

BYUNG-HO (PAUL) CHA

Convergence Software Lab
Digital Media and Communications R&D Center
Samsung Electronics Co., Ltd.
416, Maetan-3Dong, Yeongtong-Gu
Suwon-City, Gyeonggi-Do, 443-742, South Korea

url: <http://byunghopaulcha.googlepages.com>
email: byunghopaulcha@gmail.com

- RESEARCH INTERESTS △ Information Security Emphasis on Watermarking, Fingerprinting, Steganography, and Forensic Analysis
 △ Multimedia Signal Processing and Communications
 △ Multimedia Quality Assessment
 △ Information and Communication Theory
- COMPANY △ Senior Engineer in Convergence Software Lab, Aug. 2009
 Digital Media and Communications R&D Center, Samsung Electronics Co., Ltd., Suwon-City, Korea
- EDUCATION △ Doctor of Philosophy in Electrical Engineering, Aug. 2009
 University of Southern California, Los Angeles, CA, USA
- △ Master of Science in Electrical Engineering, May 2006
 University of Southern California, Los Angeles, CA, USA
- △ Bachelor of Science (*Summa Cum Laude*) in Electronic Engineering, Feb. 2004
 Sogang University, Seoul, South Korea
- HONORS AND AWARDS △ Best Student Paper Award, Dec. 2006
 The Eighth IEEE International Symposium on Multimedia 2006, San Diego, CA, USA
- △ Bronze Medal, Oct. 2003
 The Academic Competition of EE Department at Sogang University
 Title: Real-time video and audio streaming server over RTP and RTSP
- △ Silver Medal, Oct. 2002
 The Academic Competition of EE Department at Sogang University
 Title: PC control over SMS message protocol of CDMA cellular system
- △ Army Achievement Medal, Jun. 2001
 The Eighth Army of United States
- PROFESSIONAL SERVICES △ Mentoring
 Mentor for a Ph.D. Student at USC in the Area of Steganography and Steganalysis
 Mentor for a Ph.D. Student at USC in the Area of Forensic Analysis
- △ Grader
 EE569 Introduction to Digital Image Processing: fall 2005, summer/fall 2006/2007, summer 2008
 EE669 Multimedia Data Compression: spring 2007/2008
- △ Reviewer
 Conference: IEEE ICASSP 2006/2009, IEEE ICME 2006/2007/2008/2009, IEEE MWSCAS 2006, IEEE ISSPIT 2006, IEEE GLOBECOM 2006, IEEE IHHMSP 2006, IWDW 2006/2007/2008, ACM SIGMAP 2007/2009, IEEE ISPACS 2007, IEEE ISCAS 2008/2009, IEEE ICIP 2008/2009, EUSIPCO 2008/2009, IEEE MMSP 2008, ICVGIP 2008, SPIE VCIP 2009, IMSA 2009
- Journal: EURASIP JASP 2006/2008, IEEE TIFS 2009, JVCI 2009
- △ Military Service, Apr. 1999 ~ Jun. 2001
 Yongsan Garrison, U.S. Army (KATUSA), Seoul, South Korea

BYUNG-HO (PAUL) CHA

RESEARCH EXPERIENCE

△ Information Security and Traitor Tracing

Research Assistant with Prof. C.-C. Jay Kuo at Media Communications Lab

- R1. Design and Analysis of Collusion-Resistant Fingerprinting Systems (Ph.D. Thesis), Aug. 2009
- R2. Characterization of Attack and Capacity for Robust Fingerprinting, Jan. 2008 ~ Dec. 2008
 - Characterization of continuous multimedia including music and movie
 - Characterization of time-varying collusion attacks
 - Evaluation based on fingerprint-to-interference-plus-noise ratio
- R3. Design of Robust Fingerprinting Based on Multiuser Detector, Jan. 2007 ~ Dec. 2007
 - Development of pilot-aided colluder weight estimation
 - Development of multiuser detectors to increase the number of identified colluders
 - Development of combining and equalization techniques
- R4. Design of Robust Fingerprinting Based on Collusion-free Code and Circular Shift, Jan. 2006 ~ Dec. 2006
 - Design of multi-carrier collusion-resistant codes with collusion-free property
 - Design of codeword reuse via circular shift to increase the number of users

△ Multimedia Quality Assessment and Evaluation

- P1. Evaluation of Automatic Aircraft Audio Fault Detection System, Jan. 2009 ~ May. 2009

Project with PWICE & Korean Airline

- Management of project plans and 4 students for system evaluation and graphic user interface
- Evaluation of 100 2-hour watermarked ADPCM CDs with speech and music contents

- P2. Quality Ranking System, Aug. 2008 ~ Dec. 2008

Project with KDDI-WILL Company

- Simulation on blind quality evaluation and multi-layer watermark-based quality evaluation

- P3. Reversible Data Transmission Framework for Frame-based Super Resolution, Aug. 2007 ~ Jul. 2008

Project with KDDI-WILL Company

- Implementation of video super resolution technique based on reversible watermarking

- P4. Design and Development of Automatic Aircraft Audio Fault Detection System, Jul. 2007 ~ Oct. 2008

Project with PWICE & Korean Airline

- Implementation of audio quality assessment system for ADPCM CDs integrated with human perceptual system model, robust feature extraction, and synchronization technique

- P5. Video Quality Monitoring by Robust Watermarking Technique, Aug. 2006 ~ Jul. 2007

Project with KDDI-WILL Company

- Implementation of automatic synchronization system between audio and video using robust blind watermarking techniques based on quantization index modulation

△ Multimedia Security Evaluation

- P1. Watermarking Survey and Encryption Evaluation, Jan. 2007 ~ Sep. 2007

Project with Walt Disney Company

- Evaluation of partial video encryption techniques
- Survey of watermarking security
- Evaluation of video watermarking

- P2. Watermarking Evaluation and Attack Analysis, Aug. 2005 ~ Dec. 2006

Project with Walt Disney Company

- Evaluation of audio watermarking techniques
- Implementation of audio watermarking attack system

△ Image Processing and Computer Vision

Research Assistant with Prof. R.-H. Park at Image Processing Lab

- R1. Adaptive Image Interpolation Methods, Jun. 2003 ~ Jul. 2004

- Development of adaptive interpolation methods based on classified weight vector quantization
- Study of example-based interpolation and optimal recovery interpolation

Undergraduate Research with Prof. R.-H. Park at Image Processing Lab

- R1. A Study on Statistical Image Interpolation Methods (Undergraduate Thesis), Dec. 2003

- R2. Edge and Feature Masks and Those Applications, Jun. 2003 ~ Dec. 2003

- Study of edge and feature detection masks
- Study of circulant properties of masks and those applications

BYUNG-HO (PAUL) CHA

PUBLICATIONS

△ Journal Papers

- J1. **B.-H. Cha** and C.-C. Jay Kuo, "Robust MC-CDMA-based fingerprinting against time-varying collusion attacks," *IEEE Transactions on Information Forensics and Security*, vol. 4, pp. 302—317, Sep. 2009
- J2. **B.-H. Cha** and C.-C. Jay Kuo, "Design and analysis of high-capacity anti-collusion hiding codes," *Journal of Circuits, Systems, and Signal Processing, Special Issue on Digital Watermarking and Multimedia Security*, vol. 27, pp. 195—211, Mar. 2008

△ Conference Papers

- C1. J. Wang, **B.-H. Cha**, S. Cho, and C.-C. Jay Kuo, "Understanding Benford's law and its vulnerability in image forensics", *IEEE International Conference on Multimedia and Expo, MSATC*, Jun. 2009, pp. 1568—1571
- C2. **B.-H. Cha** and C.-C. Jay Kuo, "Analysis of time-varying collusion attacks in fingerprinting systems: capacity and throughput," *IEEE International Symposium on Circuits and Systems, Special Session on Multimedia Forensics, Security, and Applications*, Taipei, Taiwan, May 2009, pp. 493—496 (**Invited**)
- C3. **B.-H. Cha** and C.-C. Jay Kuo, "Anti-collusion fingerprinting with scalar Costa scheme (SCS) and colluder weight recovery," *IEEE International Conference on Acoustics, Speech, and Signal Processing*, Taipei, Taiwan, Apr. 2009, pp. 1437—1440
- C4. **B.-H. Cha** and C.-C. Jay Kuo, "Advanced colluder detection techniques for OSIFT-based hiding codes," in *Proc. IEEE International Symposium on Circuits and Systems, Special Session on Multimedia Security and Forensics*, Seattle, CA, USA, May 2008, pp. 2961—2964 (**Invited**)
- C5. **B.-H. Cha** and C.-C. Jay Kuo, "Design of multiuser collusion-free hiding codes with delayed embedding," in *Proc. IEEE International Conference on Intelligent Information Hiding and Multimedia Signal Processing*, Kaohsiung, Taiwan, Nov. 2007, pp. 379—382
- C6. **B.-H. Cha** and C.-C. Jay Kuo, "Design of collusion-free hiding codes using MAI-free principle," in *Proc. IEEE International Conference on Acoustics, Speech, and Signal Processing*, Honolulu, HI, USA, Apr. 2007, pp. 145—148
- C7. **B.-H. Cha** and C.-C. Jay Kuo, "Design of collusion-free codes based on MAI-free principle," in *Proc. IEEE International Conference on Intelligent Information Hiding and Multimedia Signal Processing*, Pasadena, CA, USA, Dec. 2006, pp. 639—642
- C8. **B.-H. Cha** and R.-H. Park, "Adaptive image interpolation using weight CVQ," in *Proc. IEEE International Symposium on Multimedia*, San Diego, CA, USA, Dec. 2006, pp. 3—10 (**Best Student Paper Award**)

△ Book Chapters

- B1. R.-H. Park and **B. H. Cha**, "Circulant matrix representation of feature masks and application," in *Advances in imaging and electron physics*, vol. 134, P. Hawkes, Ed, Elsevier Inc., pp. 1—68, May 2005

ORGANIZATIONS

- △ Marquis Who's Who in America, 2010 edition, Oct. 2009
- △ Member, The Institute of Electrical and Electronics Engineers, since 2010
- △ Alpha Sigma Nu, since 2003: Member, Jesus Honor Society

RELATED

COURSES

△ Basic

Transform Theory for Engineers, Applied Linear Algebra for Engineering, Probability Theory for Engineers, Introduction to Digital Signal Processing, Random Processes in Engineering

△ Advanced

Multimedia Signal Processing

Introduction to Digital Image Processing, Multimedia Data Compression, Mathematical Pattern Recognition

Communication and Information Theory

Communication Theory, Information Theory, Information Theory of Wireless/Multiuser Systems

Minors with Computer Science

3D Graphics and Rendering, Analysis of Algorithms, Introduction to Cryptography

BYUNG-HO (PAUL) CHA

COURSE PROJECTS

- △ Mathematical Pattern Recognition
Title: A Nearest Neighbor Classification with Radial Projections
- △ Multimedia Data Compression
Title: Fast Motion Search Using Adaptive Search Range in H.264/AVC
- △ Information Theory of Wireless/Multiuser Systems
Title: Study on Information Hiding
- △ 3D Graphics and Rendering
Title: Fluid Simulation

SKILLS

- △ Program
Assembler, C/C++, PHP
- △ Platform
Windows 95/98/NT/2000/XP, Linux
- △ Application
VC++, Matlab, Direct Show, Adobe Photoshop
- △ Language
English and Korean

ACADEMIC REFERENCES

- △ C.-C. Jay Kuo
Professor, Department of Signal and Image Processing Institute and Integrated Media System Center at Univ. of Southern California, Los Angeles, CA, USA as Professor of Electrical Engineering and Mathematics, email: cckuo@sipi.usc.edu
- △ R.-H. Park
Professor, Department of Electronic Engineering at Sogang Univ., Seoul, South Korea as Professor of Electronic Engineering, email: rhpark@sogang.ac.kr