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Waldemar Karwowski
Tareq Ahram *Editors*

Intelligent Human Systems Integration

Proceedings of the 1st International Conference on Intelligent Human Systems Integration (IHSI 2018): Integrating People and Intelligent Systems, January 7–9, 2018, Dubai, United Arab Emirates

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Preface

This volume, entitled *Intelligent Human Systems Integration*, aims to provide a global forum for introducing and discussing novel approaches, design tools, methodologies, techniques, and solutions for integrating people with intelligent technologies, automation, and artificial cognitive systems in all areas of human endeavor in industry, economy, government, and education. Some of the notable areas of application include, but are not limited to, energy, transportation, urbanization and infrastructure development, digital manufacturing, social development, human health, sustainability, new generation of service systems, as well as developments in safety, risk assurance, and cybersecurity in both civilian and military contexts. Indeed, rapid progress in developments in the ambient intelligence, including cognitive computing, modeling, and simulation, as well as smart sensor technology, weaves together the human and artificial intelligence and will have a profound effect on the nature of their collaboration at both the individual and societal levels in the near future.

As applications of artificial intelligence and cognitive computing become more prevalent in our daily lives, they also bring new social and economic challenges and opportunities that must be addressed at all levels of the contemporary society. Many of the traditional human jobs that require high levels of physical or cognitive abilities, including human motor skills, reasoning, and decision-making abilities, as well as training capacity, are now being automated. While such trends might boost the economic efficiency, they can also negatively impact the user experience and bring about many unintended social consequences and ethical concerns.

The intelligent human systems integration is to a large extent affected by the forces shaping the nature of future computing and artificial system development. This book discusses the needs and requirements for the symbiotic collaboration between humans and artificially intelligent systems, with due consideration of the software and hardware characteristics allowing for such cooperation from the societal and human-centered design perspectives, with the focus on the design of intelligent products, systems, and services that will revolutionize human–technology interactions.

This book also presents many innovative studies of ambient artificial technology and its applications, including the consideration of human–machine interfaces with a particular emphasis on infusing intelligence into development of technology throughout the lifecycle development process, with due consideration of user experience and the design of interfaces for virtual, augmented, and mixed reality applications of artificial intelligence.

Reflecting on the above-outlined perspective, the papers contained in this volume are organized into five main sections, including:

I. Intelligence, Technology, and Automation
II. Humans and Artificial Cognitive Systems
III. Computational Modeling, Simulation, and Design
IV. Ambient Intelligence and User Experience
V. Society, Governance and Smart Systems

We would like to extend our sincere thanks to Dr. Stefania Camplone, University of Chieti-Pescara, Italy, for leading a part of the technical program that focuses on Smart Materials and Inclusive Human Systems. Our appreciation also goes to the members of Scientific Program Advisory Board who have reviewed the accepted papers that are presented in this volume, including the following individuals:

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We hope that this book, which presents the current state of the art in *Intelligent Human Systems Integration,* will be a valuable source of both theoretical and applied knowledge enabling the design and applications of a variety of intelligent products, services, and systems for their safe, effective, and pleasurable collaboration with people.

January 2018

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Between a Smart City and Smart Society

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Abstract. The concept of smart cities and smart societies should start from the base up, from the individuals and not the other way around. The 21st century should be about developing the new smart concepts about a smart transportation system combined with the smart energy one. In these concepts, smart technologies like phone apps that provide people with quick information about how to move, where to park, what areas to avoid due to congestions etc., should be affordable for everybody. Apps that interconnect people and cities around states or the European Union with functions like booking a sharing bike or a sharing car should also be available for each individual. Smart transportation, from cars to trains, bikes or planes, all interconnected by a new technology should serve in the future the citizens around the globe.

Keywords: Smart cities · Smart societies · Smart transportation · Spin off

1 Introduction

The word "smart city" has become widespread in recent years and has entered into our daily lexicon even if we do not always understand the significance and what it follows. In fact, we cannot speak of a smart city unless we are thinking of building an intelligent society, this process of social change must be accompanied by a continuous process of social modernization, otherwise the advantages of such "industrial" revolution would be ineffective and would risk to create a new social gap with a substantial problem of democracy.

2 Smart City

This expression identifies an urban area that, through the widespread and pervasive use of advanced technologies, is able to address the social and economic needs of citizens in a new way.

Having different faces, there are so many ways in which a city can become smart.he city that known to move in the developing territories around it is increasingly congested and therefore needs new mobility management and governance models that enhance public transport, introduce types and models of transport as the shared ones, provide

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innovative services for monitoring, analysis, planning and management of citizen and means flows [1].

The city that doesn't know to move, meaning that a city is smart even to the extent that it helps citizens not to move. In particular, a widespread and pervasive use of IT&C services and products allows you to remotely, without moving, a lot of activities: from shopping, to meetings, to group work and project work to training as eLearning [2].

The informed city is that smart city capable of collecting and disseminating information in a capillary and continuous manner, both in terms of normal social and economic life and as regards the management of emergency situations such as natural disasters or terrorist attacks [3].

The virtuous city is that smart city able to exploit all modern energy saving technologies to reduce the impact on the environment and on the planet that comes from the presence and activities of thousands of people and products that in various forms consume energy and they produce waste [4].

The vibrant and dynamic city is that smart city capable of generating and promoting cultural and recreational activities that qualify the territory, attract talents, enrich urban fabric and stimulate creativity and social growth [5].

The participative city is the city where the size and the progressive turn into big agglomerations lose the dimension of the "medieval square", and it makes more and more concrete the danger of the loss of social cohesion and the impoverishment of moments of encounter and socialization [6–19].

A smart city is capable of inventing new forms of participation that, by combining the use of new technologies and new forms of social encounter, are able to renew and recreate the fabric of human relationships and opportunities for dialogue and dialogue [20–22].

The safe city is that city that increases the security of people and belonging. A smart city raises the level of security through the use of innovative landscape surveillance and citizen assistance.

3 The Well-Governed City

Last but not least, that smart city offers new forms of government that can both monitor and manage the territory and the dynamics that it develops, and to enhance the continuous and bidirectional relationship with citizens, businesses, the living entities that operate and grow on it.

A smart city is a place where all vital and neuralgicidal processes of social life are re-released, thanks also to the use of technologies, in order to radically improve the quality of life, opportunity, welfare, social and economic development.

In the world, various are the proposals to interpret the construction of smart cities, in Japan the prof. Fairy Matsushima proposes integrated development strategy to address 4.0 industry, digitization and data sharing, and aim at the future of company 5.0 [23–31].

Japan is in the process of addressing 4.0 industry and digitalisation as a whole, so that this is one of the main items of the government-sponsored strategic project plan of 600 billion yen in public-private investment, equivalent to 4 billion euro in total. At the

same time, on the theme of data sharing, the Japanese model is aiming at a next goal: the spread of the company 5.0. This concept implies a new, intelligent society that embraces the innovations of the fourth industrial revolution not only to improve productivity but also to help solve social problems [32].

It is the "human technology oriented" model chosen by Japan as a reference guide for the future, which puts technology at the service of the person and has the "Connected Industries" pillar. The heart of the Japanese development strategy is small and medium-sized enterprises, which are the country's productive reference fabric, identified to achieve the medium and long-term sustainable growth needed for society 5.0. The connected industry is the connection between manufacturing industries, service companies, public organizations, machines and people [33].

This model, through the Internet of Things, the use of robots and Big Data, improves productivity, quality of work and reduces costs, thanks to smart working allowing men, women and the elderly to easily access the labour market.

The real revolution, however, is to overcome the conquests of the "Connected Industries" on a large scale. It may sound surprising, but digitization has the potential to help change trades to the detriment of alienating ones, to create new value by reducing unemployment and shrinking social inequities, solving problems such as aging, lack of staff, environmental and energy constraints.

For example, in the field of new professions, technology is helping to redesign productive activities, companies can give up a "physical" workforce and the "physical" workforce can avoid wacky and damaging activities. In other words, low-value activities will be reduced. More and more, it will be necessary to replace the "labor" with the "knoldge work", more and more our companies will be hungry for knowledge professions.

To make the intelligent society sustainable in the near future, one cannot think of halting the digital revolution, but we must work to find a new balance between man and technology, raising the breadth of our goals and aiming for a better quality of life. A new equilibrium that requires us to be thinking men.

Governance policies and company policy choices must therefore be focused on people's growth and the development of new high-value-added skills. In the fourth industrial revolution, the human factor plays an even more central role in the management of new tools, especially in order to bring them to the service of the community. This is the counterweight that will make us reach a new sustainability, this is the challenge of society 5.0 [34].

4 Smart Society Spin off

One of the initiatives promoted by the Italian university is the Spin off smart society of Chieti-Pescara University, conceived by prof. Gianmarco Cifaldi.

The project wants to overthrow the paradigm, that is, to make a smart city, you must first build an intelligent society; the city is hardware as the inhabitants become its software. A city can be called smart when traditional and modern infrastructure provides sustainable economic development and high quality of life, wise management of natural

resources, through the commitment and action of the participating citizen, to produce a model of urban and social security.

- Create a local network consisting of public and private institutions that allow citizens to easily access services and improve their quality of life by consulting and sharing information that is constantly available.
- Implement mobile connection systems in urban areas.
- Facilitate the knowledge and use of new communication channels to support the interaction and socialization of citizens in their own territory.
- Disclose the use of smart technologies and culture to improve the quality of life of citizens.

The Spin off has developed a Tile Info System, consisting of a "QR Code" (horizontal signs positioned on the road surface) where the QR code of the reference organization is inserted, made of material that provides resistance to all weather conditions (Fig. 1).

Fig. 1. The placement of Tile information on the road surface (www.smartsociety.it)

The service, through the placement of Tile information on the road surface and not only, is the junction between the real world (roads and the city in general) and the virtual world (data on a server) and allows it to represent content, divulge information, activate functions, services, and interactions.

Placing a Tile Info in a street or square enables citizens to communicate and receive information at any time, in a direct and up-to-date manner.

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