is like to have robotic limbs. The system could pave the way for a new, immersive computer gaming environment.

Recent advances in computer gaming technology allow for an increasingly immersive gaming experience. Gesture input devices, for example, synchronise a player's actions with the character on the screen.

Entertainment systems now use special haptic displays - these are attached to the player's body to provide so-called 'vibrotactile feedback', synthesizing the feeling of being attacked during combat games, for example.

A new virtual reality robotization gaming system called Jointonation, developed by Hiroyuki Kajimoto at the University of Electro-Communications in Tokyo and co-workers, has taken gaming to a new level by allowing the player to discover what it feels like to become a robot. The robotic simulation uses a combination of visual, auditory and [tactile sensations](#) to 'transform' the player's arms and legs into metallic limbs.

Vibrotactile feedback makes use of sensory receptors in the skin which respond to mechanical stimuli such as pressure and distortion. By triggering a certain response to sensations, it is possible to 'fool' the brain into thinking these sensations are real. Kajimoto and his team synchronized the limb movements of an on-screen robot with the player's three-dimensional limb movements. They then used modelled vibration data recorded from the arm joint of an industrial robot, combined with robotic sound recordings, to simulate the feeling of [robotic limbs](#) via vibrators attached to the player's elbows and knees.

Trials of Jointonation proved a great success, with the combination of visual, auditory and haptic sensations providing very effective 'robot-like' feelings in [players'](#) limbs.

**More information:** Kurihara, Y., Takei, S., Nakai, Y., Hachisu, T., Kuchenbecker, K.J. & Kajimoto, H. Haptic robotization of the human body by data-driven vibrotactile feedback. *Entertainment Computing* 10 (2014)

Provided by UEC Research Portal

Citation: Virtual robotization for human limbs (2015, March 26) retrieved 9 April 2024 from <https://phys.org/news/2015-03-virtual-robotization-human-limbs.html>

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