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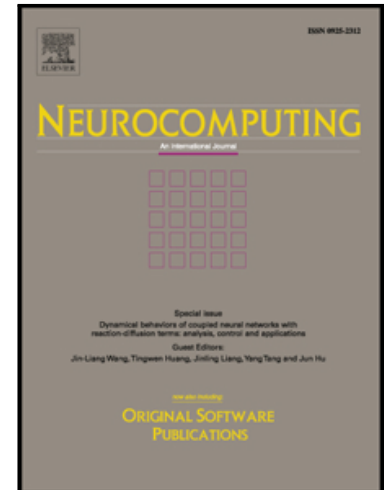
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# Design and Motion Tracking of a Strip Glove Based on Machine Vision

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## Abstract

A type of machine vision based data glove with certain encoded features on its surface, strip glove is proposed in this paper. The machine vision device replaces the sensors attached on the glove and captures the codes on the glove to obtain the hand motion data. To handle the complex geometrical transformations in the strip glove motion, conformal geometric algebra is introduced as the mathematical tool. In the framework of conformal geometric algebra, the degrees of freedom in hand motion are assigned to different planes geometrically to form palm and finger planes. The mathematical model of strip glove is established for the pose solution of the strip glove. The motion tracking of the strip glove is implemented in a binocular system. The particle filter algorithm is applied for tracking the colored blocks on a plane. A continuous motion model of finger segments is constructed in the binocular machine vision system by conformal geometric algebra according to hand motion characteristics, and the hand motion data is obtained during the tracking. Based on particle filter algorithm, the conformal geometric algebra method is applied to set particle parameters for the solution of the local occlusion problems caused by hand pose variation, and the tracking stability of the strip glove is improved.

*Keywords:* Data glove, Machine vision, Motion tracking, Conformal geometric algebra

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## 1. Introduction

Human machine interaction is the basis of virtual reality. With the interference of the human machine interaction, the motion of users can be captured, and the operation aims and experience are conveyed to the virtual environment acting on the virtual objects. However, traditional interaction technology based on the devices such as mouse and key board are not very effective in these 3D interactions [1].

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