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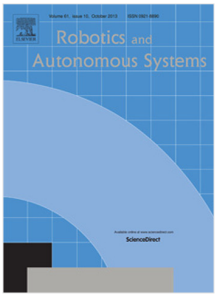

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Concurrent Controller and Simulator Neural Network Development for a Snake-like Robot in Evolutionary Robotics

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Abstract

Evolutionary Robotics (ER) is a field of study that has shown much promise in automating the development of robotic controllers and morphologies. The use of simulators as an alternative to real-world robots is often employed to reduce the time required to develop effective controllers in the ER process. However, the development of adequate simulators is often time-consuming and complex. Simulators are usually constructed from physics models and/or are based on empirically collected data. The vast majority of simulation approaches are based on physics models which can become complex and require specialised knowledge.

Alternative simulation approaches that simplify and automate the modelling of real-world phenomena can provide certain advantages over traditional approaches. An alternative simulation approach, such as Artificial Neural Networks (ANNs) that model the real-world phenomena based on empirical data are relatively simple to construct and requires little specialised knowledge. ANN-based simulators are traditionally constructed before the ER process can begin and require the sampling of real-world experimental data. Disadvantages to the traditional approach to ANN-based simulator construction are that the simulator must be created before the ER process can be initiated and a large amount of behavioural data must be collected

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