

# Music and Human-Computer Interaction

# Springer Series on Cultural Computing

## **Editor-in-chief**

Ernest Edmonds    University of Technology Sydney, Australia

## **Editorial board**

Frieder Nake	University of Bremen, Germany
Nick Bryan-Kinns	Queen Mary, University of London, UK
Linda Candy	University of Technology Sydney, Australia
David England	Liverpool John Moores University, UK
Andrew Hugill	De Montfort University, UK
Shigeki Amitani	Adobe Systems Inc. Tokyo, Japan
Doug Riecken	Columbia University, NY, USA

For further volumes:

<http://www.springer.com/series/10481>

Simon Holland • Katie Wilkie • Paul Mulholland  
Allan Seago  
Editors

# Music and Human-Computer Interaction

### *Editors*

Dr. Simon Holland  
Music Computing Lab  
Centre for Research In Computing  
The Open University  
Milton Keynes, UK

Katie Wilkie  
Music Computing Lab  
Centre for Research In Computing  
The Open University  
Milton Keynes, UK

Dr. Paul Mulholland  
Music Computing Lab  
Centre for Research In Computing  
The Open University  
Milton Keynes, UK

Dr. Allan Seago  
Sir John Cass Faculty of Art, Architecture  
and Design  
London Metropolitan University  
London, UK

ISSN 2195-9056

ISBN 978-1-4471-2989-9

ISBN 978-1-4471-2990-5 (eBook)

DOI 10.1007/978-1-4471-2990-5

Springer London Heidelberg New York Dordrecht

Library of Congress Control Number: 2013933708

© Springer-Verlag London 2013

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed. Exempted from this legal reservation are brief excerpts in connection with reviews or scholarly analysis or material supplied specifically for the purpose of being entered and executed on a computer system, for exclusive use by the purchaser of the work. Duplication of this publication or parts thereof is permitted only under the provisions of the Copyright Law of the Publisher's location, in its current version, and permission for use must always be obtained from Springer. Permissions for use may be obtained through RightsLink at the Copyright Clearance Center. Violations are liable to prosecution under the respective Copyright Law.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

While the advice and information in this book are believed to be true and accurate at the date of publication, neither the authors nor the editors nor the publisher can accept any legal responsibility for any errors or omissions that may be made. The publisher makes no warranty, express or implied, with respect to the material contained herein.

Printed on acid-free paper

Springer is part of Springer Science+Business Media ([www.springer.com](http://www.springer.com))

# Contents

<b>1</b>	<b>Music Interaction: Understanding Music and Human-Computer Interaction</b> .....	<b>1</b>
	Simon Holland, Katie Wilkie, Paul Mulholland, and Allan Seago	
<b>2</b>	<b>Should Music Interaction Be Easy?</b> .....	<b>29</b>
	James McDermott, Toby Gifford, Anders Bouwer, and Mark Wagy	
<b>3</b>	<b>Amateur Musicians, Long-Term Engagement, and HCI</b> .....	<b>49</b>
	Isaac Wallis, Todd Ingalls, Ellen Campana, and Catherine Vuong	
<b>4</b>	<b>Affective Musical Interaction: Influencing Users’ Behaviour and Experiences with Music</b> .....	<b>67</b>
	Anna Bramwell-Dicks, Helen Petrie, Alistair D.N. Edwards, and Christopher Power	
<b>5</b>	<b>Chasing a Feeling: <i>Experience</i> in Computer Supported Jamming</b> ....	<b>85</b>
	Ben Swift	
<b>6</b>	<b>The Haptic Bracelets: Learning Multi-Limb Rhythm Skills from Haptic Stimuli While Reading</b> .....	<b>101</b>
	Anders Bouwer, Simon Holland, and Mat Dalglish	
<b>7</b>	<b>Piano Technique as a Case Study in Expressive Gestural Interaction</b> .....	<b>123</b>
	Andrew P. McPherson and Youngmoo E. Kim	
<b>8</b>	<b>Live Music-Making: A Rich Open Task Requires a Rich Open Interface</b> .....	<b>139</b>
	Dan Stowell and Alex McLean	
<b>9</b>	<b>A New Interaction Strategy for Musical Timbre Design</b> .....	<b>153</b>
	Allan Seago	

<b>10 Pulsed Melodic Processing – The Use of Melodies in Affective Computations for Increased Processing Transparency</b>	171
Alexis Kirke and Eduardo Miranda	
<b>11 Computer Musicking: HCI, CSCW and Collaborative Digital Musical Interaction</b>	189
Robin Fencott and Nick Bryan-Kinns	
<b>12 Song Walker Harmony Space: Embodied Interaction Design for Complex Musical Skills</b>	207
Anders Bouwer, Simon Holland, and Mat Dagleish	
<b>13 Evolutionary and Generative Music Informs Music HCI—And <i>Vice Versa</i></b>	223
James McDermott, Dylan Sherry, and Una-May O'Reilly	
<b>14 Video Analysis for Evaluating Music Interaction: Musical Tabletops</b>	241
Anna Xambó, Robin Laney, Chris Dobbyn, and Sergi Jordà	
<b>15 Towards a Participatory Approach for Interaction Design Based on Conceptual Metaphor Theory: A Case Study from Music Interaction</b>	259
Katie Wilkie, Simon Holland, and Paul Mulholland	
<b>16 Appropriate and Complementary Rhythmic Improvisation in an Interactive Music System</b>	271
Toby Gifford	
<b>Index</b>	287

# Contributors

**Anders Bouwer** Intelligent Systems Lab Amsterdam (ISLA), Informatics Institute, Faculty of Science, University of Amsterdam, Amsterdam, The Netherlands

**Anna Bramwell-Dicks** Department of Computer Science, University of York, York, UK

**Nick Bryan-Kinns** Queen Mary University of London, London, UK

**Ellen Campana** School of Arts, Media, and Engineering, Arizona State University, Tempe, AZ, USA

**Mat Dagleish** Department of Music, SSPAL, University of Wolverhampton, West Midlands, UK

**Chris Dobbyn** Music Computing Lab, Centre for Research in Computing, The Open University, Milton Keynes, UK

**Alistair D.N. Edwards** Department of Computer Science, University of York, York, UK

**Robin Fencott** Queen Mary University of London, London, UK

**Toby Gifford** Queensland Conservatorium of Music, Griffith University, Brisbane, Australia

**Simon Holland** Music Computing Lab, Centre for Research in Computing, The Open University, Milton Keynes, UK

**Todd Ingalls** School of Arts, Media, and Engineering, Arizona State University, Tempe, AZ, USA

**Sergi Jordà** Music Technology Group, Universitat Pompeu Fabra, Barcelona, Spain

**Youngmoo E. Kim** Music Entertainment Technology Laboratory, Department of Electrical and Computer Engineering, Drexel University, Philadelphia, PA, USA

**Alexis Kirke** Interdisciplinary Centre for Computer Music Research, School of Humanities, Music and Performing Arts, Plymouth University, Plymouth, UK

**Robin Laney** Music Computing Lab, Centre for Research in Computing, The Open University, Milton Keynes, UK

**James McDermott** Evolutionary Design and Optimization Group, Computer Science and Artificial Intelligence Laboratory, Massachusetts Institute of Technology, Cambridge, MA, USA

**Alex McLean** Interdisciplinary Centre for Scientific Research in Music, University of Leeds, Leeds, UK

**Andrew P. McPherson** Centre for Digital Music, School of Electronic Engineering and Computer Science, Queen Mary, University of London, London, UK

**Eduardo Miranda** Interdisciplinary Centre for Computer Music Research, School of Humanities, Music and Performing Arts, Plymouth University, Plymouth, UK

**Paul Mulholland** Music Computing Lab, Centre for Research in Computing, The Open University, Milton Keynes, UK

**Una-May O'Reilly** EvoDesignOpt Group, CSAIL, MIT, Cambridge, MA, USA

**Helen Petrie** Department of Computer Science, University of York, York, UK

**Christopher Power** Department of Computer Science, University of York, York, UK

**Allan Seago** Sir John Cass Faculty of Art, Architecture and Design, London Metropolitan University, London, UK

**Dylan Sherry** EvoDesignOpt Group, CSAIL, MIT, Cambridge, MA, USA

**Dan Stowell** Centre for Digital Music, Queen Mary University of London, London, UK

**Ben Swift** Research School of Computer Science, Australian National University, Canberra, Australia

**Catherine Vuong** School of Biological and Health Systems Engineering, Arizona State University, Tempe, AZ, USA

**Mark Wagy** Department of Computer Science and Engineering, University of Minnesota, Minneapolis, MN, USA

**Isaac Wallis** School of Arts, Media, and Engineering, Arizona State University, Tempe, AZ, USA

**Katie Wilkie** Music Computing Lab, Centre for Research in Computing, The Open University, Milton Keynes, UK

**Anna Xambó** Music Computing Lab, Centre for Research in Computing, The Open University, Milton Keynes, UK