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SHEN RUI | RESUME

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EDUCATION

Johns Hopkins University **Baltimore, MD, U.S.** **Aug. 2017 – Present**

- **M.S. in Electrical and Computer Engineering,** Image and signal processing track
- **Current GPA:** 3.81/4.0, *Supervisor:* Dr. Jerry Prince

Southeast University **Nanjing, China** **Aug. 2013 – Jun. 2017**

- **B.E. in Biomedical Engineering,** Medical Electronics track
- **GPA:** 89.13/100, Ranking 3/55, Outstanding graduate student of Southeast University (Top 2%)

RESEARCH EXPERIENCE

Sub-thalamic nuclei Segmentation **Image Analysis and Comms Lab, JHU** **Sep. 2018 – Present**

- Advisor: Dr. Jerry Prince
- Outline: Developed segmentation and analysis methods for thalamic & sub-thalamic nuclei based on multimodal MRI
  - Systematically investigated several fiber tractography methods solving crossing fibers problem
  - Visualized multimodal MRI data using TSNE and UMAP
  - Applied constrained and non-constrained optimization tools for diffusion kurtosis calculation, investigated the causes of error estimations, and developed an initial method for signal correction

Mobile C-arm Pose Estimation **Philips Research North America** **May. 2018 – Aug. 2018**

- Advisor: Dr. Alexandru Patriciu
- Outline: Developed two methods for C-arm device pose estimation from X-ray images, using conventional landmark-based registration and deep learning-based scheme
  - Designed markers to encode and decode device pose, achieved 4 mm accuracy in real X-rays, 3 mm in simulated data
  - Generated 20000+ X-ray simulated data with different device pose, developed a deep learning scheme to improve translation error within 2.5 mm, and rotation error within 1 degree.

Integrated vascular (iVas) MRI **F. M. Kirby Research Center, JHU** **Sep. 2017 – Jan. 2018**

- Advisor: Dr. Paul Bottomley, Dr. Hanzhang Lu
- Outline: Developed the gas-inhalation time alignment pipeline of iVas MRI data and analyzed multi-parametric maps of brain hemodynamics

Paradigm Design for Grid Cell Study **Nanjing Drum Tower Hospital** **Nov. 2016 – Sep. 2017**

- Advisor: Dr. Bing Zhang
- Outline: *Outstanding Graduation Project*, designed a paradigm with both 3D and 2D directional tasks to study the fMRI spatial activation pattern in entorhinal cortex of MCI patients
  - Developed a virtual environment using Unity 3D for navigation tasks.
  - Designed a new paradigm in 2D abstract plane based on 3D directional tasks and grid cell firing field principle
  - Collected and analyzed both medical imaging and behavioral data of 10 participants

Fetal Brain Reconstruction from MRI **Nanjing Drum Tower Hospital** **Aug. 2016 – Nov. 2016**

- Advisor: Dr. Bing Zhang
- Outline: Developed an automated processing framework for fetal brain reconstruction and visualization
  - Developed a method for motion artifacts elimination through convex optimization
  - Investigated super-resolution reconstruction methods and sparse representation learning

Heart Rate Monitoring from PPG **Medical Electronics Laboratory, SEU** **Jun. 2016 – Aug. 2016**

- Advisor: Dr. Yu Sun, Dr. Suiren Wan
- Outline: Extracted and analyzed the real-time heart rate from PPG signals via HHT, investigated Mode Mixing problem, evaluated performance and compared it with STFT and CWT

Lip Language Recognization **National College Innovation Project** **Jan. 2016 – May. 2017**

- Advisor: Dr. Suiren Wan
- Outline: *Team leader*, collected 10000 photos of Chinese speaker, built a system on RPi to recognize Chinese vowels with neural network (achieved 92.03% accuracy)

Aircraft Monitoring based on ADS-B **National College Innovation Project** **Jun. 2014 – May 2016**

- Advisor: Dr. Yubo Song
- Outline: *Outstanding Project Award*, built a reliable ADS-B aircraft monitoring system with 200km detection zone and enhanced instantaneity, funded by National Undergraduate Innovation & Entrepreneurship program
  - Improved the performance of the receiver at 1090MHz by making an extensional coaxial collinear antenna
  - Obtained real-time aircraft data for one year using rtl-sdr, stored the information in XML, and visualized on website
  - Separated 1090ES aliased signals on MATLAB with Blind Extraction Algorithm based on Kurtosis

Publication

- Y. Li, P. Liu, S. Agarwal, X. Hou, **R. Shen** et al. "Integrated vascular (iVas) MRI in brain tumor", ISMRM 2018.
- D. Zhao, D. Miao, **R. Shen,** Y. Sun*, B. Zhang* et al. "A pilot study of lateral ventricle volume from in utero foetal brain magnetic resonance imaging (MRI)", ISMRM 2017.
- Z. Li, **R. Shen,** T. Wang, B. Zhang* et al. "Design and Application of fMRI Paradigm referred to Spatial navigation Based on Grid Cell Symmetry", Chinese Journal of Radiology (Submitted).

Work Experience

- **Research Assistant,** Image Analysis and Communications Lab (IACL), Johns Hopkins University (Jan. 2018 – Present)
- **Teaching Assistant,** Machine Learning at 18 Fall, JHU (Sep. 2018 – Present)
- **Research Intern,** R&D in Image Guided Surgery, Philips Research North America (May. 2018 – Aug. 2018)
- **Research Assistant,** Neuroimaging Department, Nanjing Drum Tower Hospital (June. 2016 – June. 2017)
- **Teaching Assistant,** Programming & Algorithmic Language at 14 Fall & 15 Spring, SEU (Sep. 2014 – Jul. 2015)
- **Software Engineer Intern,** R&D Department, Donglan Digital Co., Ltd (Jul. 2014 – Aug. 2014)

Awards & Honors

- *Top 3%* *The Second Place Overall of HopHacks Spring 2018* (Feb. 2018)
- *Top 2%* *Outstanding graduate student*, Southeast University (Jun. 2017)
- *Top 5%* *Outstanding Bachelor's Thesis*, Southeast University (Jun. 2017)
- *Top 4%* *Xin Haitian Scholarship*, Southeast University Education Foundation (Apr. 2017)
- *Top 4%* *Wu Jianxiong Scholarship*, Southeast University Education Foundation (Apr. 2016)
- *Top 9%* *The Second Prize of Short Code Contest*, SEU (Jun. 2015)
- *Top 1%* *Outstanding Student Leader*, SEU (May 2015)
- *Top 1%* *Course Awards* in Programming & Algorithmic Language and Digital Signal Processing, SEU

Technical Skills

- **Programming:** Python, C/C++, Swift, Pascal
- **Softwares:** MATLAB, Tensorflow, Keras, Pytorch, Unity 3D, JIST, Freesurfer, Fsl, SPM, 3D slicer, LaTeX
- **Focus Area:** Medical Imaging, Machine Learning, Computer Vision

Additional Experience

- *President,* Youth League general branch, Department of BME, SEU (Jun. 2014 – Jun. 2016)
- *Secretary,* Sports Department of Student Union, SEU (Sep. 2013 – Jun. 2014)
- *CBA Kentier Cheerleader,* Chinese Basketball Association 2015 – 2016 season
- *Hobbies:* Dance, Photography, Video Games, Basketball, Music, Chinese Seal, Literature

Reference

Jerry Prince, Ph.D., Prof. **Baltimore, MD, U.S.**
- Professor, Department of Electrical and Computer Engineering, Johns Hopkins University
- *Email: prince@jhu.edu*

Alexandru Patriciu, Ph.D. **Cambridge, MA, U.S.**
- Senior Scientist, Philips Research North America
- *Email: alexandru.patriciu@philips.com*

Suiren Wan, Ph.D., Prof. **Nanjing, China**
- Professor, Director of Medical Electronics Laboratory, School of Biomedical Engineering, Southeast University
- *Email: srwan@seu.edu.cn*