# Guest Editorial:
# Introduction to the Special Issue on
# Image- and Video-Based Biometrics—Part II

THIS is the second installment of the Special Issue on Image and Video-Based Biometrics. In the January 2004 issue of IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS FOR VIDEO TECHNOLOGY, we published ten papers on traditional biometrics, such as iris, face, and fingerprint recognition, and an introduction on biometric technologies. In this issue, we will present a set of papers addressing relatively newer technologies including gait, human body dynamics, palmprint, palm-dorsa vein-patterns, and multimodal algorithms.

The first paper of this issue investigates gait recognition, a topic that is gaining growing interests in recent years. Wang *et al.* propose a human-recognition algorithm by combining static and dynamic body biometrics. In the algorithm, the static and dynamic cues obtained from walking video are fused at the decision level using different combination rules and are shown to improve the performance of human identification and verification. In the second paper, Lu and Tan present a novel computer vision system for early detection of drowning incidents in swimming pools. This is a potentially very useful vision system that can save lives. The system consists of two main components: the vision component and the event-inference component. The vision component uses an overhead camera to detect and track swimmers. The event-inference module uses a sequential change-detection algorithm to parse the observation sequences of swimmer features for drowning behavioral signs. Tests on videos of simulated drowning have shown very encouraging results.

The next two papers by Green and Guan are a two-part series on a continuous human movement-recognition framework. Part I discusses the detailed design of the framework which forms a basis for the general biometric analysis of continuous human motion as demonstrated through tracking and recognition of a large number of skills from gait to twisting saltos. Part II applies the new framework to the biometric authentication of gait, anthropometric data, human activities, and movement disorders with promising results.

The paper by Lin and Fan describes a novel personal verification method based on the vein patterns of the palm-dorsa. They use an infrared camera to capture the thermal images of the palm-dorsa, and then multiple features over multiple resolutions are extracted from the vein patterns in the thermal image of the palm-dorsa for personal verification. In the next paper, Thomaz *et al.* develop a new covariance estimation method, the maximum entropy covariance selection method, to solve the small sample size problem in biometric pattern recognition. By combining covariance matrices under the principle of maximum uncertainty, the method outperforms conventional approaches when the sample group covariance matrices are poorly estimated or ill posed. For multimodal biometrics and classifiers

fusion, Toh *et al.* propose a reduced multivariate polynomials model to overcome the dimensionality problem of the conventional multivariate polynomials model. The algorithm is applied to combining fingerprint and voice data and has shown an improved performance over several existing methods.

Finally, the last paper of this Special Issue studies another recently developed biometric technology, which is palmprint recognition. You *et al.* explore a hierarchical multifeature coding scheme to facilitate coarse-to-fine matching for efficient and effective palmprint processing. Four-level features are computed and combined to achieve improved performance on palmprint classification and identification.

Although the two installments of the Special Issue cover many recent advances in image- and video-based biometrics, it is still far from complete. We hope that at least a snapshot of the current state of the art in the biometrics research has been provided by the innovative and interesting ideas presented in the papers of this Special Issue.

Finally, we would like to express our sincere thanks again to all of the people who have contributed their time and effort to the Special Issue. We thank all the reviewers and authors for their contributions, as they are the ones who actually produced this Special Issue. We also thank the IEEE Staff, especially Claudia Schuettler and Lauren Caruso, for their support in the preparation and completion of this Special Issue. We again thank Bo Luo, graduate student of the Chinese University of Hong Kong, for helping to set up and maintain a web page for this Special Issue. Finally, we are very grateful to the Editor-in-Chief, Dr. Thomas Sikora, and Past Editor-in-Chief, Dr. Weiping Li, for their encouragement and strong support of this Special Issue.

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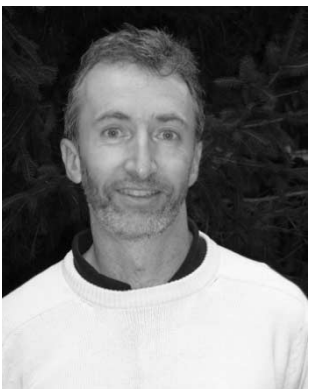
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