

VENKAIAH CHOWDARY KAVURI

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SUMMARY OF QUALIFICATIONS

- In-depth understanding of global optimization techniques (Simulated Annealing Algorithm, Genetic Algorithm) and local optimization techniques (Gauss-Newton, Levenberg-Marquardt and Conjugate gradient methods) and their combinations.
- In-depth understanding of both l_1 norm and l_2 norm regularization techniques.
- Familiar with several linear algebra techniques such as Singular Value Decomposition(SVD), LU decomposition and Eigenvalues.
- Background of working with Matlab, Python, SAS and SPSS scripting for performing statistical/predictive analysis.
- Experienced with signal processing tools such as short time Fourier transform (STFT), wavelet transform, noise filtering and parameter estimation.
- Probabilistic classifiers- Naive Bayes, Logistic Regression; Clustering- Hierarchical, k -means.
- Optical device design and testing to sense/measure biomarkers.
- Experimental design and human data collection in clinical environment.

EDUCATION

University of Pennsylvania, Philadelphia, PA

September 2014 - Present

Postdoctoral Researcher in Department of Physics and Astronomy

- Projects (in progress): (1) Optical instrumentation (stroke measurements) for Neural ICU. (2) Wearable optical flow measurement device design for muscle during exercise.
- Projects (completed): Breast cancer image reconstruction.
- Advisor: Professor Arjun Yodh.
- Areas of focus: Instrument Design, Clinical Measurements, Diffuse Optical Tomography, Diffuse Coherence Spectroscopy and Image reconstruction.

University of Texas Arlington, Arlington, TX

August 2010 - August 2014

Doctor of Philosophy in Biomedical Engineering/Medical Imaging

- Dissertation - Development Of Trans-rectal Ultrasound (TRUS) Coupled Diffuse Optical Tomography (DOT) For Prostate Cancer Imaging.
- Advisor: Professor Hanli Liu.
- Areas of focus: Probe Design, Clinical Measurements, Image Reconstruction and Image Processing.

Jawaharlal Nehru Technological University, Hyderabad, India

September 2003 - May 2007

Bachelor of Technology in Biomedical Engineering

- First class with distinction.

PROFESSIONAL EXPERIENCE

University of Pennsylvania, Philadelphia, PA .

October 2014 - Present

Postdoctoral Researcher, Yodh Biomedical Optics Lab, Philadelphia, PA

- Designed a non-invasive cerebral blood flow instrument to be used in neural ICU for predicting recurrent stroke. The instrument will be used to measure blood flow in prefrontal cortex of the brain using single photon counting techniques and diffuse auto-correlation techniques.
- Image processing and reconstruction of breast cancer images using Diffuse Optical Tomography. Explored Gauss-Newton, Levenberg-Marquardt and Conjugate gradient methods to find optimal results for locating cancer locations.
- Supervised and trained new graduate students, undergraduate students and research assistants.

- Developed a technique to detect and image early stages of aggressive prostate cancer by creating, engineering and building Transrectal Ultrasound (TRUS)-compatible Diffuse Optical Tomography (DOT) Probe (using SolidWorks), which increased sensitivity and specificity to detect prostate cancer.
- Originated, designed and built multi-spectral, low-cost and portable DOT instrumentation (using basic electronic circuit design and signal processing) then improved existing reconstruction methods (enhanced depth localization and images) by combining depth compensation algorithm and L1-regularized least squares method.
- Research work resulted in 2 peer-reviewed, 1st-authored journal papers. This produced further external funding for continuous development in detection/diagnosis of prostate cancer.

COMPUTER SKILLS

Matlab	Labview	Python	C	Solidworks	Comsol
MS Office	Ubuntu	ImageJ	L ^A T _E X	SAS	SPSS

PATENTS

- “TRUS-Integrated FD-DOI Multi-modal Imaging System for Prostate Cancer,” US Provisional Patent Application Serial No. 61/985,905, April 2014.

MEMBERSHIPS

- Member, International Professional Society for Optics and Photonics Technology(SPIE).
- Member, Optical Society of America(OSA).
- Member, Institute of Electrical and Electronics Engineers(IEEE).

HONORS

- STEM Full tuition assistantship, University of Texas Arlington.
- Outstanding Student Award - 2014, University of Texas Arlington.

PUBLICATIONS

Articles

- [1] V. C. Kavuri, Z.-J. Lin, F. Tian, and H. Liu, “Sparsity enhanced spatial resolution and depth localization in diffuse optical tomography,” *Biomedical optics express*, vol. 3, no. 5, pp. 943–957, 2012.
- [2] V. C. Kavuri and H. Liu, “Hierarchical clustering method to improve transrectal ultrasound-guided diffuse optical tomography for prostate cancer imaging,” *Academic radiology*, vol. 21, no. 2, pp. 250–262, 2014.
- [3] R. H. Patel, A. S. Wadajkar, N. L. Patel, V. C. Kavuri, K. T. Nguyen, and H. Liu, “Multifunctionality of indocyanine green-loaded biodegradable nanoparticles for enhanced optical imaging and hyperthermia intervention of cancer,” *Journal of biomedical optics*, vol. 17, no. 4, pp. 0460031–04600310, 2012.

Conference Publications

- [4] V. C. Kavuri, P. Kapur, M. Morgan, J. Cadeddu, C. Roehrborn, and H. Liu, “Optical properties of ex-vivo prostate tissues and the design of trans-rectal ultrasound coupled optical probe,” in *Biomedical Optics*, Optical Society of America, 2014, BM3A–28.
- [5] V. C. Kavuri, Z.-J. Lin, and H. Liu, “Comparison of l1 and l2 regularizations in diffuse optical tomography,” in *Biomedical Optics*, Optical Society of America, 2012, BTu3A–22.
- [6] —, “Heterogeneous hierarchical segmentation method for improved prostate cancer imaging in diffuse optical tomography: Simulation study,” in *Biomedical Optics*, Optical Society of America, 2012, BTu3A–37.
- [7] V. C. Kavuri and H. Liu, “Hierarchical clustering method for improved prostate cancer imaging in diffuse optical tomography,” in *SPIE BiOS*, International Society for Optics and Photonics, 2013, 85781K–85781K.

- [8] V. Krishnamurthy, V. Kavuri, F. Tian, and H. Liu, “Detectability of hemodynamic response to thermal pain in pre-frontal cortex using diffuse optical tomography,” in *Biomedical Optics*, Optical Society of America, 2010, BTuD103.
- [9] K. T. Nguyen, R. H. Patel, N. L. Patel, V. C. Kavuri, and H. Liu, “Multifunctionality of indocyanine green-loaded biodegradable nanoparticles for enhanced optical imaging and hyperthermia intervention of cancer,” SPIE, 2012.

PhD Thesis

- [10] V. C. Kavuri, “Development of trans-rectal ultrasound (trus) coupled diffuse optical tomography (dot) for prostate cancer imaging,” 2014.