Dynamics of Continuous, Discrete and Impulsive Systems
Series **B:** *Applications & Algorithms* **9 (2002)** 101-113

NEURAL NETWORK BASED SENSOR FUSION AND DYNAMIC MOTION CONTROL OF A ROBOTIC EYE SYSTEM

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Abstract. A person with one eye missing, through various reasons, may suffer psychologically as well as physically. The loss of an eye can be solved by an ocular implant cosmetically. This ocular implant appears natural. But it is static. In this paper, we proposed a robotic eye system to improve the quality of life of these people who lost one of their eyes. Functionality of the robotic eye system is to sense real eye position and drive the ocular implant to the same position as that of the real eye. This paper starts with a brief review of sensor fusion and motion control technologies and then an artificial neural network based eye movement sensing and robotic eye motion control algorithms are developed. Experimental study of the artificial eye movement detection and simulation study based on the robotic eye system are included.
Keywords. neural network, sensor fusion, dynamic motion control, robotic eye

1 Introduction

Multiple sensor fusion has received much attention in recent years, which can be found in survey paper [1]. Fusion algorithms and theories can be roughly divided into three categories: statistically based fusion algorithms [2], neural network and fuzzy set based fusion algorithms, and information theoretic fusion algorithms [3, 4].

Because it is difficult to obtain a model of physical system for both sensing and control, model-free based fuzzy set and neural network sensing and control approaches are greatly used, e.g., fuzzy approach [5] was used for classification; neural network was used for motion detection [6], object detection [7] and etc.