

# Soumya Snigdha Kundu

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## EDUCATION

### King's College London

*Ph.D.*, Biomedical Engineering and Imaging Science Research

Advisors: Prof. Tom Vercauteren (Computational) and Dr. Jonathan Shapey (Clinical)

Thesis: Artificial Intelligence-driven Management of Brain Tumours

London, United Kingdom

*Oct. 2023 – Oct. 2027 (Expected)*

### Queen Mary University of London

*M.Sc.*, Machine Learning for Visual Data Analytics; GRADE: DISTINCTION

Advisors: Prof. Greg Slabaugh (Computational) and Dr. Vineet Batta (Clinical)

Thesis: Unveiling the Localization Advantage in Automated Orthopaedic Implant Identification

London, United Kingdom

*Sep. 2022 – Sep. 2023*

### SRM Institute of Science and Technology

*B.Tech.*, Computer Science and Engineering; GRADE: DISTINCTION

Advisor: Prof. Dhanalakshmi Samiappan

Thesis: Examining the feasibility of Neural Network Pruning in Covid-19 Classification

Chennai, India

*Jul. 2018 – May. 2022*

## SELECTED PUBLICATIONS

1. *Kundu, S.S.* and Mo Y. et al., 'Spinal Osteophyte Detection via Robust Patch Extraction on Minimally Annotated X-rays', 2024 IEEE 21st International Symposium on Biomedical Imaging (**ISBI**), Athens, Greece, 2024, pp. 1-5.
2. *Kundu, S.S.*, "A Distributed Deep Learning Framework for Federated Big Medical Image Analysis," 2021 IEEE International Conference on Big Data (**Big Data**), Orlando, FL, USA, 2021, pp. 5938-5940.
3. Kumar, A., Ghosal, P., *Kundu, S.S.* et al., 2022. A lightweight asymmetric U-Net framework for acute ischemic stroke lesion segmentation in CT and CTP images. **Computer Methods and Programs in Biomedicine**, 226, p.107157.
4. Wang, H., Naidu, R., Michael, J. and *Kundu, S.S.*, 2020. SS-CAM: Smoothed Score-CAM for sharper visual feature localization. arXiv preprint arXiv:2006.14255. (Poster at RCV@CVPR'21 Workshop)

**Reviewing**: IEEE-ISBI 2024.

## RESEARCH EXPERIENCE

### University of Oxford

*Research Intern – Deep Learning; Li Ka Shing Centre for Health Information and Discovery*

Prof. Bartek Papiez

*Jul. 2023 – Sep. 2023*

- Developed the 1<sup>st</sup> spinal new bone formation (osteophytes) **identification** pipeline achieving 84% precision.
- Implemented a multi-view **post-processing** strategy *SegPatch* to efficiently extract regions of interests from vertebrae segmentation masks.
- Helped in the development of an automated severity classifier for Knee osteoarthritis, rivaling state of the art methods by achieving 71% Accuracy.

### Luton and Dunstable University Hospital

*Research Assistant – Software Engineering & Medical Image Computing; Department of Orthopaedics*

Dr. Vineet Batta

*Oct. 2020 – Sept. 2022*

- Raised ~ £50000 to develop a system to identify 10 separate make and models of orthopaedic implants via **convolutional neural networks** and **image processing**, while reducing data requirements by >90% and achieving 98% F1-Score.
- Spearheaded a multi-institutional collaboration involving renowned Orthopaedic Surgeons, gathering valuable insights and perspectives to publish an in-depth systematic review of 50+ papers on automated orthopaedic implant identification and develop the 1<sup>st</sup> automated orthopaedic implant annotator.
- Reviewed and analyzed monthly updates of 12 students' software submissions, identifying potential improvements and increasing code performance metrics by an average of 15%.

### National Institute of Technology - Durgapur

*Research Intern – Deep Learning; Machine Intelligence and Medical Imaging Research Group*

Prof. Debashis Nandi

*Jun. 2020 – May. 2021*

- Published a lightweight asymmetric U-Net architecture to segment stroke lesions in the brain; optimising inference times and achieving the 2<sup>nd</sup> highest test dice score on the ISLES Challenge 2018 - Ischemic Stroke Lesion Segmentation.
- Designed a joint segmentation and classification pipeline encompassing 3 separate challenge brain MRI datasets for severity classification of Alzheimer's while achieving a marginal 5% deviation on a held-out test set.
- Engineered a compound segmentation model for multiple sclerosis lesions that outperforms stand-alone backbone networks by 10-12% dice score.

## PROJECT

### Large Language Model Based Automated Debugging Enhancement Tool.

- Developed a shell command using LLMs, LangChain and Claude-API to help debug python errors.
- Proposed a novel Error Analysis **Prompting** method integrating Error Analysis and Code-Context-Aware Prompting, achieving equivalent performance to Chain of Thought Prompting in 1 iteration.
- Finalist at the Anthropic London Hackathon.

## PROGRAMMING AND SOFTWARE DEVELOPMENT

Python, C++, Torch, OpenCV, JAX, NiBabel, 3D-Slicer, ITK-SNAP, LangChain, Docker, Git, Slurm and L<sup>A</sup>T<sub>E</sub>X.

## FELLOWSHIPS, GRANTS AND AWARDS.

MRC DTP Postgraduate *Studentship* — King's College London || < 2% Selection rate. || ~ £205000 || 2023 Cohort

BDI Summer *Internship* Programme — University of Oxford || 1 of 4 selected applicants || 2023 Cohort

Summer Research *Internship* Program — IIT - Gandhinagar || < 0.008% Selection rate. || 2023 Cohort

MITACS Globalink Research *Internship* — TRIUMF (UVic) || < 3% Selection rate || 2021 Cohort

UKRI Fast Start: Innovation *Grant* — Co-Applicant || ~ £50000 || 2022 Cohort

IEEE-ICETCI'21 *Competition* (Electrical Substation Detection) — 3<sup>rd</sup> Place