

# Raihan Seraj

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## Education

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### Doctor of Philosophy

*McGill University* [🔗](#)

Jan 2019 – present

Montreal, Canada

- **Research Interest:** Reinforcement Learning, Multi-agent systems, Game Theory, Time series forecasting, Human in the loop control.
- **Affiliations:** Montreal Institute of Learning Algorithms (MILA), Group for Research in Decision Analysis (GERAD), Center for Intelligent Machines (CIM).

### MEng, Electrical & Computer Engineering

*McGill University* [🔗](#)

Jan 2017 – Jan 2019

Montreal, Canada

- **Thesis:** Learning in the presence of partial observability and concept drifts.
- **Graduate Courses:** Applied Machine Learning, Optimization and Optimal Control, Reinforcement Learning, Intelligent Robotics, Stochastic Control and Markov Decision Processes.

### BSc, Electrical & Electronic Engineering

*Islamic University of Technology* [🔗](#)

Dec 2011 – Dec 2015

Dhaka, Bangladesh

- **Thesis:** Classification of malignant and benign tissue using logistic regression with dynamic sigmoid function.

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## Research Experience

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### Research Scientist Intern

*Valence Drug Discovery*

Jun 2021 – Sep 2021

Montreal, Canada

- Implemented fibrous auto-encoders for constructing a latent space to generate molecules with different structures having the same activity level.
- Used latent molecular representation to construct a Markov Decision Process, and formulated a Reinforcement learning problem with the R&D team to identify scaffold hopping in molecules.

## **Research Scientist Intern**

*Paladin AI*

Mar 2020 – Oct 2020

Montreal, Canada

- Designed learning algorithms for automatic flight data segmentation through automatic feature learning.
- Performed time series analysis with data from aircraft simulators and segmented pilot reactions during faults to assign them a proficiency metric.

## **Research Scientist Intern**

*Aerial Technologies*

Mar 2018 – May 2019

Montreal, Canada

- Performed automatic feature extraction of WiFi Channel State Information (CSI) data that is robust to concept drift for the application of real-time indoor localization.
- Analyzed time series data and trained deep learning models to classify fall detection using WiFi Channel state information.

## **Research Engineer**

*Department of Biomedical Physics and Technology, University of Dhaka*

Dec 2015 – Dec 2016

Dhaka, Bangladesh

- Designed learning algorithms to automatically classify QRS complexes to detect acceptable ECG traces.
- Developed a personal computer-based telemedicine system with integrated diagnostic equipment that uses the internet for live (real-time) data transfer.
- Worked on software development for automatic frequency domain analysis to identify neurological disorders from evoked EMG responses.
- Performed software interfacing of a 12 lead computerized ECG machine in android that allows near real-time data transmission to and from remote areas.

## **Research Intern**

*IUT Innovation Lab*

Feb 2014 – Nov 2015

Dhaka, Bangladesh

- Designed embedded security systems for homes using Arduino and Raspberry Pi.
- Developed a device capable of remotely switching and regulating any 220V AC devices with real-time tweets.

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## Publications

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### **Tsetlin Machine for Solving Contextual Bandit Problems** [↗](#)

*Neural Information Processing Systems (NeurIPS) 2022*

Raihan Seraj, Jivitesh Sharma, Ole-Christoffer Granmo

### **Approximate Information State for Approximate Planning and Reinforcement Learning in Partially Observed Environments** [↗](#)

*Journal of Machine Learning Research (JMLR)*

Jayakumar Subramanian, Amit Sinha, Raihan Seraj and Aditya Mahajan

### **Mean-Field Approximation for Large-Population Beauty-Contest Games.** [↗](#)

*IEEE Conference on Decision and Control (CDC)*

Raihan Seraj, Jerome Le Ny and Aditya Mahajan.

### **Reinforcement Learning for Mean-Field Teams** [↗](#)

*AAMAS workshop on Adaptive And Learning Agents*

Jayakumar Subramanian, Raihan Seraj and Aditya Mahajan

### **The K-Means Algorithm: A Comprehensive Survey and Performance Evaluation** [↗](#)

*Multidisciplinary Digital Publishing Institute (MDPI), Electronics*

Mohiuddin Ahmed, Raihan Seraj, Salimur Chowdhury and Syed Mohammed Samsul Islam.

### **Entropy Regularization with Discounted Future State Distribution in Policy Gradient Methods** [↗](#)

*NeurIPS 2019 workshop on Optimization Foundations for Reinforcement Learning.*

Riashat Islam, Raihan Seraj, Pierre-Luc Bacon and Doina Precup.

### **Doubly Robust Off-Policy Actor Critic Algorithms for Reinforcement Learning** [↗](#)

*NeurIPS 2019 workshop on Safety and Robustness in Decision Making*

Riashat Islam, Raihan Seraj, Samin Yeasar Arnob and Doina Precup

### **Concept Drift for Big Data** [↗](#)

*Combating Security Challenges in the Age of Big Data. Advanced Sciences and Technologies for Security Applications. Springer, Cham*

Raihan Seraj, Mohiuddin Ahmed

### **Handling concept drift in wi-fi-based localization** [↗](#)

*US Patent App. 17/383,654, 2021 "Handling concept drift in wi-fi-based localization*

LIU Qianyu, N Ghourchian, MA Martinez and Raihan Seraj

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## Skills

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### **Programming Languages**

*Python, Matlab, C, Java, Julia*

### **Frameworks**

*Numpy, Pandas, Scikit-Learn, Pytorch, Tensorflow, Chainer*

### **Systems**

*Linux, OSX*

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## Positions of Responsibility

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<b>Reviewer</b> <i>International Conference on Machine Learning (ICML)</i>	2022
<b>Reviewer</b> <i>American Control Conference (ACC)</i>	2021
<b>Teaching Assistant</b> <i>COMP 360, Algorithm Design, McGill University</i>	2020 Montreal, Canada
<b>Teaching Assistant</b> <i>ECSE 324, Computer Organization, McGill University</i>	2019 Montreal, Canada
<b>Teaching Assistant</b> <i>COMP 760, Intelligent Robotics, McGill University</i>	2019 Montreal, Canada
<b>President</b> <i>IEEE, IUT Student Branch</i>	2014 Dhaka, Bangladesh

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## Awards

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<b>GERAD co-supervised student award</b> <i>GERAD</i> Winner of the GERAD research grant competition for co-supervised graduate students.	Feb 01, 2019
<b>McGill Engineering Doctoral Award (MEDA)</b> <i>McGill University</i> Awarded to doctoral students based on the excellence of the student's academic and research record.	Jan 01, 2019
<b>MITACS Accelerate Fellowship</b> <i>MITACS</i> Award provided to carry out extensive research in industries.	May 05, 2018
<b>Graduate Excellence Fellowship</b> <i>McGill University</i> Award to support outstanding Master's students.	Jan 01, 2018
<b>Daily Star Award</b> <i>The Daily Star</i> Award to recognize outstanding performers in GCE O and A-levels.	Jun 01, 2011

## **Entrance exam scholarship**

Dec 25, 2011

*Islamic University of Technology*

Merit-based scholarship awarded during the university entrance examination.



## **References**

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**Available upon request.**