

SUK HWAN LIM

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AREAS OF RESEARCH INTERESTS

- Algorithms and systems for multi-media interaction and visualization
- Image and video processing algorithms for advanced imaging systems
- Image and video analysis for multi-media understanding

EDUCATION

- Ph.D. in Electrical Engineering*, Stanford University, Stanford, CA March 2003
Concentrations: Digital image and video processing, CMOS circuits and image sensors
Thesis: Video Processing Applications of High Speed CMOS Image Sensor
- M.S. in Electrical Engineering*, Stanford University, Stanford, CA June 1998
Concentrations: Signal Processing, DSP, VLSI design, Communications
- B.S. in Electrical Engineering (high honor)*, Seoul National University, Seoul, Korea August 1996
Concentrations: Signal Processing, Control, Communications

PROFESSIONAL EXPERIENCE

Senior Member of Technical Staff, Hewlett-Packard Laboratories 1/2003 - present
Develop image/video processing algorithms and systems for imaging products and services such as web/retail photo services, digital cameras, photo-printers and film restoration services.

Multimedia compositing

- Accurate face analysis
- Image segmentation and matting
- Brightness and color compensation

Image analysis and enhancement solutions for challenging low-light problems in digital imaging

- Advanced Noise Filtering for severely noisy images
- Low noise image processing methods (color correction, contrast enhancement and sharpening)
- Image stabilization and enhancement for mobile imaging via multiple captures
- Blur estimation and deblurring via dual captured images
- Automatic assessment of focus quality of digital photos
- Fixed pattern and random noise removal for calibration in projector-camera systems

Video processing algorithms for motion picture films and digital cameras

- Brightness-invariant local feature detection and analysis
- Optical flow estimation with outlier rejection
- Image sequence processing for enhancement and compositing
- Video stabilization for high performance DSP
- Video grain removal for motion picture films
- Image/video pipeline for imaging devices and film restoration

Research Assistant/Ph.D. Candidate, Stanford University, CA

9/1997 - 12/2002

Worked in Smart Image Sensor Group on Programmable Digital Camera (PDC) Project under Prof. El Gamal

- Co-designed a CIF (352x288) size high-speed (10,000 frames/s) CMOS image sensor in a standard 0.18 μ m CMOS technology (successfully fabricated and tested)
- Developed a method for obtaining high accuracy optical flow estimates at a standard frame rate by capturing and processing a high frame rate version of the video
- Developed an algorithm that corrects for pixel-to-pixel gain variations in an image sensor without the need for uniform illumination based on the use of motion estimation
- Architectural studies of column level processing in programmable digital camera

Miscellaneous class projects

- Digital Imaging (EE392B): Surveyed and presented various algorithms for digital camera pipeline: Color interpolation, Color correction, White balancing, Auto exposure, Auto focus, Gamma correction algorithms
- Digital Imaging (EE392B): Implemented and compared performances of each algorithm various Auto-focus algorithms in MATLAB
- Digital Video Processing (EE392J): Implemented and simulated accurate optical flow estimation methods for high-speed imaging
- Image Video Compression (EE392C): Motion estimation with reduced computation complexity for video compression standards
- Digital Circuit Design (EE371): Designed the architecture of 64-bit segmented multiplier for multimedia applications and simulated critical path delay using HSPICE and wire data
- DSP Architecture and Programming (EE487): Generated layout using Verilog and Synopsys design compiler/analyzer and simulated speed and power consumption for low power digital correlators in GPS receivers
- DSP Architecture and Programming (EE487): Programmed 2D-FFT in TMS320C54x assembly language and simulated using TI software
- Computer Architecture (EE282H): Performance optimization of pipeline and cache of MIPS-DLX in Verilog and C

TECHNICAL SKILLS

MATLAB, C/C++, DSP assembly language, Circuit design tools learned in school (Verilog (behavioral and RTL level), Magic, IRSIM, HSPICE, Mwaves and etc)

PUBLICATIONS

- M. Chen, S.H. Lim, Q. Lin, "Multi-image processing technologies for image enhancement", The 6th International Conference on Image Science and Hardcopy, Guangdong, China, January 2008.
- R. Samadani, S.H. Lim, D. Tretter, "Representative Image Thumbnails for Good Browsing", in Proceedings of the IEEE 2007 International Conference on Image Processing, San Antonio, TX, September 2007
- P. Kisilev, D. Shaked, S.H. Lim, "Noise and Signal Activity Maps for Better Imaging Algorithms", in Proceedings of the IEEE 2007 International Conference on Image Processing, San Antonio, TX, September 2007
- J. Yen, D. Mukherjee, S.H. Lim, D. Tretter, "Pet fur color and texture classification", in Proceedings of the SPIE Vol. 6508-68, January 2007.
- S.H. Lim, "Characterization of Noise in Digital Photographs for Image Processing," in Proceedings of the SPIE Vol. 6069, January 2006.

- S.H. Lim, J. Yen and P. Wu, "Automatic Focus Quality Analysis for Managing Large Collection of Digital Photographs," in Proceedings of the SPIE Vol. 6015, 601510-1, October 2005.
- S.H. Lim and A. El Gamal, "Optical flow estimation using temporally oversampled video" in IEEE Transactions on Image Processing, Vol. 14, No. 8, pp. 1074-1087, August 2005.
- S.H. Lim and A. Silverstein, "Spatially Varying Color Correction (SVCC) Matrices for Reduced Noise," in Proceedings of the 12th Color Imaging Conference, pp. 76-81, Scottsdale, AZ, November 2004.
- S.H. Lim, J. Apostolopoulos and A. El Gamal, "Benefits of temporal oversampling in optical flow estimation," in Proceedings of the IEEE 2004 International Conference on Image Processing, v.4, pp. 2567-2570, October 2004.
- S.H. Lim, J. Yen and P. Wu, "Detection of ill-focused Digital Photographs," in Proceedings of the TECHCON 2004, Orlando, FL, June 2004
- S.H. Lim and A. El Gamal, "Gain fixed pattern noise correction via optical flow estimation," in IEEE Transactions on Circuits and Systems, Vol. 51, No. 4, pp. 779-786, April 2004.
- A.O. Ercan, F. Xiao, X. Liu, S.H. Lim, A. El Gamal and B. Wandell, "Experimental High Speed CMOS Image Sensor System and Applications," in Proceedings of the 2002 IEEE Sensors Conference, Vol. 1, pp. 15-20, Orlando, Florida, June 2002.
- S.H. Lim and A. El Gamal, "Gain fixed pattern noise correction via optical flow estimation," in Proceedings of SPIE Electronic Imaging Conference, v.4669, pp. 384-391, San Jose, CA, January 2002.
- S. Kleinfelder, S.H. Lim, X. Liu and A. El Gamal, "A 10,000 frame/s 0.18 μ m CMOS digital pixel sensor with pixel-level memory" in IEEE Journal of Solid State Circuits, Vol. 36, No. 12, pp. 2049-2059, December 2001.
- S.H. Lim and A. El Gamal, "Optical flow estimation using high frame rate sequences," in Proceedings of the IEEE 2001 International Conference on Image Processing, v.2, pp. 925-928, Thessaloniki, Greece, October 2001.
- S. Kleinfelder, S.H. Lim, X. Liu and A. El Gamal, "A 10,000 frame/s 0.18 μ m CMOS digital pixel sensor with pixel-level memory," in Digest of Technical Papers, IEEE International Solid-State Circuits Conference, pp. 88-89, San Francisco, CA, February 2001.
- S.H. Lim and A. El Gamal, "Integration of Image Capture and Processing," in Proceedings of SPIE Electronic Imaging Conference, v.4306, pp. 219-226, San Jose, CA, January 2001.
- H. Tian, X. Liu, S.H. Lim, S. Kleinfelder and A. El Gamal, "Active pixel sensors fabricated in a standard 0.18 μ m CMOS technology" in Proceedings of SPIE Electronic Imaging Conference, v.4306, pp. 441-449, San Jose, CA, January 2001.
- 2 patents granted and 20+ patents in pipeline

PROFESSIONAL ACTIVITIES

- Reviewer for IEEE International Conference on Image Processing 2008
- Technical Program Committee for ACM/IEEE International Conference on Distributed Smart Cameras 2007
- Reviewer for IEEE International Conference on Image Processing 2007
- Invited talk on "Alleviating compression artifacts in images captured with camera-phones", in Camera Phone Image Quality Technical Forum, Stanford, CA, December 7, 2006
- Technical Program Committee for IEEE International Conference on Image Processing 2006
- Session Chair for the SPIE OpticsEast 2005 conference, Boston, MA, October 2005
- Technical Program Committee for IEEE International Conference on Image Processing 2005
- Reviewer for IEEE International Symposium on Circuits and Systems 2005

- Poster Chair for HP Imaging and Color Symposium 2004, Palo Alto, CA, November 2004
- Technical Program Committee for IEEE International Conference on Image Processing 2004
- Invited talk on "CMOS Imaging: Technology and Applications", in Nano2002 Workshop III: Data Analysis and Imaging, Westwood, CA, November 5, 2002
- Refereed many journal papers including
 - IEEE Transactions on Image Processing
 - IEEE Transactions on Circuits and Systems
 - Journal of Electronic Imaging