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State of the Art in Digital Media and Applications

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Foreword

Anyone familiar with the changes that digital media has brought about in our everyday lives will want to learn more about what is driving the changes – the myriad of computer-based applications that are built on digital media technologies and are designed to meet a variety of social, cultural, economic, and artistic needs that are rapidly evolving. Rae Earnshaw's newest book, *State of the Art in Digital Media and Applications*, is a good place to start for a comprehensive look at how emerging digital media technologies are being used in a variety of application domains that are transforming how we create, consume, exchange, and manipulate media content.

This is Rae's fourth book in a series that focuses on digital media and creativity. The first book, *Research and Development in Art, Design and Creativity*, looked at the roles collaboration and communication play in research and development in creative fields such as art and design and especially the increasing importance of technological tools to support that activity. The second book, *Research and Development in the Academy, Creative Industries and Applications*, focused on university research and its relationship broadly with industry applications and specifically in the creative industries. The third book, *Art, Design and Technology: Collaboration and Implementation*, examined how art, design, and technology intertwine in the production of digital media applications. This fourth book steps back to look at the broader landscape of digital media applications by first summarizing the convergence of information technologies (computers and computer programming), telecommunications (including the Internet and the World Wide Web), and traditional media as it has evolved into new media or, as it is more often referred to, digital media.

Following the introductory Chap. 1, where the elements of digital media and related technology are summarized, Chap. 2 is a brief triptych of important visionary ideas that emerged from the early days of computing, electronic communication, and technological advances in media and provides insight into the possibilities that were imagined when digital media as we know it today was still many decades in the future.

After looking in Chap. 3 at how digital media technology often arises as collaborations across many fields, both technical and artistic, and how those partnerships, especially with small and medium enterprises (SMEs), are important for that process, in Chap. 4, the evolution of digital imaging is detailed starting with traditional analog photography to today's streaming media techniques that inherently rely on digital technology for their robustness and ubiquitous presence.

Digital libraries are discussed in Chap. 5 and used as a springboard to introduce important social issues such as the need for reliable archives, the effect on organizations and institutions (libraries, museums, exhibitions, and conferences) that traditionally were the repositories and gatekeepers for information, the evolving nature of copyright, and the blurring of traditional distinctions between content creators, publishers, broadcasters, and consumers.

With these preliminaries dealt with, Chap. 6 looks at the many applications of digital media that combine specific types of media content with innovative interaction techniques and mechanisms for distributing and sharing digital media and a more in-depth discussion of the blurring of traditional roles within media. For many readers, this will be the main point of the book, but the earlier material provides the context within which to understand how these applications arose and why those that have been successful are a consequence of the historical processes that led us to where we are now.

Chapter 7 focuses on the phenomenon of social media, and enabling Web 2.0 / Enterprise 2.0, that has driven the most pervasive and profound political, cultural, and artistic consequences of the global digital revolution. Chapter 8 explores future implications but with a cautionary warning that just as many of the visionary ideas discussed in Chap. 2 took decades to realize – and some of the visions turned out to be wrong – all that we can really predict is that the legal, economic, and social frameworks that have been stressed by the emergence of digital media will continue to need adjustment as even newer technologies and the applications they enable become commonplace.

Continuing the practice of "drill down" he adopted in his first three books in the series, for each chapter, Rae provides additional references to further reading that go beyond the discussions in the main text. There is also a bibliography at the end of the book that lists even more related literature. This allows an interested reader to look more deeply at topics of particular interest.

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Preface

The first book[1] in this subject area covered the key aspects of collaboration and communication in research and development (R & D) and how technology may be used to support creativity in the R & D process. The second book[2] covered the collaboration between the academy and industry to support developments in the creative industries and more general industrial applications. The third book[3] covered collaboration and implementation between art and design and technology.

This book examines the more general area of digital media as a whole and the application areas in which digital media is currently involved. Thus it is more of an overview and state-of-the-art survey of the field and examines the history of computing and the historical key visions in computing that have led to this current point in time and the current technologies being utilized in digital media. Current research issues in digital media are not presented or discussed in any detail in this book. A further volume is currently proposed to address the research and development agenda within the field of digital media.

There is insufficient space in a brief book of this nature to provide full detail of any particular area, and, where relevant, the more detailed material in the further reading and references at the end of each chapter is for readers to gain more detail where they feel they need it. There is also a bibliography at the end of the book with further reading grouped into sections to enable readers to easily find the further material which would be useful to them. This bibliography does not duplicate the further reading sections at the end of each chapter, so readers are advised to look at these first for further reading in the topic areas of the chapters and to use the bibliography for more general, and also more detailed, reading across the field of digital media.

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[1] Earnshaw, R.A.: Research and Development in Art, Design and Creativity. Springer (2016) http://dx.doi.org/10.1007/978-3-319-33005-1

[2] Earnshaw, R.A.: Research and Development in the Academy: Creative Industries and Applications. Springer (2017) DOI 10.1007/978-3-319-54081-8

[3] Earnshaw, R.A.: Art, Design and Technology: Collaboration and Implementation. Springer (2017)

In this state-of-the-art review, the theoretical, practical, and technical aspects of digital media are examined. The increasing power of hardware and software technologies enables multiple data types to be processed with increasing ease and facility. From the web and computer games to mobile technologies and social media, digital media continues to develop and advance.

The convergence of IT, telecommunications, and media is bringing about a revolution in the way information is collected, stored, and accessed. There are three principal reasons why this is happening – reducing cost, increasing quality, and increasing bandwidth.

A wide range of applications such as computer games, multimedia production, animation, graphics and video editing, and digital video film making are examined in general terms only. These topics fall more within the generally accepted definition of creative industries, and these are covered in more detail in the second book which examines this area.

Media content is now created in digital form and can be repurposed across different media types such as DVD, Internet, or traditional print. This offers scope for different forms of advertising and providing added value to consumers by providing dynamic links to other relevant information. This provides new value chains and ecosystems. This in turn affects social and cultural contexts and interacts with them. The user such as content creator, publisher, and broadcaster is challenging and changing the traditional roles of news media, publishers, and entertainment corporations. This in turn changes social and governmental structures and affects their power, influence, and cultural impact.

This revolution is having effects on the development, organization, and distribution of information and artifact repositories such as libraries, museums, exhibitions, and conferences and the way in which physical and digital aspects are mediated to users. There are also current issues in ensuring that digital archives remain accessible to users into the long-term future and are not rendered obsolete by future shifts in technology. The changes that digital media and digital convergence are bringing about are substantial and are also likely to be long-lasting.

The University of Bradford, UK, pioneered the area of digital media in the mid-1990s by tripartite collaborations between technology, art and design, and media and broadcasting. It was done by setting up a new academic department because it did not sit easily within existing academic disciplines and structures. It was very successful in attracting students and also meeting the needs and requirements of the industry. It also highlighted the benefits and advantages of interdisciplinary collaborations. Involvement in a number of large interdisciplinary European projects over the years at the Universities of Leeds and Bradford required research and development in a number of application areas, such as multimedia assets for design, collaborative visualization over networks, and virtual entertainment, and led to a number of important results. These are detailed in the first book referred to above.

Involvement as a professor in the School of Creative Arts at Wrexham Glyndwr University, Wales, over recent years has provided opportunity to think about these aspects and publish a number of papers in collaboration with the faculty.

The book is being published in the SpringerBriefs series which are summaries of the state of the art in a particular area. It is being published as a print book, a Kindle book, and an e-book. In the latter, each chapter will be downloadable separately. This is why the further reading and references appear at the end of each chapter. Thus a chapter contains the main points in the area and the reasons for their significance. It is not intended to examine each of these points in detail – there is insufficient space to do this. However, the interested reader can follow up in the further reading or references for further detail and information.

It is hoped that this book makes a useful contribution to an important area of discussion and debate.

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