Poster: 10

Educational Device FlexyAir in Teaching of Process Control

Čirka, Ľ., Kalúz, M.

Slovak University of Technology in Bratislava

This paper describes the use of the laboratory device FlexyAir for purposes of control education. FlexyAir is extension to Flexy2. The device is a complex dynamical system, that contains one actuator, the computer fan. This fan then drives air into the tube, where a plastic floater is then lifted from the bottom position. An infrared proximity sensor then measures the position, which constitutes a measured and controlled process variable. It comes with two knobs, that are fully configurable. FlexyAir is designed to directly support practical learning in courses focused on automatic control and programming. As the Flexy2, it comes with a Matlab/Simulink interface using which students can easily implement and test their own control strategies.

Poster: 11

Nearly-optimal Explicit MPC-based Reference Governors with Long Prediction Horizons Generated with Machine Learning

Kiš, K., Klaučo, M.

Slovak University of Technology in Bratislava

The paper shows a procedure for constructing an approximated explicit form of the MPC-based reference governor. MPC-based reference governors are often setup up with long prediction horizons with a significant number of constraints, which forbids using conventional parametric optimisation to obtain the explicit solution. This paper explores the approach of mimicking the behaviour of the MPC-based reference governor with a neural network. The paper shows methods that ensure point-wise satisfaction of process constraints during neural network training. A demonstration using a well-known MIMO process is offered to evaluate control performance.

Poster: 12

VESNA Smart Greenhouse

Bakaráč, P.

Slovak University of Technology in Bratislava

The project aimed to create an intelligent greenhouse for educational and scientific research purposes. This device is essentially a box that enables control of temperature, humidity, and air quality to achieve optimal conditions for plant growth. The greenhouse is a complex dynamic system comprising multiple sub-dynamic systems, such as irrigation, humidification, and air heating. The thesis provides a detailed account of the structure's design, the individual dynamic systems, the custom-designed electronic control unit, and the educational tasks that can be addressed. Furthermore, the parameters of the sensor and hardware equipment are comprehensively described. The system is equipped with a WiFi module, enabling remote control, data collection, and archiving using various cloud services. The data collected is then useful for the creation and design of