

Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering

296

Editorial Board Members

Ozgur Akan

Middle East Technical University, Ankara, Turkey

Paolo Bellavista

University of Bologna, Bologna, Italy

Jiannong Cao

Hong Kong Polytechnic University, Hong Kong, China

Geoffrey Coulson

Lancaster University, Lancaster, UK

Falko Dressler

University of Erlangen, Erlangen, Germany

Domenico Ferrari

Università Cattolica Piacenza, Piacenza, Italy

Mario Gerla

UCLA, Los Angeles, USA

Hisashi Kobayashi

Princeton University, Princeton, USA

Sergio Palazzo

University of Catania, Catania, Italy

Sartaj Sahni

University of Florida, Gainesville, USA

Xuemin (Sherman) Shen

University of Waterloo, Waterloo, Canada

Mircea Stan

University of Virginia, Charlottesville, USA

Xiaohua Jia

City University of Hong Kong, Kowloon, Hong Kong

Albert Y. Zomaya

University of Sydney, Sydney, Australia

More information about this series at <http://www.springer.com/series/8197>

Ghada Bassioni · Cheikh M. F. Kebe ·
Assane Gueye · Ababacar Ndiaye (Eds.)

Innovations and Interdisciplinary Solutions for Underserved Areas

Third EAI International Conference, InterSol 2019
Cairo, Egypt, February 14–15, 2019
Proceedings

Editors

Ghada Bassioni
Ain Shams University
Cairo, Egypt

Assane Gueye
Université Alioune Diop de Bambey
Bambey, Senegal

Cheikh M. F. Kebe
Ecole Supérieure Polytechnique
Dakar, Senegal

Ababacar Ndiaye
Université Assane Seck de Ziguinchor
Ziguinchor, Senegal

ISSN 1867-8211 ISSN 1867-822X (electronic)
Lecture Notes of the Institute for Computer Sciences, Social Informatics
and Telecommunications Engineering
ISBN 978-3-030-34862-5 ISBN 978-3-030-34863-2 (eBook)
<https://doi.org/10.1007/978-3-030-34863-2>

© ICST Institute for Computer Sciences, Social Informatics and Telecommunications Engineering 2019

This work is subject to copyright. All rights are reserved 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

The third edition of InterSol was held during February 14–15, 2019, in Cairo, Egypt. Cairo's Ain Shams University hosted this annual international meeting under the leadership of Prof. Ghada Bassioni. Just like the previous edition, InterSol 2019 was a forum for scientific exchange and experience shared by people from all over the world. Faithful to its main objectives, the conference served as a framework for the participants to present their work addressing issues and problems in underserved and unserved areas. In fact, populations living in underserved areas face problems in almost all sectors: energy, water, communication, climate, food, health, education, transportation, social development, economic growth, etc.

Through InterSol, researchers contribute to the remediation of these problems by proposing innovative solutions. However, given the nature of the problems, it is obvious that the proposed solutions can be sustainable, relevant, and effective only if they integrate the interdisciplinary dimension. In other words, they must combine different disciplines while taking into account geographical, social, economic, and environmental specificities, among others. These are characteristics that make InterSol unique in the African and even international scientific landscape. Its major strength resides in the number, diversity, and quality of participants.

InterSol 2019 gathered researchers, scientists, educators, students, NGOs and industry from Africa, Europe, Asia, and the Americas.

This volume includes, on the one hand, results of research efforts that were submitted and selected to be presented at the InterSol 2019 conference. On the other hand, the volume also includes selected articles that were presented at the Conference on Research in Computer Science and its Applications (CNRIA 2019). The CNRIA conference was held during April 25–28, 2019, on the campus of the Université Gaston Berger (UGB) of Saint-Louis, Senegal. In this volume, there is a total of 18 papers (9 from InterSol and 9 from CNRIA) that treat different themes including: energy, agriculture, electronics, networks and telecoms, health, social sciences, just to name a few.

We believe that this volume will serve as a good distributor to widely spread the great work presented at InterSol 2019 and CNRIA 2019. It shall also serve as a medium to share the solutions presented by the scientists, who have participated in this international gathering and are dedicated to tackling issues in underserved areas. Indeed, the primary goal of InterSol is to contribute to alleviate living standards for people in these areas, and InterSol 2019 has been another giant step towards this goal.

August 2019

Ghada Bassioni
Cheikh M. F. Kebe
Assane Gueye
Ababacar Ndiaye

Organization

Steering Committee

Imrich Chlamtac	Create-Net and University of Trento, Italy
Cheikh M. F. Kebe	Université Cheikh Anta Diop, École Supérieure Polytechnique, Senegal
Assane Gueye	University of Maryland, College Park, USA, and Université Alioune Diop, Senegal

Organizing Committee

General Chair

Ghada Bassioni	Ain Shams University, Egypt
----------------	-----------------------------

General Co-chair

Cheikh Mouhamed Fadel Kebe	Université Cheikh Anta Diop, Senegal
----------------------------	--------------------------------------

TPC Chair and Co-chairs

Assane Gueye	Université Alioune Diop de Bambey, Senegal, University of Maryland, College Park, USA
Melissa Densmore	UCT, South Africa
Tembine Hamidou	New York University, USA
Moustapha Diop	University of Maryland, Baltimore College, USA

Sponsorship and Exhibit Chair

Abdulhameed Mambo	Nile University of Nigeria, Nigeria
-------------------	-------------------------------------

Workshops Chair

Wilfred Ndiffon	African Institute of Mathematical Sciences, Kigali, Rwanda
-----------------	--

Publicity and Social Media Chair

Jessica Thorn	University of York, UK, African Climate and Development Initiative, South Africa, and African Institute for Mathematical Sciences, Rwanda
---------------	---

Publications Chair

Ababacar Ndiaye	Université Assane Seck de Ziguinchor, Senegal
-----------------	---

Web Chair

Babacar Mbaye Université Alioune Diop de Bambey, Senegal

Posters and PhD Track Chair

Maimouna Diouf Aix-Marseille University, France

Tutorials Chair

Narcisse Talla Tankam University of Ngaoundere, Cameroon

Local Arrangement Committee

Tamer Zaki	Egyptian Petroleum Research Institute, Egypt
Ayman Fareed	Ain Shams University, Egypt
Gehan Adel	Ain Shams University, Egypt
Heba Soliman	Ain Shams University, Egypt
Karima Ali	Ain Shams University, Egypt
Ali Korin	Ain Shams University, Egypt
Alaa Mohsen	Ain Shams University, Egypt
Ahmed Abdelhameed	Ain Shams University, Egypt
Walid Hisham	Ain Shams University, Egypt
Mohamed Abdelaal	Ain Shams University, Egypt
Ayman Mohammed	Ain Shams University, Egypt

Technical Program Committee

Mbaye, Mamadou Lamine	UASZ, Senegal
Garba, Aminata	CMU, Rwanda
Traval, Youssef	NEF, Rwanda
Nelson, Kara	UCB, USA
Coulibaly, Pane Jeanne d'Arc	INERA, Burkina Fasso
Sadouanouan, Malo	UPB, Burkina Fasso
Kane, El Hadji Malick	HEFR, Switzerland
Gueye, Bamba	UCAD, Senegal
Thorn, Jessica P. R.	University York, UK, ACDI, South Africa, and AIMS, Rwanda
Talla Tankam, Narcisse	University of Ngaoundere, Cameroon
Gueye, Assane	UADB, Senegal, and UMCP, USA
Ba, Mouhamadou Lamine	UADB, Senegal
Camara, Gaoussou	UADB, Senegal
Kabore, Francois Pazisnewende	Jesuit University Institute, Ivory Coast, and GU, USA
Kebe, Cheikh M. Fadel	UCAD, Senegal
Densmore, Melissa	UCT, South Africa
Diop, Alassane	UVS, Senegal

Bassioni, Ghada	Ain Shams University, Egypt
Diop, Moustapha	UMBC, USA
Mbodji, Senghane	UADB, Senegal
El Sherif, Rabab	Cairo University, Egypt
Hamidou, Tembine	NYU, USA
Ndiaye, Ababacar	UASZ, Senegal
Mambo, Abdulhameed	Nile University, Nigeria
Mahmoudi, Charif	NIST, USA
Pal, Joyojee	University of Michigan, USA
Van Stam, Gertjan	SIRDC, Zimbabwe

Contents

A Survey of Game Theoretic Solutions for Cloud Computing Security Issues	1
<i>Bernard Ousmane Sane, Cheikh Saliou Mbacke Babou, Doudou Fall, and Ibrahima Niang</i>	
New Approach for the Evaluation of Carbon Sequestration Capacity: Case of Closed Plant Formations and Gallery Forests	13
<i>Narcisse Talla Tankam, Janvier Fotsing, Maurice Ndikwé Dourwé, Idriss Landry Kouedjou, and Michel Tchotsoua</i>	
Technical, Economic and Environmental Analysis of Hybrid Energy Solutions for Rural Electrification in the Republic of Chad.	26
<i>Modou Diop, Salif Sow, Zoutene Pabame, Ababacar Ndiaye, and Cheikh M. F. Kébé</i>	
An Optimized, Low-Cost Off-grid Solar System: Design and Implementation.	38
<i>Pape Moussa Sonko, Diery Ngom, Mouhamed Ouesse, and Assane Gueye</i>	
Africa's Online Access: What Data Is Getting Accessed and Where It Is Hosted?	50
<i>Babacar Mbaye, Assane Gueye, Desire Banse, and Alassane Diop</i>	
Distributed Network Slicing and User Association in Unequal STBC-SNR Branch	62
<i>Mamadou Diallo Diouf and M. Ndong</i>	
Follow Africa: Building an African News Recommender Systems.	70
<i>Moustapha Diouf Fall and Modou Gueye</i>	
An Ontological Model for the Annotation of Infectious Disease Simulation Models	82
<i>Papa Alioune Cisse, Gaoussou Camara, Jean Marie Dembele, and Moussa Lo</i>	
S-SDS: A Framework for Security Deployment as Service in Software Defined Networks	92
<i>Adama Coly and Maïssa Mbaye</i>	
Enrichment of Medical Ontologies from Textual Clinical Reports: Towards Improving Linking Human Diseases and Signs	104
<i>Adama Sow, Abdoulaye Guissé, and Oumar Niang</i>	

Design of a Low-Cost Wind Turbine Controller for Decentralized Rural Electrification Through the Small Wind Turbine	116
<i>Ababacar Ndiaye, Mohamed El Ali, Salif Sow, Cheikh M. F. Kébé, Vincent Sambou, and Papa A. Ndiaye</i>	
The Circular Relationship Between Poverty, Environment, and Economic Development: The Case of Shakshouk Village, Fayoum	128
<i>Nada Tewfik, Marwa Abdel Latif, and Mohamed Salheen</i>	
The Community Participation in the Design Process of Livable Streets	144
<i>Nourhan Ahmed, Abeer Elshater, and Samy Afifi</i>	
A Smart Computing Framework Centered on User and Societal Empowerment to Achieve the Sustainable Development Goals	158
<i>Athula Ginige, Bahman Javadi, Rodrigo N. Calheiros, and Sheryl L. Hendriks</i>	
Towards an Efficient Prediction Model of Malaria Cases in Senegal	173
<i>Ousseynou Mbaye, Mouhamadou Lamine Ba, Gaoussou Camara, Alassane Sy, Balla Mbacké Mboup, and Aldiouma Diallo</i>	
Author Index	189