



جامعة أم القرى
UMM AL-QURA UNIVERSITY

College of
Engineering and Architecture

Department of
Architecture

Faculty
Research Papers

2025-2026



**Faculty
Research Papers
(Professors)**

2025-2026



Adel Mohammad Ahmad Binyaseen

Hameed, Y. A. S., Osra, O., Munshi, A., Alsharif, H., Alfi, A. A., Binyaseen, A. M., & El-Metwaly, N. M. (2025). Dual-functionality glasses: Optimizing optical transmission and gamma-ray attenuation in transition metal oxide-doped bismuth silicates for next-generation windows. *Arabian Journal of Chemistry*. https://doi.org/10.25259/AJC_160_2025

Osra, O. A., Alkhamis, K., Alkhatib, F., Alotaibi, M. T., & Alsharif, M. A. (2025). Spectroscopic, AC conductivity and dielectric properties of Nd₂O₃-doped lithium silicophosphate glass. *Journal of Saudi Chemical Society*, 29(16). <https://doi.org/10.1007/s44442-025-00014-0>

Alkhamis, K., Alghasham, H., Albandary, A., Alessa, H., Osra, O., Al-Ghamdi, S., Binyaseen, A., & El-Metwaly, N. M. (2024). Iron borophosphate glasses: Merging optical transparency, structural integrity, and radiation shielding efficacy for sustainable uses. *Arabian Journal of Chemistry*, 17(9), 105875.

Binyaseen, A. M. (2024a). Office design features and future organizational change toward supporting sustainability. *Buildings*, 14(1), 260. <https://doi.org/10.3390/buildings14010260>

Binyaseen, A., Alaysuy, O., Alhasani, M., Sallam, S., Alkhatib, F., Alkhamis, K., Shah, R., & El-Metwaly, N. M. (2024b). Novel strategy toward color-tunable and glow-in-the-dark colorless smart natural wooden window. *Journal of Photochemistry and Photobiology A: Chemistry*, 448, 115321.

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Al-Ahmed, Z., Alatawi, N., Alkhamis, K., Alkathami, N., Binyaseen, A., Abumelha, H., & El-Metwaly, N. M. (2023). Development of glow-in-the-dark and color-tunable poly(methyl methacrylate) plastic concrete immobilized with rare-earth aluminate. *Journal of Photochemistry and Photobiology A: Chemistry*, 444, 114959.

Alhasani, M., Alkhatib, F., Al-Bonayan, A., Shah, R., Binyaseen, A., Al-Qahtani, S., Saad, F., & El-Metwaly, N. M. (2023). Preparation of glass nanofibers to reinforce polymethyl methacrylate toward persistent photoluminescent bricks. *Journal of Photochemistry and Photobiology A: Chemistry*, 444, 114988. <https://doi.org/10.1016/j.jphotochem.2023.114988>

Absi, A., Binyaseen, A. M., & Monawar, A. (2022a). Planning of urban quarters, districts and neighbourhoods in Islam's holiest city: A comparative analytical study. *The Scientific Journal of King Faisal University*, 23.

Al-Qahtani, S. D., Al-Nami, S. Y., Alkhamis, K., Al-Ahmed, Z. A., Binyaseen, A. M., Khalifa, M. E., & El-Metwaly, N. M. (2022b). Simple preparation of long-persistent luminescent paint with superhydrophobic anticorrosion efficiency from cellulose nanocrystals and an acrylic emulsion. *Ceramics International*, 48(5), 6363–6371.



Al-Qahtani, S. D., Binyaseen, A. M., Aljuhani, E., Aljohani, M., Alzahrani, H., Shah, R., & El-Metwaly, N. M. (2022c). Production of smart nanocomposite for glass coating toward photochromic and long-persistent photoluminescent smart windows. *Ceramics International*, *48*(1), 903–912.

Binyaseen, A. M. (2022d). Development of epoxy/rice-straw-based cellulose nanowhiskers composite smart coating immobilized with rare-earth-doped aluminate: Photoluminescence and anticorrosion properties for sustainability. *Ceramics International*, *48*(4), 4841–4850.

Binyaseen, A. M. (2022e). Improving thermal performance of existing uninsulated R.C. domes through passive cooling measures using polyurethane foam in double-skin layer in hot climate. *Case Studies in Construction Materials*, *16*.

Ranjithkumar, B., Ranjith Kumar, E., Ramalingam, H. B., Rahale, C. S., Mahmoud, M. H. H., Binyaseen, A. M., Keshk, A. A., & El-Metwaly, N. M. (2021). Bio-ingredients assisted synthesis of Fe-doped zinc oxide nanostructures: Study on structural, optical, morphological and thermal properties. *Ceramics International*, *47*(24), 35378–35383.

Mohamed Atef Elhamy Kamel

Kamel, M., & Khalil, M. (2025a). Burnout in architecture students: The role of studio culture norms. *TPM – Testing, Psychometrics, Methodology in Applied Psychology*, *32*(S3), 1363–1380.

Kamel, M., & Khalil, M. (2025b). Indoor environmental quality and its role in achieving psychological and physiological comfort for education buildings. *TPM – Testing, Psychometrics, Methodology in Applied Psychology*, *32*(S3), 2144–2157.

Kamel, M., & Khalil, M. (2024a). Households' awareness and participation in sustainable waste management. *Naturalista Campano*, *28*(1). <https://doi.org/10.5281/zenodo.10882758>

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Kamel, M., & Khalil, M. (2024c). Accommodating climate changes by using renewable energy in the sustainable building design. *Naturalista Campano*, *28*(1). <https://doi.org/10.13140/RG.2.2.24655.50081>

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Kamel, M., & Khalil, M. (2023a). The impact of using computer-aided design (CAD) on the creativity of architecture students. *Journal for Educators, Teachers and Trainers*, *14*(4). <https://doi.org/10.47750/jett.2023.14.04.021>



Kamel, M., & Khalil, M. (2023b). Migration and architectural transformation in Alexandria, Egypt. *Migration Letters*, 20(S9). <https://doi.org/10.13140/RG.2.2.18449.24167>

Kamel, M., & Khalil, M. (2022a). Activating the role of the mythology of local civilization and its impact on contemporary urban design and architectural thought. *Journal of University Studies for Inclusive Research (USRIJ)*, 3(10).

Kamel, M., & Khalil, M. (2022b). Conservation of earth vernacular settlements: A case study of El-Dakhla Oasis, Egypt. *Journal of University Studies for Inclusive Research (USRIJ)*, 3(10), 7889–7919.

Kamel, M., & Khalil, M. (2021a). Evaluation of touristic routes destinations to improve visitors' experience of Makkah. In *20th Scientific Forum for Hajj, Umrah and Visit*. Umm Al-Qura University (UQU).

Kamel, M., & Khalil, M. (2021b). The sustainable urban design considerations for tourism development in coastal cities – Case study Abo Qir, Alexandria. *Journal of University Studies for Inclusive Research (USRIJ)*, 6(8).

Kamel, M., & Khalil, M. (2021c). Using green roofs to reduce stormwater runoff: A case study of Alexandria, Egypt. *Journal of University Studies for Inclusive Research (USRIJ)*, 6(8).

Kamel, M., & Khalil, M. (2021d). Strategy of a sustainable development for Muzdalifa. In *20th Scientific Forum for Hajj, Umrah and Visit*. Umm Al-Qura University (UQU).

Ehab Farouk Rached

Rached, E. F., & Wahba, A. S. (2025). *The effect of exposure to coastal climate on durability of low-rise building envelopes in NWC (North West Coast) resorts*. *World Journal of Engineering Research and Technology (WJERT)*, 11(1), 1–25.

Rashed, E., Elmansoury, A., & Shehata, A. M. (2025). *Ecolodges in desert regions: An approach to compatibility and sustainability*. *Journal of University Studies for Inclusive Research*, 7(38), 1–15.

Rached, E., & Mahmoud, O. E. (2024). *Strategies for improving energy efficiency of residential units in coastal touristic resorts of hot humid climates*. *World Journal of Engineering Research and Technology*, 10(2), 22–35.

Rached, E., & Elmansoury, A. (2024). *Local character as an indicator of sustainable tourism*. *Journal of Engineering Research*, 12(1), 45–56.

Omer, M. M., Kineber, A. F., Oke, A. E., Kingsley, C., Alyanbaawi, A., Rached, E. F., & Elmansoury, A. (2023). *Barriers to using cloud computing in sustainable construction in Nigeria: A fuzzy synthetic evaluation*. *Mathematics*, 11(2), Article 344.



Kineber, A. F., Oke, A. E., Hamed, M. M., Rached, E. F., & Elmansoury, A. (2023). *Modeling the impact of overcoming the green walls implementation barriers on sustainable building projects: A novel mathematical partial least squares–SEM method. Mathematics, 11(1), Article 25.*

Kineber, A. F., Oke, A. E., Hamed, M. M., Rached, E. F., & Elmansoury, A. (2022). *A partial least squares structural equation modeling of robotics implementation for sustainable building projects: A case in Nigeria. Sustainability, 14(24), Article 16679.*

Rached, E., & Anber, M. (2022). *Energy retrofitting strategies for office buildings in hot arid climates. International Journal of Low-Carbon Technologies, 17, 506–512.*

Shehata, A. M., & Rached, E. (2021). *Temporal model for mitigating urban development uncertainty. Umm Al-Qura University Journal of Engineering & Architecture, 12(2), 31–38.*

Rached, E., & Elmansoury, A. (2018, September 12–13). *Design of the external envelope and interior spaces of school buildings to improve environmental performance efficiency. In Second International Conference for Sustainable Design of the Built Environment: Research in Practice (Vol. 3, Issue 1, p. 45). University of East London.*

Al-Bukhari, I., Rashed, E., & Shehata, A. M. (2018, September 12–13). *Impact of outer shell design on educational buildings: Energy performance. In Second International Conference for Sustainable Design of the Built Environment: Research in Practice (Vol. 3, Issue 1, p. 9). University of East London.*

Mohamed Wahba Ibrahim

Kamel, M., & Khalil, M. (2025a). Burnout in architecture students: The role of studio culture norms. *TPM – Testing, Psychometrics, Methodology in Applied Psychology, 32(S3), 1363–1380.*

Kamel, M., & Khalil, M. (2025b). Indoor environmental quality and its role in achieving psychological and physiological comfort for education buildings. *TPM – Testing, Psychometrics, Methodology in Applied Psychology, 32(S3), 2144–2157.*

Kamel, M., & Khalil, M. (2024a). Households' awareness and participation in sustainable waste management. *Naturalista Campano, 28(1).* <https://doi.org/10.5281/zenodo.10882758>

Kamel, M., & Khalil, M. (2024b). Using physical models to generate creative ideas for architecture students. *International Journal of Nonlinear Analysis and Applications, 15(4).* <https://doi.org/10.22075/IJNAA.2023.22784.4089>

Kamel, M., & Khalil, M. (2024c). Accommodating climate changes by using renewable energy in the sustainable building design. *Naturalista Campano, 28(1).* <https://doi.org/10.13140/RG.2.2.24655.50081>



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<https://doi.org/10.22075/IJNAA.2023.78235.4200>

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Kamel, M., & Khalil, M. (2023b). Migration and architectural transformation in Alexandria, Egypt. *Migration Letters*, 20(S9). <https://doi.org/10.13140/RG.2.2.18449.24167>

Kamel, M., & Khalil, M. (2022a). Activating the role of the mythology of local civilization and its impact on contemporary urban design and architectural thought. *Journal of University Studies for Inclusive Research (USRIJ)*, 3(10).

Kamel, M., & Khalil, M. (2022b). Conservation of earth vernacular settlements: A case study of El-Dakhla Oasis, Egypt. *Journal of University Studies for Inclusive Research (USRIJ)*, 3(10), 7889–7919.

Kamel, M., & Khalil, M. (2021a). Evaluation of touristic routes destinations to improve visitors' experience of Makkah. In *20th Scientific Forum for Hajj, Umrah and Visit*. Umm Al-Qura University (UQU).

Kamel, M., & Khalil, M. (2021b). The sustainable urban design considerations for tourism development in coastal cities – Case study Abo Qir, Alexandria. *Journal of University Studies for Inclusive Research (USRIJ)*, 6(8).

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Kamel, M., & Khalil, M. (2021d). Strategy of a sustainable development for Muzdalifa. In *20th Scientific Forum for Hajj, Umrah and Visit*. Umm Al-Qura University (UQU).



**Faculty
Research Papers
(Associate Professors)**

2025-2026



Oumr Adnan A Osra

Bendekhis, M., Fezzioui, N., Benyamine, M., Osra, O. A., Alkhafaji, M. A., Dikandé, A. M., Kaid, N., Menni, Y., & Chamkha, A. J. (2025). Finite element analysis of hygrothermal interactions in date palm concrete, autoclaved aerated concrete, and gypsum walls using the Künzle model under arid and hot climate. *International Journal of Low-Carbon Technologies*, (20), 323–333.

Elnaby, F. M. Z. A., Osra, O. A. A., Karban, A. S., Majrashi, A. A., & Ali, M. A. M. (2025). Methodology of applying sustainable design to achieve energy efficiency for eco-tourism hotel buildings in urban areas at Siwa Oasis. *Metallurgical and Materials Engineering*, (31), 193–208.

Sayad, B., Osra, O. A., & Qattan, W. S. (2025). Optimizing energy and thermal comfort in residential kitchens: An on-site investigation using thermal imaging. *Journal of Asian Architecture and Building Engineering*, 1–14.

Alkhamis, K., Alghasham, H. A., Almahri, A., Alessa, H., Osra, O. A., Al-Ghamdi, B. M., & El-Metwaly, N. M. (2024). Iron borophosphate glasses: Merging optical transparency, structural integrity, and radiation shielding efficacy for sustainable uses. *Arabian Journal of Chemistry*, 17(9), 105875.

Alamoudi, M., Imam, A., Majrashi, A., Osra, O., & Hegazy, I. (2024). Integrating intelligent and sustainable transportation systems in Jeddah: A multidimensional approach for urban mobility enhancement. *International Journal of Low-Carbon Technologies*, 19, 1301–1314.

Sayad, B., Helmi, M. R., Osra, O. A., Abed, A. M., & Alhubashi, H. H. (2024). Microscale investigation of Urban Heat Island (UHI) in Annaba City: Unveiling factors and mitigation strategies. *Sustainability*, 16(2), 747.


Sayad, B., Osra, O. A., Binyaseen, A. M., & Qattan, W. S. (2024). Analyzing urban climatic shifts in Annaba City: Decadal trends, seasonal variability and extreme weather events. *Atmosphere*, 15(5), 529.

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Kaid, N., Bayram, M., Osra, A. O., Almutery, B. S., Hassan, A. R., & Menni, Y. (2023). Enhancing thermal comfort in buildings innovations in sustainable cooling and heating systems utilizing geothermal energy. *Thermal Science*, 27(4 Part B), 3477–3486.

Sakhri, N., Osra, O. A., Alsaygh, F. S., Almutery, S. B., & Menni, Y. (2023). Optimizing indoor thermal comfort with wind towers and earth to air heat exchangers: A sustainable solution for energy-efficient housing. *International Journal of Low-Carbon Technologies*, 18, 915–928.

Tlili, S., Kaddour, A., Osra, O. A., Bayram, M., Atif, M., Ahmad, H., & Menni, Y. (2023). Enhancing thermal performance and sustainability parabolic trough concentrator systems in Djelfa's solar-integrated urban design. *Thermal Science*, 27(4 Part B), 3251–3260.



Osra, F. A., Osra, K. A., Jones, P., Osra, O. A., Suhartini, N., Alzahrani, J. S., & Mirza, A. Z. (2022). Public space and solid waste facilities in Makkah. *Journal of Geoscience*, 15(10), 957.

Osra, F., Al-Zahrani, J., Al-Soufi, M., Osra, O., & Zeeshan A. (2021). Environmental and economic sustainability in the Hajj system. *Journal of Geoscience*, 14, 1–15.

Osra, O., & Jones, P. (2019). Physical form, structure, and Islamic identity and socio-cultural values in traditional and modern cities in Saudi Arabia. In *Proceedings of the 6th International Architecture Conference with Awards - S.ARCH* (pp. 340–364). S. ARCH.

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Osra, O., & Jones, P. (2018b). Understanding change of urbanism patterns in Jeddah between 1938–2017. In *Proceedings of the 5th International Architecture Conference with Awards - S.ARCH* (Vol. 6, pp. 950–972). S. ARCH.

Wadia Ali Albarqawi

Albarqawi, W. A. (2025). The perceptions of Makkah's architectural identity by residents pilgrims 2021. *American Journal of Civil Engineering and Architecture*.

Albarqawi, W. A. (2024a). Analyzing Makkah's Architectural Vocabularies (MAV): A method for building a digital library for machine learning applications. *Journal of Asian Architecture and Building Engineering*.


Albarqawi, W. A. (2024b). Generative Artificial Intelligence as a source of inspiration for a modern and authentic architectural identity of residential building facades in Makkah City. *Journal of Architecture and Planning (King Saud University)*, 36(3), 359–379.

Albarqawi, W. A. (2024c). The building of innovative place: The Start-Ups Center in Wadi Makkah.

Albarqawi, W. A. (2023a). The adopted urban and heritage preservation methodologies in the Arab world: A review article. *Rendiconti Lincei. Scienze Fisiche e Naturali*.

Albarqawi, W. A. (2023b). The building of innovative identity: The case study of The Startups Center in Wadi Makkah. In *The 1st International ARCH + DESIGN Conference 2023*.

Albarqawi, W. A. (2023c). The Line: A zero-gravity theory for urban design. *Modern Applied Science*, 17(1), 18.



Albarqawi, W. A. (2023d). Mapping the approaches for investigating Makkah's architectural vocabularies and AI: A literature review. *Frontiers of Architectural Research*.

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Ibraheem Nooruddeen Al-Bukhari

Al-Bukhari, I., Rashed, E., & Shehata, A. M. (2018a). Impact of outer shell design on educational buildings, energy performance. In *Second International Conference for Sustainable Design of the Built Environment: Research in Practice*.

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Al-Bukhari, I., & Hegazy, T. (2015). Multiple-Criteria BIM-Based Evaluation of Architectural Submittals. *International Journal of Mathematical Models and Methods in Applied Sciences, 9*, 453–462.

Naif Sultan Mesfer Alaboud

Shehata, A. M., & Alaboud, N. S. (2025a). Identification of features of architectural heritage using deep learning techniques. *Civil Engineering and Architecture, 13*(4).

Alaboud, N. S., & Almansoury, A. (2025b). Implementation of cloud computing in Saudi construction: An exploration of political, economic, social, technological, environmental, and legal factors using fuzzy DEMATEL. *Advances in Civil Engineering, 2025*, 1825108.

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Abou Leila, M. M. S., & Alaboud, N. S. (2023a). A unified sustainability assessment metrics for nations of Gulf Cooperation Council- A critical study. *Journal Architecture & Planning, 35*(2).



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Ali, A. H., Kineber, A. F., Qaralleh, T. J. O., Alaboud, N. S., & Daoud, A. O. (2023c). Classifying and evaluating enablers influencing modular construction utilization in the construction sector: A fuzzy synthetic evaluation. *Alexandria Engineering Journal*, 78, 45–55.

Aliu, J., Oke, A. E., Kineber, A. F., Ebekoziem, A., Aigbavboa, C. O., Alaboud, N. S., & Daoud, A. O. (2023d). Towards a new paradigm of project management: A bibliometric review. *MDPI*, 15(13), 9967.

Alshahrani, A., Alaboud, N., Ahmed, Y. et al. (2023e). Critical success factor of PPP for affordable housing provision in Makkah, Saudi Arabia. *Journal of Umm Al-Qura University for Engineering and Architecture*, 14(1), 36–44.

Alshahrani, A., Alaboud, N., Leje, M. I., Karban, A., & Altowerqi, Z. (2023f). Rating the significance of the factors influencing shortage of skilled labours for sustainable construction: A perception of Makkah construction practitioner. *Journal of Umm Al-Qura University for Engineering and Architecture*, 14(1), 13–25.

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Kineber, A. F., Oke, A. E., Qaralleh, T. J. O., Alaboud, N. S., Alshahrani, A., & Alaboud, M. (2023i). Cyber technology implementation barriers for sustainable buildings: A novel mathematical partial least square structural equation modelling. *MDPI*, 13(4), 1052.

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Karban, A. S., Jusan, M. B. M., Al-Aboud, N. S., Majrashi, A. A., Alzahrani, M., & Raj, R. (2020). Reviving the roles of Makkah residents in providing hospitality. *PalArch's Journal of Archaeology of Egypt/Egyptology*, 17(7), 13310–13332.

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Abdulhafeez Ahmad M. Alwafi

Alwafi, A. A. (2025a). Climate change as an influential factor in designing future cities. Case study the NEOM Project The line city in Saudi Arabia. *Journal of Umm Al-Qura University for Engineering and Architecture*.

Alwafi, A. A. (2025b). Principal component analysis for exploring sustainable interior design implementation challenges. JES. *Journal of Engineering Sciences Faculty of Engineering Assiut University*.

Alwafi, A. A. (2024). Exploring barriers to the adoption of green walls in Saudi Arabia building industry. *American Journal of Civil Engineering and Architecture*.

Alwafi, A. A. (2022a). Feasibility study of nano-technology-based insulation materials usage to decrease the cooling loads in high-income housing in KSA. In *Advances in Architecture, Engineering and Technology* (pp. 215–226).

Alwafi, A. A. (2022b). Integrated project delivery contract model supporting BIM-based construction project. *American Journal of Civil Engineering and Architecture*, 10(2), 82–92.

Alwafi, A. A. (2022c). Sustainable material selection criteria framework for environmental building enhancement. *American Journal of Civil Engineering and Architecture*, 10(1), 31–44.

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Alwafi, A. A. (2019). Effect of child behavior on the intimal spaces of kindergartens. *Journal of Al-Azhar University Engineering Sector*, 14(51), 741–749.

Alwafi, A. A. (2006). *The development of the domestic interior in Makkah, Saudi Arabia: From the traditional to the modern way of living* [Unpublished doctoral dissertation]. University of Newcastle Upon Tyne.

Abdulrahman Abdulaziz M. Majrashi

Majrashi, A. A. (2025a). Participatory urban digital twins with fairness aware optimization for equitable quality of life improvements in multi objective planning contexts. *International Journal of Environmental Sciences*, 4249–4261.

Abdelnaby, F. M. Z. A., Osra, O. A. A., Karban, A. S., Majrashi, A. A., & Ali, M. A. M. (2025b). Methodology of applying sustainable design to achieve energy efficiency for eco-tourism hotel buildings in urban areas at Siwa Oasis. *Metallurgical and Materials Engineering*, 31(1), 193–208.



Reyes-Schade, E., Grande-Ayala, C., Imam, A., Gbban, A. M., Summan, M., Karban, A. S., Majrashi, A. A., & Alamoudi, M. (2024a). (Re)writing the city from within: An exploratory approach to sustainable urban morphologies from the dialogue between public space and public transport in Barcelona's Trambess. *Sustainability*, *16*(22), 9667.

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Majrashi, A. A. (2023a). Quality of life in urban neighborhoods in Jeddah, Saudi Arabia. *La Tadeo dearte*, *9*(11).

Waheeb, S. A., Zerouali, B., Elbeltagi, A., Alwetaishi, M., Wong, Y. J., Bailek, N., AlSaggaf, A. A., Abd Elrahman, S. I. M., Santos, C. A. G., & Majrashi, A. A. (2023b). Enhancing sustainable urban planning through GIS and multiple-criteria decision analysis: A case study of Green Space Infrastructure in Taif Province, Saudi Arabia. *Water*, *15*(17), 3031.

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**Faculty
Research Papers
(Assistant Professors)**

2025-2026




Abdullah Saeed Karban

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- Ghamdi, K. A. A., Rasidi, M. H., Suruje, A. F., Karban, A. S., & Alsolami, B. M. (2025). Unified Visual Identity As An Approach To Improve Mobility At Muzdalifah Train Stations: A Proactive Vision For Pilgrim Growth Accommodation. *International Journal of Research and Innovation in Applied Science (IJRIAS)*, 79–92.
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- Karban, A. S. (2024). Enhancing Wayfinding Systems for Crowd Health and Safety in Makkah: Assessing Al-Aziziya and Al-Zahir Neighborhoods. In *The 24th Scientific Forum for the Hajj, Umrah, and Visit Research* (pp. 101–119). Umm Al-Qura University.
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- Alshahrani, A., Alaboud, N., Leje, M. I., Karban, A., & Altowerqi, Z. (2023). Rating the significance of the factors influencing shortage of skilled labours for sustainable construction: A perception of Makkah construction practitioner. *Journal of Umm Al-Qura University for Engineering and Architecture*, 14, 13–25.
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- Nabhan, Y. M., Abdullahi, H., Karban, A. S., Hasanuddin, B. L., Muhammad, B. A., & Asmaswi, Z. (2023). Urban Growth Studies for the Holy City of Makkah, Saudi Arabia, through Literature Synthesis. *Journal of Hunan University Natural Sciences*, 124–140.



- Alzahrani, M., Abdul Majid, R., Karban, A., & Majrashi, A. (2022a). The Effect of Different Specifications of Passive Spaces on Residents' Satisfaction in Adjoining Spaces within a Hot Dry Climate. *International Journal on Advanced Science, Engineering and Information Technology (IJASEIT)*, 834–845.
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Abdullah Abdulhameed Abdullah Bagasi

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Yahya Muhammad A. Nabhan

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Mohanad Ahmad Alfelali

Alfelali, M. A., & Garcia-Fuentes, J. M. (2020). The growth of the Holy Mosque in Mecca and the first legislation of heritage conservation in Saudi Arabia (1955-2010). *WIT Transactions on the Built Environment*, 197, 65–76.

Ebaa Khalid Khan

Khan, E., Sharples, S., & Mohammadpourkarbasi, H. (2022). Adopting Passivhaus principles in residential buildings in the extremely hot and dry climate of Saudi Arabia. In *3rd International Conference on Comfort at the Extremes* (pp. 11 pages).



**Faculty
Research Papers
(Lectures)**

2025-2026



Husam Ahmed Murad

Generative Artificial Intelligence as a source of inspiration for a modern and authentic architectural identity for Makkah city. (2024). *Journal of Architecture and Planning*, 36(3), 359–379.

Architectural and functional characteristics of the local mosque in the Holy City of Makkah. (2020). *Umm Al-Qura University Journal of Engineering & Architecture*, 11(2), 88.



Review of Research Portfolio



Review of Research Portfolio (2018–2025):

Strategic Positioning and Thematic Excellence

1. Executive Summary:

Profile of Research Excellence in Architectural Science

1.1. Overview and Core Research Identity

This report presents a detailed analysis of the research output from the Department of Architecture, College of Engineering and Architecture, spanning publications from 2018 through anticipated outputs in 2025 and 2026. The documented scholarly activity is robust, encompassing approximately 98 research entries across the ranks of Professor, Associate Professor, Assistant Professor, and Lecturer.

The department's research identity is defined by a highly specialized and interdisciplinary structure, demonstrating convergence around five primary thematic pillars: Advanced Smart Materials and Building Physics; Sacred Urbanism, Hajj Management, and Architectural Identity; Sustainable Urbanism and Climate Adaptation; Digital Transformation and Construction Management; and Architectural Pedagogy and Student Experience.

This specialized focus highlights a strategic operational approach. The Department of Architecture has successfully cultivated a technically intensive research profile that strategically bridges traditional design disciplines with applied physical sciences (such as material physics and chemistry) and advanced quantitative methods (mathematical modeling, artificial intelligence, and Geographic Information Systems). This unique positioning provides a competitive advantage for securing specialized external funding that typically falls outside conventional architecture research streams.

1.2. Key Findings on Productivity and Collaboration

Collaborative synergy is a defining characteristic of the department's output. Associate Professor Oumr Adnan A Osra serves as a critical junction point, contributing to both advanced materials research (Pillar 1, with Binyaseen) and climate adaptation studies (Pillar 3). Similarly, Assistant Professors Abdullah Saeed Karban, Naif Sultan Mesfer Alaboud, and Adnan Yahya Abdullah Alshahrani demonstrate systematic collaboration within the high-volume cluster focused on Makkah planning and construction management.

1.3. Strategic Alignment and Dissemination

The department employs a highly effective publication strategy designed to maximize both academic prestige and regional policy utility. Research is disseminated through high-impact international technical journals, such as *Ceramics International* (4 papers) and *Mathematics* (2 papers), concurrently with highly localized and policy-relevant forums, such as the *Scientific Forum for Hajj, Umrah and Visit* (2 papers).

The volume and specificity of research dedicated to key national priorities demonstrate exceptional alignment with strategic development goals, particularly Vision 2030. The intensive focus on Makkah urbanism, Hajj infrastructure management (e.g., blockchain systems for pilgrim housing), sustainable construction barriers, and future cities planning (e.g., climate change factors in The Line City in NEOM, Alwafi 2025a) establish the department as a critical resource for governmental and infrastructure partners.



2. Thematic Mapping and Research Pillars: Interdisciplinary Convergence

2.1. Pillar 1: Advanced Smart Materials and Building Physics (The Technical Edge)

This pillar represents the department's most technically specialized research area, dominated by the work of Professor Adel Mohammad Ahmad Binyaseen and his collaborators. The research centers on nanotechnology, functional architectural coatings, and advanced glass engineering.

Key outputs include the development of "Dual-functionality glasses: Optimizing optical transmission and gamma-ray attenuation in transition metal oxide-doped bismuth silicates for next-generation windows". This output, published in the *Arabian Journal of Chemistry*, demonstrates a fundamental engagement with chemical synthesis for architectural applications. Further material research encompasses photoluminescent substances, such as those used in "glow-in-the-dark and color-tunable poly (methyl methacrylate) plastic concrete" and glass nanofibers applied to persistent photoluminescent bricks. The research extends to improving building longevity through "long-persistent luminescent paint with superhydrophobic anticorrosion efficiency".

2.2. Pillar 2: Sacred Urbanism, Hajj Management, and Makkah's Architectural Identity (The Institutional Core)

Given its location, the department appropriately focuses institutional resources on the unique complexities of urban development, identity preservation, and mega-event management in Makkah.

A major focus is the nexus of cultural heritage and digital transformation. Associate Professor Wadia Ali Albarqawi is actively analyzing "Makkah's Architectural Vocabularies (MAV)" and is pioneering the use of Generative AI as a source of inspiration for modern, authentic architectural identity in residential facades. This work is vital, positioning the department to codify cultural heritage digitally and leverage it to inform future architectural development, ensuring authenticity despite rapid modernization.


Operational safety and efficiency during large-scale events are also addressed. Assistant Professor Abdullah Saeed Karban focuses on enhancing wayfinding systems for crowd health and safety in specific Makkah neighborhoods (Al-Aziziya and Al-Zahir). Furthermore, research has been conducted on planning for accommodation, including the study of Critical Success Factors (CSF) for Public-Private Partnerships (PPP) in affordable housing provision and the exploration of "Pilgrims housing rental system based on blockchain technology" (Alaboud, Alshahrani). The integration of GIS (AlJahdali/Alshahrani), AI (Albarqawi), and digital twins (Majrashi, 2025a) illustrates a transition from traditional descriptive urban planning towards predictive and optimization modeling, essential for managing dynamic environments like Makkah during Hajj.

2.3. Pillar 3: Sustainable Urbanism and Climate Adaptation (Performance and Resilience)

This pillar focuses on optimizing building and urban performance in the region's severe climatic conditions, encompassing hot, arid, and humid coastal environments, through both modern and traditional low-carbon technologies.

The research portfolio comprehensively addresses thermal performance and building durability. Professor Ehab Farouk Rached's work examines the critical effects of exposure to coastal climates on the durability of low-rise building envelopes in resorts and strategies for improving energy efficiency in coastal touristic resorts. He also researched energy retrofitting strategies for office buildings in hot arid climates.

The department demonstrates a robust methodological approach by simultaneously addressing advanced building materials (Pillar 1) and passive design strategies rooted in vernacular architecture. This includes research on the integration of traditional architectural elements like the



Mashrabiya for ventilation (Bagasi, Karban), the optimization of thermal comfort via analysis of Trombe walls (Osra, Bensafi), and the use of wind towers and earth-to-air heat exchangers (Osra, Sakhri). This holistic approach yields a comprehensive framework for energy policy recommendations applicable to both new megaproject construction (e.g., Alwafi's research on climate change in The Line City in NEOM) and the retrofitting of existing building stock. Rached's focus on building envelope durability in coastal climates contributes directly to reducing infrastructure lifecycle costs (LCC) by minimizing degradation risks from harsh environmental exposure, complementing the energy efficiency research.

2.4. Pillar 4: Digital Transformation and Construction Management (Industry Optimization)

Research in this pillar focuses on accelerating the modernization of the Saudi construction industry through technological adoption, improved project delivery, and detailed diagnostic analysis of systemic barriers.

The department utilizes advanced quantitative methodologies, elevating construction management research beyond qualitative observation to rigorous, evidence-based diagnostic analysis. Faculty employ techniques such as Fuzzy Synthetic Evaluation and Partial Least Squares-Structural Equation Modeling (PLS-SEM) in papers published in prestigious journals like *Mathematics* to analyze barriers related to the implementation of cloud computing, robotics, and cyber technology in sustainable construction. This high-level mathematical rigor is effective for informing governmental bodies and industry consortia about structural impediments to project efficiency and sustainability.

Further research covers critical industry operational challenges, including studies rating the significance of the shortage of skilled labor for sustainable construction and analyses of PPP Critical Success Factors for affordable housing in Makkah (Alaboud, Alshahrani). The focus on systemic risk mitigation, including studies on preventive measures for pandemics on construction projects (Karban, Alaboud), is crucial given the scale and complexity of Saudi Arabia's current megaproject pipeline.

2.5. Pillar 5: Architectural Pedagogy and Student Experience (Human Capital Focus)

This unique research pillar, driven primarily by Professors Mohamed Kamel and Mohamed Khalil, applies scientific rigor to investigate the psychological, physiological, and technical aspects of architectural education.

The research directly addresses student well-being, exemplified by the study "Burnout in architecture students: The role of studio culture norms". It also investigates the cognitive impact of design tools, comparing the use of physical models versus computer-aided design (CAD) on student creativity. Furthermore, research explores the influence of Indoor Environmental Quality (IEQ) on achieving psychological and physiological comfort in educational buildings. Publications for this pillar frequently appear in specialized psychology and education journals, such as *TPM – Testing, Psychometrics, Methodology in Applied Psychology*. This research stream functions as an internal quality control mechanism, providing objective, psychometrically validated data to inform curriculum design and student support services, thereby improving student success rates. The specialization in the human factors and psychology of learning spaces offers a distinctive global voice in the critical dialogue about professional training.

3. Comparative Faculty Productivity and Research Hierarchy

3.1. Analysis by Rank and Inter-Rank Collaboration

The Professor rank provides a foundation of specialized knowledge, with Professors Binyaseen, Kamel, and Rached maintaining high publication volumes (13, 14, and 11 papers, respectively). Professor Rached’s contributions reinforce the Sustainable Design and Construction Management themes through international collaborations on modeling green wall barriers and robotics implementation (with Kineber and Oke), and publishing in high-level venues like *Mathematics* and *Sustainability*.

The role of Associate Professor Oumr Adnan A Osra is defined by its strategic interdisciplinarity. Osra’s co-authorship spans material science (with Binyaseen, 2025), climate mitigation (urban heat island studies, 2024), and urban planning, establishing Osra as a critical "hub" author. This functional breadth facilitates interdisciplinary grant applications and streamlines knowledge transfer between the department's technical and planning clusters.

Collaboration among junior faculty is systematic and targeted. The consistent co-authorship network involving Assistant Professors Karban, Alaboud, and Alshahrani is systematically focused on resolving regional construction and planning deficiencies, covering topics from labor shortages to PPP critical factors. This strong, persistent collaboration among these faculty members ensures effective mentorship and a clear research pipeline geared toward applied regional problem-solving. Table 1 summarizes the distribution of research output across the academic ranks.

Table 1: Interdisciplinary Research Theme Clusters and Technical Specialization

Research Theme Cluster	Primary Faculty Leaders (Rank)	Top 3 Publication Venues	Key Interdisciplinary Nexus	Core Technical Specialization
Advanced Smart Materials	Binyaseen (P), Osra (AP)	<i>Ceramics International, J. Photochem. Photobiol. A: Chem., Arabian J. Chemistry</i>	Architecture + Materials Physics + Nanotechnology	Photoluminescence, Radiation Shielding, Anticorrosion Coatings
Sacred Urbanism & Hajj	Karban (AP), Albarqawi (AP), Majrashi (AP)	<i>UQU J. Eng. Archit., Hajj/Umrah Scientific Forum, Sustainability</i>	Urban Planning + GIS + AI/ML + Crowd Science	Wayfinding Systems, Digital Identity Modeling, Urban Digital Twins
Climate Adaptation & Performance	Rached (P), Osra (AP), Bagasi (AP)	<i>World J. Eng. Res. Tech., Int. J. Low-Carbon Tech., Atmosphere</i>	Architecture + Mechanical Engineering + Building Physics	Thermal Comfort Optimization, Passive Cooling (Mashrabiya, Trombe), Durability Modeling



Research Theme Cluster	Primary Faculty Leaders (Rank)	Top 3 Publication Venues	Key Interdisciplinary Nexus	Core Technical Specialization
Construction Management & Digital Tech	Alaboud (AP), Alshahrani (AP), Rached (P)	<i>Mathematics, Alexandria Engineering Journal, Sustainability</i>	Construction Management + Quantitative Modeling (Fuzzy, SEM) + IT	BIM Adoption, Cloud/Robotics Barriers, PPP Feasibility
Architectural Pedagogy	Kamel (P)	<i>TPM – Testing, Psychometrics..., J. for Educators, Teachers and Trainers</i>	Architecture + Applied Psychology + Education Science	Studio Culture Analysis, Student Burnout, CAD Impact on Creativity

4. Dissemination Strategy and Journal Impact

The department’s publication strategy is characterized by careful segmentation of output, targeting venues based on thematic fit to maximize research visibility and influence.

The strategy balances high-impact technical publishing with local application reporting. By consistently placing materials research in highly cited journals such as *Ceramics International* (4 papers between 2021 and 2022) and *Journal of Photochemistry and Photobiology A: Chemistry* (3 papers between 2023 and 2024), the department leverages a niche area to disproportionately boost its overall citation metrics and institutional ranking performance, distinct from typical architecture programs.

The commitment to quantitative methods is validated by publications in specialized venues like *Mathematics*. Conversely, high dedication to regional engagement is demonstrated by output in local journals, including the *Journal of University Studies for Inclusive Research* (5 papers) and policy-centric forums like the *20th Scientific Forum for Hajj, Umrah and Visit*. The breadth of publication venues—spanning materials science, social science/pedagogy, and regional engineering—ensures the department meets the diverse publication criteria required by various accreditation and research funding bodies.

5. Strategic Outlook and Future Trajectories

5.1. Core Competitive Strengths Synthesis

The department exhibits three distinct competitive strengths that should inform future strategic planning:

1. **Materials Innovation:** The unique expertise in dual-functionality materials science and functional coatings (Pillar 1) provides a singular advantage, positioning the department ahead of many regional architecture programs.
2. **Makkah Research Authority:** The high concentration of specialized research on Sacred Urbanism, Hajj operations, and cultural identity (Pillar 2) leverages the department's institutional relevance, establishing it as a national leader in pilgrim management, urban transformation, and identity preservation.
3. **Advanced Methodological Sophistication:** The consistent application of advanced quantitative methodologies (PLS-SEM, Fuzzy DEMATEL, AI, GIS) across Pillars 2, 3, and 4 ensures that future research outputs are robust, rigorous, and capable of addressing the complex, large-scale data requirements of modern smart city development.

Oumr Adnan Osra



Head of the Department of Architecture
October 20, 2025

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