

Preface

The book has been motivated by rapid development of technology allowing us to create innovative simulation systems designed to deliver broader content; at the same time enhancing educational opportunities and reducing the economic cost of teaching, in particular, in areas such as national defense, medicine, or sport. The concept of a simulation system is extensive and contains high-growth areas such as augmented reality or design and construction of unmanned vehicles.

Augmented reality (AR) is a term used to describe the process of enriching the perception of the real world with digital elements, generated by a computer. “Augmentation” of reality is typically performed in real time and in a contextual conformity with the observed real world. Mainly, the information added is a multimedia extension of the senses of the observer. Many research groups are working on projects and implementation of simulation systems containing elements of AR, which are used in many fields such as navigation, rehabilitation, entertainment, and video surveillance of the city.

The main aim of design and construction of UAVs is their practical application. However, their design is a lengthy process and requires intensive evaluation using both simulation and experimental data. Human perception is limited to tracking in full concentration only seven elements simultaneously. Control of unmanned vehicle and analysis of data recorded by the payload of unmanned vehicles is a significant excess of information for human and negatively impacts its analytical capabilities. Therefore, it is often necessary to apply amendments based on the actual real life experience of the application.

The goal of this monograph is to provide comprehensive guidelines on the current and future trends of innovative simulation systems; in particular, their important components, such as augmented reality and unmanned vehicles.

The book consists of three parts: Vision-based Information for Innovative Simulation Systems, Design, Construction and Analysis for Purpose of Innovative Systems and Design and Evaluation of Control Algorithms. Each part presents good practices, new methods, concepts of systems, and new algorithms. Presented challenges and solutions are the results of research conducted by the contributing authors.

The monograph can be a valuable source of information for those in contact with the design and creation of innovative simulation systems as researchers, programmers, designers, engineers, and users. The book is addressed to a wide audience: academic staff, representatives of research institutions, employees of companies and government agencies as well as students and graduates of technical universities in the country and abroad. We took an effort to present multiple solutions and challenges in the fields above. The authors encourage to actively explore the following chapters of the book and, in case of questions or concerns, invite you to an open and frank discussion of these matters.

In conclusion, the main features of the book are the following:

1. The book describes and evaluates the current state of knowledge in the field of innovative simulation systems.
2. Throughout the chapters there are presented current issues and concepts of systems, technology, equipment, tools, research challenges and current, past, and future applications of simulation systems.

We would like to thank the authors for their contributions. Without their knowledge, experience, and commitment this monograph would have never appeared. We also thank the reviewers, editors, and staff of Springer for their support during the creation of this monograph.

Gliwice
April 2015

Aleksander Nawrat
Karol Jędrasiak

Innovative Simulation Systems

Nawrat, A.; Jedrasiak, K. (Eds.)

2016, XIII, 444 p. 382 illus., 162 illus. in color.,

Hardcover

ISBN: 978-3-319-21117-6