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ICT in Education, Research, and Industrial Applications

8th International Conference, ICTERI 2012
Kherson, Ukraine, June 6-10, 2012
Revised Selected Papers

Preface

It is our pleasure to present you the proceedings of ICTERI 2012, the eighth International Conference on Information and Communication Technologies (ICT) in Education, Research, and Industrial Applications: Integration, Harmonization, and Knowledge Transfer. The conference was held in Kherson, Ukraine on June 6–10, 2012. This volume is composed of the revised and substantially extended versions of the best ICTERI 2012 papers. The selection was made by the Steering Committee based on the quality, anticipated reader interest, and coverage of the conference scope.

ICTERI as a conference series is concerned with interrelated topics that are vibrant for both the academic and industrial communities:

- ICT infrastructures, integration, and interoperability
- Machine intelligence, knowledge engineering (KE), and knowledge management (KM) for ICT
- Model-based software system development
- Methodological and didactical aspects of teaching ICT and using ICT in education
- Cooperation between academia and industry in ICT

A look at Google Analytics statistics proves broad and growing professional interest in ICTERI and its topics. Indeed, between the launch of the conference web site in November 2011 and the beginning of the conference in June 2012 we received about 3 500 visits from 75 countries (332 cities). Sixty-two per cent of those visits were by returning visitors. Between the end of the conference in June and the end of September 2012 we received an additional 900 visits, of which approximately 49 per cent were by new visitors. In fact the growing interest of the professional community was the indicator that encouraged us to offer this selection of chapters that best cover the scope of the conference and come with relevant research and development results.

This book begins with an invited contribution presenting the substance of one of ICTERI 2012 invited talks given by Prof. Martin Strecker. The chapter deals with the issues of abstraction and verification of properties in real-time Java programs. The rest of the volume is structured in four topical parts:

- ICT Frameworks, Infrastructures, Integration, and Deployment
- Formal Logic and Knowledge-Based Frameworks
- ICT-Based Systems Modeling, Specification, and Verification
- ICT in Teaching and Learning

Part 1 begins with a chapter presenting a new formal approach to developing information processing systems based on quantum automata and quantum computations. The second chapter reports on recent developments in parallelizing legacy software code using rewriting rules and algebraic models of programs. Finally, the third chapter presents the deployment of ICT that enables managing a university using best practices adopted from business corporate management.

Part 2 of the volume focuses on formal logic and knowledge based systems as an important part of the ICT landscape. It starts with a chapter reporting the development of a business-to-consumer communication framework using several channels. In particular, the chapter presents an approach to cross-channel context-dependent message transformation based on the use of semantic technology. The second chapter is more theoretical and reports recent results in solving satisfiability and validity problems for a particular type of formal logic system dealing with program models. Finally, the third chapter elaborates an existence criterion of global-in-time trajectories of non-deterministic Markovian systems.

Part 3 deals with modeling, specification, and verification of ICT-based systems. It begins with a chapter on a case study that combined verification and model driven engineering in a development process for Java programs. The next chapter elaborates an algorithmic approach for reachability checking. The last chapter in this part describes an approach to verifying UML designs looking at potential cross-diagram inconsistencies.

Part 4 of the volume offers reports on the use of ICT in teaching and learning practices. It is opened by a chapter presenting the educational experiment of using a peer-review approach and respective ICT for increasing motivation and learning quality of computer science students. The second chapter reports on the increase of the professional competencies of those future music teachers who used music art multimedia products in their studies. The third chapter is focused on forming a taxonomical structure of general principles for learning software engineering as a profession. The learning approach is supported by a tool suite that was built based on this taxonomy. The fourth chapter reports on the outcomes of introducing new ICT-intensive didactics in the introductory course on computer literacy for future elementary school teachers.

On the whole ICTERI 2012 attracted 70 submissions. The Conference Program Committee selected the best 34 of those 70. In the second selection phase the Steering Committee chose 18 papers as candidates for the proceedings volume. Out of those 18 we finally accepted the 14 most interesting chapters, which have been substantially revised and extended. This resulted in an acceptance rate of 20 per cent.

This volume would not have appeared without the support of many people. First, we would like to thank the members of our Board of Reviewers for providing timely and thorough reviews, and also for being very cooperative in doing additional review work at short notice. We are very grateful to all the

authors for their continuous commitment and intensive work. Furthermore, we would like to thank all the people who contributed to the success of ICTERI 2012. Without their effort there would have been no substance for this volume. Finally, we would like to acknowledge the support of our technical assistant Olga Tatarintseva, who invested considerable resources in checking our submissions.

September 2012

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