# HYCON

Hybrid Control: Taming Heterogeneity and Complexity of Networked Embedded Systems

KEYWORDS: Hybrid systems: modeling–simulation-analysis–control-synthesis–implementation; Energy management; Industrial control; Automotive control; Multimedia communication networks

Introduction

Wireless multimedia streaming on hand-held, mobile or otherwise battery operated devices will be a major technology underlying the next generation information and entertainment appliances. From watching small video clips on your mobile device to playing live games with other people on the bus or looking at the latest news Driven by the increasing capabilities and declining costs of computing and communication devices, information technology is being embedded into a growing range of physical devices linked through networks. It will become ever more pervasive as the component technologies become smaller, faster, cheaper and capable of more complex operations.

These networked systems of embedded computers have the potential to change radically the way people interact with their environment by linking a range of devices and sensors that will allow information to be collected, shared, and processed in unprecedented ways. They are already ubiquitous in automotive, aerospace, consumer electronics, biomedical and telecommunication technologies and the range of applications is constantly increasing with continued research and development. For these reasons, embedded systems are expected to have a radical impact on all aspects of society.
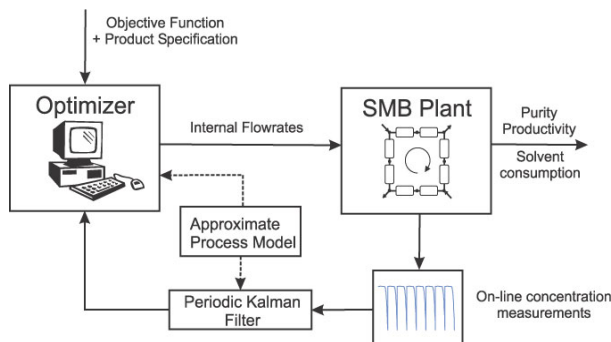
Objectives

One of the aims of this Network of Excellence (NoE) is to strengthen and integrate the scientific and technological efforts going on in Europe on embedded control systems. The main challenge is the mastering of the complexity and heterogeneity of such systems. To date, these difficulties have been mostly tackled by non-rigorous methods, supported by extensive simulation.
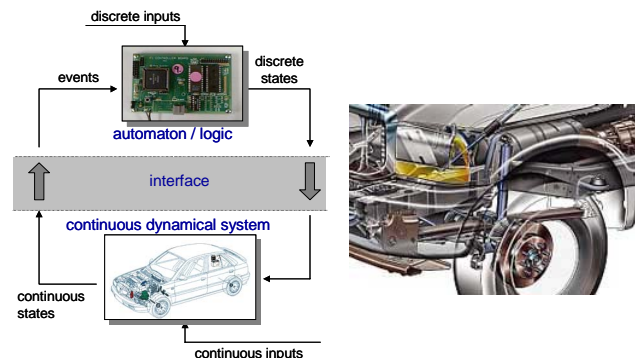
Existing solutions often make a number of assumptions, e.g. that energy is readily available, that there is sufficient computing power to allow various layers of abstraction, that the computational elements are generally in static relationships with respect to the physical world…

These assumptions do not hold for embedded control systems. Some of these solutions may actually succeed, and others may appear to have succeeded, at least for a time. However, the safety critical nature of many of the embedded system applications requires the development of a more formal approach, to increase the level of confidence and the quality of embedded controller design at minimum overall risk.

Therefore, it is of paramount relevance to start the development of a new strong theoretical and technological basis for efficient design and management of these systems. Future economic success will depend critically on the ability to deal with system complexity and heterogeneity. Because of its relatively recent development and, above all, of its multidisciplinary nature, hybrid systems science is currently fragmented across different communities with consequent, and often unaware, overlaps due to jargon barriers and lack of integration, communication and common standard.

Expected Results

The HYCON NoE will co-ordinate the fragmented European research community in networked embedded control systems design and will develop a shared research infrastructure amongst the network partners for the purpose of enabling durable collaborative research. An European Institute for Hybrid Systems (EIHS) will be created.

The establishment of the EIHS is expected to become a long-term internationally renowned focal point of multi-national and multi-disciplinary research on hybrid systems, breaking down the barriers between the traditional disciplines, as well as a motor for the dissemination of methods and tools for new collaborative research. EIHS aims at promoting the education of students and researchers on hybrid systems, and at encouraging the transfer of the methodologies to industry on four application domains: power management, industrial control, automotive control and multimedia communication networks.

This project is part of the portfolio of the

Embedded Systems Unit – C3
Directorate General Information Society

For more information please check:

http://www.cordis.lu/ist/directorate_c/ems/

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HYbrid CONtrol: Taming Heterogeneity and Complexity of Networked Embedded Systems

TYPE OF PROJECT
Network of Excellence

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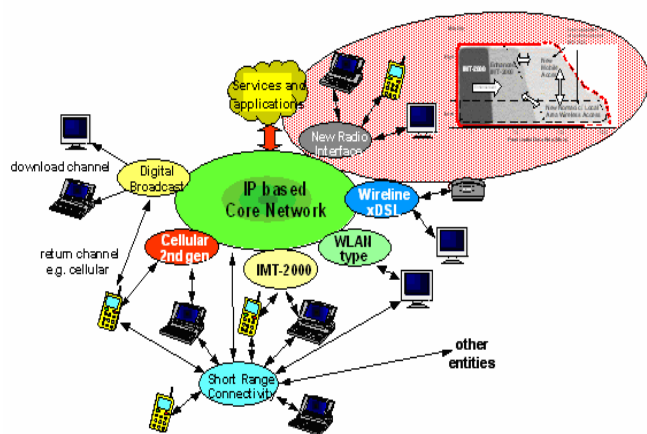Tel./Fax.   +33 1 69 85 17 27
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PROJECT WEBSITE
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BUDGET
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Funding: 4.6 MEuro

TIMETABLE
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Duration: 48 months