

The Nail-Mounted Tactile Display for the behavior modeling

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The "SmartFinger" is a new type of tactile display, which is worn on the nail side of the finger. It does not inhibit our tactile sensation, since the ball of the finger is naked and we can feel the environment directly. It is important to insert nothing between a finger and an object.

The "SmartFinger" can provide extra tactile sensations. For example, someone wearing this small device on his or her nail can touch a drawing on a flat sheet of paper and feel a virtual edge along the drawing's line, and virtual roughness from its texture pattern. This is a wearable device to add information of bump mapping on real surface objects using existing printing technique.

The "SmartFinger" consists of three components:

(1) Measuring the changing environment in real-time with photo-detectors [1]. This consists of a light emitting diode and a photo sensor, and makes the tip small by the optical fiber. For the invisibility of information, we used the ultraviolet light.

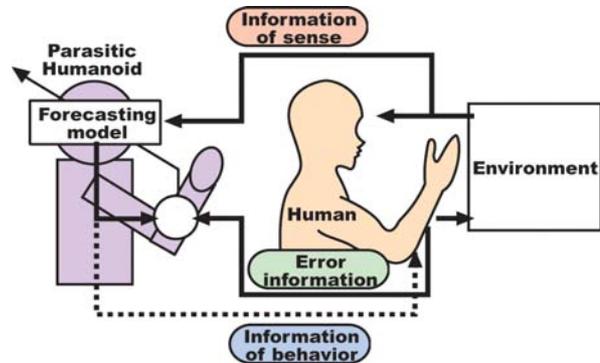
(2) Measuring change in the fingernail's color from the nail side to detect external force [2]. This consists of a light emitting diode and some photo sensors. These measure the amount of blood flows of the fingertip.

(3) Generating vibration on the nail to realize various tactile sensations. We provide tactile sensory output using the actuator. In order to give vibration limited in the vertical direction of the finger to this actuator, not a small vibration motor but the voice coil was used.

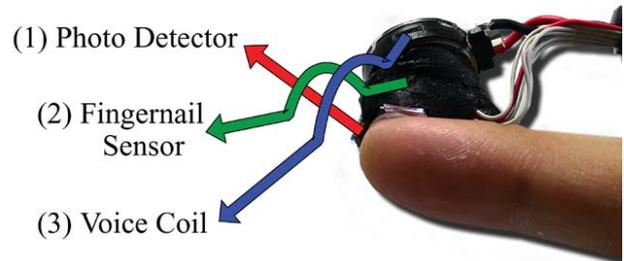
We research The Parasitic Humanoid (PH) that is a wearable robot for modeling of nonverbal human behavior. A user of PH should be able to obtain data with analyzed result without suffering any inconvenience in daily life. To realize such comfortably wearable PH, we need to develop measurement devices, which don't interfere with human behavior. We think that SmartFinger is suitable for this device.

Therefore, since visually impaired people make extensive use of their tactile sense. For example, they can use touch panel using the device detecting information from computer display. Because, the "Smart Finger" has a sensor equivalent to human's feeling input, and the actuator, which returns the stimulus to human. Therefore, it is possible to use as an interface that has a symbiotic relationship with human. For example, it made to notice what is not understood in human sensor input. Or it is behavior of human purposely.

Acknowledgement: This work is partially funded by a research grant from PRESTO, Japan Science and Technology Corporation (JST).



The concept of "Parasitic Humanoid"



The three components of the "SmartFinger"

References

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