

Accepted Manuscript

Improving the Performance of Networked Control Systems with Time delay and Data Dropouts Based on Fuzzy Model Predictive Control

Ahmad Sakr , Ahmad M. El-Nagar , Mohammad El-Bardini ,
Mohammed Sharaf

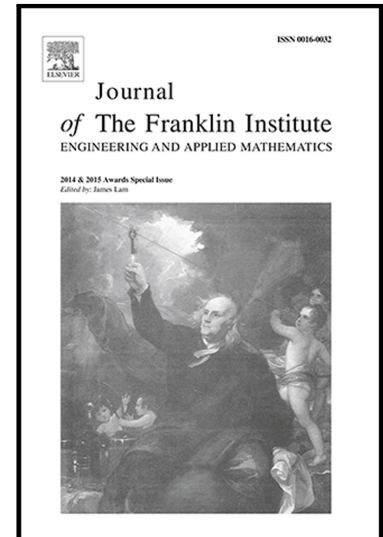
PII: S0016-0032(18)30488-5
DOI: <https://doi.org/10.1016/j.jfranklin.2018.07.012>
Reference: FI 3557

To appear in: *Journal of the Franklin Institute*

Received date: 15 February 2018
Revised date: 22 July 2018
Accepted date: 31 July 2018

Please cite this article as: Ahmad Sakr , Ahmad M. El-Nagar , Mohammad El-Bardini , Mohammed Sharaf , Improving the Performance of Networked Control Systems with Time delay and Data Dropouts Based on Fuzzy Model Predictive Control, *Journal of the Franklin Institute* (2018), doi: <https://doi.org/10.1016/j.jfranklin.2018.07.012>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Improving the Performance of Networked Control Systems with Time delay and Data Dropouts Based on Fuzzy Model Predictive Control

Ahmad Sakr ^a, Ahmad M. El-Nagar ^b, Mohammad El-Bardini ^c and Mohammed Sharaf ^d

^aDepartment of Control Engineering, High Institute of Eng., Belbies, Egypt.

^{b,c,d}Department of Industrial Electronics and Control Engineering

^{b,c,d}Faculty of Electronic Engineering, Menoufia University, Menouf, 32852, Egypt.

^aeng.ahmed.sakr.1988@gmail.com

^bahmed.elnagar@el-eng.menofia.edu.eg

^cdralbardini@el-eng.menofia.edu.eg

^dmsharaf597@gmail.com

Abstract

This paper proposes a fuzzy model predictive control (FMPC) combined with the modified Smith predictor for networked control systems (NCSs). The network delays and data dropouts are problems, which greatly reduce the controller performance. For the proposed controller, the model of the controlled system is identified on-line using the Takagi – Sugeno (T-S) fuzzy models based on the Lyapunov function. There are two internal loops in the proposed structure. The first is the loop around the FMPC, which predicts the future outputs. The other is the loop around the plant to give the error between the system model and the actual plant. The proposed controller is designed for controlling a DC servo system through a wireless network to improve the system response. The practical results based on MATLAB/SIMULINK are established. The practical results are indicated that the proposed controller is able to respond the networked time delay and data dropouts compared to other controllers.

Keywords

Networked control systems; Model predictive controller; Smith predictor; DC servo system; T-S fuzzy model

Download English Version:

<https://daneshyari.com/en/article/10226046>

Download Persian Version:

<https://daneshyari.com/article/10226046>

[Daneshyari.com](https://daneshyari.com)