Sanjeev Nara

PROFILE

I am a Biomedical Engineer turned Neuroscientist, deeply fascinated by efficient sensory processing in the human brain. I aim to develop my expertise in cognitive neuroscience and Artificial Intelligence to develop computational models of sensory processing; and their clinical applications.

CONTACT

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Research Interest

- Predictive Processing
- Temporal Dynamics
- Visual Perception
- Scene Perception
- EEG/MEG/fMRI
- Machine Learning
- Data Science

Current Position

Research Fellow & Data Scientist (The Adaptive Mind)
Justus-Liebig University, Giessen, Germany
March 2022 – till date
Working as research fellow in Mathematics Institute with Prof. Daniel Kaiser and Data Scientist in TAM Datahub team.

EDUCATION

PhD in Cognitive Neuroscience
Basque center on Cognition, Brain and language, (BCBL), San Sebastian, Spain (Jan 2017 – Feb 2022)
Supervisors: Prof. Nicola Molinaro, Senior Scientist & Group Leader, Brain Rhythms and Cognition Group, BCBL, Spain and Dr Mathieu Bourguignon, Assistant Professor, ULB, Brussels, Belgium.

Masters in Biomedical Engineering (M.Tech)
DCR University of Science and Technology, Murthal, India (2013 – 2015)
Supervisors: Dr Poonam Sheoran, DCRUST, Murthal and Dr Shilpi Modi, INMAS-DRDO, New Delhi, India

Bachelors in Biomedical Engineering (B.Tech)
PDM College of Engineering (now PDM University) Bahadurgarh, India (2008 – 2012)
Supervisors: Dr Archana Chaudhary, PDMCE, Bahadurgarh, India

Additional Academic Training

Visiting Student
Freie University Berlin, Berlin, Germany (02/2019 – 05/2019)
Supervisors: Dr Radoslaw Martin Cichy, Neural dynamics of Visual Cognition Group, FUB, Germany

Visiting Student
Universite Libre de Bruxelles, Brussels, Belgium (03/2018 – 08/2018)
Supervisors: Dr Mathieu Bourguignon, ULB, Brussels, Belgium

Programming

MATLAB:
- Fieldtrip
- Brainstorm
- EEGLAB
- SPM
- MVPA Light
- CosmoMVPA

Python:
- MNE
- Scikit learn

Statistics:
- JASP

MRI:
- SPM
- FSL
- FREESURFER

LATEX

Project Associate
Indian Institute of technology Delhi (IITD), Delhi, India (09/2015 - 05/2016)
Supervisors: Dr Tapan K. Gandhi, IITD, Delhi.

Publications

In preparation:

17**. Sanjeev Nara**, Amit Jaiswal, Mikel Lizarazu, Marie Lailler, Nicola Molinaro. "Cross modal perceptual difference in Dyslexia".

Preprint / In Review:

16. **Sanjeev Nara**, Daniel Kaiser, "Integrative processing in artificial and biological vision predicts the perceived beauty of natural images". Biorxiv 2023 (in review Science Advances since 26.05.2023)

15. Piermatteo Morucci, Mikel Lizarazu, **Sanjeev Nara**, Clara Martin, Nicola Molinaro, "Language experience shapes long-term predictive coding in human auditory cortex". Biorxiv 2023 (in review Journal of Neuroscience since 10.06.2023).

14. Nicola Molinaro, **Sanjeev Nara**, Manuel Carreiras, "Early language dissociation in the bilingual mind: Sensor-level MEG evidence", Biorxiv 2023 (in review Journal of Neuroscience since 01.06.2023).

13. **Sanjeev Nara**, Dheeraj Rathee, Nicola Molinaro, Naomi Du Bois, Braj Bhushan, Girijesh Prasad, "Temporal Dynamics of Neural Processing of Facial Expressions and Emotions". Biorxiv 2021. (in review IEEE transactions on Cognitive and Developmental Science (TCDS) since 12.10.2022).

Published:

12. **Sanjeev Nara**, Haider Raza, Manuel Carreiras, Nicola Molinaro, "Decoding Numeracy and Literacy in the Human Brain: Insights from MEG and MVPA". Nature Scientific Reports, 2023 (accepted).

11. **Sanjeev Nara**, Mikel Lizarazu, Craig G Richter, Diana C Dima, Radoslaw M Cichy, Mathieu Bourguignon, Nicola Molinaro, "Temporal uncertainty enhances suppression of neural responses to predictable visual stimuli". NeuroImage, 2021.

10. Mikel Lizarazu, Santiago Gil-Robles, Iñigo Pomposo, **Sanjeev Nara**, Lucía Amoruso, Ileana Quiñones, Manuel Carreiras, "Spatiotemporal dynamics of postoperative functional plasticity in patients with brain tumors in language areas", Brain and Language,2020.

9. Shilpi Modi, Mukesh Kumar, **Sanjeev Nara**, Pawan Kumar, Subhash Khushu, "Trait anxiety and neural efficiency of abstract reasoning: An fMRI investigation" , Journal of Biosciences, Sept 2018.

8. **Sanjeev Nara**, Poonam Sheoran, "Advancements in EEG source localisation methods ", International Journal of Medical Engineering and Informatics, 2018, vol. 10:1.

7. Dinesh Bhatia, Manvinder Kaur, **Sanjeev Nara**, Sateesh Reddy Avutu, Dhananjoy Shaw, "Effect of gender and performance on EMG activity of selected knee extensor muscles during isometric contractions of fully extended knee in athletes", International Journal of Computational Biology and Bioinformatics, 2016, vol.2:2.

References

Prof. Daniel Kaiser
Professor of Neural Computation, Mathematics Institute, Justus-Leibig University Gießen, Gießen, Germany.
Email: daniel.kaiser@math.uni-giessen.de
(Postdoc Supervisor)

Prof. Nicola Molinaro
Senior Scientist & Group Leader, Brain Rhythms & Cognition group, Basque Center on Cognition, Brain and Language (BCBL), San Sebastian, Spain
Email: n.molinaro@bcbl.eu
(PhD Supervisor)

Prof. Mathieu Bourguignon
Assistant Professor, ULB Brussels, Belgium
Email: mabourgu@ulb.ac.be
(PhD Co-supervisor)

Prof. Girijesh Prasad
Professor of Intelligent Systems, Ulster University, Northern Ireland, Kingdom (UK).
Email: g.prasad@ulster.ac.uk
(Research Collaborator)

Prof. Braj Bhushan
Indian Institute of Technology, Kanpur (IITK), Uttar Pradesh (UP), India.
Email: brajb@iitk.ac.in
(Research Collaborator)

6. Sanjeev Nara, Manvinder Kaur, Dinesh Bhatia, Dhananjoy Shaw, "Co-Contraction of Knee Stabilizer Muscles during Sustained Squat Posture (A Yogic Posture) in Athletes", Journal of Yoga & Physical Therapy, 2016, vol.6:4.

5. **Sanjeev Nara**, Manvinder Kaur, Dhananjoy Shaw, Dinesh Bhatia, "Significance of Bilateral Coactivation Ratio for Analysis of Neuromuscular Fatigue of Selected Knee Extensor Muscles during Isometric Contractions at 0º in Sportspersons", Biomedical Science and Engineering, 2016, Vol. 4, No. 2, 31-36.

4. Neelam Bhardwaj, **Sanjeev Nara**, Sunita Malik, Geeta Singh, "Analysis of ECG Signal Denoising Algorithms inDWT and EEMD Domains ", International Journal of Signal Processing Systems vol. 4, No. 5, October 2016.

3. Manvinder Kaur, **Sanjeev Nara**, Dhananjoy Shaw, Dinesh Bhatia, "EMG Asymetricity of Selected Knee Extensor Muscles in Sustained Squat Posture (A Yogic Posture) of Athletes in Relation to their Gender and Performance", Journal of Novel Physiotherapies, 2016, vol. 7:1.

2. **Sanjeev Nara**, Manvinder Kaur, Saurav Datta, "smRithm: Graphical user interface for heart rate variability analysis", Journal of Medical Engineering & Technology July 2015, vol. 39, pp. 342–347.

1. **Sanjeev Nara**, Manvinder Kaur and Kundan Lal Verma, "Novel Notch Detection Algorithm for Detection of Dicrotic   Notch in PPG Signals," International Journal of Computer Applications, January 2014, Vol. 86, No. 17, pp. 36-39.

Conferences:

11. **Sanjeev Nara**, Daniel Kaiser, "Integrative processing in artificial and biological vision predicts the perceived beauty of natural images", European Conference on Visual Perception, (to appear in ECVP August 2023), Cyprus.

10. **Sanjeev Nara**, Mikel Lizarazu, Anastasia Klimovich-Gray, Nicola Molinaro, "Expectation Suppression across visual and auditory domain: a MEG study", BIOMAG 2022, UK.

9. **Sanjeev Nara**, Naomi Du bois, Braj Bhushan, Dheeraj Rathee, Nicola Molinaro, Alain Desire Bigirimana, Mickey Keenan, Pratheepan Yogarajah, Stephen Gallagher, Girijesh Prasad, "Valence based emotions altered by emotion judgement task: Observer or Expresser effect", BIOMAG 2022, UK.

8. Nicola Molinaro, **Sanjeev Nara**, Manuel Carreiras, "Decoding and cross- decoding languages", BIOMAG 2022, UK.

7. **Sanjeev Nara**, Naomi Du bois, Dheeraj Rathee, Nicola Molinaro, Braj Bhushan, Girijesh Prasad, "Hemispheric facial dominance and emotion recognition: An MEG study", MEGUK 2021, UK.

6. **Sanjeev Nara**, Asier Zarraga, Mathieu Bourguignon, & Nicola Molinaro, (September 07, 2018). Oscillatory representations of pre-stimulus visual Predictions in Hierarchical Predictive Coding framework, Poster presentation at Neurogune Workshop, Vitoria, Spain.

5. **Sanjeev Nara**, Asier Zarraga, Mathieu Bourguignon, & Nicola Molinaro, (August 25 -31,2018). Pre and Post stimulus correlates of Prediction in Visual domain, Poster presentation at BIOMAG 2018, Philadelphia, USA

4. **Sanjeev Nara**, Asier Zarraga, Mathieu Bourguignon, & Nicola Molinaro,(June 20-22, 2018). Neural correlates of Predictable and Non-Predictable targets in Visual Predictions. Poster presentation at 1st International Workshop on Predictive Processing (WoPP), Donostia-San Sebastian, Spain.

3. **Sanjeev Nara**, Asier Zarraga, Mathieu Bourguignon, & Nicola Molinaro, (December,11-14, 2017). "Predicting visual percepts: MEG evidence". Poster presentation at the BrainModes2017, NBRC, Manesar, INDIA.

2. **Sanjeev Nara**, Piyush Swami, Manvir Bhatia, Bijaya K. Panigrahi, Tapan Gandhi, (IndiaCom-2016), "Efficient Recognition of Ictal Activities in EEG through Correlation Based Dimensionality Reduction," 3rdInternational Conference on Computing for Sustainable Global Development, New Delhi, India.

1. Mukesh K. Saini, **Sanjeev Nara**, Shilpi Modi, Pawan Kumar, Subhash Khushu, " Correlation of BOLD fMRI Signal with EEG Alpha and Beta Rhythm in Motor Cortex at Different Tapping Frequency ", Cell Symposia: Engineering the Brain -Technologies for Neurobiological Applications, USA, 2015 (Abstract Accepted).

Workshops

8. Attended INCF Neuroinformatics Assembly 2022 (12 - 16 September 2022) in virtual mode.

7. Attended winter course (02-09 Jan 2019) on Machine Intelligence and Brain Research at CCBR, IIT Madras, India.

6. Attended ENBIT 2018 workshop in Brussels, Belgium.

5. Attended 2 days workshop (23-24 January 2018) on Basics of MEG by Elekta, organised at BCBL, Spain.

4. Attended 3-day Neuroanatomy Course in London, UK (13-15th November 2017)

3. Attended PySS 2017 at UPV/EHU San Sebastian, Spain (6-8th October 2017)

2. Attended Software Carpentary at UPV/EHU San Sebastian, Spain (28-30th June 2017)

1. Attended Brainhack Global 2017 at Cruces University Hospital, Bilbao, Spain (2-4th March 2017)

Supervision:

1. Milena Fassea, Master student (BCBL, Spain), with Dr Manuela Ruzzoli (BCBL, Spain).

2. Vaibhav, B.Tech student, (Delhi University), with Dr Manuela Ruzzoli (BCBL, Spain).

3. Minerva, Master Student (Essex University, UK), with Dr Haider Raza (Essex University, UK).