

# CPS: Small: Design of Networked Control Systems for Chemical Processes

Submitted by Panagiotis Christ... on Mon, 10/31/2011 - 3:44pm

## Project Details

<b>Lead PI:</b>	<a href="#">Panagiotis Christofides</a>
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<b>Performance Period:</b>	09/01/09 - 08/31/13
<b>Institution(s):</b>	University of California-Los Angeles
<b>Sponsor(s):</b>	National Science Foundation
<b>Outcomes Report URL:</b>	<a href="https://www.research.gov/research-portal/appmanager/base/desktop?_nfpb=true&amp;_win...">https://www.research.gov/research-portal/appmanager/base/desktop?_nfpb=true&amp;_win...</a>
<b>Award Number:</b>	<a href="#">0930746</a>

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**Abstract:** The objective of the proposed research program is to develop, for the first time, the theory and methods needed for the design of networked control systems for chemical processes and demonstrate their application and effectiveness in the context of process systems of industrial importance. The proposed approach to achieving this objective involves the development of a novel mathematical framework based on nonlinear asynchronous systems to model the sensor and actuator network behavior accounting explicitly for the effect of asynchronous and delayed measurements, network communication and actuation. Within the proposed asynchronous systems framework, novel control methods will be developed for the design of nonlinear networked control systems that improve closed-loop stability, performance and robustness. The controller design methods will be based on nonlinear and predictive control theory and will have provable closed-loop properties. The development and implementation of networked control methods which take advantage of sensor and actuator networks is expected to significantly improve the operation and performance of chemical processes, increase process safety and reliability, and minimize the negative economic impact of process failures, thereby impacting directly the US economy. The integration of the research results into advanced-level classes in process control and the writing of a new book on "Networked Process Control" will benefit students and researchers in the field. The development of software, short courses and workshops and the on-going interaction of the PIs with an industrial consortium will be the means for transferring the results of this research into the industrial sector. Furthermore, the involvement of a diverse group of undergraduate and graduate students in the research will be pursued.

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