



Prince Al-hussein Bin Abdullah II Faculty for Information Technology

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ALSARHAN, AYOUB

Education

- **PhD 2011, Concordia University, Canada**
Dissertation Machine Learning Approach for Spectrum Sharing in the Next Generation Cognitive Mesh Network
- **Master of Computer Science, 2001, Al al-Bayt University, Jordan** **Dissertation**, Availability-based Processor Allocation on 2d Mesh Multicomputer
- **Bachelor of Computer Science , 1997, Yarmouk University, Jordan.**

Professional Experience

- **2015-2018**
 - **Chair of Computer Information System Dept:**
Lay foundations of the department, running computer information system department: leading in curriculum development, performing administrative work, and taking charge in establishing research programs in the area of specialization.
- **2016- Present**
 - **Associate professor:**
 - **Teaching the following graduate courses:**
Advanced Information Retrieval.

- **Teaching the following undergraduate courses:**
Wireless networks and mobile applications, Visual Languages programming.

- **2011- 2016**

- **Assistant Professor, Hashemite University.**
 - **Teaching the following undergraduate courses:**
Wireless networks and mobile applications, Compiler Design, Visual languages programming, Data Mining, Data Warehousing, Data Structure, System Programming, C++ Programming, Network Management.
 - **Teaching the following graduate courses:**
Advanced Data Mining.

- **2008- 2011:**

- **Teacher Assistant.**

- **2002-2005:**

- **Lecturer in Information Systems and Computer Science department, College of Telecom & Information System, Saudi Arabia.**
 - **Teaching the following undergraduate courses:**
Database Design, Introduction to Programming, Advanced Internet Programming (JSP), Network Security, Operating Systems, Personal Computer maintenance., and Java Programming.
 - **A member of an academic committee** that was responsible for developing the Information systems and Computer Science department into an independent college. Then, a member in the developed college curriculum committee.

- **A member in several steering committees** at Management Sciences and Planning college (registration committee, scientific committee, and computing committee).
- **2001–2002:**
 - **Computer Laboratories Supervisor** in Computer Science department, Al al-Bayt University, Mafrq – Jordan.
 - **Taught the undergraduate students the practical** Courses as Win 2000, MS word, Ms Excel, HTML, and C Language.
 - **Supervised the computer Laboratories.**
- **1997–2001:**
 - **Computer Teacher** in Ministry of Education, Jordan.
 - **Taught the Computer skills to the secondary school students.**

Research Interests

I am interested in applications of machine learning and optimization to various aspects of resource management in wireless networks. Currently I'm focusing on applications of learning and decision making applied to mobile computing devices and developing rich, structured models that are appropriate for both making and learning decisions.

GRADUATE COURSES

Pattern Recognition, Mobile Computing and Wireless Network, Advanced Computer Network, Advanced Artificial Intelligence, Programming Language Structure, Advanced Computer Architecture, Advanced Operating System, Parallel Programming, Advanced Telecommunication Networks, Modeling and Analysis of Telecommunications Networks.

Publications Refereed Journals

1. **Ayoub Alsarhan**, An optimal configuration-based trading scheme for profit optimization in wireless networks, Egyptian Informatics Journal, 2021, ISSN: 1110-8665, <https://doi.org/10.1016/j.eij.2021.05.001>.
2. Amar Almaini, Ahmed Al-Dubai, Imed Romdhani, Martin Schramm, **Ayoub Alsarhan**: Lightweight edge authentication for software defined networks. *Computing* 103(2): 291-311 (2021).

3. Esra'a Alshdaifat, Doa'a Alshdaifat, **Ayoub Alsarhan**, Fairouz Hussein, Subhieh Moh'd Faraj S. El-Salhi: The Effect of Preprocessing Techniques, Applied to Numeric Features, on Classification Algorithms' Performance. *Data* 6(2): 11 (2021).
4. Islam T. Almalkawi, Jafar Raed, **Ayoub Alsarhan**, Alaa Eddien Abdallah, Emad E. Abdallah: A Novel and Efficient Priority-Based Cross-Layer Contextual Unobservability Scheme Against Global Attacks for WMSNs. *Int. J. Interact. Mob. Technol.* 15(3): 43-69 (2021).
5. **Ayoub Alsarhan**, Abdel-Rahman Al-Ghuwairi, Islam T. Almalkawi, Mohammad Alauthman, Ahmed Al-Dubai: Machine Learning-Driven Optimization for Intrusion Detection in Smart Vehicular Networks. *Wirel. Pers. Commun.* 117(4): 3129-3152 (2021).
6. Shujaat Ali Khan Tanoli, Syed Aziz Shah, Muhammad Bilal Khan, Faiza Nawaz, Amir Hussain, Ahmed Yassin Al-Dubai, Imran Khan, Syed Yaseen Shah, **Ayoub Alsarhan**: Impact of Relay Location of STANC Bi-Directional Transmission for Future Autonomous Internet of Things Applications. *IEEE Access* 8: 29395-29406, (2020).
7. Bushra Alhijawi, Yousef Kilani, **Ayoub Alsarhan**: Improving recommendation quality and performance of genetic-based recommender system. *Int. J. Adv. Intell. Paradigms* 15(1): 77-88 (2020).
8. **Ayoub Alsarhan**: QoS-aware online mechanism for dynamic VM provisioning in cloud market using Q-learning. *Int. J. Adv. Intell. Paradigms* 15(3): 287-299 (2020).
9. Zaher Salah, Abdel-Rahman Al-Ghuwairi, Ahmad A. Al-Oqaily, Aladdin Hussein Baarah, **Ayoub Alsarhan**: A comparative investigation of approaches for web search results clustering. *Int. J. Adv. Intell. Paradigms* 17(3/4): 342-366 (2020).
10. **Ayoub Alsarhan**, Yousef Kilani, Ahmed Yassin Al-Dubai, Albert Y. Zomaya, Amir Hussain: Novel Fuzzy and Game Theory Based Clustering and Decision Making for VANETs. *IEEE Trans. Veh. Technol.* 69(2): 1568-1581 (2020)
11. Baraq Ghaleb, Ahmed Yassin Al-Dubai, Elias Ekonomou, **Ayoub Alsarhan**, Youssef Nasser, Lewis M. Mackenzie, Azzedine Boukerche: A Survey of Limitations and Enhancements of the IPv6 Routing Protocol for Low-Power and Lossy Networks: A Focus on Core Operations. *IEEE Commun. Surv. Tutorials* 21(2): 1607-1635 (2019)
12. Abdel-Rahman Al-Ghuwairi, Mohammad N. Khalaf, Zaher Salah, **Ayoub Alsarhan**: Dynamic changes of QoS parameters in cloud computing service level agreement. *Int. J. Bus. Inf. Syst.* 32(1): 73-90 (2019).

13. Yousef Kilani, **Ayoub Alsarhan**, Mohammad Bsoul, Subhieh M. El-Salhi:Local search-based recommender system for computing the similarity matrix. *Int. J. Intell. Syst. Technol. Appl.* 18(4): 391-404 (2019).
14. Islam T. Almalkawi, Rami Halloush, **Ayoub Alsarhan**, Ahmed Yassin Al-Dubai, Jamal N. Al-Karaki:A lightweight and efficient digital image encryption using hybrid chaotic systems for wireless network applications. *J. Inf. Secur. Appl.* 49 (2019)
15. Baraq Ghaleb, Ahmed Yassin Al-Dubai, Elias Ekonomou, **Ayoub Alsarhan**, Youssef Nasser, Lewis M. Mackenzie, Azzedine Boukerche:A Survey of Limitations and Enhancements of the IPv6 Routing Protocol for Low-power and Lossy Networks: A Focus on Core Operations. *CoRR abs/1902.01888* (2019).
16. Yousef Kilani, Bushra Alhijawi, **Ayoub Alsarhan**: Using artificial intelligence techniques in collaborative filtering recommender systems: survey. *Int. J. Adv. Intell. Paradigms* 11(3/4): 378-396 (2018).
17. Abdel-Rahman Al-Ghuwairi, Zaher Salah, **Ayoub Alsarhan**, Shatha Al Qudah, Ghadeer Al Qahmous, Aladdin Hussein Baarah, Ahmad A. Al-Oqaily: Monitoring and modelling service level agreement of multiple virtual machines in cloud computing. *Int. J. Bus. Inf. Syst.* 27(4): 538-553 (2018)
18. Ashraf Hamdan Aljammal, Hani Bani-Salameh, Ahmad Qawasmeh, **Ayoub Alsarhan**, Ahmed Fawzi Otoom: A new technique for data encryption based on third party encryption server to maintain the privacy preserving in the cloud environment. *Int. J. Bus. Inf. Syst.* 28(4): 393-403 (2018).
19. Yousef Kilani, Ahmed Fawzi Otoom, **Ayoub Alsarhan**, Manal AlMaayah:A genetic algorithms-based hybrid recommender system of matrix factorization and neighborhood-based techniques. *J. Comput. Sci.* 28: 78-93 (2018).
20. **Ayoub Alsarhan**, Ahmed Yassin Al-Dubai, Geyong Min, Albert Y. Zomaya, Mohammad Bsoul:A New Spectrum Management Scheme for Road Safety in Smart Cities. *IEEE Trans. Intell. Transp. Syst.* 19(11): 3496-3506 (2018).
21. **Ayoub Alsarhan**, Awni Itradat, Ahmed Yassin Al-Dubai, Albert Y. Zomaya, Geyong Min:Adaptive Resource Allocation and Provisioning in Multi-Service Cloud Environments. *IEEE Trans. Parallel Distributed Syst.* 29(1): 31-42 (2018).
22. Ahmad Nahar Quttoum, **Ayoub Alsarhan**, Abidalrahman Moh'd: ARAAC: A Rational Allocation Approach in Cloud Data Center Networks. *Future Internet* 9(3): 50 (2017)
23. **Ayoub Alsarhan**, Emad Eddien Abdallah, Ashraf Hamdan Aljammal:Competitive Processors Allocation in 2D Mesh Connected Multicomputer Networks: A Dynamic Game Approach. *Int. J. Grid High Perform. Comput.* 9(2): 53-69 (2017).

24. Ashraf Hamdan Aljammal, Hani Bani-Salameh, **Ayoub Alsarhan**, Mohammad Kamel Kharabsheh, Mamoon Obiedat: Node Verification to Join the Cloud Environment Using Third Party Verification Server. *Int. J. Interact. Mob. Technol.* 11(4): 55-65 (2017).
25. **Ayoub Alsarhan**, Ahmad Quttoum, Yousef Kilani: Optimizing Spectrum Sharing in Wireless Mesh Network Using Cognitive Technology. *Wirel. Pers. Commun.* 96(2): 1887-1905 (2017).
26. **Ayoub Alsarhan**: Reinforcement Learning for Routing and Spectrum Management in Cognitive Wireless Mesh Network, *International Journal of Wireless Networks and Broadband Technologies*, Vol. 5, No.1, pp. 59-72, 2016.
27. **Ayoub Alsarhan**, Ahmad Al-Khasawneh: Resource trading in cloud environments for utility maximisation using game theoretic modelling approach. *IJPEDS* 31(4): 319-333 (2016).
28. Sa'ed Abed, Ashraf Hasan Bqerat, Ahmad Al-Khasawneh, **Ayoub Alsarhan**, Ibrahim Obeidat: Towards improving the performance of distributed virtual memory based reversal cache approach. *IJCAT* 51(3): 247-256 (2015).
29. Emad E Abdallah, Ibrahim Al-Oqily, Alaa E Abdallah, Ahmed F Ootom, **Ayoub Alsarhan**, "Spectral Graph and Minimal Spanning Tree for 3D Polygonal Meshes Fingerprinting", *International Journal of Information Technology and Web Engineering*, Vol. 9, No. 4, pp. 40-53, 2015.
30. **Ayoub Alsarhan**, Ahmad Quttoum, Mohammad Bsoul, "Dynamic Auction for Revenue Maximization in Spectrum Market", *Wireless Personal Communications*, Vol. 83, No. 2, pp. 1405-1423, 2015.
31. Mohammad Bsoul, Yousef Kilani, Maen Hammad, Emad E. Abdallah, and Ayoub Alsarhan, "An Index-Based Approach for Wireless Sensor Networks," *Wireless Personal Communications*, Vol. 82, No.4, pp. 2185-2197, 2015.
32. Ayoub Alsarhan, Ahmed F. Ootom, Abdel-Rahman Al-Ghuwairi, Yousef Kilani: Spectrum Allocation Using Cognitive Radio in Wireless Mesh Networks, *International Journal of Computer and Information Engineering*, Vol. 1, No. 10, pp. 818-825, 2014.
33. Ayoub Alsarhan, Khalid Al-Sarayreh , Abdel-Rahman Al-Ghuwairi, Yousef Kilani: Resource trading in cloud environments for profit maximisation using an auction model. *IJAIP* 6(3): 176-190 (2014).

34. Mohammad Bsoul, Ayoub Maen Hammad, Ahmad Al-Khasawneh: A dynamic replication strategy based on categorization for Data Grid. *Multiagent and Grid Systems* 10(2): 109-118 (2014)
35. Ayoub Alsarhan, Ahmad Al-Khasawneh, Awni Itradat, I. Obeidat, Mohammad Bsoul: Spectrum trading for routing in a multi service cognitive mesh network, *Int. J. Mobile Network Design and Innovation*, Vol. 5, No. 2, pp. 85-96, 2013.
36. Ayoub Alsarhan, Ahmad Al-Khasawneh, Awni Itradat, Mohammad Bsoul: Economic model for routing and spectrum management in cognitive wireless mesh network. *IJNVO* 12(4): 331-351 (2013).
37. Yousef Kilani, Mohammad Bsoul, Ayoub Alsarhan, Ahmad Al-Khasawneh: A survey of the satisfiability-problems solving algorithms. *IJAIP* 5(3): 233-256 (2013).
38. I. Obeidat, A. Khasawneh, M. Bsoul , and A. Alsarhan (2013) " Computer based clinical decision support system for hepatitis disease diagnosis" *Int. J. of Advancements in Computing Technology* , Vol. 5, No. 14, 2013.
39. Ayoub Alsarhan, Emad E. Abdallah, Ibrahim Al-Oqily, Alaa Eddien Abdallah: An Economic Model for Resource Adaptation in 2D Mesh Multicomputer Networks. *I. J. Comput. Appl.* 20(1): 46-54 (2013).
40. Mohammad Bsoul, Iain Phillips, Chris J. Hinde, Ayoub Alsarhan: Evaluating economic-based entity strategies for the computational grid. *IJBIS* 13(2): 235-264 (2013).
41. **Ayoub Alsarhan**; Anjali Agarwal; Ibrahim Obeidat; Mohammad Bsoul; Ahmad Al-Khasawneh; Yousef Kilani. Optimal spectrum utilisation in cognitive network using combined spectrum sharing approach: overlay, underlay and trading, *International Journal of Business Information Systems*, Vol. 12 No. 4, pp. 423-454, 2013, DOI: 10.1504/IJBIS.2013.053216.
42. Emad Eddien Abdallah, Alaa Eddien Abdallah, Ahmad Al-Khasawneh, Mohammad Bsoul, **Ayoub Alsarhan**: Secure local algorithm for establishing a virtual backbone in 3D ad hoc network. *IJNVO* 12(1): 70-83 (2013).

43. **Ayoub Alsarhan**, Anjali Agarwal: Optimizing Spectrum Trading in Cognitive Mesh Network Using Machine Learning. *J. Electrical and Computer Engineering* 2012 (2012).
44. **Ayoub Alsarhan**, Anjali Agarwal: Profit optimization in multiservice cognitive mesh network using machine learning. *EURASIP Journal on Wireless Communications and Networking* 2011 2011:36.

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45. **Ayoub Alsarhan**, Ahmed Al-Dubai, Yousef Kilani Muhsen Alkhalidy: A New Security Approach for the Spectrum Access in Vehicular Ad Hoc Networks. *ICDS 2019*: 710-715.
46. I. T. Almalkawi, J. N. Al-Karaki, **A. Alsarhan**, R. Abu-Ajamiyah and D. Al-Mughrabi, "An Efficient Digital Image Encryption Using Pixel Shuffling and Substitution for Wireless Networks," 2019 IEEE Jordan International Joint Conference on Electrical Engineering and Information Technology (JEEIT), 2019, pp. 266-271, doi: 10.1109/JEEIT.2019.8717515
47. **Ayoub Alsarhan**: Game Theoretic Approach for Virtual Machines in IoT Fog Networks. *SSD 2019*: 710-715.
48. **Ayoub Alsarhan**, An Optimal Virtual Machines Provision in Cloud Market, *ICMLC 2017*, pp. 394-397, Singapore, 2017.
49. H. Shakhathreh, A. Khreishah, A. Alsarhan, I. Khalil, A. Sawalmeh and N. S. Othman, "Efficient 3D placement of a UAV using particle swarm optimization," 2017 8th International Conference on Information and Communication Systems (ICICS), Irbid, 2017, pp. 258-263.
50. Abdel-Rahman Al-Ghuwairi, Mohammad N. Khalaf, Laith Al-Yasen, Zaher Salah, Ayoub Alsarhan, Aladdin Hussein Baarah, A Dynamic Model for automatic Updating cloud computing SLA (DSLAs), *ICC '16: Proceedings of the International Conference on Internet of things and Cloud Computing*, 2016.
51. Ibrahim Al-Oqily, Mwafaq Alzboon, H. Owaied Al-Shemery, Ayoub Alsarhan, Towards Autonomic Overlay Self-Load Balancing, *IEEE International Multi-Conference on Systems, Signals and Devices (SSD 2013)*, 2013.

52. Alsarhan, A., Bsoul, M., Kilani, Y., Al-Khasawneh, A., Using Machine Learning for Optimizing Spectrum Trading in Cognitive Wireless Mesh Network. International Conference on Communication, Internet and Information Technology , pp. 818-825, Madrid, 2013.
53. Yousef Kilani, Mohammad Bsoul, Ayoub Alsarhan, Ibrahim Obeidat: Improving PAWS by the Island Confinement Method. ICAISC (2) 2012: 662-670.
54. Ayoub Alsarhan, Anjali Agarwal, "Load Balancing for Spectrum Management in A Cluster-based Cognitive Network", IEEE CCECE 2011.
55. Ayoub Alsarhan, Anjali Agarwal, "Intelligent Power Management for QoS-Aware Multimedia in Cognitive Mesh Networks using Reinforcement Learning", IEEE CNSR, 2011.
56. Ayoub Alsarhan, Anjali Agarwal, "Resource Adaptations for Revenue Optimization in Cognitive Mesh Network Using Reinforcement Learning", MCECN in conjunction with IEEE GLOBECOM, DEC 2010 .
57. Ayoub Alsarhan, Anjali Agarwal, "Cognitive Mesh Network Resource Adaptations Using Reinforcement Learning", IEEE's 25th Queen's Biennial Symposium on Communications, May 2010.
58. Ayoub Alsarhan, Anjali Agarwal, "Spectrum Sharing in Multi-Service Cognitive Network Using Reinforcement Learning", First IEEE UK-India International Workshop on Cognitive Wireless Systems (UKIWCWS), 2009, Dec 11-12, Delhi, India.
59. Ayoub Alsarhan, Anjali Agarwal, "Channel Assignment in Cognitive Wireless Mesh Networks", 3rd IEEE International Symposium on Advanced Networks and Telecommunication Systems (ANTS), 2009, Dec 14-16, Delhi, India.
60. Ayoub Alsarhan, Anjali Agarwal, "Cluster-based Spectrum Management using Cognitive Radios in Wireless Mesh Network", IEEE ICCCN 2009, Aug 2-6, San Francisco, USA.
61. Mahmudur Rahman, Anjali Agarwal, Ayoub Alsarhan, "Capacity-based Channel Assignment in Multi-Interface Wireless Mesh Networks", IEEE International Workshop on Internet and

Distributed Computing Systems, ICDS'08, Dec 25-27, 2008, Khulna, Bangladesh.

Book Chapter

62. Yousef Kilani, Ayoub Alsarhan, Mohammad Bsoul, Ahmed Fawzi Ootom: Local Search Algorithms for Solving the Combinatorial Optimization and Constraint Satisfaction Problems. SOFA (1) 2014: 199-211.

Thesis's

63. Ayoub Alsarhan, "Machine Learning Approach for Spectrum Sharing in the Next Generation Cognitive Mesh Network", Concordia University, Canada, 2011.
64. Ayoub Alsarhan, "Availability-based Processor Allocation on 2d Mesh Multicomputer", Al al-Bayt University, Jordan, 2001.

Supervisor:

65. Omar Khawaldeh, "An Economic Framework for Optimal Admission to Maximize Profit in Wireless Network:", Hashemite University, Jordan, 2018.
66. Jehad Abu-Dawud, "Priority- Based Secondary Users over Cognitive Radio Networks:", Hashemite University, Jordan, 2017.

Co-supervisor:

67. Mohammad Numan, "A Novel E-Learning Cloud Provider for Students to Bid in Learning Courses", Hashemite University, Jordan, 2018.
68. Bushra Alhijawi, "The use of the genetic algorithms in the recommender systems", Hashemite University, Jordan, 2017.

References

Upon request

Personality

- Initiative, Ambitious, & Self Motivated.
- Tending to provide a complete help and support.
- Great sense of responsibility toward Jobs assigned.
- Strong Analytical and Interpersonal Communication skills.
- Outstanding ability to learn new Technology related Jobs & Topics.
- Ability to work within any type of group, and establishing excellent relationships within the work environment, aimed to deliver well done Jobs.