

# Soonam Lee

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## EDUCATION

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- Purdue University**, West Lafayette, IN Aug. 2012 – Aug. 2019  
Ph. D. in Electrical and Computer Engineering GPA : 4.00 / 4.00  
• Advisor: Prof. Edward J. Delp
- University of Michigan**, Ann Arbor, MI Jan. 2011 – Apr. 2012  
M. S. in Mathematics GPA : 7.220 / 9.000
- University of Michigan**, Ann Arbor, MI Sep. 2009 – Apr. 2012  
M. S. in Electrical Engineering: Systems GPA : 7.220 / 9.000  
(Major: Signal Processing, Minor: Communication)  
• Advisor: Prof. Benjamin Kuipers
- Hanyang University**, Seoul, Korea Mar. 2001 – Aug. 2008  
B. S. in Electrical & Computer Engineering (Summa Cum Laude) GPA : 4.15 / 4.50  
B. S. in Information Technology Management  
• Advisor: Prof. Dongweon Yoon

## PROFESSIONAL EXPERIENCE

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- Qualcomm CDMA Technologies (QCT) Video Team, Qualcomm, San Diego, CA** Jun. 2019 – Present  
*Senior Computer Vision (Video) Systems Engineer*  
• Research and development at the QCT Video team
- Video and Image Processing (VIPER) Lab, Purdue University, West Lafayette, IN** Jan. 2013 – Jun. 2019  
*Graduate Research Assistant*  
• Research on various 2D and 3D segmentation methods with multiphoton microscopy images  
• Research on microscopy image/volume deconvolution  
• Research on microscopy image registration along depth and time  
• Developed microscopy image (2D) and volume (3D) visualization tool
- Flat Panel Display Team, Apple Inc., Cupertino, CA** May. 2016 – Aug. 2016  
*Graduate Research Intern*  
• Display algorithm intern
- New Business Initiative (NBI), Intel Corporation, Hillsboro, OR** May. 2015 – Aug. 2015  
*Machine Learning Graduate Intern*  
• Research on hardware-assisted object classification schemes using sparse coding in real time application (U.S. Patent published)  
• Research on activity classification using keyframe selection techniques applied to deep learning method
- Vision Algorithm Research Team, Delphi, Agoura Hills, CA** May. 2014 – Aug. 2014  
*Graduate Research Intern*  
• Research on image and video segmentation using SLIC superpixels method for advanced driver assistance systems (ADAS)  
• Developed vehicle ego-motion estimation methods using structure from motion

**The Intelligent Robotics Lab, University of Michigan, Ann Arbor, MI**

Aug. 2010 – Apr. 2012

*Graduate Research Assistant*

- Developed background subtraction methods in temporal domain using 3-way factorized Restrict Boltzmann Machine (RBM)
- Research on foreground / background segmentation under arbitrarily moving camera by establishing appropriate objective function

**ECE Department, Purdue University, West Lafayette, IN**

*Graduate Teaching Assistant*

- Engineering Projects In Community Service (EPICS), Spring 2019
- Engineering Projects In Community Service (EPICS), Fall 2018
- Engineering Projects In Community Service (EPICS), Spring 2018
- Engineering Projects In Community Service (EPICS), Fall 2017
- Engineering Projects In Community Service (EPICS), Spring 2017
- Engineering Projects In Community Service (EPICS), Fall 2016
- ECE 255: Introduction to Electronic Analysis and Design, Spring 2016
- ECE 301: Signals and Systems, Fall 2015
- ECE 208: Electronic Devices and Design Laboratory, Spring 2015
- ECE 255: Introduction to Electronic Analysis and Design, Fall 2014

**Mobile and Space Communication Lab, Dept, of ECE, Hanyang University, Seoul, South Korea**

Jun. 2008 – Aug. 2009

*Undergraduate Research Assistant*

- Studied recommendations for space data system standards (CCSDS 401.0-B, CCSDS 413.0-G)
- Implemented digital modulations through MATLAB & Simulink

**Republic Of Korea Air Force (ROKAF), Suwon, South Korea**

Mar. 2003 – Aug. 2005

*Staff Sergeant (E-5)*

- Repaired fighting planes overall as an airplane repair man
- Performed Preflight (PR) inspection, Basic Postflight (BPO) inspection, and Hour Postflight (HPO) inspection

**PUBLICATIONS**

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- [J1] K. W. Dunn, C. Fu, D. J. Ho, **S. Lee**, S. Han, P. Salama, and E. J. Delp, “DeepSynth: Three-dimensional nuclear segmentation of biological images using neural networks trained with synthetic data,” To Appear, *Scientific Reports*.
- [C7] S. Han, **S. Lee**, A. Chen, C. Yang, P. Salama, K. W. Dunn, and E. J. Delp, “Three dimensional nuclei segmentation and classification of fluorescence microscopy images,” Submitted to *Proceedings of the IEEE International Symposium on Biomedical Imaging (ISBI)*, April 2020, Iowa City, IA.
- [C6] **S. Lee**, S. Han, P. Salama, K. W. Dunn, and E. J. Delp, “Three dimensional blind image deconvolution for fluorescence microscopy using generative adversarial networks,” *Proceedings of the IEEE International Symposium on Biomedical Imaging (ISBI)*, April 2019, Venice, Italy.
- [C5] S. Han, **S. Lee**, C. Fu, P. Salama, K. W. Dunn, and E. J. Delp, “Nuclei counting in microscopy images with three dimensional generative adversarial networks,” *Proceedings of the SPIE Conference on Medical Imaging*, February 2019, San Diego, CA.
- [C4] C. Fu, **S. Lee**, D. J. Ho, S. Han, P. Salama, K. W. Dunn, and E. J. Delp, “Three dimensional fluorescence microscopy image synthesis and segmentation,” *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition Workshop (CVPRW)*, June 2018, Salt Lake City, UT.
- [C3] **S. Lee**, C. Fu, P. Salama, K. W. Dunn, and E. J. Delp, “Tubule segmentation of fluorescence microscopy images based on convolutional neural networks with inhomogeneity correction,” *Proceedings of the IS&T International Symposium on Electronic Imaging*, January 2018, Burlingame, CA.
- [C2] **S. Lee**, P. Salama, K. W. Dunn, and E. J. Delp, “Segmentation of fluorescence microscopy images using three dimensional active contours with inhomogeneity correction,” *Proceedings of the IEEE International*

*Symposium on Biomedical Imaging (ISBI)*, April 2017, Melbourne, Australia.

- [C1] S. Lee, P. Salama, K. W. Dunn, and E. J. Delp, "Boundary fitting based segmentation of fluorescence microscopy images," *Proceedings of the SPIE/IS&T International Symposium on Electronic Imaging*, February 2015, San Francisco, CA.

## **PREPRINTS**

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- [A1] S. Lee and D. Kim, "Background subtraction using the factored 3-way restricted Boltzmann machines," *arXiv preprint arXiv:1802.01522*, February 2018.

## **PATENTS**

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- [P1] N. K. Jain and S. Lee, "Technologies for classification using sparse coding in real time," *U.S. Pub. No. US2018/0005086 A1*, *U.S. Pub. No. US10282641 B2*, *World Pub. No. WO2018/004980 A1*, filed on July 1, 2016, published on January 4, 2018, granted on May 7, 2019.

## **POSTERS**

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- [O3] S. Han, S. Lee, C. Fu, P. Salama, K. W. Dunn, and E. J. Delp, "Nuclei counting in microscopy images with three dimensional generative adversarial networks," *Advancing Health: An Engineering – Medicine Partnership*, May 2019, Indianapolis, IN.
- [O2] N. J. Gadgil, S. Lee, C. Fu, D. J. Ho, K. W. Dunn, P. Salama, and E. J. Delp, "Three dimensional segmentation of fluorescence microscopy images of the kidney," *IUPUI Imaging Research Symposium*, October, 2014, Indianapolis, IN.
- [O1] S. Lee, K. S. Lorenz, P. Salama, K. W. Dunn, and E. J. Delp, "Three dimensional segmentation of fluorescence microscopy images using active surfaces," *Gastroenterology Symposium*, November 2013, West Lafayette, IN.

## **HONORS & AWARDS**

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- Conference Travel Grant, College of Engineering, Purdue University (2017)
- Overseas Scholarship Grantee, Hanyang University (2009 - 2010)
- Graduated Summa Cum Laude (3rd/102), Hanyang University (2008)
- Merit-Based Scholarship, Hanyang University (2001, 2002, 2007)

## **SERVICES**

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- Reviewer for the IEEE Winter Conference on Applications of Computer Vision (WACV) (2020)
- Reviewer for the PLOS ONE (2017)

## **RELEVANT COURSEWORK**

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- Purdue University: Optimization Methods for Systems and Control; Digital Image Processing I; Digital Image Processing II; Principles of Digital Color Imaging Systems; Computer Vision; Statistical Pattern Recognition and Decision Making Processes; Introduction to Statistical Mathematics; Introduction to Optical Microscopy
- University of Michigan (EECS): Machine Learning; Computer Vision; Unsupervised Feature Learning; Mathematical Methods for Signal Processing; Introduction to Digital Communication and Coding; Digital Communication Theory; Estimation, Filtering, and Detection; Probability and Random Process
- University of Michigan (MATH): Linear Algebra; Introduction to Probability; Advanced Calculus I; Advanced Calculus II; Continuous Optimization; Numerical Method for Scientific Computing I; Real Analysis; Sparse Approximation and Compress Sensing
- Hanyang University: Signal and Systems; Digital Signal Processing; Image Processing; Statistical Communication Engineering; Communication System; Digital Communication; Wireless Communication; Control Engineering; Modern Control System

## **TECHNICAL SKILLS**

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- High Level Languages: MATLAB; Python; C; Lua; JavaScript
- Image Processing Library: OpenCV
- Deep Learning Library: PyTorch; Torch

## **REFERENCES**

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- Available upon request