



School of Biomedical Engineering

INDIAN INSTITUTE OF TECHNOLOGY (BANARAS HINDU UNIVERSITY) VARANASI

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Dr. Neeraj Sharma

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Education:

Ph. D Biomedical Engineering (Instrumentation) (2008), Institute of Technology, Banaras Hindu University, Varanasi, India
Title of Thesis: Segmentation of CT and MR Images of Brain and Liver Using Neuro-Fuzzy Techniques.

M. Tech. Instrumentation (1998)
Regional Engineering College Kurukshetra*, India

B. Tech. Electrical Engineering (1993)
Regional Engineering College Kurukshetra*, India
Presently National Institute of Technology, Kurukshetra.

Field of Work:

- ★ Presently working on auto segmentation and contouring of medical images in collaboration with Department of radiotherapy and radiation medicine, actively involved in teaching of UG and PG courses of Biomedical engineering and have guided several Projects at M. Tech. level in the area of and Biomedical signal and image processing and Instrumentation.

Membership of professional Bodies:

- ★ Life member of Association of Medical Physicist of India.
- ★ Life member of Indian Society of Technical Education

Consultancy work:

- ★ Completed consultancy project in 2008 awarded for Review of quality adherence to technical specification and health facility building and medical equipment of Uttar Pradesh and Uttarakhand health system development review done for world bank jointly with Faith Healthcare Private Limited, Delhi.
- ★ Completed consultancy project in Sept 2011 regarding Review of quality/adherence to technical specification and health facility building & medical equipment of Rajasthan Health System Development Project, review done for World Bank jointly with Faith Healthcare Private Limited, Delhi.

Patent: Non invasive blood glucose meter based on modulated ultrasound & optical technique.

Selected Publications:

Papers published in journals:

- ★ Md.K.Chowdhury, A.Srivastava, N.Sharma, S.Sharma, Challenges & Countermeasures in Optical Noninvasive Glucose Detection, International Journal of Innovative Research in Science, Engineering and Technology (IJARES), Vol.2, issue 1,Jan 2013,pp.324-329. (Impact factor 1.67).
- ★ A.Srivastava, Md.K.Chowdhury, S.Sharma, N.Sharma, Blood Glucose Monitoring Using Non Invasive Optical Method: Design Limitations and Challenges, International Journal of Advanced Research in Electrical, Electronic Instrumentation Engineering (IJAREEIE), Vol. 2, issue 1, Jan 2013, pp.615-620. (Impact factor 1.686).
- ★ Md. K. Chowdhury, A. Srivastava, N. Sharma, & S.Sharma, The influence of blood glucose level upon the transport of diabetic and non-diabetic subjects. *International Journal of Biomedical and Advance Research*, 4(5) (2013), pp.306-316. (Impact factor 5.07).
- ★ A. Srivastava, Md. K. Chowdhury, S. Sharma, N. Sharma, Optical Clearance Effect Determination of Glucose by near Infrared Spectroscopy: An Experimental Study using An Intralipid Based Tissue Phantom, International Journal of Advances in Engineering Technology (IJAEET), Volume 6 Issue 3, pp. 1097-1108, July 2013. (Impact factor 0.86).

- ★ Subodh Srivastava, Neeraj Sharma, S.K. Singh, et al., Design, analysis and comparative study of a CAD tool for breast detection from mammograms using modified total variation filter, fuzzy C-means segmentation, hybrid features, G feature selection, and SVM classifier, *Pattern Recognition Letters*, Publisher : Elsevier.(communicated)
- ★ Subodh Srivastava, Neeraj Sharma, S.K. Singh, et al., Design, analysis, and classifier evaluation for an automated breast cancer detection from digital mammograms *International Journal of Biomedical Engineering Technology* Publisher: Inderscience
- ★ S. Srivastava, Rajeev Srivastava, N. Sharma ,Shiru Sharma., [A nonlinear complex diffusion based filter adapted to R speckle noise for de-speckling ultrasound images](#), *International Journal of Biomedical Engineering and Technology* Inderscience Publications, UK., Vol. 10, No. 2, pp.101117, 2012
- ★ S. Srivastava, Rajeev Srivastava, N. Sharma Shiru Sharma., [A Fourth-order PDE based Nonlinear Filter for Speckle Reduct Optical Coherence Tomography \(OCT\) Images](#), *International Journal of Biomedical Engineering and Technology* Inderscience Publications, UK., Vol. 10, No. 1, pp.5569,
- ★ Sanjay Saxena, Neeraj Sharma, Shiru Sharma, Image processing tasks using parallel computing in multicore architecture application in medical imaging in international journal of advance research in computer and communication engineering(IJARCCCE), Vol. 2, issue 4, April 2013.
- ★ Sanjay Saxena, Neeraj Sharma and Shiru Sharma , Region wise processing of an image using multithreading in multi environment & its application in medical imaging, in *International journal of Computer Engineering & Technology (IJCET)*.Volume:4,Issue:4,Pages:20-30, 2013.
- ★ Neeraj Sharma, and Shiru Sharma, Bio-inspired optimization techniques and their application to biomedical engineering *journal of industrial and applied mathematics*, Vol. 3 No. 1, pp 114-127, (2012).
- ★ Mousumi Dhara , K.K.Shukla, and Neeraj Sharma, A critical Comparison of Graph Clustering Algorithms Using the Percolation Technique, *International Journal of Engineering Research and Development*, Volume 3, Issue 7 (September) pp 15-19.
- ★ Shiru Sharma, Ranjana Patnaik, Neeraj Sharma, and Tiwari, J.P. Simulated annealing based PSO with adaptive jump strategy modelling of dynamic cerebral pressure auto regulation, *International Journal of Bio-Inspired Computation*, Vol. 3 No. 4, 237, (2011).[Cited by 9]
- ★ Neeraj Sharma and Lalit M Aggarwal, Automated medical image segmentation techniques, *Journal of Medical Physics*, No. 1, pp 3-14, (2010).
(Impact factor 0.754) [Cited by 61]
- ★ Shiru Sharma, Ranjana Patnaik, Sharma, Neeraj, and Tiwari, J.P. Modelling of dynamic cerebral pressure autoregulation using sequential genetic algorithm, *Int. J. Mathematical Modelling and Numerical Optimization* Vol.1,No.4, pp 299-315, (2010).
- ★ Neeraj Sharma, Amit K Ray, Shiru Sharma, KK Shukla, Satyajit Pradhan, Lalit M Aggarwal, Segmentation of medical images using Simulated Annealing Based Fuzzy C Means algorithm, *International Journal of Biomedical Engineering and Technology*, Vol. 2, No. 3, pp 260-278, (2009).[Cited by 9]
- ★ Neeraj Sharma, Amit K Ray, Shiru Sharma, KK Shukla, Satyajit Pradhan, Lalit M Aggarwal, Segmentation and classification of medical images using texture-primitive features: Application of BAM-type artificial neural network *Journal of Medical Physics*, Vol. 33, No. 3, pp 119-126, (2008). (Impact factor 0.754) [Cited by 28]

Papers published in conferences proceedings:

- ★ Neeraj Sharma, Shiru Sharma, and Uppala Vikram, Estimation of Convolution Masks for Image restoration using Genetic Algorithm, presented at *National conference on mathematical modelling and computer simulation, or by Deptt of Applied Mathematics*, Institute of Technology, BHU Varanasi, March 2011.
- ★ Shiru Sharma, Neeraj Sharma and Ranjana Patnaik, Comparison of Genetic algorithm and Particle swarm optimization technique for modelling of physiological system, presented at *National conference on mathematical modelling and computer simulation, organized by Deptt of Applied Mathematics*, Institute of Technology, BHU Varanasi, March 2011.
- ★ Sudip Paul, Neeraj Sharma, P Bhattacharya, A. K. Pandey, Shiru Sharma and Ranjana Patnaik, Mathematical modelling of focal cerebral ischemia using EEG data, in proceedings of *National conference on mathematical modelling and computer simulation, organized by Deptt of Applied Mathematics*, Institute of Technology, BHU Varanasi, March 2011.
- ★ Shiru Sharma and Neeraj Sharma, Frequency Response Analysis of Optimized ARX Model of Physiological System Case Study of Dynamic Cerebral Autoregulation Mechanism), presented at *International conference on Bio Engineering and Assistive Technologies, organized by National Institute of Technology Jalandhar*, Dec 2010.
- ★ *Attended meeting on 'advanced detectors in physics and medical diagnosis' at Variable Energy Cyclotron Kolkata* and presented talk on Segmentation of Medical images using artificial intelligence techniques and experiences, March-2010.
- ★ Gajendra K. Mourya, Tanmoy Mondal, H.K. Sardana , Neeraj Sharma, Semi automatic landmark localizer for cephalometric images, *National conference on computational instrumentation (NCCI-2010)*, organized by IIT Chandigarh, India. 19-20th March 2010.
- ★ Aggarwal, L.M., Mandal, A., Sharma, N., Pradhan, S., Advances in medical imaging: Boon for radiation oncology, *Proceedings of conference on Updates in Medical Physics organized by Medical physics unit, IRCH and Department of Radio diagnosis, All India Institute of Medical Sciences, New Delhi*, pp13-16, (2007).
- ★ Jaiswal S. Ray A.K., Sharma N., and Sharma S., Hazards of Electromagnetic Waves on Environment and presented at *NCCCE organized by Banaras Hindu University Varanasi* (2007).
- ★ Akash Tripathi, Neeraj Sharma, Ray A.K., and Shiru Sharma, Scientific validation and Development of Instrumentation System of Nadi Pariksha published in proceedings of *Souvenir of Scientific Validation and Technical Evaluation of Ancient Medical System* (2007).
- ★ Neeraj Sharma, Ray A.K., Computer aided segmentation of medical images based on hybridized approach of edge detection and region based techniques, *Proc. of Int. Conf. on Mathematical Biology, Mathematical Biology recent trends* ANAMAYA publishers pp. 150-155(2006).

- ★ Neeraj Sharma, Ray A. K., Pradhan, S., Sharma, S., Aggarwal, L.M., Indigenous software for computer aided analysis of medical images using artificial neural network, *Proceedings of conference of Association of Medical Physicists* (pp 125-126, (2006).
- ★ Mahendra S.N., Ray A.K., Sharma N., and Sharma S., Invited Talk on Integration of god-made sensors and man-made sensors at *National Conference on Sensors organized by Thapar Institute of Engineering and Technology (2005)*.
- ★ Sharma N., Microcontroller Based Stepper Motor control for micro stepping mode paper presented at *4 Seminars on Information and Communication Technology. Organized by the Institute of Engineering (India), IIT State center (2002)*.
- ★ Sharma N and Chauhan R., Automated Analysis of ECG using Digital Signal Processing, paper presented at *Seminar Organized by ISTE Chapter Guru Nanak Engineering College Ludhiana, India (2002)*.

Area of Specializations:

Bio-Instrumentation,
Biomedical Image Processing
Artificial Intelligence

Programming Languages Known:

MATLAB
C, C++

Trainings:

- ★ Refresher Course of 3 weeks duration on Bio-Sciences done from Academic Staff College, Himanchal Pradesh University, Shimla
- ★ Refresher Course of 3 weeks duration on Information Technology, done from Academic Staff College, Banaras Hindu University, Varanasi.
- ★ 2-weeks winter school on statistical estimation and modeling, organized by DST center for Interdisciplinary Mathematical Sciences, Banaras Hindu University Varanasi. Feb 2011.
- ★ Refresher Course of 3 weeks duration on Environment, done from Academic Staff College, Banaras Hindu University Varanasi.
- ★ Orientation Course, done from Academic Staff College, Kurukshetra University, Kurukshetra.
- ★ Certificate Course on microcontroller application 3-weeks duration from CEDTI Mohali. May 1997.
- ★ Certificate Course in Biomedical Instrumentation of 1-weeks duration from CEDTI Mohali. Nov. 1999.
- ★ 2-weeks Course on Advances in Medical Instrumentation from QIP Centre University of Roorkee, Roorkee. July

List of Projects guided at PG level:

- ★ Dual chamber pacemaker system analyzer cum external pacemaker, (2004), submitted by Sanju Nirkhe. *External supervisor: Rajat Shakti Kannago, (Chief technical coordinator) Shree pacetronix Ltd. Indore.*
- ★ Design of a PC based ECG machine with software support, (2004), submitted by Ritesh Rastogi. *Supervisor: Prof. A. Co-supervisor: Dr. Neeraj Sharma*
- ★ Medical image segmentation by using texture analysis, (2006), submitted by M.V. Raghava Reddy.
- ★ Automatic identification of region of interest, segmentation and classification of Liver disease, (2007), submitted by Kumar Bansal.
- ★ Electronic stethoscope and wireless transmission of Acoustic signals, (2007), submitted by Virendra Mohan Rao.
- ★ Fast and automated segmentation of medical images based on sum and difference histogram features using FCM algorithm (2008), submitted by Himanshu Patel.
- ★ Optimization of histogram based segmentation using particle swarm optimization, (2009), submitted by Pate Pravinchandra.
- ★ Automatic landmark localization on 2D cephalometric images, (2010), submitted by Gajendra Kumar Mourya. *Supervisor: Dr. H. K. Sardana, Scientist G CSIO Chandigarh.*
- ★ Automated diagnosis of diabetic retinopathy, (2010), submitted by Naveen Kumar. *Co-supervisor: Prof. (Dr.) Shrikanth of Ophthalmology Institute of Medical Sciences BHU.*
- ★ Motion sensing & object tracking using wavelets, (2010), submitted by Madhukar Patil.
- ★ A Novel algorithm for classification and removal of Rician noise in MR images, (2011) submitted by Sumant Mani Tripathi
- ★ A Novel hybrid filter for speckle noise removal in Ultra sound images, (2011) submitted by Dheeraj kumar.
- ★ Mutual information based image registration of C.T. and P.E.T. images, (2011) submitted by Sanjay Saxena.
- ★ A method for volume reconstruction by inverse interpolation and automated brain landmark constellation direction submitted by Tanmay Nath.
- ★ Estimation of convolution masks for image restoration using genetic algorithm, (2011) submitted by Uppala Vikram supervisor
- ★ A parametric model measuring time-varying respiratory mechanics, (2012) submitted by Ankit Kajaria, *Co-supervisor*
- ★ Mathematical Analysis of Fast ICA and its application in TMS EEG data analysis, (2012) submitted by Sreedhar *Co-supervisor: Professor Jukka Sarvas, Aalto University School of Sciences.*
- ★ Non Invasive glucose-meter using radio wave sensor, (2012), submitted by Mohammad Ishahaq.
- ★ 3D image reconstruction from 2D MRI images using level set method (2012), submitted by Yogesh Kumar Shivhare.

List of ongoing Ph. D. thesis:

- ★ **Name:** Mausmi Dhara (Ph. D. awarded)

Supervisor Name: Prof. KK Shukala.

Co-Supervisor Name: Dr. Neeraj Sharma.

Title of Thesis: New Approaches to Graph Clustering and Overlapping Community Detection with Applications"

★ **Name:** Md Koushik Chowdhury (Phd Scholar)

Supervisor Name: Dr. Neeraj Sharma.

Cosupervisor Name: Dr. Shiru Sharma.

Research Area: Development Of Optical Technique Based Noninvasive Blood Glucometer.

★ **Name:** Subodh Srivastava (Phd Scholar)

Supervisor Name: Dr. Neeraj Sharma.

Cosupervisor Name: Dr. S.K. Singh

Research Area: Design And Implementation Of A Computer Aided Diagnostic (Cad) Tool For Early Breast Cancer Detection In Digital Mammography Using Medical Image Processing Techniques.

★ **Name:** Ankit Kajaria (Phd Scholar)

Supervisor Name: Dr. Neeraj Sharma.

Research Area: Segmentation Of Medical Images And Its Application In The Treatment Plan.

★ **Name:** Jitender Singh Parihar

Supervisor Name: Dr. Neeraj Sharma

Research Area:

Other Relevant Information:

- ★ Reviewer of the journal Medical & Biological Engineering & Computing
- ★ Convener DPGC.
- ★ *Acted as Warden/Admin Warden of Limbdi Hostel from 2004-2008 and won the 1st, 3rd, 2nd and Vice-Chancellor each year respectively.*
- ★ Worked as Observer and member advance team in Pre Medical Test for year 2007, 2008 and 2010 respectively centre.

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