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LECTURES ON EMBEDDED SYSTEMS

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Preface

Embedded systems are computer systems that form an integral part of a larger system like a production cell, a controller for a home heating system, a television set, or an airplane. The term "embedded systems" encompasses thus a broad class of systems, ranging from simple microcontrollers to large and complex multiprocessors and distributed systems. In general engineering terms, embedded systems are used for the control of industrial or physical processes. Sensors continuously gather information from the environment. The service of the embedded system is to process this information and to signal the actuators in accordance with the mechanisms of the controlled process. This means that one can design and reason about embedded systems only if one takes the behavior of their environment into account. In computer science terms, embedded systems are distributed reactive systems. Typically, embedded systems have to react to stimuli from their environment in real-time. This can be highly nontrivial in situations where a lot of signal processing must be carried out on the inputs in order to compute the outputs (e.g., multimedia applications). Consequently, real-time issues often play a major role in the design and analysis of embedded systems.

This volume is based on the lectures presented at the School on Embedded Systems which took place in Veldhoven, The Netherlands, in the period November 25–29, 1996.

The School was the first event organized by the European Educational Forum (EEF) which is a joint initiative of three interuniversity research schools: BRICS (Basic Research In Computer Science) in Denmark, IPA (Institute for Programming research and Algorithmics) in The Netherlands, and TUCS (TUrku centre for Computer Science) in Finland. Altogether, EEF involves 14 universities in Denmark, The Netherlands, and Finland. The common denominator of BRICS, IPA, and TUCS is the training of Ph.D. students and young researchers. The mission of EEF is to organize educational training activities covering a broad spectrum of basic research and its applications directed at this audience.

Apart from papers based on the lectures presented at the School, some other papers have also been included in this volume. In this way, we hope to give a broad and well balanced picture of current research in embedded systems. The material from the School presented in this volume was prepared after the School, so that it also reflects the discussions that took place.

We are grateful to the contributors to this volume for their effort, and to the participants at the School for their enthusiastic and active participation. We also thank the members of the Program Committee for putting together such an interesting program. The members of the Program Committee were: Ralph Back, Ed Brinksma, Dieter Hammer, Kim Larsen, Mogens Nielsen, Kaisa Sere, and Frits Vaandrager (chair).

Finally, we are very much indebted to the management team of IPA, Jos Baeten, Alda Bouten, and Herman Geuvers, for organizing such a successful meeting.

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