

Article Abstract

Title:	Design and control of three fingers motion for dexterous assembly of compliant elements
Author(s):	W. Widhiada ^{1*,2} , S.S. Douglas ¹ , I.D.Jenkinson ¹ and J.B. Gomm ¹
Address(es):	¹ School of Engineering Liverpool John Moores University, Byrom Street,Liverpool, L3 3AF, UK ² Department of Mechanical Engineering, Udayana University, Denpasar, Bali, INDONESIA *Corresponding Author: e-mail: W.Widhiada@2008.ljmu.ac.uk, Tel +44-1512312125
Journal:	<i>International Journal of Engineering, Science and Technology</i> , Vol. 3, No. 6, 2011, pp. 18-34.
Abstract:	<p>In this paper, the authors describe and demonstrate how a three fingered gripper can be designed and simulated to provide both gross motion and fine motion to the fingers. Satisfactory motion responses for the finger simulation are achieved. The fine motion including force feedback and the gross motions, which orientate the fingers into their approximate configuration are provided by a classical PD control strategy. The force controlling gripper in contact with the environment is very important in industry applications. The fingers are to be controlled in a manner which mimics the kinematics and dynamics of the thumb force finger and index finger of a human hand. This mimicry is required to design the correct motions and tactile forces necessary to handle delicate and non delicate engineering components. In order to evaluate the design philosophy and capability of the three fingered gripper, a challenging assembly process has been identified. This is assembly of a gas regulator valve which is currently being manually assembled since the dexterous motions of the human hand out perform current automatic assembly strategies. The three fingered gripper assembly was built using Solidworks software tool, and it's mechanical assembly representation was established in SimMechanics.</p>
Keywords:	Three Fingers Gripper, PD control, Gross Motion, Fine Motion, Tactile Force, Mimicry.