Contents

Part I  Image Processing in Sport

Non-Invasive Performance Measurement in Combat Sports .................. 3
Soudeh Kasiri Behendi, Stuart Morgan and Clinton B. Fookes

Comparison Between Marker-Less Kinect-Based and Conventional
2D Motion Analysis System on Vertical Jump Kinematic Properties
Measured From Sagittal View .................................................. 11
Shariman Ismail, Effirah Osman, Norasrudin Sulaiman and Rahmat
Adnan

Test of Ball Speed in Table Tennis Based on Monocular Camera ....... 19
Hui Zhang, Ling-hui Kong, Ye-peng Guan and Jin-ju Hu

Table Tennis and Computer Vision: A Monocular Event Classifier .... 29
Kevin M. Oldham, Paul W. H. Chung, Eran A. Edirisinghe
and Ben. J. Halkon

3D Reconstruction of Ball Trajectory From a Single Camera
in the Ball Game ................................................................. 33
Lejun Shen, Qing Liu, Lin Li and Haipeng Yue

Part II  It System for Sport

Towards a Management Theory for the Introduction
of IT Innovations in Top Level Sports ................................. 43
Mina Ghorbani and Martin Lames

Information Systems for Top Level Football ......................... 51
Thomas Blobel and Martin Lames
Frame by Frame Playback on the Internet Video

Chikara Miyaji

Part III Ai in Sport

Computational System for Strategy Design and Match Simulation in Team Sports

Leonardo Lamas, Guilherme Otranto and Junior Barrera

Soccer Analyses by Means of Artificial Neural Networks, Automatic Pass Recognition and Voronoi-Cells: An Approach of Measuring Tactical Success

Jürgen Perl and Daniel Memmert

An Interval Type-2 Fuzzy Logic Based Classification Model for Testing Single-Leg Balance Performance of Athletes After Knee Surgery

Owais Ahmed Malik and S.M.N. Arosha Senanayake

A Comparison of Classification Accuracy for Gender Using Neural Networks Multilayer Perceptron (MLP), Radial Basis Function (RBF) Procedures Compared to Discriminant Function Analysis and Logistic Regression Based on Nine Sports Psychological Constructs to Measure Motivations to Participate in Masters Sports Competing at the 2009 World Masters Games

Ian Heazlewood, Joe Walsh, Mike Climstein, Jyrki Kettunen, Kent Adams and Mark DeBeliso

Detection of Individual Ball Possession in Soccer

Martin Hoernig, Daniel Link, Michael Herrmann, Bernd Radig and Martin Lames

Towards Better Measurability—IMU-Based Feature Extractors For Motion Performance Evaluation

Heike Brock and Yuji Ohgi
**Part IV  Modelling and Analysis**

**The Aikido Inspiration to Safety and Efficiency: An Investigation on Forward Roll Impact Forces**  
Andrea Soltoggio, Bettina Bläsing, Alessandro Moscatelli and Thomas Schack  

119

**To Evaluate the Relative Influence of Coefficient of Friction on the Motion of a Golf Ball (Speed and Roll) During a Golf Putt**  
Iwan Griffiths, Rory McKenzie, Hywel Stredwick and Paul Hurrion  

129

**Modelling the Tactical Difficulty of Passes in Soccer**  
Michael Stöckl, Dinis Cruz and Ricardo Duarte  

139

**Convergence and Divergence of Performances Across the Athletic Events for Men and Women: A Cross-Sectional Study 1960–2012**  
Ian Heazlewood and Joe Walsh  

145

**Introduction of the Relative Activity Index: Towards a Fair Method to Score School Children’s Activity Using Smartphones**  
Emanuel Preuschl, Martin Tampier, Tobias Schermer and Arnold Baca  

153

**Performance Analysis in Goalball: Semiautomatic Specific Software Tools**  
Christoph Weber and Daniel Link  

157

**Markov Simulation by Numerical Derivation in Table Tennis**  
Sebastian Wenninger and Martin Lames  

161

**Prediction and Control of the Individual Heart Rate Response in Exergames**  
Katrin Hoffmann, Josef Wiemeyer and Sandro Hardy  

171

**Evaluation of Changes in Space Control Due to Passing Behavior in Elite Soccer Using Voronoi-Cells**  
Robert Rein, Dominik Raabe, Jürgen Perl and Daniel Memmert  

179
What is the Best Fitting Function? Evaluation of Lactate Curves with Common Methods From the Literature. .......................... 185
Stefan Endler, Christian Secker and Jörg Bügner

Computer Analysis of Bobsleigh Team Push .......................... 193
Peter Dabnichki

Part V Virtual Reality

Development of a Novel Immersive Interactive Virtual Reality Cricket Simulator for Cricket Batting. .......................... 203
Aishwar Dhawan, Alan Cummins, Wayne Spratford, Joost C. Dessing and Cathy Craig

Multi-Level Analysis of Motor Actions as a Basis for Effective Coaching in Virtual Reality .......................... 211
Felix Hülsmann, Corneli Frank, Thomas Schack, Stefan Kopp and Mario Botsch

Part VI Sensing Technology

Evaluating the Indoor Football Tracking Accuracy of a Radio-Based Real-Time Locating System .......................... 217
Thomas Seidl, Matthias Völker, Nicolas Witt, Dino Poimann, Titus Czyz, Norbert Franke and Matthias Lochmann

Stance Phase Detection for Walking and Running Using an IMU Periodicity-based Approach .......................... 225
Yang Zhao, Markus Brahms, David Gerhard and John Barden

Gamification of Exercise and Fitness Using Wearable Activity Trackers. .......................... 233
Zhao Zhao, S. Ali Etemad and Ali Arya

Part VII Neural Cognitive Training

Training of Spatial Competencies by Means of Gesture-controlled Sports Games .......................... 243
Aleksandra Dominiak and Josef Wiemeyer
Proceedings of the 10th International Symposium on Computer Science in Sports (ISCSS)
Chung, P.; Soltoggio, A.; Dawson, C.W.; Meng, Q.; Pain, M. (Eds.)
2016, XV, 268 p. 111 illus., 50 illus. in color., Softcover
ISBN: 978-3-319-24558-4