

## Preface

In the 21<sup>st</sup> century, smart technology becomes a fundamental instrument for businesses, education and individuals worldwide to enhance job performance and productivity and to ensure the job is efficient and effective. Additionally, smart technology can improve communication, collaboration, cooperation, connection, job efficiency and proficiency between employees vs. employers, employees vs. stakeholders, students vs. students, and students vs. teachers locally and globally. Using smart technology can improve data management, support availability of Internet mobility, stimulate creativity and innovation, encourage factor of globalization phenomena, enhance customers' and students' satisfaction via communication, collaboration, cooperation and connection. Furthermore, using smart technology can reduce utility cost; more sustainable and saving energy among businesses, education and individuals.

Conversely, employing this technology can cause massive risks to our society locally and globally from increasing carbon emission, raw materials, life spans of smart technology and recycling. Furthermore, this technology can cause further risks to human begin attitudes and behaviour namely; cognitive, social and physical developments, as well as security risks. To tackle these risks, designers, businesses and education should and must take some responsibility to raise the awareness in relation to smart technology risks and designers and HCI specialists should add to their notions of design the concept of "green" technologies, since the current technologies are adversely affected and causing major problems to the environment, as the smart technology recycling is causing enormous problems to the environment and planet. Finally, some of the current materials belong to our seventh generation; therefore, we need to keep this notion in our design now as well in the future. The purpose of this book is to examine the risks and opportunities of smart technology adoption in various sectors from a global perspective. This book will cover enormous topics in relation to the journey of Smart technology and ICT particularly: Technology Opportunities; Technology Risks; Technology and Sustainability; Technology, learning and teaching; Technology and Businesses; and Technology and Education. This book will assist various sectors of Smart Technology adoption, since this tool will improve their job performance and productivity. Furthermore, this book aims to support researchers and academics' work and sharing the latest research to Smart Technology adoption among their students nationally and internationally in various sectors especially in the higher-education sector.

Chapter 1 is "Acceleration Sobel Edge Detection Using Compressor Cells Over FPGAS," and created by Ahmed Abouelfarag, Marwa Ali Elshenawy, Esraa, and Alaaeldin Khattab. This chapter discusses the recent discussion about computer vision which is playing an important role in many essential human-computer interactive applications, these applications are subject to a "real-time" constraint, and therefore it requires a fast and reliable computational system. Edge Detection is the most used approach for segmenting images based on changes in intensity. There are various kernels used to perform edge detection, such as:

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Sobel, Robert, and Prewitt, upon which, the most commonly used is Sobel. In this research a novel type of operator cells that perform addition is introduced to achieve computational acceleration. The novel operator cells have been employed in the chosen FPGA Zedboard which is well-suited for real-time image and video processing. Accelerating the Sobel edge detection technique is exploited using different tools such as the High-Level Synthesis tools provided by Vivado. This enhancement shows a significant improvement as it decreases the computational time by 26% compared to the conventional adder cells.

Chapter 2 is called “Expansion of Uses and Applications of Virtual Reality” written by Pablo Gobira and Antônio Mozelli. This chapter shows the evolution of virtual reality interfaces and technologies to the current moment and verifies what led them to an alleged decline in early 1990. Due to the development of the industry of digital games, new forms of interaction have being researched and presented to the public. It will also be shown the application of virtual reality in different contexts of digital games, in addition to reporting a brief experience of the research group in art, science and technology, LabFront (Laboratório de Poéticas Fronteiriças - CNPq/UEMG).

Chapter 3 is titled “Multimodal Human Aerobotic Interaction” and authored by Ayodeji Opeyemi Abioye, Stephen D Prior, University of Southampton, Glyn T Thomas, Peter Saddington and Sarvapali D Ramchurn. This chapter discusses HCI interfaces used in controlling aerial robotic systems (otherwise known as aerobots). The autonomy control level of aerobot is also discussed. However, due to the limitations of existing models, a novel classification model of autonomy, specifically designed for multirotor aerial robots, called the navigation control autonomy (nCA) model is also developed. Unlike the existing models such as the AFRL and ONR, this model is presented in tiers and has a two-dimensional pyramidal structure. This model is able to identify the control void existing beyond tier-one autonomy components modes and to map the upper and lower limits of control interfaces. Two solutions are suggested for dealing with the existing control void and the limitations of the RC joystick controller –the multimodal HHI-like interface and the unimodal BCI interface. In addition to these, some human factors based performance measurement is recommended, and the plans for further works presented.

Chapter 4 is titled “Methodology for Knowledge Management and Self-Directed, Science Program Engineering Computing” and written by Marcos Levano, Universidad Catolica de Temuco, Chile. This chapter shows the development of a learning methodology used to validate self-directed learning generic competences and knowledge management in a competence-based model in the engineering computer science program of the Universidad Católica Temuco (UCT). The design of the methodology shows the steps and activities of the learning-by-doing process, as shown gradually in the learning results of the competence. The designed methodological process allows creating working schemes for theory-based teaching and learning, and also for practicing and experimenting. The problematology as controlled scenarios is integrated in order to answer problems in engineering, allowing the process of validation in the self-learning and knowledge management competences. Thus, the achievements in the results have allowed helping the teachers to use their learning instruments.

Chapter 5 is titled “Adolescence Surveillance System for Obesity Prevention (ASSO) in Europe: A Pioneering Project to Prevent Obesity Using E-Technology” and authored by Garden Tabacchi,; Monèm Jemni, Joao L Viana, and Antonino Bianco. This chapter aims to discuss the ASSO. Adolescents’ obesity is a major concern in our modern life that could lead to significant increase in the rate of obese future generations and consequently in the health budget. The ASSO (Adolescence Surveillance System for Obesity prevention) project in Italy is tackling this new pandemic using the new e-technology through a multi facets monitoring system on life style including food consumptions, meal patterns and habits, alcohol, smoking, physical activity, fitness and sedentariness, and biological/genetic, and socio-cultural/

environmental characteristics of adolescents. The project has been recently piloted in the South of the country. This chapter summarizes the design and structure of the ASSO system, its implementation and the results of an evaluation process for its possible extension to the whole Italian territory and to other European realities as a national surveillance system.

Chapter 6 is titled “An Intelligent Ecosystem to Support the Development of Communication Skills in Children With Autism: An Experience Based on Ontologies, Multi-Sensory Stimulation Rooms, and Robotic Assistants” and authored by Vladimir Robles-Bykbaev, Martín López-Nores, Jorge Andrés Galán-Mena, Verónica Cevallos León Wong, Diego Quisi-Peralta, Diego Lima-Juma, Carlos Andrés Arévalo Fernández, and José Pazos-Arias, University of Vigo. This chapter aims to discuss the ASDs. The term Autism Spectrum Disorders (ASDs) covers conditions such as autism, childhood disintegrative disorder and Asperger syndrome. In this line, the World Health Organization (WHO) points that core symptoms of ASD are: a mixture of impaired capacity for reciprocal socio-communicative interaction and a restricted, stereotyped repetitive repertoire of interests and activities. Therefore, it is fundamental for a person with ASD to develop skills to communicate with his/her peers, share ideas, and express feelings. On those grounds, this chapter presents an intelligent ecosystem to support the development of social communication skills in children with ASD. The ecosystem uses a knowledge model that relies on ontologies, and defines the main elements that will be used for psychological intervention process. The different activities that will be carried out during the therapeutic intervention can be done using a robotic assistant or a Multi-Sensory Stimulation Room. This proposal has been tested with 47 children of regular schools, 9 specialists on ASD, and 36 children with ASD.

Chapter 7 is titled “Auditory Feedback in a Computer Game for Blind People” and authored by Ana Teixeira, Anabella Gomes, and Joao Gilberto Orvalho. The study presents an adaptation of the Mastermind game for blind users called MasterBlind. The game mechanics were simplified and auditory feedback introduced. The research object was to understand what kind of sounds would work better to help blind people play the game. Three versions were presented to the subjects - pentatonic notes, animal sounds and vowels - to help users recall previous steps in the game. The main hypothesis predicted that blind users would consciously benefit from the auditory feedback provided. The second hypothesis predicted that users would benefit less from the feedback that does not provide semantic information- auditory icons versus earcons. The results were congruent with the hypothesis. MasterBlind can be a usable, enjoyable and a challenging experience for blind users as long as it provides semantically significant feedback. However, new developments are in progress to prove our ideas having in mind the inclusion of blind people.

Chapter 8 is titled “Experiences With a Research Product: A Robot Avatar for Chronically Ill Adolescents” and written by Jorun Børsting and Alma Leora Culén. This chapter discusses challenges related to studying the use and usefulness of research products (robust, high fidelity prototypes placed in real use contexts for research purposes). Methods and methodologies for studying use and usefulness of such research products embedded in users’ everyday lives are still lacking and need to be better established. By presenting a case of such research product in use, a robot avatar, we wish to illustrate how new knowledge of relevance for both designers and users can be gained. The robot avatar was designed to represent chronically ill adolescents at school, improving his/hers learning opportunities, as well as helping maintain social connections with peers. The chapter shows how methods were adapted and tools designed to work with this user group and learn about the role of avatars in education and reduction of social isolation. The value of using the avatar, and similar research products, is considered.

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Chapter 9 is titled “Human-Data Interaction in Healthcare” and created by Federico Cabitza and Angela Locoro. In this chapter, we focus on an emerging strand of IT-oriented research, namely Human-Data Interaction (HDI) and on how this can be applied to healthcare. HDI regards both how humans create and use data by means of interactive systems. Healthcare is a challenging arena where to test the potential of HDI towards a new, user-centered perspective on how to support and assess “data work”. This is especially true in current times where data are becoming increasingly big and many tools are available for the lay people, including doctors and nurses, to interact with health-related data. This chapter is a contribution in the direction of considering health-related data through the lens of HDI, and of framing data visualization tools in this strand of research. The intended aim is to let the subtler peculiarities among different kind of data and of their use emerge and be addressed adequately. Our point is that doing so can promote the design of more usable tools that can support data work from a user-centered and data quality perspective and the evidence-based validation of these tools.

Chapter 10 is called “Children Using Social Media to Connect With Others and With Consumer Brands” and authored by Katharine Jones and Mark S Glynn. This chapter aims to discuss social media usage via children. Children’s use of social media affects their interactions with consumer brands. Because children’s social media use is a part of people’s increasing use of social platforms to communicate and share content with each other, it is important to understand how children are using such platforms as sources of market-related information. This is because children’s socialisation as consumers depends upon their accessing a range of market-related information sources, and social media platforms are envisaged to facilitate such access. Children’s interactions with consumer brands are governed by interaction processes, and such processes shape the relationships that children may form with brands. Understanding these interaction processes will provide insights for parents, educators, and business marketers seeking information as to how the next generation of consumers uses social media for market-related activities.

Chapter 11 is called “Design of a University Learning Environment for SMART Education” and authored by Nataliia V. Morze, Eugenia Smyrnova-Trybulska, and Olena Glazunova. This chapter discusses theoretical, methodological and practical aspects of a design of a university learning environment for SMART education. Smart technology is analyzed against university background. The authors consider a process of transformation from e-learning to smart education, in particular the VLE objective according to the concept of smart education, formation of individual learning trajectories in a smart environment and a quality university educational environment for smart education. In the second part of chapter, the authors look at the development of teacher ICT competence of teachers in the system of smart education and present their conclusions. The references include more than thirty items: articles, books, chapters, conference proceedings on SMART education, university learning environment, virtual learning environment (VLE).

Chapter 12 is named “EvalCOMIX®: A Web-Based Programme to Support Collaboration in Assessment” and created by María Soledad Ibarra-Sáiz and Gregorio Rodríguez-Gómez. This chapter aims to examine the web based programme in assessments. The increasing use of technological tools to support the process of participation in assessment is explained, firstly, by the current tendencies in assessment and learning in Higher Education which encourage the active participation of students as a means to improve their learning; secondly, by the universal presence of technology that makes it impossible to conceive of any educational process that does not contemplate its use and that is leading to ever more courses that are either virtual or require minimal attendance; and, finally, an environment in which there are ever greater numbers of students per class. This chapter presents the results of using the web-based EvalCOMIX® programme in the context of a number of Higher Education training courses. Data has been

collected through questionnaires and interviews applied to students, lecturers and academic coordinators. The results illustrate the ease of implementation of EvalCOMIX®, its usefulness in creating and sharing assessment instruments and the opportunity it provides to facilitate student participation in assessment.

Chapter 13 is called “Transformative Academic Development: A Complexity of Converging Features” and written by Kuki Singh. This chapter aims to examine and discuss the new configurations in the practice of academic development. In a dynamically changing higher education environment, a deep understanding and facilitation of relevant and flexible academic development is vitally important organisationally. A qualitative case study methodology was employed to analyse the organisational positioning and design of academic development as a means of gaining insights into the needs, challenges and evolutionary trends occurring at one university. A non-linear organisational-level data analysis based on triangulation from document study, direct observation, and experiential and reflective knowledge, provided theoretical and practical insights into how academic development is embodied institutionally. A design perspective revealed the characterisation of an expanded remit, as complex, contradictory and complementary. The study concluded that new configurations in the practice of academic development are convergent in nature, integrating a transformative agenda representational of professional learning trends globally.

Chapter 14 is titled “University Students’ Perceptions of Personal Mobile Devices in the Classroom and Policies” and written by Ieda M. Santos and Otávio Bocheco. This chapter discussed the results of a study that explored students’ perceptions of personal mobile devices in the classroom and suggestions for policies. Thirty-four students enrolled in two undergraduate courses taught at a Brazilian higher education institution took part in the study. Data collection consisted of a survey and focus group interview. Quantitative data suggested an overall tendency to rare use of the devices for content and non-content activities. Qualitative results, however, showed that students may have used more often their devices in class. The results discussed several policies recommended by the students ranging from allowing the devices for content and emergency to not using social media for off- task activities. The study suggested that inappropriate use of mobile technology in the classroom may be minimized if students participate in the development of policies, and instructors integrate the devices in class to promote engagement and interest among students. Recommendations for practice and future research are discussed.

Chapter 15, “CRM 2.0 and Mobile CRM: A Framework Proposal and Study in European Recruitment Agencies,” is written by Tânia Isabel Gregório and Pedro Isaías. This chapter aims to examine how companies are becoming more focused on customers and on new ways to approach them individually. Mobile technologies and Web 2.0 have been pushing companies to evolve in this area. This research is focused on the way Customer Relationship Management (CRM) systems are used, on a European level, by recruiting companies to assist candidates in finding a satisfactory job. A framework is presented to identify how CRM 2.0 and mCRM (mobile CRM) can help candidates to find jobs in a personalized way. A set of four hypotheses have been defined. To gain a better understanding of these CRM systems, the methodology used in the exploratory study was quantitative, employing a non-probabilistic sampling technique, with 35 recruiting agencies being studied. Results showed that the use of software in recruiting agencies is quite common and that CRM 2.0 is present in the vast majority of the studied companies. When it comes to mobile CRM, there’s still much to be explored in this channel, as agencies focus their resources on Web 2.0, leaving this channel’s great potential of mobile CRM unused.

Chapter 16 is called “The Complexities of Digital Storytelling: Factors Affecting Performance, Production, and Project Completion” and created by Peter Gobel and Makimi Kano. This chapter describes a pair of studies investigating factors involved in task-based learning using digital storytelling.

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In Study 1, the stories were analyzed using the factors of topic, time, medium, and reported technological proficiency. Student attitudes towards the tasks were gauged using a questionnaire that measured perceived task cost and value, engagement with the task, and expectancy for success on future tasks. In Study 2, three mid-task planning conditions were introduced and a questionnaire was administered to see student attitudes towards various modes of mid-task planning. The results of Study 1 suggest that digital storytelling can be incorporated into EFL classes to reduce foreign language anxiety, to provide greater opportunities to use English, and to foster ICT skills. The results of Study 2 suggest that students favor a teacher-led planning condition, and that this planning condition had a positive effect on student attitudes towards the project (value and cost).

Chapter 17 is titled “Our Future: With the Good, the Bad, or the Ugly eServices? Case Finland” and written by Maija R Korhonen. We live in an ever-changing world. Despite that many new and excellent reforms are achieved; this period of time is also very confusing when many things that were regarded as concrete are becoming virtual. In spite of all this incompleteness, our common goal should be a good information society and the purpose of this chapter is to find out some factors that reveal the steps toward it. The question we ask is how to find a balance between a good life and eServices from the human point of view. The key findings pointed to issues in the needs of structural changes in the society. Another challenge that can be observed and which will be in the most essential role in the future is the ownership and control over My Data. Agreements are a common practice in the business and when the subject is eServices in the future, we cannot avoid discussion of the end-user agreements, too.

Finally, this book is mainly intended to support various business sectors, an academic audience (academics, university teachers, researchers, and post-graduate students – both Master and Doctorate levels). In addition, this book will be beneficial for public and private universities, IS developers and researchers, education managers, Professionals related to the information society, ICT, education, sustainability and green IT sectors.

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