MILLEND ROY

millend.roy@columbia.edu | millendroy.github.io | Google Scholar | +1 (646)-206-1452

Education

Columbia University, New York *2023 - Present*
M.S. - Ph.D. in Operations Research
GPA : 3.75/4.0
Advisor : Dr. Agostino Capponi

Indian Institute of Technology (IIT), Dhanbad *2017 - 2021*
B.Tech in Electrical Engineering (EE)
GPA : 9.51/10.0 (**Institute Silver Medalist**)
Advisor : Dr. Bhukya K. Naick

Work Experience & Research Projects

Microsoft Research Lab India, *Technology and Empowerment Lab*
– *SCAI Research Fellow* with Dr. Akshay Nambi, Dr. Shivkumar Kalyanaraman *July 2021 - July 2023*

1. EnCortex, a Decision Management Framework for Smart Grid Utility.
   * Built core energy abstractions that are easily extensible.
   * Paired with modular optimizers including stochastic, traditional and reinforcement learning techniques.
   * Worked on a range of use-case scenarios:
     Carbon Arbitrage, Micro-grid Profit Maximization, Demand Matching and Bidding
   * MLOps compatibile for retraining, and finetuning RL models: Worked on Behaviour Cloning, OfflineRL, Far-Transfer and Near-Transfer
2. Anomaly detection in electric vehicle's battery systems.
   * Modeled battery life cycles, State of Health (SoH) and rate of battery degradation.
   * Used clustering algorithms to group batteries of similar behaviour.
   * Extracted trends and seasonality across time in the patterns of battery degradation.

– *Research Intern* with Tanuja Ganu, Dr. Akshay Nambi *Mar 2021 - July 2021*
Energy consumption modeling for an electric vehicle fleet.
* Direct use of primary features (like trip distance, trip expected time, etc) available before the trip.
* Predicted Secondary non-trivial features (like regenerative braking energy, overspeeding, harshbraking counts, etc) through extensive feature engineering process
* Prepared a 2-stage Model using LightGBM and AdaBoost
* Work published in ACM COMPASS'22

Hurrey Tech Ventures R&D *April 2020 - Sept 2020*
Data Science Intern
Hurr.AI, a reinforcement learning (AIEd and NLTK) based Recommendation Engine to surface '3Rs' : the right learning material to the right student at the right time.

Indian Institute of Technology (IIT), Delhi, *Comm. Networks Lab* *May 2019 - July 2019*
Summer Research Fellow with Akash K. Mondal, Dr. Swades De
* A comprehensive survey of islanding detection methods.
* Synchro-Phasor Measurement Unit based anti-islanding detection in IEEE 9 Bus System.
* Designed Simulation Relays using SR Flip Flop logics and programmed auto-reclosures in circuit breakers.
* Generated a large fault-detection Dataset for later research.

Publications

Under Review * - equal contribution

1. EnCortex: A General, Extensible and Scalable Framework for Decision Management in New-age Energy Systems Vaibhav Balloli*, **Millend Roy***, Anupam Sobti, Tanuja Ganu, Akshay Nambi. In: *ACM COMPASS JCSS.*

Journal

2. Machine Learning Based Adaptive Fault Diagnosis considering Hosting Capacity Amendment in Active Distribution Network Sourav Kumar Sahu, **Millend Roy**, Soham Dutta, Debomita Ghosh, Dusmanta Kumar Mahanta. In: *Electric Power Systems Research (EPSR'23)*

1. A Data-Driven Fault Detection Approach with an Ensemble Classifier based Smart Meter in Modern Distribution System Soham Dutta*, Sourav Kumar Sahu*, **Millend Roy**, Pradip Kumar Sadhu. In: *Sustainable Energy, Grids*

and Networks (SEGN'23)

Conference Publications

3. Reliable Energy Consumption Modeling for an Electric Vehicle Fleet **Millend Roy**, Akshay Nambi, Anupam Sobti, Tanuja Ganu, Shivkumar Kalyanaraman, Shankar Akella, Jaya Subha Devi, and S A Sundaresan. In: *ACM SIGCAS/SIGCHI Conference on Computing and Sustainable Societies (COMPASS). COMPASS'22. Seattle, WA, USA*
2. A Deep Learning Framework for Enhancing Maritime Coastal Security **Millend Roy**, Abhinav Gautam, Aayush Sugandhi. In: *2021 2nd IEEE International Conference for Emerging Technology (INCET). INCET'21. Belgaum, Belagavi, India*
1. Renewable Energy and Demand Forecasting in an Integrated Smart Grid Vishnu Vardhan Sai Lanka, **Millend Roy**, Shikhar Suman, Shivam Prajapati. In: *2021 IEEE Innovations in Energy Management and Renewable Resources(IEMRE). IEMRE'21. Kolkata, India*

Theses

1. Classification of Islanding Condition Detection using an A3C based deep reinforcement learning algorithm respectively **Millend Roy**, Bhukya Krishna Naick, Kalyan Chatterjee. In: Bachelor's Thesis, EE'21, IIT Dhanbad.

Software

EnCortex - Stochastic Optimization for Renewable Energy sources. : *Microsoft Research India*
Hurr.AI - an AI enabled Recommendation Engine based Learning Platform. : *Hurrey Tech Ventures R&D*

POC Projects:

1. **Autonomous Self-Driving Car Simulation** [🔗]
   * Graphics creation using Kivy modules in Python: serving as the environment.
   * Deep Q-Learning used with specific reward policies where the taxi (3 sensors) has a to and fro journey.

2. **Seq2Seq Architecture based DL Chatbot**
   * Trained on Movie-lens dataset by building a Seq2Seq neural architecture.
   * Dropout regularization is used to remove any kind of overfitting and the losses are optimized using Adam optimizer.

Skills

Languages	Python, C++, C
Frameworks	PyTorch, StableBaselines, RLlib, rsome, Pyomo, scikit-learn, Keras, TensorFlow, NumPy, Pandas, SciPy, SymPy, Matplotlib, Seaborn, Plotly, Streamlit
Tools and Tech.	Matlab, Simulink, Tableau, Docker, Git
Courses	Linear, Convex and Combinatorial Optimzation, Stochastic Processes, Market Design, Game Theory, Theoretical Analysis of Algorithms, Control System, Signals and System, Inferential Statistics, Machine Learning by Andrew NG, Coursera Deep Learning AI Specialization

Select Awards and Honors

- Selected as the **Piyasombatkul Fellow'23** at Columbia Engineering. Sept 2023
- Convocation: Institute **Silver Medal** Holder of EE'21 batch, IIT ISM Dhanbad. Aug 2022
- TEM Talk on Smart Grid Utilities and SCAI Technical Talk on Project Vasudha, internal to MSRI. Dec 2021
- ASEAN India Hackathon'21 **Global Finalist**. Jan 2021
- **Winner** of the Grand Finale of Smart India Hackathon'20. 2020
- Samsung Innovation Awards **Finalists**. 2020
- **Press:** Contribution to Hurr.Ai led to nomination of Hurrey in SAP ET Innovation Awards. 2020

Teaching & Volunteering

* Serving as a **Ph.D. Enhanced Teaching Assistant** for the Analysis of Algorithms course, Spring 2024.
* Volunteering at Kartavya: taught Mathematics to underprivileged children; preparing them for secondary high school.

Extra Curriculars

1. Completed 5th year (Sr. Diploma) with distinction in the subject of **Painting** under Ideas Art and Craft Forum.
2. Completed 3rd year (Sangeet Bhushan Final) with first division in the subject of **Vocal Classical**.