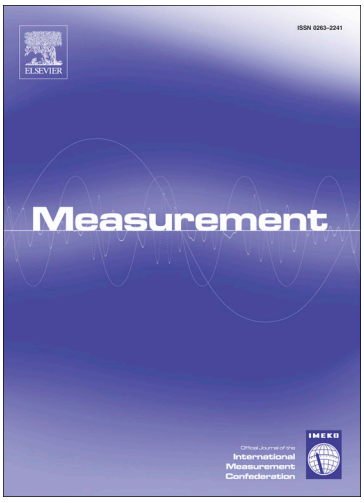

Smart controller for conical tank system using reinforcement learning algorithm

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SMART CONTROLLER FOR CONICAL TANK SYSTEM USING REINFORCEMENT LEARNING ALGORITHM

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Abstract: The objective of the paper is to study the implementation of machine learning based controller to control non-linear systems. A smart controller based on reinforcement learning algorithm is proposed, and its performance is demonstrated by using it to control the level of liquid in a non-linear conical tank system. The system is represented in terms of a Markov Decision Process (MDP), and a reinforcement learning technique based on Q-learning algorithm is used to control the process. The advantage is that a standalone controller is designed on its own without prior knowledge of the environment or the system. The hardware implementation of the designed controller showed that the controller controlled the level of fluid in the conical tank efficiently, and rejected random disturbances introduced in the system. This controller provides an edge over PID, fuzzy, and other neural network based controllers, by eliminating the need for linearizing non-linear characteristics, tuning PID parameters, designing transfer functions, and developing fuzzy membership functions.

Keywords: Non-linear process, Machine learning, Reinforcement learning, Data acquisition, Conical tank control

1. Introduction