OSAMA ABU HAMDAN

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PROFESSIONAL SUMMARY

Computer Science Ph.D. candidate specializing in federated learning, with a strong focus on communication efficiency, scalability, and real-world network integration. Proven track record in building advanced FL frameworks like FLEET and SmartFLow, and publishing impactful research in top IEEE venues. Skilled in backend development, SDN, and cloud/edge frameworks, combining deep technical expertise with hands-on system-building experience. Adept at driving innovation across research and development teams to deliver high-performance FL solutions.

PROFESSIONAL EXPERIENCE

Abacus Cloud and Edge Systems **Arlington, TX, USA**
Research Assistant *2021 - Present*

- Built FLEET, an open-source, scalable, and configurable Federated Learning testbed that integrates Flower AI with Containernet and Hydra. Supports diverse ML frameworks, real-world network topologies, and dynamic background traffic generation, attracting interest from hundreds of potential users.
- Designed SmartFLow, an SDN framework that cuts Cross-Silo Federated Learning synchronization time by 47% vs. shortest-path and 41% vs. capacity-aware routing, scaling to 50+ clients.
- Created RENET, boosting QoS satisfaction by 30% and improving adaptive video quality by 54% over existing solutions.
- 6 peer-reviewed publications in IEEE conferences with 60+ citations.

Safwa Academy **Remote**
Programming Instructor *2022 - 2024*

- Lead hands-on programming classes for youth students (10-15 years old), covering both beginner and advanced levels, with a cohort of over 20 students.
- Facilitate weekly lectures, assignments, and projects, ensuring active student engagement throughout the learning process.
- Guide students in building websites using HTML, CSS, Bootstrap 5, and Flask-Python.
- Students' class projects included a personal portfolio, password generator, Tic-Tac-Toe game, school management system, and other technically challenging tasks.

John Wiley & Sons **Amman, Jordan**
Backend Developer *2018 - 2021*

- Backend Development: Built and maintained APIs and components in Java to support platform functionality.
- Collaboration & Problem-Solving: Worked with Solution Architects, Project Managers, and Team Leaders, diagnosing and resolving bugs efficiently.
- High-Traffic Feature Development: Contributed to search functionality for Cell and The Lancet, handling 4M articles and 100k daily visitors.

Wird.app **Remote**
Fullstack Developer *2020 - Present*

- Team Leadership & Project Delivery: Led a team of 10 developers to build Wird, a student Ramadan activity tracking app.
- Technical Contributions & Scale: Developed backend APIs using Django REST Framework (DRF) with PostgreSQL and Redis caching, connecting a React-based admin panel and a Flutter student app, optimizing performance and scalability.
- User Engagement & Impact: Enabled students to log activities, track performance, and compete, while admins manage contests and generate reports, supporting 1,000+ daily users.

EDUCATION

University of Texas - Arlington **August 2023 - June 2026**
PhD, Computer Science *GPA: 4*

- Thesis Title: Communication-Efficient and QoS-Aware Network Frameworks for Edge and Federated Learning Systems

University of Nevada - Reno **August 2021 - August 2023**
Master's, Computer Engineering *GPA: 3.9*

- Thesis Title: Overcoming Bandwidth Fluctuations in Hybrid Networks with QoS-Aware Adaptive Routing

PUBLICATIONS

- ***SmartFLow: A Communication-Efficient SDN Framework for Cross-Silo FL*** to IEEE CCNC 2026
- ***FLEET: A Federated Learning Emulation and Evaluation Testbed for Holistic Research*** to IEEE CCNC 2026
- ***Reliable Network Performance for Edge Networks with QoS-Aware Adaptive Routing*** In IEEE EDGE 2024
- ***UNR-IDD: Intrusion Detection Dataset using Network Port Statistics*** In IEEE CCNC 2023
- ***Bandwidth and Congestion Aware Routing for Wide-Area Hybrid Networks*** In IEEE LANMAN 2022
- ***Flood Control: TCP-SYN Flood Detection for SDN using OpenFlow Port Statistics*** In *IEEE CSR 2022*

RESEARCH PROJECTS HIGHLIGHTS

FLEET: A Federated Learning Emulation and Evaluation Testbed for Holistic Research *July 2024 - Present*
Researcher and Developer

- Developed FLEET, a framework-agnostic federated learning testbed integrated with high-fidelity network emulation.
- Enabled scalable, configurable experiments by combining Flower for FL orchestration with Containernet for realistic network environments.
- Supported diverse FL setups including various frameworks, datasets, aggregation strategies, and heterogeneous data distributions.
- Simulated realistic network conditions (bandwidth limits, latency, packet loss, background traffic) and advanced dataset partitioning (IID, shard-based, Dirichlet) to analyze their impact on FL convergence.
- Built comprehensive evaluation tools, including background traffic generation, holistic performance metrics, and reproducible configuration/logging for detailed system and network analysis.
- *Link to project*

SmartFLow: A Communication-Efficient SDN Framework for Cross-Silo Federated Learning *July 2024 - May 2025*
Researcher and Developer

- Focus on optimizing network communication for Federated Learning using Software-Defined Networking (SDN).
- Integrate the Flower framework for Federated Learning with SDN tools like ONOS, Mininet, and PyTorch to enhance the efficiency and scalability of distributed machine learning models.
- Utilize the SDN controller (ONOS) to manage dynamic routing, minimizing communication latency and improving performance across multiple edge devices.
- Test in simulated environments using Mininet and optimize through real-time adjustments based on network conditions.
- Aim to accelerate model training while reducing bandwidth consumption.
- *Link to project*

SERVICES

- Jul 2025: IEEE Transactions on Computers - Subreviewer
- Apr 2024: IEEE CLOUD 2024 - Subreviewer
- Apr 2023: IEEE CLOUD 2023 - Subreviewer
- Dec 2021: CCGRID 2023 - Subreviewer

SKILLS

Programming & Development: Java, Python, Spring, Flask, Django, Django Rest Framework, REST APIs, GraphQL, Bootstrap, Selenium, BeautifulSoup, Maven, DevOps, Debugging Tools
Machine Learning & Research: Deep Learning, Federated Learning, Keras, PyTroch, Matplotlib, NumPy, Pandas, Hydra, Artificial Intelligence
Networking: P4, SDN, Mininet, TCP/IP, HTTP/HTTPS, Wireshark, Postman, OpenFlow
Systems: Linux/Unix, PostgreSQL, Redis, Git, Docker, Nginx

REFERENCES

- Prof. Hao Che (University of Texas at Arlington) - hche@cse.uta.edu
- Dr. Engin Arslan (Meta) - enginarslan@meta.com
- Dr. Md Arifuzzaman (Missouri University of Science and Technology) - marifuzzaman@mst.edu