

The INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, Inc.
Eastern Idaho Section
and the University of Idaho, Idaho Falls

Technical Seminar presented by visiting professor:

TOPIC: System-Level Algorithmic Concurrent Error Detection for Improved Resilience in Complex Control Systems
SPEAKERS: Professor Juan José Rodríguez-Andina of the University of Vigo in Vigo Spain

DATE: Thursday, September 11, 2008
TIME: 4:30 P.M.
PLACE: University Place, Idaho Falls Idaho. 1776 Science Center Drive.
Student Union Building (SUB) Room 109
COST: None.
RSVP: mcjunkin@ieee.org or misko@ieee.org to get details on parking.

Abstract:

Existing solutions for Concurrent Error Detection (CED) in complex control systems are either based on replication, or on the addition of CED capabilities to each specialized building block the system consists of. The overhead (additional complexity) associated to both approaches is very significant.

System-level algorithmic CED addresses the problem of increasing resilience from a high-level perspective, considering the properties of the overall system (control unit + data path). It is based on the on-line monitoring of system-level properties that can be checked at the I/O, therefore only an external checker adds overhead to the system.

The presentation will focus on improved resilience in the presence of hardware faults, but the concept is also applicable to software faults. Two application examples (image compression and packet switching) will be used to show how error-tolerant resilient control systems can be obtained from algorithmic CED.

The advantages of algorithmic CED are:

- 1) Reduced complexity and latency
- 2) It does not rely on the assumption of any restricted type of fault
- 3) The independence of the checker makes the technique applicable to existing systems, as well as to several systems that time-share the checker.

The main disadvantage is that its applicability has to be studied for each system, but the kind of properties to be checked may be expected to be fulfilled by many current control systems.

Biography (from http://www.dte.uvigo.es/home/juan_rodriguez/homepage.html):

Juan José Rodríguez-Andina is currently Associate Professor at the Department of Electronic Technology, University of Vigo, Vigo, Spain. He received an MSc degree in Industrial Engineering (major in Automatic Control and Electronics) from Polytechnic University of Madrid, Madrid, Spain and a PhD (with honors) in Industrial Engineering (Electronics) from University of Vigo, Vigo, Spain, in 1990 and 1996, respectively. Dr. Rodríguez-Andina is a Senior Member of the Institute of Electrical and Electronics Engineers (IEEE) and a member of the IEEE Industrial Electronics Society (IES) Administrative Committee (AdCom).



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