# Moni Shankar Dey

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## Education

**Indian Institute of Technology, Bombay** — Aug 2020
M.Tech. in Geo-Informatics | Specialization - Image Analysis — CPI - 9.58

- Thesis: *Attention Morph-UNet for Linear Structure Extraction from Satellite Images*
- Key Course: Machine Learning for RS, Deep Learning, Geospatial Data Analysis, Advanced Image Processing

**Presidency University, Kolkata** — Aug 2017
M.Sc. in Physics | Specialization - Radio Astronomy — CPI - 7.21

- Thesis: *Simulating Foregrounds for Redshifted HI 21 cm Signal Study of Epoch of Reionization (EoR)*
- Key Course: Computational Physics, Radio Astrophysics, Gravity & Cosmology, Quantum Field Theory

## Publications

- **Dey, M. S**., Chaudhuri, U., Banerjee, B., & Bhattacharya, A. (2021). Dual-Path Morph-UNet for Road and Building Segmentation From Satellite Images. *IEEE Geoscience and Remote Sensing Letters* ( 2021).
- R. Mondal, **M. S. Dey**, and B. Chanda, "Image Restoration by Learning Morphological Opening-Closing Network," *Mathematical Morphology-Theory and Applications*, vol. 4, no. 1, pp. 87–107,2020.

## Experience

**Rakuten Mobile** — Nov 2020 - Present
Software Engineer — Tokyo

- Part of 30+ member team responsible for developing **Link**, Rakuten Mobile's flagship app
- Entrusted with developing Proof of Concepts (**PoC**) & **features** for Voicemail, Greetings and Call sections
- Implemented unit **test case** for code **robustness**, including edge cases, usability & general reliability
- Collaborating closely with **cross-cultural** product & UI teams across the time zones under **agile** methodologies

**Indian Statistical Institute** — May 2019 - Aug 2019
Machine Learning Research Intern — Kolkata

- Investigated **image processing** operations and ways to incorporate them in **deep learning** based framework
- Developed **morphological neural network** (**MNN**) for **style transfer** & **pencil sketch** on *MIT Adobe Dataset*
- Designed **Deep-MNN** in **Tensorflow** for **crowd strength estimation** & achieved **18.3 %** accuracy improvement over Multi-Column Convolutional Neural Network (**MC-CNN**) on *ShanghaiTech dataset*

**SustLabs** — Dec 2018 - Jan 2019
Data Science Intern — Mumbai

- Responsible for building **dataset** of **30+** home and industrial appliances for non intrusive load monitoring (**NILM**)
- Detected individual **appliance signature** from **smart meter** aggregate load data using Scikit & Pandas

## Major Projects

**Dual Path Morph-UNet (DPM-UNet) for Road & Building Segmentation from Satellite Images** — Sep 2021

- Designed novel **DPM-UNet** for aerial object **segmentation** based solely on their **morphological** features.
- Incorporated **residual** & **dense** path in **UNet** architecture resulting in reduced redundancy & **small model size**
- Achieved state of the art (**SOTA**) on road & building **segmentation** while having **10x** less parameters (**0.45 mil.**)

**Image Restoration by Using Deep Morphological Opening-Closing Network** — Sep 2020

- Designed **Alternate Sequential Filter** based morphological network for **de-raining** and **de-hazing** images
- **Reconstructed** de-hazed image by estimating **airlight** and **transmittance** map using **joint DSSIM loss**
- Achieved **SOTA** on *O-HAZE*, *D-HAZY*, and *Rain* dataset for de-hazing & de-raining tasks respectively

**Hourly Micro-Climatic Parameter Forecasting using Deep Learning** — Nov 2021

- Performed **EDA** & removed **trend** and non **stationarity** from micro climatic **time series** IoT data
- Extracted **multiple seasonalities** using **Fourier** transform & utilized it as **exogenous** variables in **ARIMA** model
- Developed model consisting of **1D CNN** & achieved **23%** lower **MAPE** compared to ARIMA for **hourly forecast**

## Skills

Python | Swift | C | Tensorflow | Keras | TFLite | OpenCV | Scikit | CoreML | MapKit | RxSwift | Git | ENVI | ArcGIS