Lecture Notes in Networks and Systems

Volume 483

Series Editor

Janusz Kacprzyk, Systems Research Institute, Polish Academy of Sciences, Warsaw, Poland

Advisory Editors

Fernando Gomide, Department of Computer Engineering and Automation—DCA, School of Electrical and Computer Engineering—FEEC, University of Campinas—UNICAMP, São Paulo, Brazil

Okyay Kaynak, Department of Electrical and Electronic Engineering, Bogazici University, Istanbul, Turkey

Derong Liu, Department of Electrical and Computer Engineering, University of Illinois at Chicago, Chicago, USA

Institute of Automation, Chinese Academy of Sciences, Beijing, China

Witold Pedrycz, Department of Electrical and Computer Engineering, University of Alberta, Alberta, Canada

Systems Research Institute, Polish Academy of Sciences, Warsaw, Poland

Marios M. Polycarpou, Department of Electrical and Computer Engineering, KIOS Research Center for Intelligent Systems and Networks, University of Cyprus, Nicosia, Cyprus

Imre J. Rudas, Óbuda University, Budapest, Hungary

Jun Wang, Department of Computer Science, City University of Hong Kong, Kowloon, Hong Kong

The series "Lecture Notes in Networks and Systems" publishes the latest developments in Networks and Systems—quickly, informally and with high quality. Original research reported in proceedings and post-proceedings represents the core of LNNS.

Volumes published in LNNS embrace all aspects and subfields of, as well as new challenges in, Networks and Systems.

The series contains proceedings and edited volumes in systems and networks, spanning the areas of Cyber-Physical Systems, Autonomous Systems, Sensor Networks, Control Systems, Energy Systems, Automotive Systems, Biological Systems, Vehicular Networking and Connected Vehicles, Aerospace Systems, Automation, Manufacturing, Smart Grids, Nonlinear Systems, Power Systems, Robotics, Social Systems, Economic Systems and other. Of particular value to both the contributors and the readership are the short publication timeframe and the world-wide distribution and exposure which enable both a wide and rapid dissemination of research output.

The series covers the theory, applications, and perspectives on the state of the art and future developments relevant to systems and networks, decision making, control, complex processes and related areas, as embedded in the fields of interdisciplinary and applied sciences, engineering, computer science, physics, economics, social, and life sciences, as well as the paradigms and methodologies behind them.

Indexed by SCOPUS, INSPEC, WTI Frankfurt eG, zbMATH, SCImago.

All books published in the series are submitted for consideration in Web of Science.

For proposals from Asia please contact Aninda Bose (aninda.bose@springer.com).

Paulo Novais · Joao Carneiro · Pablo Chamoso Editors

Ambient Intelligence –
Software and Applications –
12th International
Symposium on Ambient
Intelligence



Editors
Paulo Novais
Departamento de Informática
University of Minho
Braga, Portugal

Joao Carneiro ISEP/GECAD Porto, Portugal

Pablo Chamoso Biotechnology, Intelligent Systems University of Salamanca Salamanca, Spain

ISSN 2367-3370 ISSN 2367-3389 (electronic) Lecture Notes in Networks and Systems ISBN 978-3-031-06893-5 ISBN 978-3-031-06894-2 (eBook) https://doi.org/10.1007/978-3-031-06894-2

This work is subject to copyright. All rights are solely and exclusively licensed by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors, and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Switzerland AG The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

Ambient Intelligence (AmI) has established as one of the main trends within the area of artificial intelligence (AI). One of the main reasons is its orientation towards the search for the improvement of the multiple environments that surround human beings through the application of AI, in a way that is as transparent as possible for the end user.

The set of environments that surround us in our day-to-day lives is so broad that AmI applications are becoming more and more numerous. For example, in the last year, due to the COVID-19 pandemic, the research and possibilities of AmI on health care have skyrocketed, being one of the main lines of AmI research today. However, other paradigms that have recently emerged, such as the Internet of Things (IoT), which has been trending in AmI research for more than five years, still have much to contribute.

ISAmI is the International Symposium on Ambient Intelligence, which seeks to bring together scientists working in all areas related to AmI, as can be seen in the papers included in the conference.

This year, in addition to the aforementioned lines of research (health care and IoT applications), you can find, among others, papers on Intelligent Mixed Reality (IMR), an evolution of traditional virtual reality environments and one of the most ambitious expression of AmI.

In total, 17 articles have been selected and, as in previous editions, there are special issues in JCR-ranked journals such as Electronics or Neurocomputing.

The symposium is organized by the Universidad de Salamanca, the Universidade do Minho, and the Instituto Superior de Engenharia do Porto. The present edition was held in Salamanca, Spain, from October 6 to 8, 2021.

Paulo Novais Joao Carneiro Pablo Chamoso

Contents

and Users	1
Radu-Daniel Vatavu and Ovidiu-Andrei Schipor	•
Users with Motor Impairments' Preferences for Smart Wearables to Access and Interact with Ambient Intelligence Applications and Services Ovidiu-Ciprian Ungurean and Radu-Daniel Vatavu	11
Assistive Technology in the Synchrony Between Ambient Intelligence and Mixed Reality for People with Motor Disabilities	23
Exploring AI-Infused Products Qualities to Unleash AmI Davide Spallazzo, Martina Sciannamè, Marco Ajovalasit, Mauro Ceconello, and Venanzio Arquilla	35
Scientific Production in Portuguese Public Universities	47
A Data-Locality-Aware Distributed Learning System Davide Carneiro, Filipe Oliveira, and Paulo Novais	59
IoT Artifacts: Incorporating Artifacts into the SPADE Platform J. Palanca, J. A. Rincon, V. Julian, C. Carrascosa, and A. Terrasa	69
Human Action Detection, Classification and Monitoring Based on Micro-Doppler Processing for Avoidance of Work Accidents Luca Dall'Asta and Georg Egger	81
Blockly Toolbox for Visual Programming of Smart IoT Automations Anthony Savidis Vannis Valsamakis and Dimitris Linaritis	93

viii Contents

Supporting Speech Therapies at (Smart) Home Through Voice Assistance Fabio Cassano, Alessandro Pagano, and Antonio Piccinno	105
Uncertainty Identification in Context-Aware Systems Using Public Datasets Leandro O. Freitas, Pedro Rangel Henriques, and Paulo Novais	115
A Novel Component of Decision-Making for Context-Aware Applications in Pervasive Environments Roua Jabla, Maha Khemaja, Félix Buendía, and Sami Faiz	127
Towards a Model-Driven Ontology-Based Architecture for Generating Adaptive User Interfaces Amani Braham, Maha Khemaja, Félix Buendía, and Faiez Gargouri	139
Ambient Photomontage: Ambiently Superimposing Multiple Perspectives on a Human Visual Perspective Risa Kimura and Tatsuo Nakajima	149
Decision Support System for Facility Location Problems in Fleet Management João Martins, Goreti Marreiros, and Carlos Abreu Ferreira	159
Security Constraints on an Multi-agent System to Manage Users and Spaces in an Adaptive Environment System Pedro Filipe Oliveira, Paulo Novais, and Paulo Matos	171
Multiagent Architecture for a Codebook-Based Bug Management System Guillermo Hernández, Pablo Chamoso, Ana Belén Gil, Javier Prieto, and Juan Manuel Corchado	177