

Contents

1	Fingerprint Quality Assessment: Matching Performance and Image Quality	1
	Zhigang Yao, Jean-Marie Le Bars, Christophe Charrier, and Christophe Rosenberger	
2	A Novel Perspective on Hand Vein Patterns for Biometric Recognition: Problems, Challenges, and Implementations	21
	Septimiu Crisan	
3	Improving Biometric Identification Performance Using PCANet Deep Learning and Multispectral Palmprint	51
	Abdallah Meraqumia, Farid Kadri, Hakim Bendjenna, Salim Chitroub, and Ahmed Bouridane	
4	Biometric Acoustic Ear Recognition	71
	Mohammad Derawi, Patrick Bours and Ray Chen	
5	Eye Blinking EOG Signals as Biometrics	121
	Sherif N. Abbas and M. Abo-Zahhad	
6	Improved Model-Free Gait Recognition Based on Human Body Part	141
	Imad Rida, Noor Al Maadeed, Gian Luca Marcialis, Ahmed Bouridane, Romain Herault, and Gilles Gasso	
7	Smartphone User Authentication Using Touch Dynamics in the Big Data Era: Challenges and Opportunities	163
	Lijun Jiang and Weizhi Meng	
8	Enhanced Biometric Security and Privacy Using ECG on the Zynq SoC	179
	Amine Ait Si Ali, Xiaojun Zhai, Abbas Amira, Faycal Bensaali, and Naeem Ramzan	

9	Offline Biometric Signature Verification Using Geometric and Colour Features	203
	Abdelaali Hassaine, Somaya Al Maadeed, and Ahmed Bouridane	
10	Non-cooperative and Occluded Person Identification Using Periocular Region with Visible, Infra-Red, and Hyperspectral Imaging	223
	Muhammad Uzair, Arif Mahmood, and Somaya Ali Al-Maadeed	
11	Robust Face Recognition Using Kernel Collaborative Representation and Multi-scale Local Binary Patterns	253
	Muhammad Khurram Shaikh, Muhammad Atif Tahir, and Ahmed Bouridane	
12	Recognition of 3D Faces with Missing Parts Based on SIFT and LBP Methods	273
	Narimen Saad and NourEddine Djedi	
13	Face Anti-spoofing in Biometric Systems	299
	Zinelabidine Boulkenafet, Zahid Akhtar, Xiaoyi Feng, and Abdenour Hadid	
14	Biometric Template Protection: A Systematic Literature Review of Approaches and Modalities	323
	Mulagala Sandhya and Munaga V.N.K. Prasad	
15	A Survey on Cyber Security Evolution and Threats: Biometric Authentication Solutions	371
	Leila Benarous, Benamar Kadri, and Ahmed Bouridane	
16	Data Protection and Biometric Data: European Union Legislation ..	413
	Pedro Miguel Freitas, Teresa Coelho Moreira, and Francisco Andrade	
	Index	423