

# **Virtual Reality and Virtual Environments in 10 Lectures**

# Synthesis Lectures on Image, Video, and Multimedia Processing

## Editor

**Alan C. Bovik**, *University of Texas, Austin*

The Lectures on Image, Video and Multimedia Processing are intended to provide a unique and groundbreaking forum for the world's experts in the field to express their knowledge in unique and effective ways. It is our intention that the Series will contain Lectures of basic, intermediate, and advanced material depending on the topical matter and the authors' level of discourse. It is also intended that these Lectures depart from the usual dry textbook format and instead give the author the opportunity to speak more directly to the reader, and to unfold the subject matter from a more personal point of view. The success of this candid approach to technical writing will rest on our selection of exceptionally distinguished authors, who have been chosen for their noteworthy leadership in developing new ideas in image, video, and multimedia processing research, development, and education.

In terms of the subject matter for the series, there are few limitations that we will impose other than the Lectures be related to aspects of the imaging sciences that are relevant to furthering our understanding of the processes by which images, videos, and multimedia signals are formed, processed for various tasks, and perceived by human viewers. These categories are naturally quite broad, for two reasons: First, measuring, processing, and understanding perceptual signals involves broad categories of scientific inquiry, including optics, surface physics, visual psychophysics and neurophysiology, information theory, computer graphics, display and printing technology, artificial intelligence, neural networks, harmonic analysis, and so on. Secondly, the domain of application of these methods is limited only by the number of branches of science, engineering, and industry that utilize audio, visual, and other perceptual signals to convey information. We anticipate that the Lectures in this series will dramatically influence future thought on these subjects as the Twenty-First Century unfolds.

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Stanislav Stanković

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# Virtual Reality and Virtual Environments in 10 Lectures

Stanislav Stanković  
Helsinki, Finland

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## ABSTRACT

The book is based on the material originally developed for the course on Virtual Reality, which the author was teaching at Tampere University of Technology, as well as a course on Virtual Environments that the author had prepared for the University for Advancing Studies at Tempe, Arizona. This original purpose has influenced the structure of this book as well as the depth to which we explore the presented concepts.

Therefore, our intention in this book is to give an introduction into the important issues regarding a series of related concepts of Virtual Reality, Augmented Reality, and Virtual Environments. We do not attempt to go into any of these issues in depth but rather outline general principles and discuss them in a sense broad enough to provide sufficient foundations for a further study. In other words, we aim to provide a set of keywords for readers in order to give them a good starting point from which he could go on and explore any of these issues in detail.

## KEYWORDS

virtual reality, augmented reality, virtual environments, human computer interaction, user experience

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# Preface

In the recent years, we are seeing resurgent interest in Virtual Reality as a concept. Virtual Reality, as we recognize it, is by now several decades old. It has its origin in the fascination with possibilities of human computer interaction brought on by the rapid advances in IT technology in the second half of the 20th century. In the first few decades, Virtual Reality was a very technology-driven field, aiming to explore the possibilities that new technology offered. Researchers and developers rushed to dream up new technologies, and create a variety of proof-of-concept projects, happily stepping over the rough edges of technology. The quality of actual user experience was too often overlooked.

In effect this field has been guided by very vague notions about its own purpose. This vagueness contributed to excitement in the general public as every onlooker was free to project his own expectations, regardless of their feasibility. Virtual Reality as a field had set itself very high yet very vague goals. Arguably, this led to disillusionment. Despite this, fascination remained.

Today Virtual Reality is a mature field. During the decades of its development the work that originated within it had a profound effect on many aspects of IT technology. Many original Virtual Reality concepts have become part of our daily lives, so much that we take them for granted. On the other hand, Virtual Reality in the imagination of people remains linked to Sci-Fi-fueled images of the near future, a sort of utopian concept that remains perennially unattainable.

In our opinion, too many of the books on this topic still cling to the old technology-first point of view, giving little regard to user experience. We intentionally take the other approach. This book tries to reassess the important aspects of Virtual Reality from a user-centric point of view. We find this to be of utmost importance. Without keeping in mind the user, the person that is supposed to make use of the technology, we risk repeating the same mistakes.

Stanislav Stanković  
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