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PERSONAL INFORMATION

Nationality:	Chinese	Gender:	Male
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RESEARCH INTEREST

Image processing and computer vision, specifically, 3D human face/body reconstruction/tracking, image and video quality assessment, anaglyph image generation, screen-camera calibration, video compression, video transcoding, video de-interlacing.

EDUCATION

2008.8 – 2012.5	The Chinese University of Hong Kong	Ph.D in Electronic Engineering
2004.9 – 2006.8	Harbin Institute of Technology*	M.Eng. in Computer Science
2000.9 – 2004.8	Harbin Institute of Technology*	B.Eng. in Computer Science

* *University in Project 985 and 211*

WORKING

2014.9 – Present	The Chinese University of Hong Kong	Research Assistant Professor
2012.6 – 2014.9	The Chinese University of Hong Kong	Postdoctoral Fellow
2007.4 – 2008.7	The Chinese University of Hong Kong	Research Assistant
2006.8 – 2007.3	ESS Co. Ltd., Beijing	Software Engineer
2006.4 – 2006.6	Huawei Technologies Co. Ltd.	Intern
2006.4 – 2006.6	JDL, Chinese Academy of Sciences	Exchange Student

TEACHING

2015/16 1 st term	Engineering Mathematic II	Lecturer
2014/15 2 nd term	Advanced Techniques for Video Coding	Co-lecturer
2012/13 1 st term	Image Processing and Video Technology	Co-lecturer

AWARDS

2006	Excellent thesis award and outstanding graduate student of Hei Long Jiang province
2001	Outstanding student of the school of computer science and technology, HIT

PUBLICATIONS

A. Thesis

1. "Full-Reference Objective Visual Quality Assessment for Images and Videos", Ph.D. Thesis, The Chinese University of Hong Kong, May 2012.
2. "A DSP-platform MPEG2 Transcoding System", Master Thesis, Harbin Institute of Technology, May 2006.

B. Refereed Journal Papers

1. **Songnan Li**, King Ngi Ngan, Raveendran Paramesran, Lu Sheng, "Real-time head pose tracking with online face template reconstruction", IEEE Transactions on Pattern Analysis and Machine Intelligence, short paper, 2015, accepted.
2. Ran Shi, King Ngi Ngan, **Songnan Li**, Raveendran Paramesran, Hong Liang Li, "Visual Quality Evaluation of Image Object Segmentation: Subjective Assessment and Objective Measure", IEEE Transactions on Image Processing, vol. 24, no. 2, pp. 5033 - 5045, Aug. 2015.
3. Lu Sheng, King Ngi Ngan, Chern-Loon Lim, **Songnan Li**, "Online Temporally Consistent Indoor Depth Video Enhancement via Static Structure", IEEE Transactions on Image Processing, vol. 24, no. 7, pp. 2197-2211, July 2015.
4. Lin Ma, **Songnan Li**, and King Ngi Ngan, "Reduced-Reference Image Quality Assessment in Reorganized DCT Domain", Signal Processing: Image Communication, vol. 28, no. 8, pp. 884-902, Aug. 2013.
5. **Songnan Li**, Lin Ma, King Ngi Ngan, "Anaglyph Image Generation by Matching Color Appearance Attributes", In Signal Processing: Image Communication, vol. 28, no. 6, pp. 597-607, July 2013.
6. Long Xu, **Songnan Li**, King N. Ngan, and Lin Ma, "Consistent Visual Quality Control in Video Coding", IEEE Transactions on Circuits and Systems for Video Technology, vol. 23, no. 6, pp. 975-989, June, 2013.
7. Lin Ma, **Songnan Li**, and King N. Ngan, "Reduced-Reference Video Quality Assessment of Compressed Video Sequences", IEEE Transactions on Circuits and Systems for Video Technology, vol. 22, no. 10, pp. 1441-1456, Oct. 2012.
8. **Songnan Li**, Lin Ma, King Ngi Ngan, "Full-reference video quality assessment by decoupling detail losses and additive impairments", IEEE Transaction on Circuits and Systems for Video Technology, vol. 22, no. 7, pp. 1100-1112, July 2012.
9. **Songnan Li**, Fan Zhang, Lin Ma, King Ngi Ngan, "Image quality assessment by separately evaluating detail losses and additive impairments", IEEE Transaction on Multimedia, Vol. 13, no. 5, pp. 935-949, Oct. 2011.
10. Fan Zhang, Lin Ma, **Songnan Li**, and King N. Ngan, "Practical Image Quality Metric Applied to Image Coding", IEEE Transaction on Multimedia, vol. 13, no. 4, pp. 615-624, Aug. 2011.
11. Lin Ma, **Songnan Li**, Fan Zhang, and King N. Ngan, "Reduced-Reference Image Quality Assessment Using Reorganized DCT-Based Image Representation", IEEE Transaction on

Multimedia, vol. 13, no. 4, pp. 824-829, Aug. 2011.

12. Lin Ma, King Ngi Ngan, Fan Zhang, **Songnan Li**, "Adaptive Block-Size Transform Based Just-Noticeable Difference Model for Images/Videos", In Signal Processing: Image Communication, Vol. 26, no. 3, pp. 162-174, Mar. 2011.
13. Lin Ma, **Songnan Li**, and King N. Ngan, "Visual Horizontal Effect for Image Quality Assessment", IEEE Signal Processing Letters, vol. 17, no. 7, pp. 627-630, Jul. 2010.
14. Xin Jin, **Songnan Li**, King Ngi Ngan, "Platform-independent MB-based AVS video standard implementation", In Signal Processing: Image Communication, Europe, vol. 24, no. 4, pp. 312-323, April 2009.

C. Refereed Conference Papers

1. **Songnan Li**, King Ngi Ngan, Lu Sheng, "Screen-camera Calibration Using a Thread", IEEE International Conference on Image Processing (ICIP2014), 27-30, Paris, 2014.
2. Lu Sheng, King Ngi Ngan, **Songnan Li**, "Temporal Depth Video Enhancement based on Intrinsic Static Structure", IEEE International Conference on Image Processing (ICIP2014), 27-30, Paris, 2014.
3. Ran Shi, King Ngi Ngan, **Songnan Li**, "Jaccard Index Compensation for Object Segmentation Evaluation", IEEE International Conference on Image Processing (ICIP2014), 27-30, Paris, 2014.
4. Ran Shi, King Ngi Ngan, **Songnan Li**, "The Objective Evaluation of Image Object Segmentation Quality", Advanced Concepts for Intelligent Vision Systems (ACIVS 2013), Poznan, Poland, Oct. 28-31, 2013.
5. **Songnan Li**, King Ngi Ngan, Lu Sheng, "A Head Pose Tracking System Using RGB-D Camera", The 9th International Conference on Computer Vision Systems (ICVS2013), St. Petersburg, Russia, 16-18, July 2013.
6. Long Xu, King N. Ngan, **Songnan Li**, and Lin Ma, "Video Quality Metric for Consistent Visual Quality Control in Video Coding", Asia Pacific Signal and Information Processing Association Annual Summit and Conference (APSIPA ASC 2012), Hollywood, California, USA, Dec. 3-6, 2012.
7. Lin Ma, **Songnan Li**, and King N. Ngan, "Reduced-Reference Image Quality Assessment via Intra- and Inter-Subband Statistical Characteristics in Reorganized DCT Domain", Asia Pacific Signal and Information Processing Association Annual Summit and Conference (APSIPA ASC 2011), Xi'an, China, Oct. 18-21, 2011.
8. **Songnan Li**, Lin Ma, King Ngi Ngan, "Video quality assessment by decoupling additive impairments and detail losses", The third International Workshop on Quality of Multimedia Experience (QoMEX), Mechelen, Belgium, Sep. 2011.
9. Lin Ma, **Songnan Li**, King Ngi Ngan, "Motion trajectory based visual saliency for video quality assessment", International Conference on Image Processing (ICIP 2011), Brussels, Belgium, Sep. 2011.

10. Lin Ma, **Songnan Li**, King Nghi Ngan, "Perceptual image compression via adaptive block-based super-resolution directed down-sampling", IEEE International Symposium on Circuits and Systems (ISCAS), Brazil, May. 2011.
11. **Songnan Li**, Lin Ma, Fan Zhang, King Nghi Ngan, "Temporal inconsistency measure for video quality assessment", Picture Coding Symposium, Japan, Dec. 2010.
12. Lin Ma, Fan Zhang, **Songnan Li**, King Nghi Ngan, "Video quality assessment based on adaptive block-size transform just-noticeable difference model", International Conference on Image Processing (ICIP2010), Hong Kong, Sep. 2010.
13. Fan Zhang, **Songnan Li**, Lin Ma, King Nghi Ngan, "Limitation and challenges of Image Quality Measurement", Visual Communications and Image Processing conference (VCIP2010), Huang Shan, China, July 2010.
14. **Songnan Li**, King Nghi Ngan, "Subtractive impairment, additive impairment, and image visual quality", IEEE International Symposium on Circuits and Systems (ISCAS2010), Paris, France, May 2010.
15. **Songnan Li**, King Nghi Ngan, "Influence of the smooth region on the structural similarity index", IEEE Pacific-Rim Conference on Multimedia (PCM2009), Bangkok, Thailand, pp. 836-846, Dec 2009.
16. Xin Jin, **Songnan Li**, King Nghi Ngan, "AVS video standard implementation for SoC design", IEEE Int. Conf. on Neural Networks and Signal Processing, Zhejiang, China, pp. 660-665, June 2008.
17. Jianguo Du, **Songnan Li**, Debin Zhao, Qian Huang, Wen Gao, "An adaptive de-interlacing algorithm based on texture and motion vector analysis", IEEE Int. Conf. Multimedia Expo (ICME2006), Toronto, Canada, pp. 473-476, July 2006.
18. **Songnan Li**, Jianguo Du, Debin Zhao, Qian Huang, Wen Gao, "An improved 3DRS algorithm for video de-interlacing", Picture Coding Symposium (PCS2006), Beijing, China, April 2006.

D. Book Chapter

Songnan Li, Chun-Man Mak and King Nghi Ngan, "Visual Quality Evaluation for Images and Videos", Multimedia Analysis, Processing and Communication, Springer Berlin/Heidelberg Publisher, vol. 346/2011, pp. 497-544, 2011.

E. Patent

King Nghi Ngan, **Songnan Li**, "Real-Time Head Pose Tracking with Online Face Template Reconstruction", U.S. Patent Application, No. 14/313,639, 2014.

R&D EXPERIENCES

A. Research

1. *Head pose tracking*

Location: The Chinese University of Hong Kong
Year: 2013 - Now
Language: C++
Website: <http://www.ee.cuhk.edu.hk/~snli/HeadTracking2.htm>
Motivation: Use RGBD camera to estimate the rigid head pose with 6 degrees of freedom, including translations (forward/backward, up/down, and left/right) and rotations (pitch, yaw, and roll) in the 3D space.
Contribution: Successfully applied the Innovation & Technology Fund from ITC, Hong Kong. Designed a novel, accurate, robust, and real-time head pose tracking system. Developed two applications to demonstrate its usage. Future works include comparison with prior studies and preparation for publications.

2. *Screen-camera calibration*

Location: The Chinese University of Hong Kong
Year: 2014
Language: MATLAB
Website: http://www.ee.cuhk.edu.hk/~snli/screen_camera_cali.htm
Motivation: Estimate the 3D position of the screen in the camera coordinates system.
Contribution: Proposed a novel screen-camera calibration algorithm which uses more accessible and cheaper calibrating object in comparison with prior studies. The MATLAB code was released for publicity. A holographic-like displaying system was developed to demonstrate its usage.

3. *Multi-view video synthesis*

Location: The Chinese University of Hong Kong
Year: 2012
Language: C++
Motivation: Use multiple cameras to estimate the depth map and synthesize novel views in a video sequence. Tackle with both narrow baseline and wide baseline cameras setup.
Contribution: Proposed a novel method for depth map initialization in a video sequence. Optimized the code for novel view synthesis from 5 fps to 62 fps. Developed a video displayer to show the novel view synthesis results.

4. *Anaglyph image generation*

Location: The Chinese University of Hong Kong
Year: 2012
Language: MATLAB
Website: http://www.ee.cuhk.edu.hk/~snli/anaglyph_database.htm
Motivation: Given a stereo image pair generate an anaglyph image that can provide 3D effect when seen through colored glasses.
Contribution: Proposed a novel algorithm for anaglyph image generation which can minimize the perceptual distortions of anaglyph image such as retinal rivalry, color distortion, and ghosting effect. Compared the state-of-the-art anaglyph image generation algorithms using subjective quality tests for the first time in the literature. Published an anaglyph image database and released our MATLAB code for publicity.

5. *Image and video quality assessment*

Location: The Chinese University of Hong Kong
Year: 2008 - 2012
Language: MATLAB
Website: <http://www.ee.cuhk.edu.hk/~snli/VQM.htm>
Motivation: Evaluate the perceptual quality of an image or a video sequence using an objective metric.
Contribution: Proposed several novel image and video quality metrics that can achieve the state-of-the-art performances. Published 3 (9 refereed) journal papers and 5 (12 refereed) conference papers. Constructed a subjectively-rated video quality database and released it for academic uses.

6. *Video de-interlacing*

Location: Harbin Institute of Technology
Year: 2005
Language: C
Motivation: Recover the missing lines from a field picture to reconstruct a frame picture.
Contribution: Proposed to use bi-directional block matching and hierarchical motion estimation to improve the 3D recursive searching (3DRS) algorithm. Both objective and subjective experimental results showed performance improvements in comparison to the original 3DRS algorithm when used for video de-interlacing.

7. *Facial features segmentation*

Location: Harbin Institute of Technology
Year: 2003 - 2004
Language: C
Motivation: Segment facial features, i.e., eyes, nose and mouth from a face image of digital personal ID card.
Contribution: Designed an ad-hoc facial features segmentation algorithm using basic image processing tools such as image erosion, edge detection. Derived a skin color model from face images of Asian people.

B. Development

1. *Free-viewpoint video communication using multiple RGBD cameras*

Location: The Chinese University of Hong Kong
Year: 2013
Language: C++
Group size: 1
Website: <http://www.ee.cuhk.edu.hk/~snli/freeview.htm>
Introduction: The objective is to develop a system that can deliver both 3D and free-viewpoint viewing experiences to the end user. The system consists of a server and a client. At the server side, two Kinect cameras are used to capture the scene. At the client side, the system detects the head position of the viewer, and displays the corresponding view to create the free-viewpoint viewing experience. To enhance the immersive feeling, the system displays the scene in 3D mode.

2. *AVS video decoder implementation*

Location: The Chinese University of Hong Kong
Year: 2007
Language: C
Group size: 2
Introduction: Implemented an AVS decoder to facilitate embedded video codec development. In order to minimize the on-chip memory and save the time consumed in on-chip/off-chip data transfer, an MB-based architecture is developed by modifying the data flow, decoding hierarchy, and buffer definition. Such system architecture provides over 80% reduction in on-chip memory compared to frame-based architecture when decoding 720p sequences.

3. *G.723 speech codec implementation*

Location: ESS Co. Ltd., Beijing

Year: 2007

Language: Assembly language

Group size: 4

Introduction: Used assembly language to implement the G.723 speech codec on a digital signal processor (DSP).

4. *Graphic user interface development for DSP (Aura) simulator*

Location: ESS Co. Ltd., Beijing

Year: 2006

Language: TCL/TK

Group size: 1

Introduction: Aura is a DSP core designed by ESS Co. Ltd. which is used in projects such as VoIP, HD-DVD. Aura simulator is a software for aura's users to check pipe-lines, registers and memory locations while tracing the assembly code on a personal computer. Previously it is a command-line program. I developed a graphic user interface for Aura simulator to facilitate the visualization of the tracing results.

5. *MPEG-2 transcoding system implementation*

Location: Chinese Academy of Sciences, Huawei Technologies Co. Ltd.

Year: 2005 - 2006

Language: C and Assembly language

Group size: 2

Introduction: A contract project between Chinese Academy of Sciences and Huawei Technologies Co. Ltd. This system aims to reduce the bit rate of MPEG-2 elementary streams. It consists of 3 modules. De-multiplex module extracts video and audio data from original transport stream. Transcoding module reduces bit rate of the video data according to the desired output bit rate. The reduced video data is re-compressed and re-packed by multiplex module to form the output transport stream.