Curriculum Vitae

Yaoshen Yuan

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EDUCATION

PhD, Northeastern University, College of Engineering | Boston, MA   Sept 2016–Now
Major: **Electrical and Computer Engineering**
Master, Tufts University, School of Engineering | Medford, MA   Sept 2014–June 2016
Major: **Electrical and Computer Engineering**
Bachelor, Southeast University, School of Automation | Nanjing, China   Sept 2010–July 2014
Major: **Automation**

WORK EXPERIENCE

Research Assistance, Northeastern University | Boston, MA   Sept 2016-Now
· Lead research projects
· Organize annual MCX workshop
Teaching Assistance, Tufts University | Medford, MA   Sept 2015
· Introduction to Electrical Systems
· Mentor, office hour and grading
Developer, Jiangsu Shengtai Limited Company | Nanjing, China   Aug 2013
· Design frequency divider
· Implement frequency divider using CPLD

RESEARCH

Implicit meshed-based Monte Carlo photon transport algorithm for complex structures such as vessel network, porous medium and membrane tissue (on-going)
· Reduce the mesh complexity of complex vessel network by hundreds folds
· Achieve 20% speed improvement compared to conventional MMC in preliminary results.
· Implement GPU-accelerated algorithm using OpenCL.
Transcranial Photobiomodulation with Near-Infrared Light from Childhood to Elderliness: Simulation of Dosimetry (submitted)   Nov 2018
· Study photomodulation (for Major Depressive Disorder treatment) dosimetry in dlPFC and vmPFC brain region using Monte Carlo simulation for 1 to 89 years old.
· A general decrease of energy deposition and increase of exposure time is found.
· F3-F4 (EEG 10-20 system) source position targeting dlPFC is 10x more efficient than Fpz position targeting vmPFC.
· The thickness of extra-cerebral tissue (ECT) of the head is primarily responsible for the energy decline of F3-F4 position.
GPU-accelerated adaptive nonlocal means filter for denoising three-dimensional Monte Carlo

photon transport simulations   Jan 2017
- Filter images generated by Monte Carlo method that simulates the photon migration in both homogeneous and heterogeneous media using Adaptive Non-local Means filter.
- Apply Graphic processing unit (GPU) to accelerate the filtering processing. 3 to 4-fold speed-up is achieved compared to the CPU version.
- Filtering can bring 6 dB improvement in SNR which is roughly equivalent to adding 3.5-fold more photons in MC simulation.

Multi-energy approach in Compton and PE reconstruction   May 2015
- Use multi-energy bin to reconstruct the Compton and photoelectric images using weighted least square method.
- Use Cramer-Rao lower bound to compare the signal-to-noise ratio between dual and multiple bins reconstruction methods.
- The results show prominent improvement by using weighted multi-energy approach.

PROJECTS

Pedestrian Detection Based on Deep Learning   May 2014
Detect pedestrian in a given image. By using supervised five-level convolutional neural network (CNN) and implementing the detecting algorithm, pedestrian from the image can be detected.

Animation Vending Machine   July 2013
Complete a vending machine using touchscreen, stepmotor and RFID with Qt4 under Linux embedded environment. Management system and interactive interface are included in the software.

Auto-Navigation Vehicle   May 2013
Use two supersonic sensors, an electrical compass to determine the direction and location of vehicle to maintain the correct route under unexpected disturbance using PID algorithm.

PUBLICATIONS

- Yuan Y, Cassano P, Pias M, et al. Transcranial Photobiomodulation with Near-Infrared Light from Childhood to Elderliness: Simulation of Dosimetry[J]. Neurophotonics (submitted)
- Yuan Y, Yu L, Doğan Z, et al. Graphics processing units-accelerated adaptive nonlocal means filter for denoising three-dimensional Monte Carlo photon transport simulations[J]. Journal of biomedical optics, 2018, 23(12): 121618.
- Cassano P, Tran A P, Katnani H, et al. Selective photobiomodulation for emotion regulation: model-based dosimetry study[J]. Neurophotonics, 2019, 6(1): 015004.

- Yuan Y, Yu L, Fang Q. Denoising in Monte Carlo photon transport simulations using GPU-accelerated adaptive non-local mean filter[C]//Optical Tomography and Spectroscopy. Optical Society of America, 2018: JTh3A. 41.
- Yu L, Yuan Y, Hang Z, et al. Denoising in Monte Carlo Photon Transport Simulation Using Neural Networks[J].
- Yuan Y, Tracey B, Miller E. Robust x-ray based material identification using multi-energy sinogram decomposition[C]//Anomaly Detection and Imaging with X-Rays (ADIX). International Society for Optics and Photonics, 2016, 9847: 98470V.
- Yuan Y. The Application of Multiple Energy Bins in Compton and Photoelectric Reconstructions of X-ray Computed Tomography[D]. Tufts University, 2016.

GRADUATE CURRICULA

Advance Machine Learning, Computer Vision, Graph Theory, Biomedical Optics, Numerical Analysis, Numerical Optimization, Stochastic Processes, Numerical Linear Algebra, Digital Signal Processing, Image Processing, Probability, Algorithm, Computer Engineering

Coursera Certifications: Neural Networks and Deep Learning, Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization, Convolutional Neural Networks

TECHNICAL SKILLS

Language: C++, MATLAB, Cuda, Python, Java, LaTex, PostgreSQL, MongoDB, CPLD
Software: Visual C++, Eclipse, Qt4, Keil, Quartus II, Microsoft Office, TeXstudio

HONORS AND AWARDS

- SPIE Student Member
- Software patent of the PRC (2015SR137375)   July 2015
- Tufts Tuition Scholarship   Aug 2014
- Second Prize in Electronic Design Competition, Southeast University   May 2013
  Designed the Automatic Guided Vehicle (AGV)
- Subject Scholarship for *Microcomputer Systems & Interfaces*   Sept 2012