

# *Il Yong Chun*

4125 EECS Bldg., 1301 Beal Ave., Ann Arbor, MI 48109-2122

(Email: [ychun@umich.edu](mailto:ychun@umich.edu), Phone: 765-586-3511)

- OBJECTIVE** To seek a tenure-track faculty position, particularly in computational imaging and/or translational imaging
- EDUCATION**
- Purdue University** West Lafayette, IN, USA  
Ph.D. in Electrical and Computer Engineering Aug. 2009 – Aug. 2015
- Thesis title: Advances in medical imaging and image reconstruction
  - Advisors: Prof. Thomas M. Talavage and Prof. Ben Adcock
- Korea University** Seoul, South Korea  
B.Eng. in Electrical Engineering Mar. 2002 – Feb. 2009
- University of Hong Kong** Hong Kong, China  
Exchange Student in Electrical and Electronic Engineering Aug. 2007 – May 2008
- WORK EXPERIENCE**
- University of Michigan** Ann Arbor, MI, USA  
Postdoc. in Electrical Engineering and Computer Science May 2016 – Present  
(supervisor: Prof. Jeffrey Fessler)
- Convolutional operator learning and neural networks: Global approach, theory, and its application to low-dose CT reconstruction
  - Tensor decomposition and its application to light-field photography
- Purdue University** West Lafayette, IN, USA  
Postdoc. in Mathematics (supervisor: Prof. Ben Adcock) Aug. 2015 – May 2016
- Compressed sensing and parallel acquisition: Theory
- Purdue University** West Lafayette, IN, USA  
Research Assistant (advisor: Prof. Thomas M. Talavage) Aug. 2010 – May 2015
- Compressed sensing in MRI and X-ray CT
  - Computational imaging and stochastic modeling in MRI and X-ray CT
  - Image analysis in neuroimaging
- Teaching Assistant (advisor: Prof. Michael D. Zoltowski) Jan. 2011 – May 2011
- Signals and systems (ECE301)
- Research Assistant (advisor: Prof. Michael G. Heinz) Aug. 2011 – May 2013
- Template-based peak detection in auditory signal
- Samsung Advanced Institute of Technology (SAIT)** Yongin, South Korea  
Graduate Intern (supervisor: Dr. Jung-Bae Kim) Jun. 2013 – Jul. 2013
- Multi-modal (ultrasonography & MRI) image registration using multiple mutual information
- Neuroscience Research Institute (NRI)** Incheon, South Korea  
Lecturer (supervisor: Prof. Zang-Hee Cho) May 2013 – Jun. 2013
- Lecture: Introduction to optimization
  - Research: High-resolution positron emission tomography (PET) image reconstruction with sparsity regularization and structural image
- Intel Labs** Hillsboro, OR, USA  
Graduate Intern (supervisor: Dr. Willem M. Beltman) May 2011 – Jul. 2011
- Real-time frequency-domain blind source separation of convolutive speech mixtures using non-stationarity in mobile environment
- Gangnam-gu and Yeongdeungpo-gu District Office** Seoul, South Korea  
Public Interest Service Personnel Jun. 2003 – Sep. 2005
- Administrator for the traffic offense vehicle server and regulation system

## **PUBLICATION** Preprints

Ikbeom Jang, **Il Yong Chun**, Eric L. Breedlove, Larry J. Leverenz, Eric A. Nauman, and Thomas M. Talavage, “Axonal impairment in high school football athletes: Longitudinal study using diffusion

weighted imaging,” preprint, Oct. 2017.

Miao-Bin Lien, Che-Hung Liu, **Il Yong Chun**, Saiprasad Ravishankar, Hung Nien, Minmin Zhou, Jeffrey A. Fessler, Theodore B. Norris, and Zhaohui Zhong, “Ranging and light field imaging with transparent photodetectors,” preprint, Feb. 2018.

### Submitted Journal Papers

**Il Yong Chun** and Jeffrey A. Fessler, “Convolutional analysis operator learning: Acceleration, convergence, application, and neural networks,” submitted to *IEEE Trans. Image Process.*, Jan. 2018. [Online] Available: <http://arxiv.org/abs/1802.05584>

**Il Yong Chun** and Ben Adcock, “Uniform recovery from subgaussian multi-sensor measurements,” under review for *Appl. Comput. Harmon. Anal.*, Feb. 2018. [Online] Available: <http://arxiv.org/abs/1610.05758>

**Il Yong Chun**, Xuehang Zheng, Zhipeng Li, Yong Long, and Jeffrey A. Fessler, “Sparse-view X-ray CT reconstruction using  $\ell_1$  prior with learned transform,” under review for *IEEE Trans. Rad. Plasma Med. Sci.*, Nov. 2017. [Online] Available: <http://arxiv.org/abs/1711.00905>

### Journal Papers

**Il Yong Chun** and Jeffrey A. Fessler, “Convolutional dictionary learning: Acceleration and convergence,” *IEEE Trans. Image Process.*, vol. 27, no. 4, pp. 1697–1712, Apr. 2018. [Online] Available: <https://arxiv.org/abs/1707.00389>

**Il Yong Chun** and Ben Adcock, “Compressed sensing and parallel acquisition,” *IEEE Trans. Inf. Theory*, vol. 63, no. 8, pp. 4860–4882, May 2017. [Online] Available: <http://arxiv.org/abs/1601.06214>

**Il Yong Chun**, Song Noh, David J. Love, Thomas M. Talavage, Stephen Beckley, and Sherman J. Kisner, “Mean squared error (MSE)-based excitation pattern design for parallel transmit and receive SENSE MRI image reconstruction,” *IEEE Trans. Comput. Imag.*, vol. 2, no. 4, pp. 424–439, Dec. 2016.

**Il Yong Chun**, Ben Adcock, and Thomas M. Talavage, “Efficient compressed sensing SENSE pMRI reconstruction with joint sparsity promotion,” *IEEE Trans. Med. Imag.*, vol. 5, no. 1, pp. 354–368, Jan. 2016.

**Il Yong Chun**, Xianglun Mao, Eric L. Breedlove, Larry J. Leverenz, Eric A. Nauman, and Thomas M. Talavage, “DTI detection of longitudinal WM abnormalities due to accumulated head impacts,” *Dev. Neuropsychol.*, vol. 40, no. 2, pp. 92–97, May 2015.

### Conference Papers & Abstracts

**Il Yong Chun** and Jeffrey A. Fessler, “Deep BCD-Net using identical encoding-decoding CNN structures for iterative image recovery,” submitted to *IEEE Image, Video, and Multidim. Signal Process. (IVMSP) Workshop*, Feb. 2018. [Online] Available: <http://arxiv.org/abs/1802.07129>

**Il Yong Chun**, Cameron J. Blocker, and Jeffrey A. Fessler, “Low-rank plus sparse tensor models for light-field reconstruction from focal stack data,” submitted to *IEEE Image, Video, and Multidim. Signal Process. (IVMSP) Workshop*, Mar. 2018.

**Il Yong Chun** and Jeffrey A. Fessler, “Deep BCD-Net for extreme computational imaging,” *Gordon Research Conference on Image Science*, Jun. 2018.

Saiprasad Ravishankar, **Il Yong Chun**, and Jeffrey A. Fessler, “Physics-driven deep training of dictionary-based algorithms for MR image reconstruction,” to appear in *Proc. Asilomar Conf. on Signals, Syst., and Comput.*, Pacific Grove, CA, Nov. 2017.

**Il Yong Chun** and Jeffrey A. Fessler, “Convergent Convolutional Dictionary Learning using Adaptive Contrast Enhancement (CDL-ACE): Application of CDL to image denoising,” in *Proc. 12<sup>th</sup> Sampling Theory and Appl. (SampTA)*, Tallinn, Estonia, Jul. 2017, pp 460–464.

**Il Yong Chun**, Xuehang Zheng, Yong Long, and Jeffrey A. Fessler, “Efficient sparse-view X-ray

CT reconstruction using  $\ell_1$  regularization with learned sparsifying transform,” in *Proc. 14<sup>th</sup> Intl. Mtg. on Fully 3D Image Recon. in Rad. and Nuc. Med. (Fully 3D)*, Xi’an, China, Jun. 2017, pp 115–119.

Ikbeom Jang, **Il Yong Chun**, Sumra Bari, Yukai Zou, Eric A. Nauman, and Thomas M. Talavage, “DTI reveals persistent effects on white matter in football players with history of sports-related concussion,” *4<sup>th</sup> IN Neuroimaging Symp.*, Bloomington, IN, Nov. 2016.

**Il Yong Chun** and Ben Adcock, “Compressed sensing and parallel acquisition: Optimal uniform and nonuniform recovery guarantees,” Shannon Centennial Symposium, Ann Arbor, MI, Sep. 2016.

**Il Yong Chun**, Chen Li, and Ben Adcock, “Sparsity and parallel acquisition: Optimal uniform and nonuniform recovery guarantees,” in *Proc. 1<sup>st</sup> Workshop on Sparsity and Compressive Sensing in Multimedia (MM-SPARSE), IEEE Intl. Conf. on Multimedia and Expo (ICME) 2016*, Seattle, WA, Jul. 2016, pp 1–6. [Online] Available: <http://arxiv.org/abs/1603.08050>

**Il Yong Chun** and Ben Adcock, “Optimal sparse recovery for multi-sensor measurements,” in *Proc. IEEE Inf. Theory Workshop (ITW) 2016*, Cambridge, UK, Aug. 2016, pp 270–274. [Online] Available: <http://arxiv.org/abs/1603.06934>

Sumra Bari, **Il Yong Chun**, Larry J. Leverenz, Eric A. Nauman, and Thomas M. Talavage, “DTI detection of WM abnormalities using randomization test with complete and incomplete pairs,” in *Proc. 21<sup>st</sup> Org. for Hum. Brain Mapp. (OHBM)*, Honolulu, HI, Jun. 2015.

Ikbeom Jang, **Il Yong Chun**, Larry J. Leverenz, Eric A. Nauman, and Thomas M. Talavage, “DWI detection of WM abnormality and relation with collision events in high school athletes,” in *Proc. 21<sup>st</sup> Org. for Hum. Brain Mapp. (OHBM)*, Honolulu, HI, Jun. 2015.

Ikbeom Jang, **Il Yong Chun**, Larry J. Leverenz, Eric A. Nauman, and Thomas M. Talavage, “Robust detection of axonal abnormalities in high school collision-sport athletes: longitudinal single subject analysis,” in *Proc. 23<sup>rd</sup> Intl. Soc. Mag. Res. Med. (ISMRM)*, Toronto, ON, May 2015.

**Il Yong Chun**, Ben Adcock, and Thomas M. Talavage, “Efficient compressed sensing SENSE parallel MRI reconstruction with joint sparsity promotion and mutual incoherence enhancement,” in *Proc. 36<sup>th</sup> IEEE Eng. Med. Biol. Soc. (EMBS)*, Chicago, IL, Aug. 2014, pp. 2424–2427.

**Il Yong Chun**, Ben Adcock, and Thomas M. Talavage, “Non-convex compressed sensing CT reconstruction based on tensor discrete Fourier slice theorem,” in *Proc. 36<sup>th</sup> IEEE Eng. Med. Biol. Soc. (EMBS)*, Chicago, IL, Aug. 2014, pp. 5141–5144.

**Il Yong Chun**, Allan Diaz, Sijia Qiu, Larry J. Leverenz, Eric A. Nauman, and Thomas M. Talavage, “DTI detection of symptomatic and asymptomatic injury due to repetitive hit exposures,” *3<sup>rd</sup> IN Neuroimaging Symp.*, Bloomington, IN, Oct. 2013.

**Il Yong Chun** and Thomas M. Talavage, “Efficient compressed sensing statistical X-ray/CT reconstruction from fewer measurements,” in *Proc. 12<sup>th</sup> Intl. Mtg. on Fully 3D Image Recon. in Rad. and Nuc. Med. (Fully 3D)*, Lake Tahoe, CA, Jun. 2013, pp. 30–33.

**Il Yong Chun**, Allan Diaz, Xiaodong Li, Yun Jang Jin, Larry J. Leverenz, Eric A. Nauman, and Thomas M. Talavage, “DTI detection of symptomatic and asymptomatic injury due to repetitive head blows,” in *Proc. 19<sup>th</sup> Org. for Hum. Brain Mapp. (OHBM)*, Seattle, WA, Jun. 2013.

**Il Yong Chun** and Thomas M. Talavage, “Fast non-convex statistical compressed sensing MRI reconstruction based on approximated  $L_p(0 < p < 1)$ -quasi-norm with fewer measurements than using  $L_1$ -norm,” in *Proc. 21<sup>st</sup> Intl. Soc. Mag. Res. Med. (ISMRM)*, Salt Lake City, UT, Apr. 2013.

**Il Yong Chun** and Thomas M. Talavage, “Edge-preserving non-iterative MAP SENSE MRI reconstruction,” in *Proc. 21<sup>st</sup> Intl. Soc. Mag. Res. Med. (ISMRM)*, Salt Lake City, UT, Apr. 2013.

**Il Yong Chun** and Thomas M. Talavage, “Sparse Tikhonov-regularized SENSE MRI reconstruction,” in *Proc. 21<sup>st</sup> Intl. Soc. Mag. Res. Med. (ISMRM)*, Salt Lake City, UT, Apr. 2013.

**Il Yong Chun**, Allan Diaz, Yun Jang Jin, Xiaodong Li, Larry J. Leverenz, Eric A. Nauman, and

Thomas M. Talavage, “Robust detection of progressive white matter abnormalities in mTBI using DW-MRI,” in *Proc. 21<sup>st</sup> Intl. Soc. Mag. Res. Med. (ISMRM)*, Salt Lake City, UT, Apr. 2013.

## HONORS AND AWARDS

**Travel Funds for Purdue Engineering Ph.D. Candidates**, Purdue Univ. Sep. 2014

**Travel Funds**, 12<sup>th</sup> Fully 3D Jun. 2013

**Magna Cum Laude Merit Award**, 21<sup>st</sup> ISMRM Apr. 2013

**Award of Trainee (Educational) Stipend**, 21<sup>st</sup> ISMRM Apr. 2013

**Semester High Honor**, Korea Univ. Dec. 2005 – Jun. 2007

**Honors Scholarship**, Korea Univ. Feb. 2006 – Aug. 2007

## TALKS

### Seminar Presentations

“Convolutional dictionary learning using a fast block proximal gradient method”  
*Communications & signal processing seminars*, Univ. of Michigan-Ann Arbor Apr. 2017

“Compressed sensing and parallel acquisition”  
*Communications & signal processing seminars*, Univ. of Michigan-Ann Arbor Jan. 2016

### Conference Presentations

“From convolutional analysis operator learning (CAOL) to convolutional neural network (CNN)”  
Minisymposium “Recent advances in convolutional sparse representations”  
*on SIAM Conf. on Imaging Science (IS) (Invited)* Jun. 2018

“Physics-driven deep training of dictionary-based algorithms for image reconstruction”  
*Asilomar Conf. on Signals, Syst., and Comput. (Invited)* Nov. 2017

“Convergent convolutional dictionary learning using adaptive contrast enhancement (CDL-ACE): Application of CDL to image denoising”  
12<sup>th</sup> *Sampling Theory and Appl. (SampTA)* Jul. 2017

“Efficient sparse-view X-ray CT reconstruction using  $\ell_1$  regularization with learned sparsifying transform”  
14<sup>th</sup> *Intl. Mtg. on Fully 3D Image Recon. in Rad. and Nuc. Med. (Fully 3D)* Jun. 2017

“DTI reveals persistent effects on white matter in football players with history of sports-related concussion”  
4<sup>th</sup> *IN Neuroimaging Symp.* Nov. 2016

“Optimal sparse recovery for multi-sensor measurements”  
*IEEE Inf. Theory Workshop (ITW) 2016* Aug. 2016

“Sparsity and parallel acquisition: Optimal uniform and nonuniform recovery guarantees”  
1<sup>st</sup> *Workshop on Sparsity and Compressive Sensing in Multimedia (MM-SPARSE)*  
*IEEE Intl. Conf. on Multimedia and Expo (ICME) 2016* Jul. 2016

“Robust detection of axonal abnormalities in high school collision-sport athletes: longitudinal single subject analysis”  
23<sup>rd</sup> *Intl. Soc. Mag. Res. Med. (ISMRM)* May 2015

“Non-convex compressed sensing CT reconstruction based on tensor discrete Fourier slice theorem”  
36<sup>th</sup> *IEEE Eng. Med. Biol. Soc. (EMBS)* Aug. 2014

“Efficient compressed sensing statistical X-ray/CT reconstruction from fewer measurements”  
12<sup>th</sup> *Intl. Mtg. on Fully 3D Image Recon. in Rad. and Nuc. Med. (Fully 3D)* Jun. 2013

“Robust detection of progressive white matter abnormalities in mTBI using DW-MRI”  
21<sup>st</sup> *Intl. Soc. Mag. Res. Med. (ISMRM)* Apr. 2013

## PROFESSIONAL EXPERIENCE

**Reviewer for the following journals:**

- IEEE Transactions on Image Processing
- IEEE Transactions on Medical Imaging
- IEEE Transactions on Computational Imaging
- Medical Image Analysis

**Reviewer for the following proceedings:**

- IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2018

**Membership:**

- Member in IEEE
- Affiliated member in IEEE special interest group on computational imaging

<b>ACTIVITIES</b>	<b>Purdue Electrical Engineering Korean Association (PEEKA)</b>	Purdue Univ.
	Vice President	Aug. 2011 – Aug. 2012
	<b>Academic Society of Communication Engineering</b>	Korea Univ.
	President	Mar. 2006 – Jun. 2007
<b>VISA STATUS</b>	F-1	
<b>MILITARY SERVICE</b>	Republic of Korea Army	Seoul, South Korea
	Private (Mandatory in South Korea)	Jun. 2003 – Sep. 2005
<b>COMPUTER SKILL</b>	MATLAB, C, and C++	