SUBRATA MUKHERJEE

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Web Page, LinkedIn Profile , Google Scholar Profile

PERSONAL SUMMARY

Six years of research experience and more than four years of industrial experience focusing on algorithm development, non-destructive evaluation, noninvasive imaging, data analysis, statistical inference, signal and image processing, artificial intelligence, machine learning, computer vision and fault daignostics.

EDUCATION

2018- July 2023: Michigan State University, Non-Destructive Evaluation (NDE) Laboratory
Doctor of Philosophy (Ph.D.), Electrical and Computer Engineering, CGPA: **3.83/4**
Dissertation: *Machine learning based efficient automated NDE methods for defect diagnostics*
Advisor: Dr. Yiming Deng, Dr. Lalita Udpa
Recipient of 2018 Engineering Distinguished Scholar at Michigan State University

2011 – 2015: National Institute of Technology, Durgapur
Bachelor of Technology (B. Tech) in Electronics & Communication Engineering
Graduated First Class with Distinction, CGPA: **8.5/10**

PROFESSIONAL EXPERIENCE

Postdoctoral Research Scientist- *Oak Ridge National Laboratory*
(Sensors and Embedded Systems Group)   [July 2024 – Present]

At ORNL, I am working in the Sensors and Embedded Systems Group of the Electrification and Energy Infrastructures Division (EEID), part of the Energy Science and Technology Directorate (ESTD). My primary responsibility involves the development and application of Machine Learning (ML) and Artificial Intelligence (AI) algorithms to enhance fault diagnostics, process monitoring, and advanced control methods. These sophisticated data-driven and physics-based dynamic models find application across diverse fields such as smart manufacturing, water treatment, desalination, and electrical grid monitoring.

Postdoctoral Fellow- *US Food and Drug Administration*
(Division of Imaging, Diagnostics, and Software Reliability)   [August 2023 – July 2024]

At FDA, I worked on the project "*Prediction of Response to Therapy for Metastatic Breast Cancer: Joint Analysis of Radiologic and Genomic Data Using Machine Learning*". I have developed an image registration based automated lesion correspondence and matching (RAMAC) algorithm and have designed the algorithm into a regulatory science tool (RST). This algorithm is designed to dynamically track both target and non-target entities, addressing the variability observed across different timepoints and radiologists in longitudinal data analysis. I have developed joint modelling of the longitudinal and time-to-event data for Metastatic breast cancer (mBC) progression risk prediction and performing lesion and organ segmentation by various deep learning frameworks on our dataset. I actively participated in reviewing consults related to AI/ML, medical imaging devices and diagnostics and attended regulatory discussion meetings at FDA.

Research Associate- Department of Electrical and Computer Engineering   [August 2018 – July 2023]
Michigan State University, East Lansing, USA

At MSU, during my PhD, I worked as a research assistant (RA) where I developed robust automated defect detection and identification algorithms using the data collected by developing novel near field electromagnetic sensors. Here I have led various projects being funded by our industrial partners such as: Electric Power Research Institute (EPRI),

Gas Technology Institute (GTI) and on other DOT, DOE based PHMSA projects. The task involved in these projects were: Developing flexible deep learning frameworks, Spatially adaptive Denoising algorithms, Efficient Data augmentation, Digital Twinning and fusion schemes, Sophisticated data compression algorithms, Defect tracking algorithms, Nondestructive sensor development for inline inspection (ILI).

Advanced Algorithm Researcher- *Analog Garage (Boston)*　　　　　　　[May 2022 – September 2022]

At Analog Garage, I worked on Advanced Battery Monitoring (ABM) project. We developed various novel statistics-based transfer learning algorithms for EV battery state of health (SOH) estimation across various battery types. We also developed synthetic battery aging models in Ansys following complex test protocols like in real experiments.

Solution Integrator-*Ericsson*　　　　　　　　　　　　　　　　[September 2015 – May 2018]

I worked in R&D and Operations for Work Force Management (WFM) in Kolkata, India. There I developed optimized algorithms and new customized routines and policies for mobile touch customization using C#, Click and JQuery that enable dispatchers and technicians to communicate feedback in real time.

TECHNICAL SKILLS

- **General Purpose Programming Languages:** C, SQL, C#
- **Scripting and Scientific Computing software:** R, Matlab, Scilab, Python (Efficient in PyTorch, Tensorflow, Keras, OpenCV, Scikit-learn, Pandas, NumPy), UNIX commands. GIT version control
- **EDA, FEM & Document Typesetting:** COMSOL, ANSYS, ADS, Altium Designer, Circuit Maker, LATEX, MS Office

PEER REVIEWED PUBLICATIONS AND UNDER SUBMISSION ARTICLES

JOURNAL PAPERS

- Improved joint modelling of radiomic features and hazard by image registration aided longitudinal CT data, ***Subrata Mukherjee**, Qian Cao, Thibaud Coroller, Craig Wang (submitted in IOP Science)*

- [Robust defect detection under uncertainties using spatially adaptive Capacitive Sensing](), ***Subrata Mukherjee, Lalita Udpa, Yiming Deng***, Journal of Applied Physics 131, 234901 (2022)

- [Dynamic Defect Detection in Fast, Robust NDE Methods by Transfer Learning Based Optimally Binned Hypothesis Tests](), ***Subrata Mukherjee**, Lalita Udpa, Yiming Deng Research in Nondestructive Evaluation*.

- [Enhanced Defect Detection in NDE Using Registration aided Heterogeneous Data Fusion](), ***Subrata Mukherjee, Ciaron Hamilton, Xuhui Huang, Lalita Udpa, Yiming Deng,** NDT & E International, 102964*

- [Inline Pipeline Inspection Using Hybrid Deep Learning Aided Endoscopic Laser Profiling](), ***Subrata Mukherjee, Yiming Deng,** Journal of Non-destructive Evaluation, Springer (2022)*.

- [A Kriging-Based Magnetic Flux Leakage Method for Fast Defect Detection in Massive Pipelines](), ***Subrata Mukherjee, Xuhui Huang, Lalita Udpa, Yiming Deng*.** ASME Journal of Nondestructive Evaluation, Diagnostics and Prognostics of Engineering Systems, 2021.

- [Navigation Algorithm Based on The Boundary Line of Tillage Soil Combined with Guided Filtering and Improved Anti-Noise Morphology](), *Wei Lu, Mengie Zeng, Ling Wang, Hui Luo, **Subrata Mukherjee**, Xuhui Huang, Yiming Deng*. Sensors (Basel), 19(18):3918, 2019.

- [Adaptive Segmentation-based Evaluation of Material Properties of Dielectric Sheets using Microwave NDE](#) *Shankar Aenagandula, **Subrata Mukherjee**, Neeraj Rao, Yiming Deng*. Nondestructive Testing, July 2023.

BOOK CHAPTER
- Signal and Image Processing for Electromagnetic testing, ***Subrata Mukherjee**, Lalita Udpa (ASNT forthcoming 2024)*

PEER REVIEWED CONFERENCE PAPERS
- [Image Registration based Automated Lesion Correspondence and Tracking Pipeline for Longitudinal CT Data](#), ***Subrata Mukherjee**, Thibaud Coroller, Craig Wang, Ravi k. Samala, Tingting Hu, Didem Gokcay Berkman Sahiner, Nicholas Petrick, Qian Cao, IEEE* PHM (ICPHM) 2024 (Accepted).

- Early Assessment of Progression-Free Survival in Metastatic Breast Cancer: Radiomic Analysis from Initial Post-Treatment CT Data, ***Subrata Mukherjee**, Qian Cao, Thibaud Coroller, Craig Wang*, RSNA 2024 (accepted).

- [Defect Tracking Via NDE Based Transfer Learning,](#) ***Subrata Mukherjee**, Vivek Rathod, Xuhui Huang, Lalita Udpa, Yiming Deng,* IEEE PHM Detroit (ICPHM) 2020.

- [Accurate Material Characterization of Wideband RF Signals via Registration-based Curve Fitting Model using Microstrip Transmission Line](#), ***Subrata Mukherjee**, Lalita Udpa, Yiming Deng,* accepted in IEEE PHM Quebec (ICPHM) 2023.

- [Enhanced Defect Detection in NDE Using Pixel Level Data Fusion](#), ***Subrata Mukherjee**, Lalita Udpa, Yiming Deng,* Applied Computational Electromagnetics Society (ACES) 2023.

- [Rapid Material Characterization Using Smart Skin with Functional Data Analysis](#), *Rajendra P Palanisamy, **Subrata Mukherjee**, Mahmood, Yiming Deng,* IEEE PHM Europe (PHME) 2021.

- [FEM of Magnetic Flux Leakage Signal for Uncertainty Estimation in Crack Depth Classification using Bayesian Convolutional Neural Network and Deep Ensemble](#), *Li, Zi, Xuhui Huang, Obaid Elshafiey, **Subrata Mukherjee**, and Yiming Deng.* ACES, pp. 1-4. IEEE, 2021.

- [Machine Learning Enabled Damage Classification in Composite Laminated Beams Using Mode Conversion Quantification](#), *Vivek Rathod, **Subrata Mukherjee**, Yiming Deng,* SPIE Proceedings 2020.

- [Extracting Mode Converted Guided Wave Response Due to Delamination Using Embedded Thin Film Sensors](#), *Vivek Rathod, **Subrata Mukherjee**, Lalita Udpa, Yiming Deng*, IEEE PHM Detroit (ICPHM) 2020.

- [Fatigue Damage Prognosis in Adhesive Bonded Composite Lap-Joints Using Guided Waves](#), *Rajendra P Palanisamy, **Subrata Mukherjee**, Lalita Udpa, Yiming Deng,* IEEE PHM Detroit (ICPHM) 2020.

- [A Kriging Based Fast and Efficient Method for Defect Detection in Massive Pipelines Using Magnetic Flux Leakages](#), ***Subrata Mukherjee**, Xuhui Huang, Lalita Udpa, Yiming Deng,* IMECE 2020.

- [NDE Based Cost-Effective Detection of Obtrusive and Coincident Defects in Pipelines Under Uncertainties](#), ***Subrata Mukherjee**, Xuhui Huang, Lalita Udpa, Yiming Deng,* IEEE PHM Paris 2019.

- Dynamic Tracking of Defects in Pipelines Via NDE Based Transfer Learning, *Subrata Mukherjee, Xuhui Huang, Lalita Udpa, Yiming Deng,* QNDE Conference Proceeding Portland 2019.

REVIEWER

Review consults at FDA, IEEE Sensors, IEEE Transaction on Instrumentation and Measurement, Springer Nature-Journal of Nondestructive Evaluation (JNDE), Research in Nondestructive Evaluation (RNDE), IEEE PHM, IMECE (ASME), British Journal of Radiology (BJR), and Medical Physics.

PH.D. COURSES UNDERTAKEN

Computer Vision, Pattern Recognition and Analysis, Artificial Neural Networks, Statistical Computation, Computational Imaging and Compressed Sensing, Detection and Estimation Theory, Computational Modelling, Electromagnetic Fields and Waves-1, Sensor Technologies for NDE, Multi Objective Optimization Using Evolutionary Algorithms, Millimeter Wave Electronics.