



## INVESTIGATION OF VHI AFFECTED BY THE DENSITY OF MECHANORECEPTIVE UNITS FOR VIRTUAL SENSATION

N.Rajaei<sup>1</sup>, M.Ohka<sup>1</sup>, T.Miyaoka<sup>2</sup>, Hanafiah Yussof<sup>3</sup>, Ahmad Khushairy Makhtar<sup>3</sup>, Siti Nora Basir<sup>3</sup>

<sup>1</sup>Graduate School of Information Science

Nagoya University Furo-cho Chikusa-ku, Nagoya 464-8601, Japan

<sup>2</sup>Faculty of Comprehensive Informatics, Shizuoka Institute of Science and Technology

2200-2 Toyosawa, Fukuroi, Shizuoka 437-8555, Japan

<sup>3</sup>Center for Humanoid Robots and Bio-Sensing (HuRoBs), Faculty of Mechanical

Engineering, Universiti Teknologi MARA, Malaysia

Emails: Nader\_23\_1@yahoo.com; ohka@is.nagoya-u.ac.jp; hanafiah1034@salam.uitm.edu.my

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*Abstract- The velvet hand illusion (VHI) is an innovative tactile illusion that enables a human to perceive a velvety sensation by gently rubbing the hands on both sides of wire mesh string through a frame. In order to enhance tactile displays presentation ability, VHI's mechanism is applied through a series of psychophysical experiments. In this paper, we have investigated the effects of several physical parameters on intensity variation of VHI in subjects' fingers and fingertips, such as wire distance  $D$  and a dimensionless ratio of wire stroke  $r$  to wire distance  $r/D$  in passive touch based on psychophysical experiment. We obtain  $D = 45$  mm and  $r/D \approx 1$  as optimum values for VHI intensity for wire distance and the ratio, respectively. Furthermore, as the result of comparison between the present result and the previous result for palm, we conclude that a combination of mechanoreceptive afferent units, SAI, SAII and FAI, are involved in VHI. VHI mechanism is*

*induced when movement of wires is accepted through FAI under constant compressive stimulus for SAI and no shearing force for SAI. This result indicates that VHI can be generated by normal pin matrix type tactile displays because no stimulation of SAI is required.*

**Index terms:** Tactile displays and sensors, Virtual sensation, Velvet hand illusion, Psychophysical experiment, Mechanoreceptive afferent units.