Rajesh Kumar Tripathy

Department of Electrical and Electronics Engineering
Birla Institute of Technology and Science (BITS) Pilani, Hyderabad, Telegana, India
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EDUCATION

Ph.D. Machine Learning for Biomedical Signal Processing (EEE), Indian Institute of Technology (IIT) Guwahati, India, 2013-2017 (8.25/10 in course work)

M.Tech. Biomedical Engineering, National Institute of Technology (NIT) Rourkela, India, 2011-2013 (CGPA-8.67/10)

B.Tech. Electronics and Telecommunication Engineering, Biju Pattnaik University of Technology (BPUT), Odisha, India, 2005-2009 (CGPA-8.77/10)

ACADEMIC APPOINTMENTS

July, 2018–Till date Birla Institute of Technology and Science (BITS) Pilani, Hyderabad
Assistant Professor, Department of Electrical and Electronics Engineering

March, 2017–June, 2018
Siksha O Anusandhan Deemed to be University
Assistant Professor, Department of Computer Science and Engineering, Faculty of Engineering and Technology (FET), ITER

RESEARCH AREAS

Machine Learning and Deep Learning for Healthcare

Data Science and Engineering

Time-Frequency analysis and modal decomposition

Graph Signal Processing and Vertex-Frequency Analysis

Neural Signal Processing and Cognitive Neuroscience

Cardiovascular Signal processing and Health Informatics

THESIS/ PROJECT SUPERVISION

PhD: Pranjali Gajbhiye, Thesis Title: Multiscale Hybrid approaches for the analysis of Electroencephalogram Signals (as Sole supervisor, Status: In progress, Paper Status: Three papers published in IEEE Sensors Journal and One published in IEEE TIM).

PhD: Samit Kumar Ghosh, Thesis Title: Time-Frequency based methods for the analysis and classification of PCG signals (as Co-supervisor, Status: In progress, Paper Status: Four papers published (1-CBM, Elsevier, 2-IEEE Sensors letters, 1-BRI, Hindawi).

M-Tech: Ashish Padhi, Project Title: Compressive sensing driven ECG Telementry system for Automated Patient Monitoring, (Status- In progress).

M-Tech: Yakkati Rajesh Reddy, Project Title: Automated Modulation Classification from Radio signals using Multiscale convolutional Neural Network, (Status- In progress).

M-Tech: Sourav Panigrahi, Thesis Title: Estimating Loss of Diagnostic Information During ECG Transmission for Tele-Healthcare Monitoring Applications. (Status-Completed on 12/05/2018).

B-Tech: CH.S.S.S Viswabhargav, Project Title: Detection of Sleep Apnea using Sparse Residual Entropy features with Various Dictonaries extracted from EDR and HRV Signals. (Status-Completed on 15/12/2018, Paper Published in Elsevier).

B-Tech: Siddharth T., Project Title: Classification of Focal and Non-Focal EEG Signals using Autoencoder based Network. (Status-Completed on 15/05/2019, Paper status: Published in IEEE Sensors Journal.

B-Tech: Srirangan M., Project Title: Time-Frequency domain CNN for the Classification of Focal and Non-Focal EEG Signals. (Status-Completed on 15/05/2019, Paper status: Published in IEEE Sensors Journal.

B-Tech: Sahil Jain, Project Title: Development of Multivariate Sliding mode singular spectrum analysis for the decomposition of multisensor time series. (Status-Completed on 15/11/2019, Paper status: Published in IEEE Sensors letters).

B-Tech: Rohan Panda, Project Title: Cross-term elimination in WVD based Time-Frequency representation using Signal-driven methods. (Status-Completed on 15/11/2019, Paper status: Published in CSSP, Springer).

B-Tech: Piyush Jain, Project Title: A two stage deep CNN for the classification of low-risk and high-risk hypertension types from multi-lead ECG signals. (Status-Completed on 15/06/2020, Paper status: Published in IMU, Elsevier).

B-Tech: Daksh Maheswari, Project Title: Deep CNN for the classification of emotions from multi-channel EEG signals. (Status-Completed on 15/06/2020, Paper status: received major revision at CBM, Elsevier)

B-Tech: Tejas Radhakrishnan, Project Title: Time-Frequency domain Deep CNN for the detection of atrial fibrillation using single channel ECG signals. (Status-Completed on 15/12/2020, Paper status: paper to be submitted in IEEE TIM)

B-Tech: Abhishek Varsheny, Project Title: Classification of Mental arithmetic based cognitive workload task from EEG signals using recurrent neural network. (Status-Completed on 15/12/2020, Paper status: under review at MDPI Electronics)

PUBLICATIONS

Articles in Peer-Reviewed Journals (Selected Journal papers)

2021 Samit kumar Ghosh, Asirbad ray, **RK Tripathy**, RN Ponnalagu "A Transform domain Approach for the Compression of Fetal Phonocardiogram Signal", **IEEE Sensors Letters**, 2021.

2021 Pranjali Gajbhiye, Nopparada Mingchinda, Wei Chen, Subhas Chandra Mukhopadhyay, Theerawit Wilaiprasitporn, **RK Tripathy** "Wavelet Domain Optimized Savitzky-Golay Filter for the Removal of Motion Artifacts from EEG Recordings", **IEEE Transactions on Instrumentation and Measurement**, 2021.

2021 Abhijeet Bhattacharyya, **RK Tripathy**, L. Garg, RB Pachori, "A novel multivariate-multiscale approach for computing EEG spectral and temporal complexity for human emotion recognition", **IEEE Sensors Journal**, 2021.

2021 Rohan Panda, Sahil Jain, **RK Tripathy***, RR Sharma, RB Pachori, "Sliding Mode Singular Spectrum Analysis for the Elimination of Cross-terms in Wigner-Ville Distribution", **Circuits, Systems Signal Processing, Springer**, 2021.

2020 **RK Tripathy***, SK Ghosh, Pranjali Gajbhiye, UR Acharya, "Development of automated sleep stages classification system using multivariate projection-based fixed boundary empirical wavelet transform and entropy features extracted from multichannel EEG signals", **Entropy, MDPI Journal**, 2020.

2020 Samit Kumar Ghosh, RN Ponnalagu, RK Tripathy*, UR Acharya, "Deep Layer Kernel Sparse Representation Network for the Detection of Heart valve Ailments from the Time-Frequency Representation of PCG Recordings", Biomed Research International, Hindawi, 2020.

2020 Piyush Jain, Pranjali Gajbhiye, RK Tripathy*, UR Acharya, "A two-stage CNN Architecture for the classification of Low-risk and High-risk hypertension classes using Multichannel ECG Signals", Informatics in Medicine Unlocked, Elsevier, 2020.

2020 Rohan Panda, Sahil Jain, **RK Tripathy***, UR Acharya, "Detection of Shockable Ventricular Cardiac Arrhythmias from ECG Signals using FFREWT Filter-bank and Deep Convolutional Neural Network", **Computers in Medicine and Biology, Elsevier**, 2020.

2020 **RK Tripathy***, Pranjali Gajbhiye, UR Acharya, "Automated Sleep Apnea Detection from Cardio-Pulmonary Signal using Bivariate Fast and Adaptive EMD Coupled with Cross Time-Frequency Analysis", **Computers in Medicine and Biology, Elsevier**, Vol. 120, May 2020, 103769 , 2020.

2020 SK Ghosh, **RK Tripathy***, MRA Paternina, Juan J Arrieta, A. Z. Mendez, GR Naik, "Detection of Atrial Fibrillation from Single Lead ECG Signal using Multirate Cosine Filter bank and Deep Neural Network", **Journal of Medical Systems, Springer**, Vol. 44 (144) 2020.

2020 Samit Kumar Ghosh, RN Ponnalagu, RK Tripathy, UR Acharya, "Automated Detection of Heart Valve Diseases using Chirplet Transform and Multiclass Composite Classifier with PCG Signals ", **Computers in Medicine and Biology, Elsevier**, 2020.

2020 Sahil Jain, Rohan Panda, **RK Tripathy***, "Multivariate Sliding Mode Singular Spectrum Analysis for the Decomposition of Multisensor Time series ", **IEEE Sensors Letters**, Vol. 4 (6), pp. 1-4, 2020.

2020 Himali Singh, **RK Tripathy**, RB Pachori, "Detection of sleep apnea from heart beat interval and ECG derived respiration signals using sliding mode singular spectrum analysis", **Digital Signal Processing, Elsevier**, 2020.

2020 T Siddharth, Pranjali Gajbhiye, **RK Tripathy***, RB Pachori, "EEG based Detection of Focal Seizure Area using FBSE-EWT rhythm and SAE-SVM Network", **IEEE Sensors Journal**, 2020.

2020 J. A. de la O Serna, MRA Paternina, A. Z. mendez, **RK Tripathy***, RB Pachori, "EEG-Rhythm Specific Taylor-Fourier filter bank Implemented with O-splines for the Detection of Epilepsy using EEG Signals", **IEEE Sensors Journal**, 2020.

2020 Pranjali Gajbhiye, **RK Tripathy***, RB Pachori, "Elimination of Ocular Artifacts from single channel EEG Signals using FBSE-EWT based rhythms", **IEEE Sensors Journal**, 2020.

2020 M. Srirangan, **RK Tripathy***, RB Pachori, "Time-Frequency Domain Deep Convolutional Neural Network for the Classification of Focal and Non-Focal EEG Signals, **IEEE Sensors Journal**, 2020.

2020 Pavan B, V. Jeffry Louis, A. Subramaniam, RK Tripathy, S. Banerjee and S. Kundu, "Implementation of Fast ICA Using Memristor Crossbar Arrays for Blind Image Source Separations", **IET Circuits, Devices Systems**, 2020.

2019 Viswabhargav Ch.S.S.S, **RK Tripathy***, U R Acharya, "Automated Detection of Sleep Apnea using Sparse Residual Entropy Features with Various Dictionaries extracted From Heart rate and EDR signals", **Computers in Biology and Medicine, Elsevier**, Vol. 108, pp: 20-30, 2019.

2019 **RK Tripathy***, Mario R. A. Paternina, Juan G. Arrieta, Alejandro Zamora-M endez, and Ganesh R. Naik, "Automated Detection of Congestive Heart Failure from Electrocardiogram Signal using Stockwell Transform and Hybrid Classification Scheme ", **Computer Methods and Programs in Biomedicine , Elsevier**, Vol. 173, pp: 53-65, 2019.

2019 T Siddharth, **RK Tripathy***, RB Pachori, "Discrimination of Focal and Non-focal Seizures from EEG Signals using Sliding Mode Singular Spectrum Analysis ", **IEEE Sensors Journal**, Vol. 19 (24), pp: 12286 - 12296, 2019.

2019 **RK Tripathy***, Abhijeet Bhatacharyya, RB Pachori, "Localization of Myocardial Infarction from Multi-Lead ECG Signals using Multiscale Analysis and Convolutional Neural Network", **IEEE Sensors Journal**, Vol. 19 (23), pp: 11437 - 11448 , 2019.

2019 Pranjali Gajbhiye, **RK Tripathy***, Abhijeet Bhatacharyya, RB Pachori, "Novel Approaches for the Removal of Motion Artifact from EEG recordings", **IEEE Sensors Journal**, Vol. 19 (22), pp: 10600 - 10608 , 2019.

2019 **RK Tripathy***, Abhijeet Bhattacharyya, RB Pachori, "A Novel Approach for Detection of Myocardial Infarction from ECG Signals of Multiple Electrodes", **IEEE Sensors Journal**, Vol. 19 (12), pp: 4509 - 4517, 2019.

2019 MRA Paternina, RK Tripathy, AZ Mendez, D Dotta, "Identification of Electromechnical Modes using Variational Mode Decomposition", Electric Power System Research (EPSR), Elsevier, 2019.

2019 HP Tripathy, Priyabrata Pattanaik, DK Mishra, SK Kamilla, RK Tripathy, "A Model-based Approach to Validate the Aluminium Nitride Material based Ultrasonic MEMS Transceiver for Temperature Sensing", IET Micro and Nano Letters, Vol. 14 (3), pp. 280 – 285, 2019.

2019 Samit Kumar Ghosh, **RK Tripathy***, R N Ponnalagu, RB Pachori, "Automated Detection of Heart Valve Disorders from PCG Signal using Time-Frequency Magnitude and Phase Features ", IEEE Sensors Letters, Vol.

3 (12), Dec, 2019.

2018 R. K. Tripathy, A. Z. mendez, J. A. de la O Serna, MRA Paternina, J. G. Arrieta, G. R. Naik, "Detection of Life Threatening Ventricular Arrhythmia using Digital Taylor Fourier Transform", Frontiers in Physiology, 2018.

2018 Daniel Guillen, Mario. R. Arrieta Paternina, Jose Ortiz-Bejar, R. K. Tripathy, Alejandro Zamora, Ruben Tapia-Olvera, Eric S. Tellez, "Fault detection and classification in transmission lines based on a power spectral density index", IET Generation, Transmission and Distribution, 2018 .

2018 **RK Tripathy***, U. R. Acharya, "Use of features from RR-time series and EEG signals for Automated Classification of Sleep Stages in Deep Neural Network Framework", Biocybernetics and Biomedical Engineering, Elsevier, 2018.

2018 H. P. Tripathy, D. Bej, P. Pattanaik, D.P Mishra, S. K. Kamilla, R. K. Tripathy, "Measurement of Zone Temperature Profile of a Resistive Heating Furnace Through RVM Model", IEEE Sensors Journal, 18(11), pp. 4429 - 4435, 2018.

2018 **RK Tripathy***, "Application of intrinsic band function technique for automated detection of sleep apnea using HRV and EDR signals", Biocybernetics and Biomedical Engineering, Elsevier, 38(1), pp. 136-144, 2018.

2018 A. Chetan, **RK Tripathy***, S. Dandapat, "A Diagnostic System for Detection of Atrial and Ventricular Arrhythmia Episodes from Electrocardiogram", Journal of Medical and Biological Engineering, Springer, 38(2), pp. 304-315, 2018.

2018 LM Satapathy, RK Tripathy, P Das, "A Combination of Variational Mode Decomposition and Histogram Equalization for Image Enhancement ", National Academy Science Letters, Springer, 2018.

2018 S. Bagha, R.K. Tripathy, P. Nanda, C. Preetam, D. P. Das, "Understanding Perception of Active Noise Control System through Multichannel EEG Analysis", IET Healthcare Technology Letters, 2018.

2017 **RK Tripathy***, S. Dandapat, "Detection of Myocardial Infarction from Vectorcardiogram using Relevance Vector Machine", Signal, Image and Video Processing, Springer, 2017.

2017 H. P. Tripathy, P. Pattanaik, S. K. Kamilla, **RK Tripathy***, "A Simulation Approach to Study the Effect of Ultrasonic MEMS-based Receiver for Blood Glucose Sensing Applications", IEEE Sensors Letters, 1(5), 2017.

2017 R. K. Tripathy*, Mario R. A. Paternina, Juan J. Arrieta, P. Pattnaik, "Detection of Atrial Fibrillation using Two-stage VMD and Atrial Fibrillation Diagnosis Index", Journal of Mechanics in medicine and biology, World Scientific, 17(8), 1-20, 2017.

2017 R. K. Tripathy*, Mario R. A. Paternina, P. Pattnaik, "A new method for detection of diabetes from heart rate signal", Journal of Mechanics in medicine and biology, World Scientific, 17(7), 1-12, 2017.

2017 R. K. Tripathy*, S. Dandapat, "Automated Detection of Heart Ailments from 12-lead ECG using Complex Wavelet Subband Bispectrum Features", IET Healthcare Technology Letters, 4(2), 57-63, 2017.

2017 R. K. Tripathy*, S. Deb, S. Dandapat, "Analysis of Physiological Signal using State Space Correlation Entropy", IET Healthcare Technology Letters, 4(1), 30-33, 2017.

2016 **RK Tripathy***, S. Dandapat, "Detection of Cardiac Abnormalities from Multilead ECG using Multiscale Phase Alternation Features", Journal of Medical Systems, Springer, 40(6):1-9, 2016.

2016 **RK Tripathy***, L. N. Sharma, S. Dandapat, "Detection of Shockable Ventricular Arrhythmia using Variational mode decomposition", Journal of Medical Systems, Springer, 40(4):1-13, 2016.

2016 R. K. Tripathy*, L. N. Sharma, S. Dandapat, "Diagnostic measure to quantify the loss of Clinical Components in Multilead Electrocardiogram", IET Healthcare Technology Letters, 3(1): 1-6, 2016.

2015 L. N. Sharma, RK Tripathy, S. Dandapat, "Multiscale energy and eigenspace approach to detection and localization of myocardial infarction", IEEE Transactions on Biomedical Engineering, 62(7):1827-1837, 2015.

2014 RK Tripathy, S. Mahanta, and S. Paul, "Artificial intelligence-based classification of breast cancer using cellular images", RSC Advances, Royal Society (UK), 4(18), 9349-9355, 2014.

2014 R. K. Tripathy*, L. N. Sharma, S. Dandapat, "A New way of Quantifying Diagnostic Information from Multilead Electrocardiogram for Cardiac Disease Classification", IET Healthcare Technology Letters, 1(4): 98-103, 2014.

Book Chapters

2021 SK Ghosh, RN Ponnalagu, RK Tripathy, "A Study on Time-Frequency analysis of Phonocardiogram Signals", Microelectronics and Signal Processing, CRC Press , Taylor and Francis, 2021.

2020 SK Ghosh, RN Ponnalagu, RK Tripathy, "Heart Sound Data Acquisition and Preprocessing Techniques A Review ", Advancement of Artificial Intelligence in Healthcare Engineering , IGI Global, doi: 10.4018/978-1-7998-2120-5 , Feb, 2020.

2015 S. Dandapat, L. N. Sharma, R. K. Tripathy, "Quantification of diagnostic information from electrocardiogram signal: A review", In Advances in communication and computing, Lecture notes on Electrical Engineering, Springer, pp. 17-39, 2015.

2015 R. K. Tripathy, S. Dandapat, "Quantifying Clinical Information in MECG Using Sample and Channel Convolution Matrices", In Advances in communication and computing, Lecture notes on Electrical Engineering, Springer, pp. 73-80, 2015.

Conference Papers

2020 Samit Kumar Ghosh, RN Ponnalagu, RK Tripathy, "Evaluation of Performance Metrics and Denoising of PCG Signal Using Wavelet Based Decomposition", INDICON, NSUT, Delhi, 2020.

2019 Alejandro Zamora-Mendez, Daniel Dotta, Joe H. Chow, R. K. Tripathy, Mario R. Arrieta Paternina, "Data-Driven Modal Features Extraction Through the Variational Mode Decomposition Method ", IEEE PES INNOVATIVE SMART GRID TECHNOLOGY CONFERENCE - LATIN AMERICA, 2019.

2017 M.R.A. Paternina, Daniel Guillen, R. K. Tripathy, A. Zamora, J.C. Silva, J. C. Rosas-Caro, "Phasor, Frequency and ROCOF Measurements in Microgrids: A practical approach", IEEE International Autumn Meeting on Power, Electronics and Computing (ROPEC 2017), Ixtapa, Mexico, 2017.

2016 R. K. Tripathy, S. Dandapat, "Multiresolution Inter-sample and Inter-lead Eigen Error Features for Detection of Cardiac Ailments", Twenty-Second National Conference on Communications (NCC), IIT Guwahati, 2016.

2015 A. Chetan, R. K. Tripathy, S. Dandapat, "Classification of Cardiac Arrhythmia from Multilead ECG using Multiscale Non-linear analysis", IEEE Conference on Electrical, Computer and Electronics, IIIT Allahabad, 2015.

2015 R. K. Tripathy, L. N. Sharma, S. Dandapat, "Detection of Cardiac Ailments from multilead ECG using Diagnostic Eigen Error Features", IEEE Conference on Power, Communication and Information Technology, Bhubaneswar, 2015.

Patents

2019 Anukul Pandey, BS Saini, Butta Singh, Neetu Sood, OM Prakash, RK Tripathy, Anil Kumar. *Automotive Adaptive Electrocardiogram QRS Pattern Design for Data Compression*. Indian Patent 201931041139, 50/2019.

INVITED TALKS

2020 Delivered a talk on “Empirical wavelet transform and its biomedical applications at TEQIP-III sponsored Short Term Training Program on “Emerging Trends in Speech Biomedical Signal Processing” from September 23 to September 27, 2020 at SVNIT Surat, India (Virtual mode).

TECHNICAL AND PROGRAMMING SKILLS

Python, numpy, scipy, Tensorflow, Keras

MATLAB

Embedded C programming

CONFERENCE ACTIVITY

Session Chair/ Session Organizer

2020 "Machine Learning and Data Engineering.", IEEE ICIIS, IIT Ropar, India, 2020. (Session Chair)

2017 "A General Framework for Micro-Grids." IEEE International Autumn Meeting on Power, Electronics and Computing (ROPEC 2017), Ixtapa, Mexico, 2017. (Session Chair)

GRANTS AND AWARDS

Awards and Honors

2020 Received 120$ as Honorarium from Elsevier for reviewing a book proposal.

2019 Awarded Certificate for the second position in M.Tech Examination.

2018 Outstanding reviewer award by Biomedical Signal processing and Control Journal, Elsevier, 2016.

2014 Outstanding reviewer award by Knowledge-based system Journal, Elsevier, 2017.

2010 Outstanding reviewer award by IEEE Transactions on Instrumentation and Measurement, 2017.

Sponsored Projects and Fellowships

2018–23 Outstanding Potential for Excellence in Research and Academics (OPERA) Grant (22.80 laks). BITS Pilani, India. PI.

2019–21 Detection of Sleep related disorders from physiological signals using multiscale analysis and deep neural network (2 laks). BITS Pilani, Hyderabad campus. PI. (Status-Completed)

2019-20 Design and development of an automated flow calibration system for fuel and oxidizer injectors for reaction control system (10 laks). DRDO CARS Project. Co-PI with Prof. SD Deshmukh and Prof. S Supradepan. (Status-Completed)

2013-17 MHRD Ph.D. Fellowship at IIT Guwahati (2013-2017, 18000 per month for 2 years, 28000 per month for remaining 2 years)

2011-13 GATE MTech Fellowship at NIT Rourkela (2011-2013, 8000 per month for 2 years)

TEACHING EXPERIENCE

BITS Pilani Hyderabad Campus

Neural Network and Fuzzy Logic

Signals and System

Analog Electronics Circuit

Digital Signal Processing

Introduction to Neural Network and Deep Learning

Virtual Instrumentation using LABVIEW

Advance Signal Processing

Signals and system Lab

Neural Network and Deep Learning Lab

Siksha O Anusandhan

Introduction to Information Theory

Introduction to MATLAB Course

ADMINISTRATIVE EXPERIENCE

Member of Department Research Committee, BITS Pilani Hyderabad (2018-2020)
Member of Department Academic Committee, BITS Pilani Hyderabad (2020-2022)

PROFESSIONAL SERVICE

Associate editor/ Academic editor role

Biomed Research International, Hindawi (SCIE, IF-2.27)

Guest editor for the special issue entitled as " Machine Learning and Deep Learning for Physiological Signal Analysis" from Frontiers in Physiology Journal (SCI, IF-3.367).

Academic Journal Peer Review

IEEE Transactions on Signal Processing
IEEE Transactions on Instrumentation and Measurement
IEEE Journal of Biomedical and Health Informatics
IEEE Sensors Journal
IEEE Access
Biomedical Signal Processing and Control, Elsevier
Computer methods and programs in biomedicine, Elsevier
Applied Soft Computing, Elsevier
Knowledge Based System, Elsevier
Computers in biology and medicine, Elsevier
Medical and biological engineering and computing, Springer

REFERENCES

Prof. Samarendra Dandapat, Professor
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Prof. Mario Arrieta Paternina, Associate Professor
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Ph-(+521)5622-0882 (O)

Prof. U Rajendra Acharya
Department of ECE, Ng N Polytechnic, Singapore
Email-Rajendra_Udyavara_ACHARYA@np.edu.sg
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PERSONAL DETAILS

Date Of Birth- 15/05/1987

I hereby certify that the above information provided by me is correct and further declare that the information contained herein forms an integral part of the contract should I be employed by the institute.

Rajesh Kumar Tripathy
Date- March 28, 2021