

Gaith Rjoub

RESEARCH ASSISTANT · CLOUD EXPERT

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“Be the change that you want to see in the world.”

Summary

Experienced of working in the higher education industry. Skilled in research and teaching in the areas of Big Data, Deep learning, Federated Learning, cloud computing, Task Scheduling and Internet of Things. Strong education professional with a Doctor of Philosophy (Ph.D.) focused in Information and Systems Engineering from Concordia University.

Education

Concordia University, Concordia Institute for Information Systems Engineering (CIISE)

DOCTOR OF PHILOSOPHY (PHD) IN INFORMATION AND SYSTEM ENGINEERING

Montreal, Canada

Jan. 2015 - Dec. 2021

Concordia University, Concordia Institute for Information Systems Engineering (CIISE)

MASTER DEGREE OF QUALITY SYSTEM ENGINEERING

Montreal, Canada

Jan. 2010 - Dec. 2013

Concordia University, Computer Science and Software Engineering (CSSE)

DIPLOMA - GRADUATE, COMPUTER SCIENCE

Montreal, Canada

Sep. 2009 - Dec. 2009 (discontinued)

Arab Open University

BACHELOR DEGREE OF INFORMATION TECHNOLOGY AND COMPUTERIZATION

Amman, Jordan

Jan. 2004 - Jun. 2008

Al-Balqa Al-Tatbiqiyya University

DIPLOMA DEGREE OF AIR CONDITIONING ENGINEERING

Amman, Jordan

Jan. 2000 - Dec. 2002

Work Experience

Concordia University

POSTDOCTORAL RESEARCHER

Montreal, Canada

jun. 2022 - Present

- Develop an artificial intelligence (AI) management device for cardiopulmonary resuscitation.
- Develop A formal and automatic framework with advanced control models and algorithms to optimize and personalize resuscitation for each patient.
- Design models and algorithms that will allow the device to be autonomous and adapt optimally to different situations and physiological variations.

Concordia University

RESEARCH ASSOCIATE

Montreal, Canada

Jan. 2022 - May 2022

- Initiated, designed, and executed 2 independent projects
 - Proposing a trust-based deep reinforcement learning approach to select the most adequate client in healthcare domain and applying our approach in a COVID-19 detection scenario over IoT devices.
 - Proposing an object detection system over Autonomous Vehicles that capitalizes on the You Only Look Once (YOLO) emerging Convolutional Neural Network (CNN) approach, together with a Federated Learning (FL) framework with the aim of improving the detection accuracy in adverse weather circumstances in real-time.
- Mentored and trained 2 graduate students.

Concordia University

Montreal, Canada

RESEARCH ASSISTANT

Jan. 2015 - Dec. 2021

- Proposed deep and reinforcement learning-based scheduling approaches to automate the process of scheduling large-scale workloads onto cloud computing resources.
- Proposed a trust model to be an integral part of the decision-making process and therefore design a trust establishment mechanism between the edge server and IoT devices.
- Designed a Double Deep Q Learning (DDQN)-based scheduling algorithm that takes into account the trust scores and energy levels of the IoT devices to make appropriate scheduling decisions.
- Proposed an object detection system over AVs that capitalizes on the You Only Look Once (YOLO) emerging convolutional neural network (CNN) approach, together with a Federated Learning (FL) framework with the aim of improving the detection accuracy in adverse weather circumstances in real-time.

Concordia University

Montreal, Canada

TEACHING ASSISTANT

Sep. 2021 - Dec. 2021

- Course: SOEN 342 Software Requirements and Specifications
 - Introduced students to the apply standard modeling techniques, such as UML, within an industry-grade project.
 - Explained the main advancements and challenges for formal requirements specification, verification, apply requirements traceability, risk analysis, evaluation, and quality assurance methods.
- Course: SOEN 343 Software Architecture and Design
 - Developed and delivered tutorials that helped students Identify, generate design deliverables, and manipulate UML to solve a design problem.
 - Assisted students in apply design patterns for specific design situation, draw the behavioral model using different techniques.

Concordia University

Montreal, Canada

TEACHING ASSISTANT

Jan. 2021 - May. 2021

- Course: SOEN 6431 Software Comprehension and Maintenance
 - Taught students how to analyse code and apply software evolution activities such as refactoring, impact analysis and software migration for specific case studies.
 - Assisted students to evaluate software based on its characteristics: Repositories, mining software repositories, versioning... etc.
- Course: INSE 6250 Quality Methodologies for Software
 - Explained the main advancements and challenges of the software engineering, software process principles, and apply quality methodologies for Software.
 - Assisted students to understand and apply verification techniques for software, particularly model checking.
- Course: SOEN 342 Software Requirements and Specifications
 - Introduced students to the apply standard modeling techniques, such as UML, within an industry-grade project.
 - Explained the main advancements and challenges for formal requirements specification, verification, apply requirements traceability, risk analysis, evaluation, and quality assurance methods.
- Course: SOEN 343 Software Architecture and Design
 - Developed and delivered tutorials that helped students Identify, generate design deliverables, and manipulate UML to solve a design problem.
 - Assisted students in apply design patterns for specific design situation, draw the behavioral model using different techniques.

Xperts Solutions Inc.

Quebec, Canada

AI AND ML FOR CYBERSECURITY

Sep. 2020 - Jan. 2021

- Build a large cloud-based data warehouse to store the user access and entitlement data on a global scale, with low-latency access to data and Analysis-Ready and Analytics-Optimized structure of data.
- Design and implement deep learning techniques on the data warehouse to detect and report abnormal entitlements and activities at the level of users.

Concordia University

Montreal, Canada

TEACHING ASSISTANT

Jan. 2020 - May. 2020

- Course: COEN 244 PROGRAMMING METHODOLOGY II
 - Taught students how to implement C++ solutions using proper object-oriented concepts and C++ language constructs.
 - Performed the marking of several assignments and the invigilation of several exams.
- Course: COMP 348 PRINCIPLES OF PROGRAMMING LANGUAGES.
 - Developed and delivered tutorials that helped students understand the logic of different artificial intelligence programming languages such as Prolog, Lisp, Ruby, C, and AspectJ.
 - Assisted students with handling implementation problems and developing advanced intelligent applications.
 - Performed the marking of several assignments and the invigilation of several exams.
- Course: SOEN 287 WEB PROGRAMMING.
 - Assisted students in Internet architecture and protocols; Web applications through clients and servers; markup languages; client-side programming using scripting languages; static website contents and dynamic page generation through server-side programming; preserving state in Web applications.

Concordia University

Montreal, Canada

TEACHING ASSISTANT

Sep. 2019 - Dec. 2019

- course: COMP 232 MATHEMATICS FOR COMPUTER SCIENCE.
 - Introduced students to the basic abstractions from Discrete Mathematics that are of central relevance in Computer Science.
 - Prepared students for courses on the foundations of computation.
- course: COMP 348 PRINCIPLES OF PROGRAMMING LANGUAGE.
 - Developed and delivered tutorials that helped students understand the logic of different artificial intelligence programming languages such as Prolog, Lisp, Ruby, C, and AspectJ.
 - Assisted students with handling implementation problems and developing advanced intelligent applications.
 - Performed the marking of several assignments and the invigilation of several exams.

Concordia University

Montreal, Canada

TEACHING ASSISTANT

Jul. 2019 - Aug. 2019

- course: INSE 6260 SOFTWARE QUALITY ASSURANCE.
 - Explained the main advancements and challenges of the quality assurance and software inspection concepts and developed tutorials to teach students how to inspect huge software using software verification, testing processes, static analysis, control-flow analysis, data-flow analysis, control-flow testing, loop testing, data-flow testing, transaction flow testing.

Concordia University

Montreal, Canada

STUDENT RESEARCHER

Jul. 2012 - Nov. 2013

- Worked in the reliability, maintenance optimization, and condition monitoring, for tool wear estimation in dry milling operation systems.
- Proposed an artificial neural network approach for remaining useful life prediction for tool wears estimation in dry milling operation.

Royal Jordanian Air Force

Amman, Jordan

AIR CONDITIONING TECHNICIAN

June. 2002 - 2008

- Responsibilities included: installing, servicing, and repairing heating and air conditioning systems in The Jordanian air force establishments, complying with all applicable standards, policies, and procedures.
- Read and comprehend technical specifications and manuals using United States Air force Standards.

Summary Skills

PRINCIPAL APPLICANT

Total number of publications: 19 (8 journal articles, 11 conference papers), h-index: 8, total number of citations: 245, reviewer and technical program committee member for more than 10 refereed journals and conferences.

RESEARCH INTERESTS

Cloud computing, big data, Cybersecurity, task scheduling, deep learning, federated learning, Internet of Thing (IoT), and reinforcement learning.

SOFT SKILLS

Leadership, strong communication skills, teamwork, ability to work under pressure, and public speaking.

TEACHING SKILLS

Adjunct professor, teaching assistant, and laboratory demonstrator for 10 courses in the subjects of programming languages, software quality assurance, Web services, mathematics for computer science, and programming methodology.

LANGUAGE SKILLS

- Arabic—Native.
- English—Fluent.
- French—Beginner.

Presentation

The IEEE 5th International Conference on Future Internet of Things and Cloud (FiCloud)

Prague, Czech Republic

PRESENTER FOR <CLOUD TASK SCHEDULING BASED ON SWARM INTELLIGENCE AND MACHINE LEARNING>

Aug. 2017

- Introduced a hybrid approach, called Multi Label Classifier Chains Swarm Intelligence (MLCCSI). This approach is based on two strategies. The first strategy is the swarm intelligence, which we applied on, Ant Colony Optimization (ACO) algorithm, Artificial Bee Colony (ABC) algorithm and, Particle Swarm Optimization (PSO) algorithm to find the optimal resource allocation for each task in the dynamic cloud system. Then, the second strategy is the application of the machine learning algorithm (Classifier Chains) on the results from the three algorithms and generate a new hybrid model considering the size of the tasks and the number of the virtual machines.

The IEEE 7th International Conference on Future Internet of Things and Cloud (FiCloud)

Istanbul, Turkey

PRESENTER FOR <DEEP SMART SCHEDULING: A DEEP LEARNING APPROACH FOR AUTOMATED BIG DATA SCHEDULING OVER THE CLOUD>

Aug. 2019

- Introduced a Deep learning Smart Scheduling (DSS), an automated big data task scheduling approach in cloud computing environments. DSS combines Deep Reinforcement Learning (DRL) and Long Short-Term Memory (LSTM) to automatically predict the Virtual Machines (VMs) to which each incoming big data task should be scheduled to so as to improve the performance of big data analytics and reduce their resource execution cost.

The International Conference on Service Oriented Computing (ICSOC)

Dubai, UAE

PRESENTER FOR <A TRUST AND ENERGY-AWARE DOUBLE DEEP REINFORCEMENT LEARNING SCHEDULING STRATEGY FOR FEDERATED LEARNING ON IoT DEVICES>

Dec. 2020

- Introduced a trust establishment technique for the IoT devices with a Double Deep Q-Network (DDQN) reinforcement learning-based algorithm which enables the edge servers to find the optimal scheduling decisions in terms of energy efficiency and the trustworthiness. DDQN algorithm is designed to solve the optimization problem while modeling the uncertainty that the server faces regarding the resource and trust levels of the IoT devices.

The International Conference on Mobile Web and Intelligent Information Systems (MobiWis)

Rome, Italy

PRESENTER FOR <IMPROVING AUTONOMOUS VEHICLES SAFETY IN SNOW WEATHER USING FEDERATED YOLO CNN LEARNING>

Aug. 2021

- Introduced an object detection system over AVs that capitalizes on the You Only Look Once (YOLO) emerging convolutional neural network (CNN) approach, together with a Federated Learning (FL) framework with the aim of improving the detection accuracy in adverse weather circumstances in real-time.

Publications

JOURNAL ARTICLES (REFEREED)

Gaith Rjoub*, Jamal Bentahar, and Omar Abdel Wahab. "BigTrustScheduling: Trust-aware big data task scheduling

approach in cloud computing environments.” Future Generation Computer Systems (2019), DOI:10.1016/j.future.2019.11.019 [**Impact Factor: 7.187**].

Omar Abdel Wahab, Robin Cohen, Jamal Bentahar, Hadi Otrok and Azzam Mourad, **Gaith Rjoub***. ”An Endorsement-based Trust Bootstrapping Approach for Newcomer Cloud Services”. Information Sciences (2019) [**Impact Factor: 6.795**].

Gaith Rjoub*, Jamal Bentahar, Omar Abdel Wahab, Ahmed Bataineh. ”Deep and Reinforcement Learning for Automated Task Scheduling in Large-Scale Cloud Computing Systems”. Concurrency and Computation: Practice and Experience. DOI:10.1002/cpe.5919 , 2020, [**Impact Factor: 1.536**].

Ahmed Saleh Bataineh, Jamal Bentahar, Omar Abdel Wahab, Rabeb Mizouni, **Gaith Rjoub***, May El Barachi. ”Cloud computing as a platform for monetizing data services: A two-sided game business model”. IEEE Transactions on Network and Service Management. 2021, [**Impact Factor: 4.195**].

Nagat Drawel, Jamal Bentahar, Amine Laarej, **Gaith Rjoub***. ”Formal Verification of Group and Propagated Trust in Multi-Agent Systems, to Autonomous Agents and Multi-Agent Systems”. Journal of Autonomous Agents and Multi-Agent Systems, 2022, [**Impact Factor: 1.595**].

Gaith Rjoub*, Jamal Bentahar, Omar Abdel Wahab, Ahmed Bataineh. ”Trust-driven Reinforcement Selection Strategy for Federated Learning on IoT Devices”. Springer Computing, 2022, [**Impact Factor: 2.258**].

Omar Abdel Wahab, **Gaith Rjoub***, Jamal Bentahar, Ahmed Bataineh. ”Federated against the Cold: A Trust-based Federated Learning Approach to Counter the Cold Start Problem in Recommendation Systems”. Information Sciences, 2022 [**Impact Factor: 3.82**].

Gaith Rjoub*, Jamal Bentahar, Omar Abdel Wahab, Robin Cohen, Ahmed Bataineh. ”Trust-augmented Deep Reinforcement Learning for Federated Learning Client Selection”. Information Systems Frontiers, 2022, [**Impact Factor: 5.261**].

CONFERENCE PAPERS (REFEREED)

Gaith Rjoub*, Jamal Bentahar. ”Cloud Task Scheduling Based on Swarm Intelligence and Machine Learning”. The International Conference on Future Internet of Things and Cloud (FiCloud), Prague, Czech Republic, 2017, (**First author**).

Gaith Rjoub*, Jamal Bentahar, Omar Abdel Wahab, Ahmed Bataineh. ”Deep Smart Scheduling: A Deep Learning Approach for Automated Big Data Scheduling over the Cloud”. The International Conference on Future Internet of Things and Cloud (FiCloud), Istanbul, Turkey, 2019, (**First author**).

Gaith Rjoub*, Omar Abdel Wahab, Jamal Bentahar, Ahmed Bataineh. ”A Trust and Energy-Aware Double Deep Reinforcement Learning Scheduling Strategy for Federated Learning on IoT Devices”. The International Conference on Service Oriented Computing (ICSOC 2020), Dubai, UAE, 2020, (**First author**)

Nagat Drawel, Jamal Bentahar, Amine Laarej, **Gaith Rjoub***. ”Formalizing Group and Propagated Trust in Multi-Agent Systems”. The International Joint Conference on Artificial Intelligence (IJCAI 2020), Yokohama, Japan, 2020

Ahmed Bataineh, Jamal Bentahar, Omar Abdel Wahab, Rabeb Mizouni, **Gaith Rjoub***. ”A game-based secure trading of big data and IoT services: Blockchain as a two-sided market”. The International Conference on Service Oriented Computing (ICSOC 2020), Dubai, UAE, 2020

Gaith Rjoub*, Omar Abdel Wahab, Jamal Bentahar, Ahmed Bataineh. "Improving Autonomous Vehicles Safety in Snow Weather Using Federated YOLO CNN Learning". The International Conference on Mobile Web and Intelligent Information Systems (MobiWis) , Rome, Italy, 2021, **(First author)**.

Ahmed Saleh Bataineh, Jamal Bentahar, Rabeb Mizouni, Omar Abdel Wahab, **Gaith Rjoub***, May El Barachi. "Cloud as platform for monetizing complementary data for AI-driven services: A two-sided cooperative game". IEEE International Conference on Service Computing (SCC 2021).

Gaith Rjoub*, Jamal Bentahar, Y A Joarder. "Active Federated YOLOR Model for Enhancing Autonomous Vehicles Safety". The International Conference on Future Internet of Things and Cloud (MobiWIS 2022).

Gaith Rjoub*, Jamal Bentahar, Omar Abdel Wahab. "Explainable AI-based Federated Deep Reinforcement Learning for Trusted Autonomous Driving". IEEE International Wireless Communications and Mobile Computing Conference (IWCMC 2022) .

Gaith Rjoub*, Jamal Bentahar, Omar Abdel Wahab, Nagat Drawel. "One-Shot Federated Learning-based Model-Free Reinforcement Learning". The International Conference on Deep Learning, Big Data and Blockchain (DBB 2022).

SUBMITTED JOURNAL ARTICLES (REFEREED)

Gaith Rjoub*, Jamal Bentahar, Omar Abdel Wahab, Robin Cohen. "A Survey on Explainable Artificial Intelligence for Cybersecurity". IEEE Transactions on Neural Networks and Learning Systems, 2022, **[Impact Factor: 14.255], (Submitted)**.

THESES

Artificial Intelligence Models for Scheduling Big Data Services on the Cloud, Concordia University, October 2021.

Technical Skills

Programming Languages: Python, Java, ASP.NET, PHP, C, C++, PL-SQL, MATLAB, R, Scala, and Prolog.

Technologies: DevOps, Apache Spark ecosystem, Amazon Web Services, TensorFlow.

Microsoft Office Tools: Word, Excel, Power Point, Lync, Project, and Visio.

Research Funding History

PROJECTS

Machine Learning Solutions for Detecting Suspicious and Abnormal Access Roles and Entitlements

Funding Source:

- Mitacs Accelerate (Canada's premier research internship program)

Improving Autonomous Vehicles Safety in Snow Weather

Funding Source:

- Natural Sciences and Engineering Research Council of Canada (NSERC)
- Innovation for Defence Excellence and Security (IDEaS)

Trust-aware big data task scheduling approach in cloud computing environments

Funding Source:

- SRT program of Gina Cody School of Engineering and Computer Science

Extracurricular Activity

International Conference on Autonomous Agents and Multiagent Systems (AAMAS)

Montreal, Canada

VOLUNTEER COORDINATORS

May, 2019

- Coordinate and monitor AAMAS Conference activities.
- Partake in AAMAS Conference preparation, and supervise the execution of services rendered.

Google Cloud On Board Workshop

Montreal, Canada

PARTICIPANT

Nov. 2017

- Attending the Google Cloud OnBoard event at the Sheraton.

Al-Yarmouk University

Irbid, Jordan

TRAINER

Sep. 2008 - Feb. 2009

- Training at Yarmouk University for six months: networking and maintenance.
 - Skilled in network security, administration, and operating system software.
 - Detailed understanding of processors and circuit boards.

PROFESSIONAL SERVICES

Undergraduate & Graduate Student Mentorship (Supervision):

- **YA Joarder** (PhD) - Concordia University
Project: Active Federated YOLOR Model for Enhancing Autonomous Vehicles Safety.
- **Saidul Islam** (MSc) - Concordia University
Project: Natural Language Processing with Transformers.
- **Alyssa Song** (BSc) - University of Waterloo
Project: Explainable Artificial Intelligence (XAI) for Cybersecurity.

Reviewer for the following journals:

- Ad Hoc Networks (Elsevier)
- IEEE Transactions on Services Computing (ISC)
- Natural Computing (Springer)
- Future Generation Computer Systems (Elsevier)
- IEEE Internet of Things Journal
- IEEE Transactions on Network and Service Management

Reviewer for the following international conferences:

- The International Conference on Web Services (ICWS 2020)
- IEEE International Conference on Communications (ICC 2020)

- The International Conference on Autonomous Agents and Multiagent Systems (AAMAS 2019)
- The International Conference on Web Services (ICWS 2019)
- The International Conference on Future Internet of Things and Cloud (FiCloud 2022)
- IEEE Global Communications Conference IoT and Sensor Networks. (IEEE GLOBECOM 2022)

Conferences session chair:

- Advanced Networks and Services (FiCloud 2019)

Editorial Board Membership:

- Applied and Computational Mathematics(ACM)