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Using of Nature Inspired Computing Models for Mobile Robot Control

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Abstract

This paper addresses a significant challenge that has emerged over the last few decades: the application of nature-inspired computing to develop advanced control systems in robotics. By drawing on concepts and algorithms derived from biological phenomena, the research seeks to enhance the behavior and performance of mobile robots in diverse environments and operational scenarios. This study focuses on the application of living cell functions and communication models to design reconfigurable control systems that leverage parallel and concurrent data processing. To achieve this, the paper proposes the structure of a computing cell, a Venn diagram of the control system grounded in the membrane computing model, and a functional diagram of the control system. These foundations support the prototyping and deployment of a sensor array for managing the position of mobile robots within their workspace.

Keywords: computational modelling, biological system modelling, control systems, robot sensing systems, mathematical models, mobile robots, membrane computing, fuzzy logic, neural networks, parallel computing

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