WESTFÄLISCHE
WILHELMS-UNIVERSITÄT
MÜNSTER

FACHBEREICH 10
MATHEMATK UND INFORMATIK
Prof. Dr. Matthias Löwe
Dekan

14.12.2010

Einladung

Am Donnerstag, dem 6. Januar 2010, Hörsaal M 5

spricht

Prof. Dr. Radu Grosu (State University of New York at Stony Brook, USA)

15:00 Uhr Lehrvortrag: Information und ihre Repräsentation

15:30 Uhr Forschungsvortrag: Modeling, Analysis and Control of Embedded Systems

Zusammenfassung:
The first part of the talk is a quick outline of my research in embedded systems. The outline is organized around modeling, analysis and control, and the research projects I was or still am involved in.

The second part of the talk is devoted to the in depth presentation of a particular research problem addressed within our ongoing embedded-systems expeditions project: the specification and detection of emergent behavior in networks of cardiac myocytes, spiral electric waves in particular, a precursor to atrial and ventricular fibrillation.

Our solution combines new ideas with existing tools and techniques, in a way that is very representative for the analysis of embedded systems. In particular we: 1) Apply discrete mode abstraction to the hybrid automata we have recently developed for modeling the behavior of myocyte networks; 2) Introduce the new concept of spatial-superposition of hybrid automata modes; 3) Develop a novel spatial logic, based on spatial superposition, for specifying emergent behavior; 4) Devise a new method for learning the formulae of this logic from the spatial patterns under investigation; and 5) Apply bounded model checking to detect the onset of spiral waves. We have implemented our methodology as the Emerald tool suite, a component of our EHA framework for specification, simulation, analysis and control of excitable hybrid automata. We illustrate the effectiveness of our approach by applying Emerald to the scalar electrical fields produced by our CellExcite simulation environment for excitable-cell networks.

Auf diese Vorträge wird besonders hingewiesen

Matthias Löwe, Dekan