Dr. Ayan Sengupta

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Education

2013-2016 **Ph.D. (Dr. rer. nat.), Computational Neuroscience**
Otto-von-Guericke-University, Germany

Dissertation: *The Effect of Acquisition Resolution and Magnetic Field Strength on Multivariate Decoding of fMRI*

2010-2012 **M.S., Computer Science and Engineering**
University of Nebraska, USA

Dissertation: *MRI and histo-pathological image co-registration of brain for HIV-based murine model of neurocognitive decline*

2010-2012 **B.Tech., Electronics and Communication Engineering**
West Bengal University of Technology, India

Research Awards

2019 Hughes Hall Travel Grant, University of Cambridge (£1.5k)

2013 German Research Foundation Doctoral Scholarship (€97k)

2010 University of Nebraska Graduate Assistantship ($31k)

2010 University of Nebraska Chancellor's Fellowship ($8k)

Research Experience

2019- **Affiliate** (*Lifetime Senior member*),
Hughes Hall, University of Cambridge

2019- **MRI Research Fellow** (*Tenured Position*),
Royal Holloway, University of London

- Developing novel Brain Imaging techniques in **High field functional MRI** to understand functioning of human brain in decisions making and other psychological conditions.
- Teaching and Guidance of Doctoral Students in **Advanced Functional MRI, Image Analysis pipelines** and **Machine Learning**.
- **In-Charge** of Neuroimaging Computational Cluster.

2018-2019 **Research Associate, University of Cambridge**

- Developing state-of-the art Brain Imaging techniques with **Ultra-high field (UHF) 7T MRI** including **motion correction**, **fMRI** and **MR angiography**.
- Developing novel Medical **Image processing** and **Image Reconstruction pipelines** for 7T MRI and **RF pulse sequence programming**.

2016-2018 **Research Fellow, University of Nottingham**

- Successfully generated the **first UHF 7T fMRI based Probabilistic Atlas** for localization of **hand digits** in the **primary somatosensory cortex** in **human population**.
- Designed and developed a **novel UHF MR-safe vibrotactile stimulation delivery system** based on Arduino microcontroller.
- Applied **machine learning** algorithms on BOLD fMRI response to **Intraneural Microstimulation** and **vibrotactile stimulation**.

2013-2016 **DFG Research Associate, Otto-von-Guericke University**

- High impact work on machine learning and statistical analysis of **UHF 7T multi-resolution fMRI** for **orientation decoding** in **human primary visual cortex.**
- **Novel Comparison Study** of **Magnetic Field Strength (3T vs 7T)** for better SNR and sensitivity in multi-resolution fMRI to find its contribution to **orientation classification analysis**.

2012-2013 **Technical Officer, National Brain Research Centre**

- **Technical Officer** under Ministry of Science and Technology, Govt. Of India for design and implementation of the first longitudinal Neuroimaging grid of India in collaboration with McGill University, Montreal. Responsible for extension of LORIS platform for studying Dementia in the aging population in India.
- **Visiting Scholar** at National Institute of Mental Health and Neurosciences, India researching on fMRI, MRS, co-registration of MR angiography and DTI.

2010-2012 **Graduate Researcher, University of Nebraska**

- Successfully finished **Medical Image Analysis** project in collaboration with University of Nebraska Medical Center,
- **Automatic landmark selection** and optimization of landmarks, for **non-linear co-registration of MRI** slices of rat brains with corresponding **histological images** for tracking growth of HIV induced neuro-cognitive disorders in murine models.

Teaching Experience

Undergraduate Teaching

University of Cambridge

- Supervisions and tutorials of 'Digital Signal Processing' course for final year students in the Department of Computer Science

University of Nebraska

- Worked with senior faculty members in re-designing of 'Introduction to Computer Science' and 'Object Oriented Programming' course modules in the University of Nebraska.
- Responsible for holding tutorial and lab sessions for undergraduate students.
- Elected representative (for 2 consecutive years) of all Graduate teaching assistants in the department to the faculty meetings for course allocation and performance evaluations of TAs.

Postgraduate Teaching

Royal Holloway, University of London

- Currently co-supervise PhD students in application of Machine learning and decoding in fMRI experiments.

University of Nottingham

- Co-supervised a masters student for his thesis and setting up a fMRI experiment with congenitally deaf participants.

Industry Experience

2008-2010 **Programmer Analyst, Cognizant Technology Solutions**

- Worked successfully as a Java developer and a Sybase Analyst on the Global Strategic Trading Platform of JP Morgan Chase Bank, USA

Technical Skills

- Programming Languages: Python, MATLAB, BASH, C++, JAVA
- Neuroimaging Softwares: PyMVPA, FSL, Freesurfer, AFNI
- Sun Certified JAVA programmer (SCJP 1.5)
- Oracle 9i PL/SQL Award of Achievement from Oracle University

Publications

- **Sengupta, A.**, O'Neill, G., Azghar M., Barratt, E., Besle, J., Schluppeck, D., Francis, S., and Sanchez Panchuelo, R. (2019). A Probabilistic Atlas of Digit Somatotopy in the Human Primary Somatosensory Cortex. (*Neuroimage, in press*).

- O'Neill, G., Watkins, R., Ackerley, R., Barratt, E., **Sengupta, A.**, Asghar, M., Sanchez Panchuelo, R., Brookes, M., Glover, P., Wessberg, J. and Francis, S. (2019). Imaging human cortical responses to intraneural microstimulation using magnetoencephalography. *NeuroImage*, 189, pp.329-340.

- **Sengupta, A.**, Yakupov, R., Speck, O., Pollmann, S., Kanowski, M., Tempelmann, C. and Hanke, M. The effect of acquisition resolution on orientation decoding from V1: comparison of 3T and 7T. (*Neuroimage: Under Review*).

- **Sengupta, A.**, Pollmann, S. and Hanke, M. (2018). Spatial band-pass filtering aids decoding musical genres from auditory cortex 7T fMRI. F1000Research, 7, p.142.

- **Sengupta, A.**, Yakupov, R., Speck, O., Pollmann, S. and Hanke, M. (2017). The effect of acquisition resolution on orientation decoding from V1 BOLD fMRI at 7 T. *NeuroImage*, 148, pp.64-76.

- **Sengupta, A.**, Yakupov, R., Speck, O., Pollmann, S. and Hanke, M. (2017). Ultra high-field (7 T) multi-resolution fMRI data for orientation decoding in visual cortex. *Data in Brief*, 13, pp.219-222.

- **Sengupta, A.**, Kaule, F., Guntupalli, J., Hoffmann, M., Häusler, C., Stadler, J. and Hanke, M. (2016). A studyforrest extension, retinotopic mapping and localization of higher visual areas. *Nature Scientific Data*, 3, p.160093.

- Hanke, M., Adelhöfer, N., Kottke, D., Iacovella, V., **Sengupta, A.**, Kaule, F., Nigbur, R., Waite, A., Baumgartner, F. and Stadler, J. (2016). A studyforrest extension, simultaneous fMRI and eye gaze recordings during prolonged natural stimulation. *Nature Scientific Data*, 3, p.160092.

- Das, S., Madjar, C., **Sengupta, A.** and Mohades, Z. (2016). LORIS: DICOM anonymizer. *GigaScience*, 5(suppl_1).

- **Sengupta, A.** (2012). [online] Digitalcommons.unl.edu. Automation of landmark selection for rodent brain MRI-histology registration using thin-plate splines.

Conference Publications

ISMRM abstracts

- **Ayan Sengupta**, Iulius Dragonu and Christopher T. Rodgers. Online reconstruction of GRE Fat Navigators with Gadgetron on Siemens Terra 7T Scanner (ISMRM 2020).

- **Ayan Sengupta**, Roger Holmes-Watkins, Rochelle Ackerley, Rosa Sanchez-Panchuelo Johan Weissberg and Susan Francis. Global responses to microstimulation at 7T and comparison with vibrotactile stimulation (ISMRM 2018 Oral Presentation, ***Summa Cum Laude***).
- **Ayan Sengupta**, Denis Schluppeck, Eleanor Barrat, Julien Besle, Susan Francis and Rosa Sanchez-Panchuelo. A Probabilistic Atlas of Digit Somatotopy in the Human Primary Somatosensory Cortex (ISMRM 2018 Power Pitch, ***Magna Cum Laude***).

Presenter

- Ayan Sengupta, Renat Yakupov, Oliver Speck, Stefan Pollmann and Michael Hanke (2015). **Optimal Resolution and Filtering for Orientation Decoding in V1 at 7T**. Organization of Human Brain Mapping 2015. Presentation delivered at the Organization of Human Brain Mapping 2015 meeting, Honolulu, Hawaii, June, 2015.
- Ayan Sengupta, Cecile Madjar and Samir Das (2014). **DicAT - DICOM anonymization Tool** Organization of Human Brain Mapping 2014. The software was conceived, developed and presented in collaboration with LORIS team of McGill University at the Organization of Human Brain Mapping Hackathon, Berlin, June,
- Ayan Sengupta, Michael D. Boska, Howard E. Gendelman, Ashok Samal, Yutong Liu (2012). **Automation of Landmark Selection for Rodent Brain MRI-Histology Registration using Thin-Plate Splines**. Nebraska Annual Research Symposium 2012, Lincoln, Nebraska, 2012.