عنوان مقاله:

Hybrid Time Delay Petri Nets as a Mathematical Novel Tool to Model Dynamic System with Current Sample Time

محل انتشار:

مجله کنترل و بهینه سازی در ریاضیات کاربردی, دوره 3, شماره 1 (سال: 1397)

تعداد صفحات اصل مقاله: 21

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خلاصه مقاله:

The existing modeling methods using Petri Nets, have been successfully applied to model and analyze dynamic systems. However, these methods are not capable of modeling all dynamic systems such as systems with the current sample time signals, systems including various subsystems and multi-mode systems. This paper proposes Hybrid Time Delay Petri Nets (HTDPN) to solve the problem. In this approach, discrete and continuous Petri Nets are combined so that the continuous PNs part and the discrete PNs are responsible for past time samples and current sample time, respectively. To evaluate the performance of the proposed tool, it is employed to model a legless piezoelectric capsubot robot as a multi modes system and a PID controller, in which the gains tuned by the Genetic Algorithm are designed for the resulting model by HTDPN. Results show that the proposed method is faster in terms of mathematical calculations which can reduce the simulation time and complexity of complicated systems. It would be observed that the proposed approach makes the PID controller design simpler as well. In addition, a comparative study of capsubot has been performed. Simulation results show that the presented method is encouraging compared to the predictive control, which is used in the literature.

کلمات کلیدی:

Hybrid Petri Nets, Current sample time signals, Capsubot robot, Genetic algorithm