

The Synthesis of Three Dimensional Haptic Textures: Geometry, Control, and Psychophysics

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Gianni Campion

The Synthesis
of Three Dimensional
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Geometry, Control,
and Psychophysics

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To Elena

Series Editors' Foreword

Haptics is a multi-disciplinary field with researchers from Psychology, Physiology, Neurology, Engineering, and Computer Science (amongst others) that contribute to a better understanding of the sense of touch, and research on how to improve and reproduce haptic interaction artificially in order to simulate real scenarios.

The “*Springer Series on Touch and Haptic Systems*” is a new *Springer* book series published in collaboration with the EuroHaptics Society. It is focused on publishing new advances and developments in all aspects of haptics. The goal is to obtain a fast dissemination of the latest results in order to stimulate the interaction among members of the haptics community and to promote a better understanding of touch perception and find the most suitable technologies to reproduce and simulate haptic environments.

The first issue of this series has been prepared by Gianni Campion, and is based on his PhD thesis. The content is focused tactile texture perception, a highly relevant topic in the field of haptics, and covers the simulation of textures and their evaluation with psychophysical methods.

The selection of this thesis for publication reflects the interest in the topic of texture perception and the high quality of the work. Being a thesis, it covers the topic in a very focused manner and analyzes it in considerable depth. As series editors we will continue to encourage this kind of publication as well as supporting publication of books focused on more general topics.

Finally, the series editors would like to thank the EuroHaptics Society for promoting haptics and for supporting this exciting new book series by Springer on Touch and Haptic Systems. Moreover, we would also like to thank all the members of the Series Editorial Advisory Board for their contributions in reviewing and so ensuring high quality of the publications.

Manuel Ferre
Marc O. Ernst
Alan Wing

Foreword

“The Synthesis of Three-Dimensional Haptic Textures: Geometry, Control and Psychophysics” by Gianni Campion under the advisement of Dr. V. Hayward presents a series of innovative tools that can be used to remove the artifacts from haptic rendering of textures. The main contributions include a complete platform, device, and synthesis algorithm, as well as evaluation of the techniques.

Overall, this book presents an all-front attack and very in-depth investigation of all components involved in haptic rendering of textures: hardware, software and psychophysics. The proposed techniques are effective and clever. I have worked in these areas for over a decade. There is a huge collection of literature in all these areas. I’m impressed that the work has done an excellent effort in surveying prior research, analyzing previous work, proposing new points of view, and synthesizing techniques to improve the overall rendering performance of haptic textures. The technical writing of the book is clear, coherent, carefully thought-out and well-organized. The diagrams and captured images clearly illustrate the basic concepts and further enhance the overall presentation. I believe the findings and results would be of significant interest to the haptics and robotics community.

Chapel Hill
December 2010

Ming Lin

Foreword

Working with Gianni Campion has been a most gratifying experience. Gianni started out as a self proclaimed computer scientist who would not even touch a screwdriver with a six-foot pole, but ended up having fun in the workshop making (simple) parts with the lathe more often than he would care to confess. The results of his voracious intellectual curiosity are evident throughout his work which is a must-read for anyone interested in haptic virtual environments where the surfaces are, as they should be, not smooth.

Gianni, again, congratulations for a job well done.

Paris
December 29, 2010

Vincent Hayward

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I would like to thank Prof. Vincent Hayward for his kind supervision, his willingness to share his (numerous) ideas and insights, and for his generous style of teaching.

My colleagues in the Haptics Laboratory were always open to discuss the most various topics, the majority of which were not even loosely related to this thesis. I would like thank them in random order: Andrew Gosline with his magnets, Qi Wang, Hsin-Yun Yao and the PCBS, Mohsen Mahvash, Vincent Levesque the coder, Jerome Pasquero, Hanifa Dostmohamed, Omar Ayoub, Mounia Ziat, and Diana Garroway. I would not dare to forget the support of the people at the Center for Intelligent Machines, specially Cynthia Davidson, who has been a seamless interface with the bureaucratic side of McGill, and Jan Binder, who answered the too many requests I had for the System Administrator.

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