

**Hybrid Control Approaches Integrating Reinforcement Learning Techniques
and Nature-Inspired Algorithms**

PhD Thesis – Summary

Thesis Submitted for obtaining
the Scientific Title of PhD in Engineering
from Politehnica University Timișoara
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The thesis proposes various Reinforcement Learning (RL) approaches introduced in papers published as part of the PhD research work. The new hybrid approaches were obtained from combinations between state of the art RL and nature-inspired algorithms. The new contributions consist mainly in presenting classical RL algorithms from an optimal control perspective, presenting the new approaches developed to overcome known drawbacks of the classical approaches and experimental comparison results based on which to conclude if the proposed approaches can be considered as alternatives for the classical ones. The proposed RL hybrid approaches are validated based on experiments conducted for optimal reference tracking control tasks on two laboratory equipment systems, a servo system and a tower crane system.