**Dr. Ahmad H. Sawalmeh**

**Computer Engineering - Artificial Intelligence and Robotics Technology**

Address | Alfaisal University – Riyadh - Saudi Arabia

Email Address: sawalmeh@gmail.com | asawalmeh@alfaisal.edu

**Google Scholar account:**
https://scholar.google.com/citations?user=ng-tEQkAAAAJ&hl=en

**Research Gate account:**
https://www.researchgate.net/profile/Ahmad-Sawalmeh

## Key Skills

- Robotics, Artificial Intelligence and Data Science, Machine Learning and Deep Learning.
- Cybersecurity, Cryptography, and Network Security.
- Arduino, and Arduino IDE for programming microcontrollers
- Internet of Things (IoT) and Machine-to-Machine (M2M) Communication.
- Wireless communication with Intelligent UAVs.
- Computer Optimization and AI Algorithms.
- Computer architecture and design - Assembly Language, MIPS and Motorola 68K family.
- Computer networks.
- Operating systems, Linux (Fedora Red Hat, SUSE, and Mandrake).
- VERILOG Hardware Description Language (MAX+plus II ALTERA, LeonardoSpectrum from Mentor Graphics)
- Programming languages Python, C++, C.
- TensorFlow, AI, Machine learning and Deep learning platforms.
- LaTeX.
- Matlab.
- Management and strategic planning.
- Quality and Academic Accreditation.

## Professional Summary

- Research expertise in wireless networks using smart unmanned aerial Vehicles (UAVs), visible light communication, and aerial networks.
- Artificial intelligence and machine learning techniques to support wireless communications and emerging technologies for 5G and 6G networks
- Unmanned Aerial Vehicle (UAV)-Assisted Guidance System for Mortar Guns and Short-Range Missile Targeting.
- Published more than 35 impact factor journal papers
- More than 15 years of teaching and research experience
- Research work highlighted in local and global media as well as cited over 3100 times

# Education

**Doctor of Philosophy in Engineering**                                    **Feb-2016 - Aug. 2020**

    University Tenaga Nasional, Malaysia

    Dissertation: "Deployment Strategies and Optimization in Providing Wireless Coverage using Intelligent

    Unmanned Aerial Vehicles (UAVs)".

    In short, the research focuses on the deployment of unmanned aerial vehicle (UAV) as aerial base station in providing wireless coverage for outdoor and indoor users.


**Master of Science in Computer Engineering (***Very Good***)**                **Oct 2003 - April. 2006**

    Jordan University of Science and Technology, Jordan

    Thesis: HARDWARE DESIGN OF AES S-BOX USING PIPELINING STRUCTURE OVER $GF((2^4)^2)$


**Bachelor of Science in Computer Engineering (***Very Good***)**            **Oct 1998 - Jun. 2003**

    Jordan University of Science and Technology, Jordan

# Career History

**Aug 2023 - present**

    Alfaisal University, College of Engineering - Software Engineering Department    **Senior Lecturer**

- o Taught courses of Artificial Intelligent and AI Algorithms, Introduction to Cybersecurity, Internet of Things (IoT) Development, Operating Systems, Programming for Engineers (Python), OOP with Java.
- o Conducting research within the software Engineering Department.


**Oct 2022 – Aug 2023**

    Irbid National University, Data science and artificial intelligence Department    **Assistant Professor**

*Department of Artificial Intelligence and Data Science, Faculty of Science and Information Technology.*
- o **Head of the Department**: Teaching classes and labs within the department of Artificial Intelligence and Data Science.
- o Head of the Quality and Academic Accreditation unit.
- o Taught courses of Artificial Intelligent, AI Algorithms, Computer Architecture, Data science with python, Data
- o Base, and Digital logic design. Programming language c, c++, pyhton.
- o Conducting research within the department of Artificial Intelligence and Data Science.


**Sep 2020 – Oct 2022**

    *Department of Computer Science* Northern Border University, KSA            **Assistant Professor**

*Department of Computer Science, Faculty of Science, Northern Borders University, Arar – KSA.*
- o Faculty member: Teaching classes and labs within the department of Computer Science.
- o Head of the Information Technology Unit & Quality Systems at the Quality and Academic Accreditation
- o Deanship.
- o Taught courses of Computer Networks, Operating Systems, Computer Architecture, Data Structures and
- o Algorithms, and Digital logic design
- o Teaching computer science graduate program at the Deanship of Community Service and Continuing Education.
- o Conducting research within the department of computer science.
- o Member of the remote sensing unit
- o Published 15 high impact factor journal and 5 conference papers

- o  Member of the academic accreditation committee for the computer science program

**Aug 2006 – June 2015    Technical Vocational Training Corporation (TVTC)**                                      **Lecturer**

- o  Lecturer in the Computer Science Department at the Technical Vocational Training Corporation (TVTC), Kingdom of Saudi Arabia. www.tvtc.gov.sa
- o  Taught courses of Computer Networks, Operating Systems, Algorithms, Circuits, and Digital logic design

**Jan 2003 – Nov 2004   Jordan University of science and Technology (JUST)        Teaching and Research assistant**

- o  Teaching and Research assistant for Advanced Computer Design Course (Verilog HDL Language), Computer Networks course, Digital Logic Design Lab in the Department of Computer Engineering, at Jordan University of science and Technology. www.just.edu.jo

## AWARDS

- o  Vice Chancellor's Award; Best Postgraduate Student Awarded 2019-2020 at Universiti Tenaga Nasional (UMITEN) Malaysia.

## Publications

### Journals
1. Anan, Muhammad, Khalid Kanaan, Driss Benhaddou, Nidal Nasser, Basheer Qolomany, Hanaa Talei, and **Ahmad Sawalmeh**. "Occupant-Aware Energy Consumption Prediction in Smart Buildings Using a LSTM Model and Time Series Data." (2024).
2. **Sawalmeh A**, Alenezi, A. H., Shakhatreh, H., Almutiry, M., The Impact of Using Intelligent Reflecting Surfaces (IRSs) on Minimizing Operational Costs in UAV Wireless Networks. Scientific Reports, Springer Nature. **(Under review)**
3. Conrado Vizcarra1, Shadan Alhamed, Abdulelah Algosaibi, Mohammed Alnaeem, Adel Aldalbahi, Nura Aljaafari, **Ahmad Sawalmeh**, Mahmoud Nazzal, Abdallah Khreishah, Abdulaziz Alhumam, Muhammad Anan, Deep Learning Adversarial Attacks and Defenses on License Plate Recognition System, Cluster Comuting, **Aceepted 2024.**
4. Sharif Naser Makhadmeh, Mohammed Azmi Al-Betar, Sofian Kassaymeh, **Ahmad Sawalmeh**, and Yousef Sanjalawe, Opportunities and Challenges in The Path of Developing a Smart Grid System, Scientific Reports, Springer Nature. **(Under review)**
5. Nazzal, M., Aljaafari, N., **Sawalmeh, A**., Khreishah, A., Anan, M., Algosaibi, A., ... & Alhamed, S. (2023, September). Genetic Algorithm-Based Dynamic Backdoor Attack on Federated Learning-Based Network Traffic Classification. In *2023 Eighth International Conference on Fog and Mobile Edge Computing (FMEC)* (pp. 204-209). IEEE.

6. Shakhatreh, H., **Sawalmeh, A.,** Hayajneh, K. F., Abdel-Razeq, S., & Al-Fuqaha, A. (2024). A Systematic Review of Interference Mitigation Techniques in Current and Future UAV-Assisted Wireless Networks. *IEEE Open Journal of the Communications Society*.
7. Alenezi, A. H., Nazzal, M., **Sawalmeh, A.,** Khreishah, A., Shao, S., & Almutiry, M. (2024). Machine learning regression-based RETRO-VLP for real-time and stabilized indoor positioning. *Cluster Computing*, *27*(1), 299-311.
8. Shakhatreh, H., **Sawalmeh, A**., Alenezi, A. H., Abdel-Razeq, S., & Al-Fuqaha, A. (2024). Mobile-IRS assisted next generation UAV communication networks. *Computer Communications*, *215*, 51-61.
9. Aljaafari, N., Nazzal, M., **Sawalmeh, A.,** Vizcarra, C. P., ... & Alhumam, A "On the Factors Impacting Adversarial Attack and Defense Performances in Federated Learning Systems" Accepted, 03-2022 IEEE Transactions on Engineering Management.
10. Haq, M. I. U., Khalil, R. A., Almutiry, M., **Sawalmeh, A**., Ahmad, T., & Saeed, N. (2023). Robust graph-

based localization for industrial Internet of things in the presence of flipping ambiguities. *CAAI Transactions on Intelligence Technology*, 8(4), 1140-1149.

11. Ali Shah, S. A., Jan, T., Shah, S. M., Khalil, R. **A., Sawalmeh**, A., & Anan, M. (2023). Fractional Processing Based Adaptive Beamforming Algorithm. Computers, Materials & Continua, 76(1).

12. Igried, B., Alsarhan, **A., Sawalmeh**, A., Anan, M., & Alkhawaldeh, I. (2023). A novel game theoretic approach for market-driven dynamic spectrum access in cognitive radio networks. *Wireless Networks*, 1-16.

13. Alenezi, A. H., Nazzal, M., **Sawalmeh, A**., Khreishah, A., Shao, S., & Almutiry, M. (2022). Machine learning regression-based RETRO-VLP for real-time and stabilized indoor positioning. *Cluster Computing*, 1-13.

14. Abu-Baker, A., Shakhatreh, H., **Sawalmeh, A**., & Alenezi, A. H. (2023). Efficient Data Collection in UAV-Assisted Cluster-Based Wireless Sensor Networks for 3D Environment: Optimization Study. Journal of Sensors, 2023.

15. Djehaiche, R., Aidel, S., **Sawalmeh, A.,** Saeed, N., & Alenezi, A. H. (2023). Adaptive Control of IoT/M2M Devices in Smart Buildings Using Heterogeneous Wireless Networks. *IEEE Sensors Journal*, 23(7), 7836-7849. Nazzal, M., **Sawalmeh, A.,** Abdallah Khreishah, Retro-VLP: Towards Single Light Source-based Real- time Indoor Positioning" Accepted 13th International Conference on Information and Communication Systems, IEEE ICICS 2022.

16. Alenezi, A., **Sawalmeh, A.,** Shakhatreh, H., Almutiry, M., & Alreshidi, N. A. (2022). A Novel Mining Approach for Data Analysis and Processing Using Unmanned Aerial Vehicles. *Complexity*, *2022*.

17. Hazim Shakhatreh, **Ahmad Sawalmeh**, Ali Alanazi Next Generation of IRS-Assisted UAV Communications in Wireless IoT Networks. Submitted to IEEE systems journal.

18. Nazzal, Mahmoud, **Ahmed Sawalmeh**, Sihua Shao, Muhammad Anan, Abdallah Khreishah, and Ali Alanazi. "Retro-VLP: Towards Single Light Source-based Real-time Indoor Positioning." 13th International Conference on Information and Communication Systems (ICICS) 2022, pp. 485-490. IEEE, 2022.

19. Ali Alanazi, Nazzal, Mahmoud, **Ahmed Sawalmeh**, Sihua Shao, Abdallah Khreishah. "Machine Learning Regression-Based RETRO-VLP for Real-Time and Stabilized Indoor Positioning." Cluster Computing, 12- 2022.

20. Alsmadi, I., Aljaafari, N., Nazzal, **Sawalmeh, A.,** Vizcarra, C. P., ... & Alhumam, A. (2022). Adversarial Machine Learning in Text Processing: A Literature Survey. IEEE Access.

21. **Sawalmeh, Ahmad**, Noor Shamsiah Othman, Guanxiong Liu, Abdallah Khreishah, Ali Alenezi, and Abdulaziz Alanazi. "Power-Efficient Wireless Coverage Using Minimum Number of UAVs." Sensors 22, no. 1 (2021): 223.

22. Shakhatreh, Hazim, Waed Malkawi, **Ahmad Sawalmeh**, Muhannad Almutiry, and Ali Alenezi. "Modeling ground-to-air path loss for millimeter wave uav networks." Journal of Green Engineering, 2021, Volume:11 Issue:1.

23. Hayajneh, Khaled F., Khaled Bani-Hani, Hazim Shakhatreh, Muhammad Anan, and **Ahmad Sawalmeh**. "3d deployment of unmanned aerial vehicle-base station assisting ground-base station." Wireless Communications and Mobile Computing 2021 (2021).

24. Shakhatreh, Hazim, Ali Alenezi, **Ahmad Sawalmeh**, Muhannad Almutiry, and Waed Malkawi. "Efficient placement of an aerial relay drone for throughput maximization." Wireless Communications and Mobile Computing 2021 (2021)

25. Jasim, M. A., Shakhatreh, H., Siasi, N., **Sawalmeh, A. H.,** Aldalbahi, A., & Al-Fuqaha, A. (2021). A Survey on Spectrum Management for Unmanned Aerial Vehicles (UAVs). IEEE Access, 10, 11443- 11499.

26. Abdel-Razeq, S., Shakhatreh, H., Alenezi, A., Sawalmeh, A., Anan, M., & Almutiry, M. (2021). PSO- Based UAV Deployment and Dynamic Power Allocation for UAV-Enabled Uplink NOMA Network. Wireless Communications and Mobile Computing, 2021.

27. Shakhatreh, H., Hayajneh, K., Bani-Hani, K., **Sawalmeh, A.,** & Anan, M. (2021). Cell on Wheels-Unmanned Aerial Vehicle System for Providing Wireless Coverage in Emergency Situations. Complexity, 2021.

28. Shakhatreh, Hazim, **Ahmad H. Sawalmeh**, Ala Al-Fuqaha, Zuochao Dou, Eyad Almaita, Issa Khalil, Noor Shamsiah Othman, Abdallah Khreishah, and Mohsen Guizani. **"**Unmanned aerial vehicles (UAVs): A survey on civil applications and key research challenges." *Ieee Access* 7 (2019): 48572-48634.

29. **Sawalmeh, Ahmad** H., and Noor Shamsiah Othman. "An overview of collision avoidance

approaches and network architecture of unmanned aerial vehicles (UAVs)." International Journal of Engineering and Technology, 2019.

30. **Sawalmeh, Ahmad H.**, Noor Shamsiah Othman, Hazim Shakhatreh, and Abdallah Khreishah. "Wireless coverage for mobile users in dynamic environments using UAV." IEEE Access 7 (2019): 126376-126390.

31. **Sawalmeh, Ahmad**, Noor Shamsiah Othman, and Hazim Shakhatreh. "Efficient deployment of multi-UAVs in massively crowded events." Sensors 18, no. 11 (2018): 3640

32. **Sawalmeh, Ahmad,** Noor Shamsiah Othman, Hazim Shakhatreh, and Abdallah Khreishah. "Providing wireless coverage in massively crowded events using UAVs." In 2017 IEEE 13th Malaysia International Conference on Communications (MICC), pp. 158-163. IEEE, 2017.

33. Shakhatreh, Hazim, Abdallah Khreishah, Ayoub Alsarhan, Issa Khalil, **Ahmad Sawalmeh**, and Noor Shamsiah Othman. "Efficient 3D placement of a UAV using particle swarm optimization." In 2017 8th International Conference on Information and Communication Systems (ICICS), pp. 258-263. IEEE, 2017.

34. Shakhatreh, Hazim, Abdallah Khreishah, Noor Shamsiah Othman, and **Ahmad Sawalmeh**. "Maximizing indoor wireless coverage using uavs equipped with directional antennas." In 2017 IEEE 13th Malaysia International Conference on Communications (MICC), pp. 175-180. IEEE, 2017.

35. Abdel-hafeez, Saleh, **Ahmed Sawalmeh,** and Sameer Bataineh. "High performance AES design using pipelining structure over GF ((2 4) 2)." 2007 IEEE International Conference on Signal Processing and Communications. IEEE, 2007.

# GRANTS & FUNDING PROJECTS

| Project | Funding |
|---|---|
| A Novel Mining Approach using Ground Penetrating Radar Tomography Mounted on Intelligent Unmanned Aerial Vehicles UAVs | Deputyship for Research and Innovation, Ministry of Education in Saudi Arabia for funding this research work through the project **Number-6864 2020 IF**. |
| Wireless Coverage for Mobile Users in Dynamic Environments Using UAVs. | **Universiti Tenaga Nasional, BOLD Grant 10289176/B/9/2017/16.** |
| Maximizing indoor wireless coverage using UAVs | **US NSF grants CNS-1647170 and EEC-1560131.** |
| Efficient Deployment of Multi-UAVs in Massively Crowded Events | **Universiti Tenaga Nasional, UNIIG 2017 grant**. |
| Power-Efficient Wireless Coverage Using Minimum Number of UAVs | **Universiti Tenaga Nasional Internal Grant (UNIIG2018) J510050800.** |
| Real-time Indoor Positioning with Visible light communication (VLC) | **ENGA-2022-11-1649** from the Deanship of Scientific Research at Northern Border University |
| A Novel Communication Approach in Dynamic Environments for Next Generation Wireless Networks | **SCIA-2022-11-1466** from the Deanship of Scientific Research at Northern Border University |

## COMMITTEES

[1]. Head of the Quality and Academic Accreditation Committee at the Software Engineering Department- Alfaisal University [2023 - Present]
[2]. Coordinator of the of Executive Committee for Quality and Academic Accreditation [2020 – 2022]
[3]. Member of the strategic plan committee at the Quality and Academic Accreditation Deanship [2020 –2022]
[4]. Member of the Computer Science Department Graduation project committee [2021 – 2022]
[5]. Member of the Computer Science Program Supervising Committee of the Evaluation Study Project at the Program Accreditation Level.
[6]. Member of the Council of the Deanship of Quality and Academic Accreditation [2020–2022]
[7]. Member of the Occupational Safety Committee, College of Science [2021 – 2022]
[8]. Member of the Technical Committee for Academic Accreditation at Quality Deanship [2020 –2022]
[9]. Member of The Remote Sensing Unite [2021 – 2022]
[10]. Member of the academic accreditation committee for the computer science program [2020 – 2022]

## Training Courses (Sample)

- Many courses focus on quality assurance and academic accreditations, including NCAAA..
- Training course in TCP/IP-based network using Ethernet LAN media, "Cisco Networking Academy Program," JUST Jordan.
- Geographic Information System (GIS) Training Course using GeoMedia Professional 5.2 (40 hours).
- A foundation Management Training Program for New Entrance to Business, At EuroJordanian Advanced Business Institute (EJABI), In cooperation with the International Finance Corporation (IFC).
- Communication Skills Training Course, At EuroJordanian Advanced Business Institute (EJABI), In cooperation with the International Finance Corporation (IFC).
- Owner/Manager and Human Resources Training Course, At EuroJordanian Advanced Business Institute (EJABI), In cooperation with the International Finance Corporation (IFC).

## PROFESSIONAL LINKS AND NETWORKING

- Google Scholar: https://scholar.google.com/citations?user=ng-tEQkAAAAJ&hl=en
  Total number of citations = 3475
- Research gate: https://www.researchgate.net/profile/Ahmad-Sawalmeh
- ORCID: https://orcid.org/my-orcid?orcid=0000-0002-7040-8963
- LinkedIn: https://www.linkedin.com/in/ahmad-sawalmeh-60446736/
- Publons (WoS): https://publons.com/researcher/3923761/ahmad-sawalmeh/
- Web of Science ResearcherID: AAZ-9563-2020
- IEEE: https://ieeexplore.ieee.org/author/37086059141
- Scopus Author ID: https://www.scopus.com/authid/detail.uri?authorId=57194440590