

- [ScienceWatch Home](#)
- [Inside This Month...](#)
- [Interviews](#)

- [Featured Interviews](#)
- [Author Commentaries](#)
- [Institutional Interviews](#)
- [Journal Interviews](#)
- [Podcasts](#)

Analyses

- [Featured Analyses](#)
- [What's Hot In...](#)
- [Special Topics](#)

Data & Rankings

- [Sci-Bytes](#)
- [Fast Breaking Papers](#)
- [New Hot Papers](#)
- [Emerging Research Fronts](#)
- [Fast Moving Fronts](#)
- [Research Front Maps](#)
- [Current Classics](#)
- [Top Topics](#)
- [Rising Stars](#)
- [New Entrants](#)
- [Country Profiles](#)

About Science Watch

- [Methodology](#)
- [Archives](#)
- [Contact Us](#)
- [RSS Feeds](#)



- [Interviews](#)
- [Analyses](#)
- [Data & Rankings](#)

2009 : January 2009 - Hew Hot Papers : Afef Fekih

NEW HOT PAPERS - 2009

November 2009



Afef Fekih talks with ScienceWatch.com and answers a few questions about this month's New Hot Paper in the field of Computer Science.



Article Title: Neural networks based system identification techniques for model based fault detection of nonlinear systems

Authors: Fekih, A;Xu, H;Chowdhury, FN

Journal: INT J INNOV COMPUT INF CONTRO

Volume: 3

Issue: 5

Page: 1073-1085

Year: OCT 2007

* Univ SW Louisiana, Dept Elect & Comp Engr, POB 43890, Lafayette, LA 70504 USA.

(addresses have been truncated)

SW: Why do you think your paper is highly cited?

I think the paper is highly cited because it describes the development and application of a new structure of a neural networks-based system identification technique for nonlinear systems with the specific goal of real-time residual generation for fault detection purposes. The technology was tested on a Boeing 747 model but is of general interest to several complex technological systems.

SW: Does it describe a new discovery, methodology, or synthesis of knowledge?

This paper describes a new structure of partially connected neural networks for real-time residual generation in nonlinear systems. For nonlinear systems, the task of residual generation is sometimes complicated by the size of the problem, or by the lack of a suitable model from where the residual can be generated.

This paper develops and implements a new structure of partially connected neural networks for such systems and successfully implements it on a Boeing 747 aircraft model. It also provides a comparison between the performance of the proposed partially connected neural networks structures and the fully connected one.

SW: Would you summarize the significance of your paper in layman's terms?

Residual generation is an essential part of model-based fault detection schemes. This paper presents a new tool for residual generation in nonlinear systems and its application to aircraft systems.

SW: How did you become involved in this research, and were there any problems along the way?

I got involved in this research through my participation as a Co-PI for a research project funded by

"This research is going to change the way we design technological systems in the future."

NASA. I have faced few technical challenges during the course of this research, as it was a relatively new research topic for me. My prior research work was not specifically on this subject.

SW: Where do you see your research leading in the future?

Fault detection and identification technology is fast becoming an issue of primary significance in intelligent and autonomous control system design since it provides the prerequisites for increased reliability, safety, and system availability, automation of inspection procedures, and minimization and maintenance activities and cost. Real-time FDI would insure high performance of technological systems even with impairments to the actuators, sensors, or control surface, and thus increase the system's survivability, and probability of mission success.

SW: Do you foresee any social or political implications for your research?

Yes. This research is going to change the way we design technological systems in the future. Research into FDI technology is going to grow in importance with the increased complexity of engineering systems along with the stringent requirements on reliability, safety, and performance.

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Keywords: neural networks-based system identification technique for nonlinear systems, real-time residual generation, fault detection purposes, Boeing 747, research into FDI technology.



[back to top](#) 

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