

FUNDING PROGRAM FOR NEXT GENERATION WORLD-LEADING RESEARCHERS

Project Title: Development of Haptic Interaction Technologies based on Surface Actuation

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1. Background of research

Intuitive operations utilizing touch modality have become popular in recent information devices. However, use of touch modality is still limited to input operations; touch modality is not effectively used for information output from devices to users. By utilizing the modality also in information output, we can expect much more intuitive operations for information devices. Moreover, new output interfaces involving touch modality have a potential to create new applications for information devices.

2. Research objectives

The essential component to realize output touch interfaces is an actuator, which is a device to generate physical motion or stimulus based on electric control signals. To realize a touch interface that can be easily integrated with recent information devices, a thin and light-weight actuator is needed. Conventional actuators, however, do not meet such a demand. In this research project, we will study and develop various touch interfaces by utilizing surface actuation technologies mainly based on electrostatic actuation. Some examples of the touch interfaces to be studied include *active desktop interface* that realizes intuitive interactions through physical objects placed on a desktop, and *surface tactile displays* that render various touch sensations, such as surface texture sensations, to a user's fingertip.

3. Research characteristics (incl. originality and creativity)

Originality of this project lies in its use of a unique electrostatic actuation technology. The electrostatic actuation technology is characterized by its thin and light weight structure. The technology allows us to realize transparent actuators that do not interfere with visual displays of information devices. In despite of the great potential, the actuation technology has not been studied extensively, and therefore, the technology still has a lot of issues that need to be solved. Applications of the actuation technology to touch interfaces have not been well studied too. This research project will tackle those issues to realize novel touch interaction technologies.

4. Anticipated effects and future applications of research

Intuitive touch interactions will revolutionize usability of information devices, and allow more people to benefit from the information technologies. Moreover, novel touch interactions can lead to some novel applications. Potential applications include remote palpation technology in remote medicine. In another aspect, touch interfaces utilizing electrostatic actuation are expected to be compatible with magnetic resonance imaging. They can potentially contribute to human studies performed with magnetic resonance imaging.