

# Multimedia Encryption, Transmission and Authentication

Edited by

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## Contents

		Page No.
<b>Part I- Multimedia Encryption and Transmission</b>		
Chapter 1	Image and Video Coding Techniques <i>Sinzobakwira Issa and Othman O. Khalifa</i>	2
Chapter 2	Video Coding: MPEG standards <i>Othman O. Khalifa, Sinzobakwira Issa and Muhammad Umar Siddiqi</i>	7
Chapter 3	H.264/Advance Video Coding Standard <i>Othman O. Khalifa, Sinzobakwira Issa and Aisha-Hassan Abdulla</i>	16
Chapter 4	Development of Scalable Video Compression algorithm <i>Othman O. Khalifa, Sinzobakwira Issa and Mohamed Abomhara</i>	22
Chapter 5	Video Encryption Using Computation between H.264/AVC and AES Encryption Algorithm <i>Mohamed Abomhara Omar Zakaria and Othman O. Khalifa</i>	29
Chapter 6	Selective Video Encryption Algorithm Based on H.264/AVC and AES <i>Mohamed Abomhara Omar Zakaria and Othman O. Khalifa</i>	39
Chapter 7	Scalable Video Coding: A Review <i>Haris Al Qodri Maarif, Teddy Surya Gunawan, Othman O. Khalifa</i>	56
Chapter 8	JSVM Reference Software <i>Haris Al Qodri Maarif, Teddy Surya Gunawan, Othman O. Khalifa</i>	71
Chapter 9	Fast Mode Decision Algorithm <i>Haris Al Qodri Maarif, Teddy Surya Gunawan, Othman O. Khalifa</i>	78
Chapter 10	An Overview of Scalable Video Streaming <i>Mohammed Abumuala, Othman Khalifa and Aisha-Hassan A. Hashim</i>	88
Chapter 11	A Survey on Video Segmentation for Real-Time Applications <i>Haris Al Qodri Maarif, Sara Bilal, Teddy Surya Gunawan, Othman O. Khalifa</i>	100
Chapter 12	H.264/AVC Video Coding Tools and Functions <i>Sinzobakwira Issa, Othman O. Khalifa and Aisha-Hassan Abdulla</i>	107
Chapter 13	Speech Coding Techniques and Algorithms <i>Liban A. Kassim, Othman O. Khalifa, Teddy S. Gunawan</i>	116
<b>Part II- Digital Watermarking</b>		
Chapter 14	Digital Watermarking: An Overview <i>Othman O. Khalifa and Yusnita binti Yusof</i>	135
Chapter 15	Digital Watermarking : Related work <i>Othman O. Khalifa and Yusnita binti Yusof</i>	143
Chapter 16	Digital Watermarking Techniques and Methodologies <i>Othman O. Khalifa and Yusnita binti Yusof</i>	150
Chapter 17	Wavelet Transform for Digital Images Watermarking <i>Othman O. Khalifa, Yusnita Yusof</i>	156
Chapter 18	Wavelet Digital Watermarking System Design and Performance Evaluation <i>Othman O. Khalifa and Yusnita binti Yusof</i>	166
Chapter 19	An Improved Wavelet Digital Watermarking Software Implementation <i>Othman O. Khalifa and Yusnita binti Yusof</i>	175

Chapter 20	Adaptive Digital Watermarking System for Authentication of Intellectual Properties <i>Rashidah F. Olanrewaju, Azizah Abd Manaf and Akram Zeki</i>	182
Chapter 21	An Evaluation of Transform Domain Watermarking and its application to Intellectual Properties of images <i>Rashidah F. Olanrewaju, Othman O Khalifa, Aisha Hassan Hashim, A.A. Aburas and Akram Zeki</i>	192
Chapter 22	Applications of Digital Watermarking: Current and Future Trends <i>Othman O. Khalifa and Yusnita binti Yusof</i>	198
Chapter 23	State-Of-The-Art Digital Watermarking Attacks <i>Othman O. Khalifa and Yusnita binti Yusof</i>	204
Chapter 24	Performance evaluations of Digital Watermarking System <i>Yusnita binti Yusof and Othman O. Khalifa</i>	215
<b>Part-III Multicast Transmission</b>		
Chapter 25	Classifications Of Multicast Routing In Mobile Ad Hoc Networks <i>Mohammad Qabajeh, Aisha-Hassan A. Hashim, Othman O. Khalifa and Liana Qabajeh</i>	221
Chapter 26	Qualitive study on Multicast Routing Protocols In Manets <i>Mohammad Qabajeh, Aisha-Hassan A. Hashim, Othman O. Khalifa and Liana Qabajeh</i>	228
Chapter 27	Issues In Location-Based Multicast Routing In Manets <i>Mohammad Qabajeh, Aisha-Hassan A. Hashim, Othman O. Khalifa and Liana Qabajeh</i>	235
Chapter 28	Multicasting Challenges In Wireless Mesh Networks <i>M. L. Sanni, A. A. Hashim, F. Anwar and J. I. Daoud</i>	241
Chapter 29	Mobility Management In Multicast Environment <i>M. L. Sanni, A. A. Hashim, A. W. Naji and G. S. M. Ahmed</i>	249
Chapter 30	<i>Multicast Security</i> : Issues and Solutions <i>Mohammad Qabajeh, Aisha-Hassan A. Hashim and Othman O. Khalifa</i>	257
Chapter 31	Real-time MPEG-4 transmission over Wireless LAN <i>Abdirisag Mohammed Jama and Othman O. Khalifa</i>	263

# Chapter 18

## Wavelet Digital Watermarking System Design and Performance Evaluation

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### 18.1 Introduction

Nowadays, it is easy to obtain, manipulate, distribute and store multimedia contents due to evolution of Internet, excellent multimedia tools and low-cost storage devices. Research community and industry has shown extensive interests in developing and implementing possible solutions via digital watermarking. Digital watermarking is distinctive depending on its techniques and applications. In general, digital watermarking is distinguished according to media type (image, audio, video and etc.), visibility (visible and invisible), robustness level (fragile, semi-fragile and robust) and the need for original data (blind, semi-blind and non-blind). The scope of this research is invisible digital image watermarking for gray-scale images using Discrete Wavelet Transform (DWT). The system consists of watermark embedding, attacks and watermark extraction. A new method called subband matching was proposed and implemented. For this method, the 1-level DWT coefficients of the watermark image were embedded in 2-level DWT coefficients of the cover image for the same matching subbands. System design consists of introductory details of system input, embedding and extraction processes and system output for the proposed methods. Second section is dedicated to describe evaluations of digital watermarking system.

### 18.2 SYSTEM DESIGN

As far as the scope of this chapter is concerned, the system design considerations were categorized into the following:

#### 18.2.1 System Input

The system requires two inputs, an image to host the watermark or simply referred as a cover image while an image as the watermark to be embedded in the cover image. In this chapter,