

# N.P. GUHAN SESHADRI, Ph.D.

Ad-Hoc Faculty

Department of Biomedical Engineering

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## PROFESSIONAL EXPERIENCE

July 2023- Present Ad-Hoc Faculty, Department of Biomedical Engineering, National Institute of Technology Raipur, India

2016 - 2017 Junior Research Fellow, National Institute of Technology Raipur, India  
Developed a Multi-wavelength near infrared spectroscopy device using laser diodes to detect ulcer risk areas in the diabetic foot of elderly people. This work was funded by Science and Engineering Research Board (SERB) of Government of India.

## EDUCATION

December 2023 *Doctor of Philosophy* in Biomedical Engineering  
National Institute of Technology Raipur, India.  
Thesis: ***Functional Brain Network Analysis and Imaging in Dyslexic Children***

July 2016 *Master of Engineering* in Medical Electronics  
SSN College of Engineering (affiliated to Anna University), Chennai, India.

July 2014 *Bachelor of Engineering* in Electronics and Communication Engineering  
Saveetha Engineering College (affiliated to Anna University), Chennai, India.

## GRANTS AND AWARDS

2022 Best Research Paper Award at ICBEST 2022  
2020 Best Research Paper Award at ICPC2T 2020  
2017 Awarded Institute Ph.D Fellowship  
2016 Junior Research Fellowship Award

## RESEARCH INTERESTS

Brain network analysis; Neuro-feedback; Brain computer interface; Developmental and neurological disorders; Cognitive neuroscience; Machine learning; Biomedical instrumentation

## PUBLICATIONS

- **Seshadri, NP Guhan**, B K Singh, and R B Pachori. "EEG Based Functional Brain Network Analysis and Classification of Dyslexic Children During Sustained Attention Task." *IEEE Transactions on Neural Systems and Rehabilitation Engineering* 31 (2023): 4672–82.
- **Seshadri, NP Guhan**, Sneha Agrawal, Bikesk Kumar Singh, B. Geethanjali, V. Mahesh, and Ram Bilas Pachori. "EEG based classification of children with learning disabilities using shallow and deep neural network." *Biomedical Signal Processing and Control* 82 (2023): 104553.
- **Seshadri, NP Guhan**, B. Geethanjali, and Bikesk Kumar Singh. "EEG based functional brain networks analysis in dyslexic children during arithmetic task." *Cognitive Neurodynamics* 16, no. 5 (2022): 1013-1028.
- Brindha, M., **N. P. Seshadri**, and R. Periyasamy. "Non-invasive assessment of tissue oxygenation parameters in diabetic patients foot sole using near infrared spectroscopy." *Biomedical Spectroscopy and Imaging* 10, no. 1-2 (2021): 27-36.

- Geethanjali, B., K. Adalarasu, M. Jagannath, and **NP Guhan Seshadri**. "Music-induced brain functional connectivity using EEG sensors: A study on Indian music." *IEEE Sensors Journal* 19, no. 4 (2018): 1499-1507.
- Balasubramanian, Geethanjali, Adalarasu Kanagasabai, Jagannath Mohan, and **NP Guhan Seshadri**. "Music induced emotion using wavelet packet decomposition—An EEG study." *Biomedical Signal Processing and Control* 42 (2018): 115-128.
- Subramanian, Muthumeenakshi, B. Geethanjali, **NP Guhan Seshadri**, Bhavana Venkat, and R. Vijayalakshmi. "Visualization of brain activation during attention-demanding tasks using cognitive signal processing." *International Journal of Cognitive Informatics and Natural Intelligence (IJCINI)* 11, no. 1 (2017): 60-81.
- **Seshadri, NP Guhan**, B. Geethanjali, and S. Pravin Kumar. "Analysis of heart sounds using time-frequency visual representations." *International Journal of Biomedical Engineering and Technology* 21, no. 3 (2016): 205-228.
- **Guhan, Seshadri NP**, B. Geethanjali, and K. Adalarasu. "Wavelet based EEG analysis of induced emotion on South Indians." *Aust. J. Basic & Appl. Sci.* 9, no. 33 (2015): 156-161.

### SUBMITTED MANUSCRIPTS

- **Seshadri, NP Guhan** and Bikesh Kumar Singh, "Analysis of reading-task based brain connectivity in dyslexic children using EEG signals", *Medical & Biological Engineering & Computing*. (Under revision)

### BOOK CHAPTERS

- Prasad, Raghavendra, **NP Guhan Seshadri**, R. Periyasamy, Stephanie Miller, Arindam Bit, and Kunal Mitra. "Electroencephalography and near-infrared spectroscopy-based hybrid biomarker for brain imaging." In *Bioelectronics and Medical Devices*, pp. 145-181. Woodhead Publishing, 2019.
- **Seshadri, NP Guhan**, B. Geethanjali, S. Muthumeenakshi, V. Bhavana, and R. Vijayalakshmi. "Visualization of Event-Related Changes in Brain Networks During Attention-Demanding Tasks: Visualization of Functional Connectivity During Attention Task Using EEG." In *Innovations, Algorithms, and Applications in Cognitive Informatics and Natural Intelligence*, pp. 127-150. IGI Global, 2020.

### CONFERENCES

- Sneha Agrawal, **Guhan Seshadri N P**, Bikesh Kumar Singh, B. Geethanjali and V. Mahesh. "EEG based classification of learning disability in children using pretrained network and support vector machine." In *2023 Second International Conference on Biomedical Engineering Science and Technology (ICBEST): Roadway from Laboratory to Market*, Springer. (**Presenter & Best paper award**)
- Shivwanshi, Resham Raj, **N. P. Guhan Seshadri**, and R. Periyasamy. "Multispectral NIRS System Design to Analyze Hemoglobin Concentration on Plantar Foot Surface." In *Advances in Biomedical Engineering and Technology: Select Proceedings of ICBEST 2018*, pp. 401-412. Springer Singapore, 2021.
- **Seshadri, NP Guhan**, and Bikesh Kumar Singh. "Hemispheric lateralization analysis in dyslexic and normal children using rest-EEG." In *2020 IEEE Recent Advances in Intelligent Computational Systems (RAICS)*, pp. 37-41. IEEE, 2020.

- **Seshadri, NP Guhan**, B. Geethanjali, and Bikesh Kumar Singh. "Resting state EEG signal analysis in Indian Dyslexic children." In 2020 First International Conference on Power, Control and Computing Technologies (ICPC2T), pp. 300-304. IEEE, 2020. **(Best paper award)**
- **Guhan Seshadri, N. P.**, and R. Periyasamy. "Design of multi-wavelength near infrared probe to detect risk areas in diabetic foot." *Biotechnological Applications in Human Health (2020)*: 1-9.
- Dev, Prakash, R. Steiney Lancet, Suman Saurav, **NP Guhan Seshadri**, Bikesh Kumar Singh, and Manju Jha. "Effect of yoga on hemodynamic changes at prefrontal cortex during sustained attention task." In 2019 5th International Conference on Advanced Computing & Communication Systems (ICACCS), pp. 728-731. IEEE, 2019.
- Pavithran, P. G., K. Arunkumar, **NP Guhan Seshadri**, Bikesh Kumar Singh, V. Mahesh, and B. Geethanjali. "Index of Theta/Alpha ratio to quantify visual-spatial attention in dyslexics using Electroencephalogram." In 2019 5th International Conference on Advanced Computing & Communication Systems (ICACCS), pp. 417-422. IEEE, 2019.
- Shivwanshi, Resham Raj, **NP Guhan Seshadri**, and R. Periyasamy. "A review of present and futuristic development of near infrared spectroscopy system in the assessment of diabetic foot risk." In 2018 Fourth International Conference on Biosignals, Images and Instrumentation (ICBSII), pp. 206-212. IEEE, 2018.
- Menon, Shraddha, B. Geethanjali, **N. P. Guhan Seshadri**, S. Muthumeenakshi, and Sneha Nair. "Evaluating the induced emotions on physiological response." In *Computational Signal Processing and Analysis: Select Proceedings of ICNETS2, Volume I*, pp. 211-220. Springer Singapore, 2018.
- Chandra, Akash, **NP Guhan Seshadri**, and R. Periyasamy. "Skin reflectometry technique for measurement of bilirubin concentration to detect jaundice." In *Proceedings of the 2017 International Conference on Biomedical Engineering and Bioinformatics*, pp. 22-26. 2017.
- **Seshadri, NP Guhan**, S. Muthumeenakshi, B. Geethanjali, and S. Pravin Kumar. "Visualization of Brain Connectivity during Emotion induction." In *Front. Neuroinform. Conference Abstract: Neuroinformatics*. 2016.
- Muthumeenakshi, S., B. Geethanjali, **NP Guhan Seshadri**, V. Bhavana, and R. Vijayalakshmi. "Visualization of brain activation during the performance of attention-demanding tasks." In 2016 IEEE 15th International Conference on Cognitive Informatics & Cognitive Computing (ICCI\* CC), pp. 34-41. IEEE, 2016.
- **NP, Guhan Seshadri**, B. Geethanjali, and S. Muthumeenakshi. "Visualizing the brain connectivity during negative emotion processing–An EEG study." In *Front. Neuroinform. Conference Abstract: Neuroinformatics*. 2016.

## TECHNICAL SKILLS

MATLAB programming, LabVIEW programming, Python programming, IBM SPSS statistical analysis, EEG signal acquisition

## Professional Service

Peer Review:

*IEEE-ACM Transactions on Audio Speech and Language Processing, Scientific Reports, PlosONE, Cognitive Neurodynamics, Computer Methods in Biomechanics and Biomedical Engineering*

## ACTIVITIES

- Coordinator, Advanced Hands-On Training on Biomedical Signal Acquisition and Analysis (sponsored by SERB, Govt of India under the KARYASHALA scheme), 1-7 August 2023, NIT Raipur.

- Student coordinator, Second International Conference on Biomedical Engineering Science and Technology: Roadway from Laboratory to Market (ICBEST 2023), 10-11 February 2023, NIT Raipur.
- Student coordinator, First International Conference on Biomedical Engineering Science and Technology: Roadway from Laboratory to Market (ICBEST 2018), 20-21 December 2018, NIT Raipur.
- Resource person for conducting one day workshop on Bio-signal Acquisition and processing in SMK Fomra Institute of Technology, August 2015.
- Resource person for conducting one day workshop on MEMS technology in M.G.R University, June 2014.
- Diploma in MEMS technology, 2014.
- Completed Kaisen Robotics Programs conducted by Lema Labs Robotics IIT Madras, 2014.
- Head Student Organiser in IEEE International Conference on Smart Structures and Systems on 28th and 29th March 2013.
- Technical coordinator of Drestein (Technical Symposium) at Saveetha Engineering College, 2013.
- National Service Scheme volunteer, 2011.