Mohanna Shahrad

HomePage | LinkedIn | GitHub

Location: Montreal, Quebec, Canada
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Education

McGill University, Montreal, Canada — Sep 2020 – May 2024
Bachelor of Science in Computer Science — *3.94/4.00 GPA*

University of British Columbia, Vancouver, Canada — Sep 2023 – Dec 2023
Exchange Semester as a Computer Science Visiting Student

Sharif University of Technology, Tehran, Iran — Sep 2019 – June 2020
Bachelor of Science in Computer Engineering — *19.21/20.00 GPA*

Research Experience

Research Intern — Sep 2023 – Dec 2023
Dependable Systems Lab, UBC, Supervisor: Prof. Karthik Pattabiraman — *Vancouver, British Columbia*

NSERC USRA Research Assistant — May 2023 – Aug 2023
Distributed Information Systems, McGill University, Supervisor: Prof. Bettina Kemme — *Montreal, Quebec*

- Contributed to designing a middleware on top of **Neo4j**, a graph DBMS, to support view declaration and usage.
- Extended the **Cypher** query language with **ANTLR** to create and use views.
- Optimized middleware efficiency for non-materialized and views containing paths.
- Conducted experiments to assess view creation, materialization, and maintenance effectiveness with graph updates.

Undergraduate Research Assistant — Jan 2023 – May 2023
Advanced Networking Research Lab, McGill University, Supervisor: Prof. Muthucumaru Maheswaran — *Montreal, Quebec*

- Designed a **distributed digital twin model** within smart physical objects and proposed proximity, mobility, and service discovery protocols for effective distribution of the model in the physical realm.
- Developed a **Python Turtle simulator** as a platform to translate theoretical concepts into practical algorithms.
- Ported the protocols to **ESP32** microcontrollers with the **JamScript** language illustrating real-world applicability.

Volunteer Research Contributor — Sep 2022 – May 2023
UBC CIRRUS Lab, UBC — *Vancouver, British Columbia*

- Collaborated with the UBC CIRRUS lab, contributing to the UnFaaSener project, a lightweight framework for optimizing expenses in serverless environments through non-serverless compute resource utilization.
- Implemented benchmarks in two popular serverless workflow platforms: **AWS Step Functions** and **Google Cloud Workflows**, conducting performance evaluations for cost and latency comparisons.
- Further assessed UnFaaSener's performance by comparing it to using **AWS Lambda functions** glued with **AWS SNS** and **Google Cloud functions** glued with **Google Pub/Sub**.

Research Volunteer — May 2022 – Aug 2022
The Prometheus Lab, McGill University, Supervisor: Prof. Joseph Vybihal — *Montreal, Quebec*

- Studied security vulnerabilities, challenges, and requirements of **multi-agent systems** (MAS).
- Developed a security model for MAS's with **PKI**-based authentication, **RBAC** for authorization, and fault tolerance mechanisms, and utilized **Mobile Ad Hoc Networks** to enhance communication reliability in remote areas.

Industry Experience

Software Development Engineering Intern — June 2022 – Sep 2022
AWS IoT FreeRTOS Team, Amazon — *Vancouver, British Columbia*

- Developed and open-sourced templates for automated IoT data ingestion and visualization from edge devices into **AWS IoT Core** benefiting **AWS IoT ExpressLink** customers, and adaptable to various edge devices.
- Implemented using **CloudFormation** templates for easy deployment of real-time and near-real-time data visualization on intuitive dashboards such as **Grafana** and **Amazon Quicksight**.

Data Engineering Intern — May 2021 – Aug 2021
DataLake Team, Canadian National Railway (CN) — *Montreal, Quebec*

- Implemented an internal knowledge-sharing platform for the team using **Java, Docker, and Para backends**.

- Developed real-time **Microsoft Power BI** dashboards showcasing data from **Azure Data Lake** for team insights.

Research & Development Intern Feb 2021 – May 2021
Affinity RCM Team, Harris Computer Corporation *Ottawa, Ontario*

- Developed an automated quality assurance (QA) process framework using **Selenium WebDriver** and **C#** to support efficient web-based application testing.

Teaching Experience

Undergraduate Teaching Assistant, School of Computer Science, McGill University Sep 2022 – Dec 2022
Operating Systems Course (Comp 310), Instructor: Professor Muthucumaru Maheswaran

Publications

- Ghazal Sadeghian, Mohamed Elsakhawy, **Mohanna Shahrad**, Joe Hattori, and Mohammad Shahrad. "UnFaaSener: Latency and Cost Aware Offloading of Functions from Serverless Platforms". In 2023 USENIX Annual Technical Conference (ATC '23).

Honors and Awards

2023 Mobility Bursary for Exchanges, McGill University

2023 NSERC Undergraduate Student Research Award, Natural Sciences and Engineering Research Council of Canada, McGill University

2022 Québec Perspective Scholarship (PBPQ), Government of Quebec

2021 Member of the Golden Key International Honour Society, Dean of Students at McGill University

2021 McGill Faculty of Science Scholarship, Faculty of Science Scholarships Committee, McGill University

2021 Member of the McGill Dean's Honour List, McGill University

2021 Excellence Scholarship in Computer Science, Computer Engineering and Computer Construction, and Electrical, Electronic and Communications Engineering, Ministère de l'Enseignement supérieur

2021 McGill Perseverance Award, Scholarships and Student Aid Office, McGill University

2021 Selected for Google CS Research Mentorship Program (CSRMP)

2019 Ranked 68th among +164,000 participants, Iranian University Entrance Exam

2017 Bronze Medal, 2017 India International Mathematics Competition (InIMC), Lucknow, India

2015 Recipient of Outstanding Achievement Certificate, Gauss Mathematics Contest, University of Waterloo Centre for Education in Mathematics and Computing (CEMC)

2015 Gold Prize Winner, The 2015 International Mathematics Contest (IMC), Singapore

Projects

UnFaaSener: Latency and Cost Aware Offloading of Functions from Serverless Platforms Source Code Paper

CloudFormation Templates for IoT Data Ingestion and Visualization in the Cloud Source Code

2D Unified Particle Solver for Fluid and Fluid-Solid Coupling Simulation Source Code Report

Design and Implementation of a Load-Balanced Elastic Cloud Infrastructure Source Code

Implementing a PID Controller for Inverted Pendulum Stabilization using Image Tracking and Kalman Filter Source Code

Microsoft Azure Quantum-Inspired Optimization (QIO) Solver for the Traveling Salesman Problem Source Code

Multi-Label Image Classification with CNNs using MobileNetV2, ResNet50, and SESEMI Source Code

AI-Driven Environmental Solutions: Predictive Tree Planting to Combat Deforestation and Climate Change Source Code

Python-based AI Agent for Colosseum Survival Game Source Code

Simple Brick Breaker in x86 assembly language, OpenGL and GLSL Source Code

Analyzing COVID-19 Discussions in Canadian Social Media: A Focus on Vaccine Hesitancy Source Code

Technical Skills

Programming	Proficient: Python, Java, C/C++, Bash, SQL, Cypher - Intermediate: C#, x86 Assembly, CUDA, R, OCaml, KQL
Tools	Git, Docker, Power Bi, AWS CDK, Selenium, PyTorch, Flask, Maven, Turtle Graphics, ZooKeeper, ANTLR, Kibana, Neo4j
Cloud Comp.	Microsoft **Azure**: VMs, Data Factory, Databricks, App Service, Container Instances, Data Lake Storage, Azure DevOps, Azure Quantum, **AWS** Lambda, S3, EC2, EFS, ECR, VPC, SNS, Step Functions, Athena, Glue, Kinesis , OpenSearch, QuickSight, Timestream, IoT Core, **GCP**: VM Instances, Storage, Cloud Functions, Pub/Sub, Workflows, Cloud Composer

Coursework

Graduate-Level	Applied Machine Learning, Distributed Systems, Cryptography & Data Security, Fundamentals of Computer Animation, Cloud Computing
Undergraduate-Level	Algorithms & Data Structures, Software Design, Intro. to Computer Systems, Theory of Computation, Algorithm Design, Programming Lang & Paradigms, Operating Systems, Artificial Intelligence, Intro. Robots & Intelligent Systems, Parallel Computing, Database Systems

Volunteer Work

2023	Student Volunteer, Very Large Data Bases Conference (VLDB 2023)
2021	McGill University Head Delegate, Canadian University Software Engineering Conference 2022 (CUSEC)
2021	Mentor at New Student Mentorship Program (NSMP), McGill Campus Life and Engagement
2021	Co-president, Girls Who Code McGill Student Club
2020	Vice President of Internal Affairs, Through Their Eyes Student Club, Students' Society of McGill University
2019	Executive Staff, International Collegiate Programming Contest (ICPC), Sharif University of Technology

Immigration Status

Canadian Permanent Resident (PR)