SUSTAINABILITY 2023-2024

COMMUNICATION ON ENGAGEMENT (COE)

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

RESEARCH ON INDUSTRY, INNOVATION AND INFRASTRUCTURE

In the past two years, the university in SDG 9 has published research on efficient computer vision for tennis ball retrieval and finite element analysis of glass crushers. Other studies explored carrier phase recovery in LDPC-coded systems and the impact of recycled waste on concrete. Topics also include polymer fiber reinforced geopolymer concrete, grinding efficiency in cementitious materials, and life cycle assessment of hybrid energy systems. Additional research covers the empowerment of rural female entrepreneurs, performance of asphalt mixtures, and chitin-enhanced wood adhesives. Further areas of study include sustainable pervious concrete, green roofs, shear strength of fiber-reinforced concrete beams, sustainable geopolymer materials, and restoration of historical monuments.

2023

1. Wahidi, M., Imad, R., & Rishmany, J. (2023, May). **A Highly Efficient Computer Vision Approach for Tennis Ball Retrieval with Limited Computational Power.** In International Conference on Advances in Computing Research (pp. 192-203). Cham: Springer Nature Switzerland.
2. Rishmany, J., & Imad, R. (2023). **Finite Element and Multibody Dynamics Analysis of a Ball Mill Glass Crusher.** Modelling and Simulation in Engineering, 2023(1), 1905702.
3. Imad, R., & Houcke, S. (2023). **Carrier phase recovery of LDPC-coded systems based on the likelihood difference algorithm.** EURASIP Journal on Advances in Signal Processing, 2023(1), 16.
4. Marín, C., El Bachawati, M., & Pérez, G. (2023). **The impact of green roofs on urban runoff quality: A review.** Urban Forestry and Urban Greening. Open access.
5. Ghali, A.E.A., El Ezz, N.E., Hamad, B.S., Assaad, J.J., & Yehya, A. (2023). **Comparative study on shear strength and life cycle assessment of reinforced concrete beams containing different types of fibers.** Case Studies in Construction Materials. Open access.
6. Rishmany, J., Sabiini, G., Mansour, A., & Imad, R. (2023). **Generating rectilinear motion using permanent magnets.** Journal of Engineering and Applied Science. Open access.
7. Abdayem, J., Saba, M., & Aouad, G. (2023). **Elaboration of a sustainable bottom ash geopolymer material.** In E3S Web of Conferences. Open access.
8. Saba, M., Arairo, W., Sabalbal, G., El Bachawati, M., & Absi, J. (2023). **Use of aluminum powder for the development of a sustainable paste used in the restoration of historical monuments.** In E3S Web of Conferences. Open access.

9. Saba, M., Pérez, G., Coma, J., & Polls, M. (2023). **Geopolymer as an Innovative Material for Green Roofs- A State-of-the-Art Review.** In E3S Web of Conferences. Open access.
10. Mahfoud, F., Assaf, J.C., Elias, R., Debs, E., & Louka, N. (2023). **Defatting and Defatted Peanuts: A Critical Review on Methods of Oil Extraction and Consideration of Solid Matrix as a By-Product or Intended Target**. Processes. Open access.
11. Jabali, Y., Assaad, J.J., & Aouad, G. (2023). **Photocatalytic Activity and Mechanical Properties of Cement Slurries Containing Titanium Dioxide.** Buildings. Open access.
12. Abou Rachied, T., Dbouk, F., Hamad, B.S., & Assaad, J.J. (2023). **Structural behavior of beams cast using normal and high strength concrete containing blends of ceramic waste powder and blast furnace slag.** Cleaner Materials. Open access.
13. Barraj, F., Mahfouz, S., Kassem, H.A., Goulias, D., & El Kordi, A.A. (2023). **Investigation of Using Crushed Glass Waste as Filler Replacement in Hot Asphalt Mixtures.** Sustainability (Switzerland). Open access.
14. Semaan, N.M. (2023). **A Novel Service Life Prediction for Reinforced Concrete Infrastructure Systems.** In RILEM Bookseries.
15. El Samad, M., Dennaoui, H.K., & El Nemar, S. (2023). **Machine Learning and Big Data in Finance Services.** In Artificial Intelligence for Capital Markets.
16. Garba, A., Khoury, D.J., Balian, P., Charafeddine, J., & Al-Mutib, K.N. (2023). **LightCert4IoTs: Blockchain-Based Lightweight Certificates Authentication for IoT Applications.** EEE Access. Open access.
17. Nahas, L., Dahdah, E., Aouad, S., Abi-Aad, E., & Estephane, J. (2023). **Highly efficient scallop seashell-derived catalyst for biodiesel production from sunflower and waste cooking oils: Reaction kinetics and effect of calcination temperature studies.** Renewable Energy.
18. Fadel, M., Courcot, D., Seigneur, M., Ledoux, F., & Afif, C. (2023). **Identification and apportionment of local and long-range sources of PM2.5 in two East-Mediterranean sites. Atmospheric Pollution Research.** Open access.
19. El Inaty, F., Baz, B., & Aouad, G. (2023). **Long-term durability assessment of 3D printed concrete.** Journal of Adhesion Science and Technology.

2024

1. Gerges, N.N., Issa, C.A., Khalil, N.J., & Aintrazi, S. (2024). **Effects of recycled waste on the modulus of elasticity of structural concrete.** Scientific Reports. Open access.
2. Ahıskalı, A., Ahıskalı, M., Bayraktar, O.Y., Kaplan, G., & Assaad, J.J. (2024). **Mechanical and durability properties of polymer fiber reinforced one-part foam geopolymer concrete: A sustainable strategy for the recycling of waste steel slag aggregate and fly ash.** Construction and Building Materials.
3. Kaya, Y., Kobya, V., Mardani, A., & Assaad, J.J. (2024). **Effect of modified Triethanolamine on grinding efficiency and performance of cementitious materials.** Talanta Open. Open access.
4. Mansour, M., Harajli, H.A., Zakhem, H.E., & Manneh, R. (2024). **Cradle-to-grave life cycle assessment of a photovoltaic–diesel hybrid system: the case of an industrial facility.** Environment, Development and Sustainability.

5. Khabbaz, L., & Kuran, O. (2024). **EMPOWERING RURAL LEBANESE FEMALE ENTREPRENEURS: A RESOURCE-BASED PERSPECTIVE.** Journal of Developmental Entrepreneurship.
6. Barraj, F., Bilani, M., Hatoum, A.A., Assaad, J.J., & Goulias, D. (2024). **Aging behavior and long-term performance: a comparative study of hot mix versus chemical warm mix asphalt.** Innovative Infrastructure Solutions.
7. Charii, H., Boussetta, A., Ait Benhamou, A., Boutoial, K., & Moubarik, A. (2024). **Exploring the potential of chitin and chitosan extracted from shrimp shell waste in enhancing urea-formaldehyde wood adhesives.** International Journal of Adhesion and Adhesives.
8. Assaad, J.J., & Khatib, J.M. (2024). **Recycled materials used for sustainable pervious concrete.** In Sustainable Concrete Materials and Structures.

IEEE GRAND TECH LEBANON

The University of Balamand (UOB) hosted the IEEE Grand Tech Lebanon 2023 conference, focusing on Augmented Reality (AR), Virtual Reality (VR), and the Metaverse. Co-organized by IEEE Young Professionals Lebanon, IEEE Computer Society Lebanon, and IEEE UOB Student Branch, the event aimed to engage Lebanese youth from various technological backgrounds. Over 100 students from 15 universities and graduates attended, seeking to advance their careers. The conference's primary goal was to empower and enlighten attendees about AR, VR, and the Metaverse. A highlight was a simulation competition by Altered Realities, where participants created a simulation of the Nahyan Building on the UOB campus.

A 3D/360-DEGREE CAR SCANNER ROBOTIC ARM

The 3D/360-degree Car Scanner Robotic Arm, a joint project between VT Solutions and the University of Balamand's Faculty of Engineering, was led by Dr. Rodrigue Imad and Dr. Jihad Rishmany. This multidisciplinary project, completed in nearly a year, was manufactured and assembled in the university's Mechanical Engineering laboratories. The robotic arm, equipped with high-resolution cameras, meticulously inspects vehicles, capturing detailed stereoscopic images to identify issues like bumps and scratches. It can perform a complete 360-degree scan and create a 3D model of a car in under a minute.

UOB HOSTING THE GOOGLE DEVATHON COMPETITION

The Department of Computer Science celebrated the success of three of its teams, which secured the first, fifth, and sixth positions in the Google Devathon Competition. This event, organized by Google through the Google Developer Students Club and hosted by UOB, featured 34 teams from 17 universities in Lebanon. The Devathon serves as a preparatory stage for the globally recognized Google coding competition.