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Training

- BTech (Hons) Electrical Engg -*Govt Engg College, Trichur* (1982-1987)
- MTech Electrical Engg – *Indian Institute of Technology Madras,* (1990-1992)
- PhD Electrical Engg – *Indian Institute of Technology Madras,* (1995-1999)
- Post Doctoral Fellow – *Purdue University, IN* (1999-2000)
- Post Doctoral Fellow – *Johns Hopkins University, MD* (2000-2002)

Employment

- Engineer Trainee –*Indian Telephone Industries Transmission R&D* (1987-1990)
- Asst, Executive Engineer –*Indian Telephone Industries Transmission R&D* (1992-1995)
- Sr. Project Officer - *Indian Institute of Technology Madras,* (1995-1997)
- Asst. Professor (Electrical Engg.) – *National University of Singapore,* (2002-2004)
- Image Analyst – MRI Unit, *National Society for Epilepsy, Chalfont St. Peter, UK* (2004-2005)
- fMRI Scientist – Wellcome Trust for Neuro-Imaging , *University College London,* (2005-2006)
- Associate Scientist (MR) – *University of California Irvine* (2006-2007)
- Lecturer – *Graduate School of Biomedical Engg, UNSW*, Sydney (2007- Dec 23rd 2010)

Research Projects

- Numerical investigation of electromagnetic interaction in Magnetic Resonance Imaging– Council of Scientific and Industrial Research (2014) Signal processing for rapid and partial echo-planar acquisition in Magnetic Resonance Imaging of Neural Ischemic Stroke–Kerala State Council for Science , Technology and Environment   (2013)
- Signal processing approaches for time-constrained MRI – Department of Science and Technology (2012)
- MEMS Capacitance array Electrodes for intra-operative monitoring of Spreading Depression – *University Faculty Research Grant* (2002-2004).
- Image processing methods for Laser Speckle Contrast Imaging of the Brain– *Intel Research Grant* (2002-2004).
- MEMS Optical Neuroprobe for neurosurgical monitoring –*SERC award* (2004)

Service Project

- Development of a Tele-Radiology Network; Kerala State Planning Board (2016).

US Patents

- Information theoretic measures for neural monitoring of comatose patients in the ICU (Filed from IBT and Johns Hopkins), 2002.
- MEMS Neuroprobe for Functional Imaging of the Brain (Filed from the Institute of Micro Electronics Singapore), 2004.

Book Chapters

JS.Paul, S.Acharya, Functional MRI and EEG-fMRI analysis and applications: Quantitative EEG Analysis Methods and Clinical Applications edited by Shanbao Tong and Nitish V. Thakor, ISBN: 159693204X, Artech House Press, (2009).

JS. Paul, RS. Mathew and MS. Renjith., Theory of Parallel MRI and Cartesian SENSE Reconstruction: Highlight. In Medical Imaging in Clinical Applications (pp. 311-328). Springer International Publishing.(2016).

Book

JS.Paul, GR Subha, Understanding Phase Contrast MR Angiography: A practical approach with MATLAB examples, Springer Books.

JS.Paul, RS. Mathew, Regularized Image Reconstruction in Parallel MRI with MATLAB Examples, CRC press, Taylor & Francis Group, LLC (Under preparation).

Student Theses Supervised

- Laser Speckle Contrast Analysis : Elijah Yew (2004)
- FID signals in Magnetic Resonance Elstography (2008).
- Design Optimization of Acousto-Optic imaging through Turbid medium: Richard Fu (2009)
- Image Reconstruction in Magnetic Resonance Elastography (2010)
- MR Scan-Time Reduction using Echo Prediction (2012)
- Analysis of T_2^* Effects in MRI using a Lorentzian Model for Spin Dephasing : (2012)
- Causal echo model based image reconstruction in sparse MRI (2013).
- Phase correction model for partial Fourier reconstruction of MRI (2013).
- Spatial pre-processing of DTI data for diffusion noise rejection using a modified form of anisotropic filter (2013).
- MR Image reconstructions using an extended neighbourhood filter (2013).
- Region growing connected tree path search algorithms for segmentation of neural lesions and fiber tracking (2013).
- Reconstruction of intensity projected angiograms: Application of multichannel parallel imaging (2014).
- Deblurring of Intensity projected angiograms using Non local reverse diffusion (2014).
- Image enhancement in intensity projected multichannel MRI using spatially adaptive directional anisotropic diffusion (2014).
- High speed Compressed Sensing Reconstruction in parallel MRI using modified GRAPPA (2015).
- Reconstruction of Parallel MRI using modified SENSE method (2015).
- Phase Contrast Magnetic Resonance Angiogram: Flow and directional information (2015).
- A scale space model for Image degradation (2015)
- Regularization approaches to parallel imaging using SVD (2016).
- Filter based approach to MR simulation (2016).

Journal Publications

A Joy, JS. Paul, "Multi-channel Compressed Sensing MR Image Reconstruction using Statistically Optimized Non-Linear Diffusion". Magnetic Resonance in Medicine, (June 2017), DOI:10.1002/mrm.26774.

RS Mathew, JS. Paul. "A Frequency Dependent Regularization for autocalibrating Parallel MRI using the Generalized Discrepancy Principle". IEEE Trans. Computational Imaging. May (2017).

S. Madhusoodhanan, JS. Paul, "A quantitative survey of GRAPPA reconstruction in parallel MRI: impact on noise reduction and aliasing". Concepts in Magnetic Resonance part-A Aug (2016).

AP Krishnan, A Joy JS Paul, "Improved Image reconstruction of low resolution multichannel Phase contrast angiography" J Medical Imaging -014001- 3(1) (2016).

RS Mathew, JS. Paul. Improving Image Quality in low SNR Parallel Acquisition using a Weighted Least Squares GRAPPA reconstruction. J Interv Radiol Imaging., 2:2. (2016)

JS. Paul , UKS.Pillai, A Higher dimensional homodyne filter for phase sensitive partial Fourier reconstruction of MRI, Magnetic Resonance Imaging. 33(9) 1114-1125 (2015)

JS.Paul , JJ.Mathew, C.Kesavadas , MR image enhancement using an extended neighborhood filter, . J. Vis. Commun. Image Representation. 25 :1604–1615 (2014)

JS. Paul, UKS. Pillai, A Model-based Echo Filter for MR Image Restoration with Partial-echo Acquisition, Journal of Medical Imaging and Health Informatics ,4: 576-586 (2014).

JS. Paul, M.Prasad, R.Venkatesan , M.Braun, Magnetic Resonance Scan Time Reduction using Echo Prediction, Int. J. of Imaging Syst. and Technology, 23(1): 1-8 (2013).

JS. Paul, UKS.Pillai , Application of Linear Prediction for Phase and Magnitude Correction in Partially acquired MRI, ISRN Biomedical Imaging, http://dx.doi.org/10.1155/2013/826508 (2013).

A. Varghese, R. Rajan, K. Kannan, JS Paul, Brain slice retrieval from feature-reduced MR images using Moments, Intl. Journal of Comp. Sc & Tech, 3(1): 2012.

A. Varghese, R. Rajan, K. Kannan, JS Paul, Identification of Region of Ineterst using Local Binary pattern with ternary encoding, Intl. Journal of Digital Image Processing, 3(16): (2011).

JS Paul, WC.Fu, S.Dokos, MA. Box, Anisotropic scattering of discrete lattices, Journal of Optical Society of America. A, 27(5): 951-959 (2010).

JS.Paul, WC.Fu, Acousto-optic modulation of point scatterer arrays, Optics Letters, 35(7):925-927 (2010).

JS.Paul, S.Dokos, Implications of Ultrasound Beam Shape on the Modulation of Diffuse light: Analysis using spatio-temporal perturbation of the refractive index, Springer Journal of Optics, 39(3):126-135 (2010).

JS Paul, S.Dokos, P.Duchateau, Eigenfunctions of Acousto-optics, Optics Letters, 34(16): (2009).

JS.Paul, D.Sen, S.Dokos, Acousto-Optic Modulation by Pulsed Optical Excitation: Implications for Imaging in Turbid media, Optics Letters, 35(16):2780-2782 (2010).

F.Kruggel, JS Paul, HJ Gertz, Texture Based Segmentation of Diffuse Lesions of White Matter, Neuroimage 39: 987–996 (2008).

TM.Le, JS.Paul, H.Al-Nashash, AR.Luft, FS.Sheu, SH.Ong, New Insights into image processing of cortical blood flow monitors using Laser Speckle Imaging, IEEE Trans. Medical Imaging, 26(6):833-841 (2007).

L.Lemieux, H.Laufs, D.Carmichael, JS.Paul, MC.Walker, JS Duncan, Noncanonical spike-related BOLD responses in Focal epilepsy, Human Brain Mapping 29:329–345 (2008).

JS.Paul, AR.Luft, E.Yu, FS.Sheu, Imaging the development of an ischemic ore following photochemically induced cortical infarction in rats using Laser speckle contrast Analysis (LASCA), Neuroimage, 29(1):38-45 (2006).

JS. Paul, FS Sheu, AR Luft, Early adaptations in somatosensory cortex after focal ischemic injury to motor cortex, Experimental Brain Research, 168:178-185 (2006).

JS Paul, H. Al-Nashash, AR Luft, TM Le. Statistical mapping of speckle autocorrelation for visualization of Hyperemic responses to Cortical stimulation. Annals of Biomedical engineering, 34(7):1107-1118 (2006.).

H.Laufs, JL.Holt, R.Elfont, M.Krams, JS.Paul, K.Krakow, A.Kleinshmidt, Where the BOLD signal goes when alpha EEG leaves. Neuroimage. 31(4):1408-1418 (2006).

H.Al-Nashash, Y.Yousof, JS Paul, NV.Thakor, EEG Signal Modelling Using Adaptive Markov Process Amplitude, IEEE Trans. Biomed. Engineering, 51(5):744 – 751 (2004).

JS.Paul, CB.Patel, H.Al-Nashash, N.Zhang, W.Ziai, MA.Mirski, DL.Sherman, Prediction of PTZ-Induced Seizures Using Wavelet-Based Residual Entropy of Cortical and Subcortical Field Potentials, IEEE Transactions on Biomedical Engineering, 50(5):640-648 (2002).

S.Tong, A.Bezerianos, JS.Paul, Y.Zhu, NV.Thakor, Independent Component Analysis for separation of EKG artefacts from weak EEG signals, J. of Neuroscience Methods, 108:11-17 (2001).

S.Tong, A.Bezerianos, JS.Paul, Y. Zhu, NV.Thakor, Nonextensive entropy measure of EEG following brain injury from cardiac arrest, Physica A, 305:619-628 (2002).

JS.Paul, MRS.Reddy and VJ.Kumar, A Transform Domain SVD Filter for suppression of Muscle noise Artefacts in Exercise ECGs, IEEE Trans. Biomed. Eng., 47:654-663 (2000).

JS.Paul, MRS.Reddy and VJ.Kumar, QRS Estimator Using Linear Prediction Approach, Signal Processing, 72:15-22 (1999).

JS.Paul, MRS.Reddy and VJ.Kumar, A recursive Algorithm for efficient representation of ECG signals, Electronic Letters, 34:526-528 (1998).

JS.Paul, MRS.Reddy and VJ.Kumar, Cepstral Transformation Technique for Dissociation of Wide QRS Type Arrhythmia Signals Using DCT, Signal Processing, 76:123-131 (1999).

JS.Paul, MRS.Reddy and VJ.Kumar, Data Processing of Stress ECG Using DCT, Computers in Biology and Medicine, 28:639-658 (1998).

JS.Paul, MRS.Reddy and VJ.Kumar, Identification of Premature Ventricular Cycles in Surface Electrograms Using the envelope of DCT, Journal of Applied Signal Processing, 5(4):226-239 (1998).

Conference Papers

UKS.Pillai, C.Kesavadas ,JS.Paul, Partial Fourier Reconstruction Using Subspace Projection, National Conference on Computer Vision, Pattern Recognition, Image Processing and Graphics 2013(accepted).

YJ.Tan, WZ.Liu, YS.Yew, SH.Ong, JS.Paul, Speckle image analysis of cortical blood flow and perfusion using temporally derived contrasts, IEEE International Conference on Image Processing, Singapore, October 2004, pp.3323-3326.

CB.Patel, DL.Sherman, JS.Paul, N.Zhang, MA.Mirski, Residual entropy reveals effects of deep brain stimulation on neural activity in PTZ-induced epilepsy, Engineering in Medicine and Biology Society, 2003. Proceedings of the 25th Annual International Conference of the IEEE, Sept. 2003, pp. 2281 – 2284.

JA.Ramos, JS.Paul, A total least squares approach for data reduction of longterm ECG recordings, Proceedings. 42nd IEEE Conference on Decision and Control, Dec. 1999, pp. 6435 – 6440.

YM.Al-Assaf, H.Al-Nashash, JS.Paul, NV.Thakor, EEG signal segmentation using adaptive Markov process amplitude modelling, -24th Annual Conference and the Annual Fall Meeting of the Biomedical Engineering Society EMBS/BMES Conference, 2002, pp.173 – 174.

H.Al-Nashash, JS.Paul, NV.Thakor, Wavelet entropy method for EEG analysis: application to global brain injury**,** Proc. Neural Engineering, March 2003, pp.348 – 351.

JS.Paul, VJ.Kumar, and MRS.Reddy, An adaptive correlation based data compression based method for ECG. 5th National conference on Biomechanics, IIT, Madras, Feb. 1996, pp: 160-162.

JS.Paul, MRS.Reddy and VJ.Kumar, Model order determination of ECG signals using rational function approximations. Proc. IWSIP '96, Manchester, UK., Nov. 1996, pp.469-474.

JS.Paul, VJ.Kumar, and MRS.Reddy, Signal subspace approach to QRS detection, Proc. INCONBME'96, CIT-Coimbatore, Dec. 1996, pp.I-26 to I-29.

JS.Paul, MRS.Reddy and VJ.Kumar, Elimination of weak interfering components from ECG signals using Linear Prediction Analysis. Proc. of the 17th Southern Biomedical Conference, Minneapolis, USA, Sept. 1997.

JS.Paul, VJ.Kumar, and MRS.Reddy, Detection of PVC's using Autoregressive modelling. Proc. of 19th Intl. Conf. of IEEE-EMBS Chicago, Oct. 1997, pp. 68-71.

JS.Paul, MRS.Reddy and VJ.Kumar, Computer detection of P-waves from Wide QRS type arrhythmia recordings, Proc. of the 25th Annual Computers in cardiology Conference, Cleveland, Sep. 1998, pp.621-624.

JS.Paul, MRS.Reddy and VJ.Kumar, On Eigen Filter based extraction of ST-segment Parameters from Surface Electrograms, Proc. of the 20th Annual IEEE-EMBS Conference, Hong Kong, Nov. 1998.

JS.Paul, S.Tong, Y.Zhu, A.Bezerianos, NV.Thakor, Entropy of Brain Rhythms: Normal Versus Injury EEG, Proc. of the 11th IEEE Signal Proc. Workshop on Statistical methods in signal processing, April, 2001, pp.257 –260.

JS.Paul, S.Tong, DL.Sherman, A.Bezerianos, NV.Thakor, On the application of model based distance metrics of signals for detection of brain injury, Proc. of the 11th IEEE Signal Proc. Workshop on Statistical methods in signal processing, April, 2001, pp. 251 -264

JS.Paul, DF.Hanley and NV.Thakor, An Iterative Transform domain filter for detection of injury using coherence estimation in Evoked potential recorded during neurosurgery of the spine, Proc. IEEE-NSIP, Baltimore MD, July, 2001.

JS.Paul, DF.Hanley and NV.Thakor, Relating the banded entropy structure in Cortical Field potentials to the rhythmic burst firing of thalamocortical neurons, Proc. 31st SFN Annual meeting, San Diego, Nov. 2001.

MM.Buitrago, AR.Luft, J.Hagan, M.Ding, JS.Paul, NV.Thakor, DF.Hanley, ME.Blue, Effects of somatosensory stimulation on neuronal damage after cardiac arrest, Society for Neuroscience Abstracts, May 2001, pp.558-560.

H.Al-Nashash, JS.Paul, W.Ziai, DF.Hanley, and NV.Thakor, Wavelet entropy for sub-band segmentation of EEG during injury and recovery, Proc. IFMBE-EMBEC'02, Vienna, 2002, pp. 430-431.

H.Al-Nashash, YM.Al-Assaf, JS.Paul, NV.Thakor, Adaptive EEG Signals Modeling, Proc. IFMBE-EMBEC'02, Vienna, 2002, pp.438-439.

CB.Patel, JS.Paul, H.Al-Nashash, N.Zhang, W.Ziai, MA.Mirski, DL.Sherman, A Wavelet Entropy Approach for Predicting PTZ-Induced Seizures, Biomedical Engineering: Recent Developments, 21st Southern Biomedical Engineering Conference, Washington, D.C., USA, 9/28/02-9/29/02.

JS.Paul, CB.Patel, VK.Asari, and DL.Sherman, Unbiased Frequency Estimation of Narrowband Signals Using Procrustes Type Subspace Rotation, Proc. of the 27th International Conference of the IEEE Acoustics, Speech, and Signal Processing (ICASSP), Orlando, Florida, USA, 5/13/02-5/17/02.

DL.Sherman, CB.Patel, JS.Paul, W.Ziai, N.Zhang, and MA.Mirski, Deep Brain Electrical Stimulation and Epilepsy: New Results from the Lab Bench, Johns Hopkins University Whitaker Biomedical Engineering Institute Inaugural Reunion Poster Session, Baltimore, Maryland, USA, 5/2/03.

EYY.Seng, JS.Paul, Statistical measures based on Laser Speckle Contrast Analysis (LASCA) for quantification of vascular flow and perfusion changes during cortical stimulation, Proc. IASTED BioMED, Innsbruck, Austria, Feb. 2004.

Refereed International Conference Proceedings

JS. Paul, H. Laufs, A Salek-Haddadi, L.Lemieux, Institute of Neurology, UCL, UK 525 W-AM Non-canonical BOLD responses in focal epilepsy., Presented at the Human Brain Mapping Meet 2006.

K.Hamandi, H.Laufs, D.Carmichael, U.Noeth, JS.Paul, J.Duncan, and L.Lemieux., BOLD and Perfusion FMRI of Generalised Spike Wave Activity at 1.5T and 3T, AES Annual Meeting 2006, Poster 1.121.

YJ.Tan, WZ Liu, YS.Yew, SH Ong, JS Paul, Speckle image analysis of cortical blood flow and perfusion using temporally derived contrasts, IEEE International Conference on Image processing, 24-27 October 2004, Singapore, pp.3323-3326.

Invited Talks

- Indiana University Purdue University, Indianapolis (1999) : Signal Processing techniques for arrhythmia analysis
- Medtronic, St.Paul/Minneapolis (2000) : Tools for Late Potential analysis from surface recordings
- National University of Singapore (2002) : Current Trends in EEG Analysis and Brain Monitoring
- Bioinformatics Institute, Singapore (2003) : Setting new insights: Functional imaging using optical methods
- CMC Vellore (2004) : Clinical applications of fMRI
- GIST, Gwanju, Korea (2005) : Image Reconstruction techniques for fMRI
- University of Newcastle, Australia (2005) : System Identification problems in functional imaging of the brain
- University of Manitoba, Canada (2006) : Current Trends in Signal Processing for Human Brain Mapping and multi-modality functional imaging
- Cochin University of Science and Technology (2007) : Laser Speckle Imaging and Analysis for functional and anatomical imaging of the brain
- University of New South Wales (2007) : Key Issues in Acousto-Optic Imaging Systems
- IIIT Bangalore (2010) : Role of Information Technology in emerging techniques of electro-optical imaging systems

Awards and Honours

- GATE Scholarship (Score 99.98 Percentile) 1990
- University Research Council award for S$50000 Singapore (2002)
- SERC award for joint research project on MEMS optics neuroprobe with Institute of Microelectronics, Singapore (2004)

Professional service

- Topical Editor, Springer Briefs Subseries on Imaging Systems
- Reviewer for Journal of Electromagnetic Waves and Applications
- Reviewer for Optical Society of America
- Reviewer for Journal of Biomedical Signal Processing and Control

Teaching

COURSES TAUGHT (National University of Singapore):

Signal Analysis (Tutoring)
Engineering Principles in Medicine

COURSES TAUGHT (UNSW):
BIOM9611(Medical Imaging)
Graduate course offered to Students of the Bioengineering program

BIOM9621(Biological Signal Analysis)
Graduate course offered to Students of the Bioengineering program
Course Contents : Mathematical and programming aspects of Signal analysis, Taught with
Examples using MATLAB / LABVIEW

BIOM96401(Medical Instrumentation)
Graduate course offered to Students of the Bioengineering program
Course Contents : Analog circuits for instrumentation with Laboratory sessions

BIOM9650(Biosensors)
Graduate course offered to Students of the Bioengineering program
Course Contents : Sensors and Data acquisition with Laboratory sessions

- *Teaching Feedback reports are attached as a separate file*.
- **Software used**: LABVIEW, COMSOL, MATLAB