

# KUAN HAN

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## EDUCATION

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- **PhD, Electrical and Computer Engineering** *January 2020 - March 2023*  
*University of Michigan, Ann Arbor, MI*
- **PhD Student, Electrical and Computer Engineering** *August 2016 - December 2019*  
*Purdue University, West Lafayette, IN*
- **B.Eng, Information and Communication Engineering** *August 2012 - June 2016*  
*Zhejiang University, Hangzhou, Zhejiang, China*

## RESEARCH INTERESTS

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Machine Learning, Signal and Image Processing, and Neuroimaging Data Analysis

## EXPERIENCE

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- **Postdoctoral Research Fellow** *March 2023 - Present*  
*Laboratory of Integrated Brain Imaging, University of Michigan, Ann Arbor, MI*  
*Advisor: Prof. Zhongming Liu*
  - Developed self-supervised learning models for fMRI representation learning with resting-state and task fMRI data.
- **Graduate Research Assistant** *August 2016 - March 2023*  
*Laboratory of Integrated Brain Imaging, University of Michigan, Ann Arbor, MI*  
*Advisor: Prof. Zhongming Liu*  
*(at Purdue University from August 2016 to December 2019)*
  - Developed generalizable and modular models for fMRI representation learning and behavior prediction.
  - Developed computational methods with deep neural networks to study how the visual information is represented and processed in human visual cortex.
  - Used biologically plausible principles to design the architecture of artificial neural networks, to improve the performance and efficiency of networks for object recognition.
- **Undergraduate Research Assistant** *December 2014 - June 2016*  
*Information and signal processing (ISP) Lab, Zhejiang University, Hangzhou, China*  
*Advisor: Prof. Zhiguo Shi*
  - Developed particle-filtering algorithms which can reconcile time-varying number of targets with the fixed architecture on digital systems, to support resource-efficient and real-time multi-target tracking.

## KEY COMPETENCIES

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- **Programming** - Shell scripting, C/C++, Python, Lua, Matlab
- **Libraries/Tools** - PyTorch, Keras, TensorFlow, Numpy, Git,  $\text{\LaTeX}$
- **Languages** - Mandarin (Native), English (Proficiency)
- **Courses** - Linear Algebra, Estimation Theory, Medical Imaging Systems, Statistical Learning and Deep Learning

## HONORS AND PROFESSIONAL ACTIVITIES

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- Reviewer of Human Brain Mapping
- Reviewer of NeuroImage (NIMG)
- Reviewer of IEEE Transaction on Biomedical Engineering (TBME)
- Reviewer of IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)
- Reviewer of the Thirty-Fourth AAAI Conference on Artificial Intelligence (AAAI-20)
- Reviewer of the 2019 Conference on Neural Information Processing Systems (NeurIPS 2019)
- Travel Award of the 2018 Conference on Neural Information Processing Systems (NeurIPS 2018)
- Chu Kochen Scholarship and Chu Kochen Medal, Zhejiang University, 2015
- Meritorious Winner in Interdisciplinary Contest in Modeling (ICM 2015)
- National Scholarship, Zhejiang University, 2013 & 2014

## PRESENTATIONS

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- [1] **Kuan Han**, Minkyu Choi, Xiaokai Wang, Jeffrey A. Fessler, Douglas Noll, Scott J. Peltier, Zhongming Liu. “**Individualized representation learning of resting-state fMRI**”. In 2023 ISMRM & ISMRT Annual Meeting (**Oral presentation**).  
(also in 2023 Cosyne and OHBM Annual Meetings, and Whistler Scientific Workshop as posters)
- [2] Xiaokai Wang, Jiayue Cao, **Kuan Han**, Minkyu Choi, Yushi She, Ulrich Scheven, Zhongming Liu. “**Tracking the Moving Stomach using MRI and Neural Ordinary Differential Equations**”. In 2023 ISMRM & ISMRT Annual Meeting (**Oral presentation**).
- [3] **Kuan Han**, Minkyu Choi, Zhongming Liu. “**Deep Predictive Coding Networks for Object Recognition**” In 2022 CRCNS Annual Meeting (**Poster**).
- [4] Jung-Hoon Kim, Kun-Han Lu, **Kuan Han**, Minkyu Choi, Yizhen Zhang, Zhongming Liu. “**Representation Learning of Resting-state fMRI**” In 2020 OHBM Annual Meeting (**Poster**).
- [5] Weicheng Wang, **Kuan Han**, Haiguang Wen, Junxing Shi, Yizhen Zhang and Zhongming Liu. “**A Web-based Platform for Predicting Brain Responses Based on Deep Neural Networks**”. In 2018 OHBM Annual Meeting (**Poster**).
- [6] **Kuan Han**, Haiguang Wen, Yizhen Zhang, Zhongming Liu. “**Comparing Deep Neural Network Based Encoding Models for Predicting Movie-induced Cortical Activities**”. In 2018 OHBM Annual Meeting (**Poster**).
- [7] **Kuan Han**, Haiguang Wen, Junxing Shi, Kun-Han Lu, Zhongming Liu. “**Decoding Cortical Activity with Variational Autoencoder Supports Direct Visual Reconstruction**”. In 2017 OHBM Annual Meeting (**Poster**).

## PUBLICATIONS

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- [1] X. Wang, J. Cao, **K. Han**, M. Choi, Y. She, U. Scheven, R. Avci, P. Du, L. K. Cheng, M. R. D. Natale, J. B. Furness, and Z. Liu, “**Diffeomorphic Surface Modeling for MRI-Based Characterization of Gastric Anatomy and Motility**,” *IEEE Transactions on Biomedical Engineering*, pp. 1–12, 2023.
- [2] M. Choi, Y. Zhang, **K. Han**, X. Wang, and Z. Liu, “**Human Eyes Inspired Recurrent Neural Networks are More Robust Against Adversarial Noises**,” *arXiv preprint arXiv:2206.07282*, 2022.
- [3] Y. Zhang, M. Choi, **K. Han**, and Z. Liu, “**Explainable Semantic Space by Grounding Language to Vision with Cross-Modal Contrastive Learning**,” *Advances in Neural Information Processing Systems*, vol. 34, 2021.
- [4] J.-H. Kim, Y. Zhang, **K. Han**, Z. Wen, M. Choi, and Z. Liu, “**Representation learning of resting state fMRI with variational autoencoder**,” *NeuroImage*, vol. 241, p. 118423, 2021.
- [5] Y. Zhang, **K. Han**, R. Worth, and Z. Liu, “**Connecting concepts in the brain by mapping cortical representations of semantic relations**,” *Nature communications*, vol. 11, no. 1, pp. 1–13, 2020.
- [6] **K. Han**, H. Wen, J. Shi, K.-H. Lu, Y. Zhang, D. Fu, and Z. Liu, “**Variational autoencoder: An unsupervised model for encoding and decoding fMRI activity in visual cortex**,” *NeuroImage*, vol. 198, pp. 125–136, 2019.
- [7] **K. Han**, H. Wen, Y. Zhang, D. Fu, E. Culurciello, and Z. Liu, “**Deep predictive coding network with local recurrent processing for object recognition**,” in *Advances in Neural Information Processing Systems*, 2018, pp. 9201–9213.
- [8] C. Yang, Z. Shi, **K. Han**, J. J. Zhang, Y. Gu, and Z. Qin, “**Optimization of particle CBMeMber filters for hardware implementation**,” *IEEE Transactions on Vehicular Technology*, vol. 67, no. 9, pp. 9027–9031, 2018.
- [9] H. Wen, **K. Han**, J. Shi, Y. Zhang, E. Culurciello, and Z. Liu, “**Deep Predictive Coding Network for Object Recognition**,” in *International Conference on Machine Learning*, 2018, pp. 5263–5272.
- [10] J. Shi, H. Wen, Y. Zhang, **K. Han**, and Z. Liu, “**Deep recurrent neural network reveals a hierarchy of process memory during dynamic natural vision**,” *Human brain mapping*, vol. 39, no. 5, pp. 2269–2282, 2018.
- [11] **K. Han**, Z. Qin, X. Gao, M. Jin, and Z. Shi, “**Dynamic particle allocation for CB-MeMber filter**,” in *2015 10th International Conference on Information, Communications and Signal Processing (ICICS)*. IEEE, 2015, pp. 1–5.