



"BAU's Journey towards SDG 9: Fostering Industry, Innovation and Infrastructure"



جامعة بيروت العربية
BEIRUT ARAB UNIVERSITY

Beirut Arab University (BAU) is fully committed to advancing Sustainable Development Goal 9 (SDG 9) – "Industry, Innovation, and Infrastructure." Through a comprehensive range of initiatives and collaborations, BAU is at the forefront of promoting innovation, fostering industry growth, and enhancing infrastructure development in Lebanon. Let's delve into the specific achievements that highlight BAU's dedication to SDG 9:

1. Campus Sustainability Initiatives:

- **Implementation of Solar Energy Systems:** BAU has installed solar energy systems on the Beirut Campus, harnessing sunlight to generate electricity and mitigate power outages. Plans were laid in August 2024 to extend this initiative to the Debbieh Campus, ensuring sustainable energy sources.
- **Artificial Lake Preparation:** The excavation of an artificial lake on the Debbieh Campus, is currently on the way, aiming to store rainwater for irrigation purposes, addressing water scarcity challenges and promoting sustainable land use.
- **Beehive Establishment:** in September 2024, BAU introduced beehives on the Debbieh Campus to support pollination and biodiversity conservation efforts, fostering environmental sustainability.

2. Research and Innovation for Sustainable Development:

It is based on our continuous update of our strategy and platform that we were also able to collect data regarding research that helps in serving SDG 9, which can be seen below:

- **Faculty Contributions:** BAU's Faculty of Science and Faculty of Engineering are leading research efforts contributing to sustainable industrialization and innovation. Projects include advancements in clean energy, smart cities, and sustainable manufacturing processes.
- **Publication Highlights:** Noteworthy publications under SDG 9 include research on digital leadership post-pandemic, AI applications in talent management, and novel mechanisms for smart energy metering and unmanned aerial vehicle stabilization.

According to data collected from BAU Publication Form, the Faculties of Engineering and Science are the Faculties with the highest contribution to research under this SDG, where SDG 9 accounts for 22% of the publications collected so far for the academic year 2023-2024.

Some examples of the publications listed under SDG9:

1. Digital Leadership and Innovation Mediated by Employees' Satisfaction: A Recovery Strategy after the Pandemic
2. Transforming Human Resources with AI: Empowering Talent Management and Workforce Productivity
3. A Secure and Resilient Smart Energy Meter
4. Characterization and optimization of mechanical properties in design materials using convolutional neural networks and particle swarm optimization
5. Control of a Novel Parallel Mechanism for the Stabilization of Unmanned Aerial Vehicles

3. Industry-Academia Collaboration:

- BAU established partnerships with industries and businesses to facilitate knowledge exchange, technology transfer, and collaborative research endeavors, thereby fostering innovation and advocating for sustainable industrial practices.

- A recent collaboration initiative, in September 2024, involves partnering with IRALEB (formerly known as LIRA: Lebanese Industrial Research Achievements), a renowned Private Non-Governmental Organization registered in Lebanon since 1997. IRALEB aims to provide career opportunities for university researchers, combat brain drain, and advance the Lebanese industrial sector. Their collaboration extends across 13 prestigious Lebanese universities and various local industries.

- On February 2024, BAU hosted IRALEB representatives for workshops held at both the Beirut and Debbieh campuses, where they introduced the "Innovation Program 2024." This initiative supports early-phase innovation for academic researchers and talented students, focusing on applied research projects in sectors such as agrifood, healthcare, pharmaceuticals, cosmetics, ICT, and creative industries. The program, under the umbrella of "Lebanon Innovate," receives funding from the "European Union," enhancing its capabilities and impact. By participating in the "Innovation Program 2024," BAU aligns with its commitment to academic excellence while contributing to the growth and competitiveness of the Lebanese industrial sector.

- This collaborative effort empowers researchers to translate innovative ideas into successful ventures or industrial solutions, leveraging support from both Lebanese and European stakeholders. Through partnership with IRALEB and participation in the "Innovation Program 2024," BAU underscores its dedication to fostering innovation, entrepreneurship, and impactful research.

- Dr. Amira Zaylaa, Assistant Professor at the Faculty of Engineering, Beirut Arab University, participated in LIRA 2024 with two Biomedical Engineering projects. These two projects were shortlisted nationally among several submitted projects from different universities.

Track 1: Revolutionizing Breast Cancer Diagnosis through Breast Mass Images, AI and Web Development

Track 2: Development of A Smart Bionic Prothesis Arm

Dr. Amira Zaylaa, Underwent the Building Capacity Training in April 2024 and was certified after the training.

4. Curriculum Integration:

- SDG Integration: starting from the beginning of the academic year 2024-2024, BAU is incorporating sustainability and SDG-related concepts across its curriculum, ensuring that students are equipped with the knowledge and skills needed to address contemporary challenges and drive innovation.

- Conferences and Projects integrated with SDG9: BAU is planning to integrate artificial intelligence into education and research to benefit the community and industry. Several AI conferences have been organized, including one titled "The Future of Academia in Light of Artificial Intelligence." Additionally, BAU is raising awareness about the UN Sustainable Development Goals (SDGs) and aligning research plans with these goals. The BAU Publication Form has been updated to include the relevant SDGs for each research paper, demonstrating BAU's commitment to sustainability and academic excellence. BAU research subthemes are also being updated to accommodate the integration of Sustainable Development Goals into research plans.

6. Integration of Artificial Intelligence (AI):

- AI-focused Initiatives: BAU organized conferences and initiatives centered on AI, fostering dialogue and collaboration in areas such as AI education, research, and application, thereby aligning with the latest advancements in AI technology.

- There have been several AI conferences planned, one that was organized in April 2024 and is called "The Future of Academia in Light of Artificial Intelligence." BAU is also promoting awareness of the UN Sustainable Development Goals (SDGs) and coordinating research plans with these objectives.

- BAU researchers and academic are being equipped with the knowledge of AI tools to promote their experience as Faculty members and their relationship with their students, as well as to facilitate research activity and to reach new horizons.

7. Capacity Building and Technical Training:

- BAU offers training programs and workshops designed to equip students and professionals with skills and knowledge relevant to sustainable infrastructure development, industrialization, and innovation.

- Innovation HUB - SDG9:

- The Innovation Hub of Beirut Arab University was launched and has started working since mid-2023 as part of the ELEGANT project funded by the European Union.

- The hub is dedicated to empowering Final Year Project (FYP) Students by providing realistic learning opportunities, fostering pioneering mindsets, and developing transferable skills essential for their chosen career paths.

- The hub is fostering links between ICT companies' needs and students' skills, thus strengthening employability skills, facilitating cooperation in applied research, and fostering knowledge transfer between the university and partner enterprises. Aimed at preparing students to explore their interests confidently, the hub equips them with the necessary knowledge and skills to pursue post-graduation training and achieve success in their chosen careers.

8. Community Engagement and Outreach:

- BAU engages with local communities through awareness campaigns, workshops, and collaborative projects to promote sustainable practices, infrastructure development, and innovation.

- The establishment of the Digital Fabrication Lab at the Faculty of Architecture – Design and Built Environment has revolutionized Digital Architecture and Fabrication. The lab, equipped with cutting-edge technology like the 6-axis robotic machine, enables the conversion of virtual models into tangible material systems, through a direct connection between the digital model and the production process known as file-to-factory. Final year students, have started from September of the academic year 2023-2024 using this lab to build new design methods, fostering inquiry and driving the development of new software tools for design.

9. Policy Influence and Advocacy:

- Policy Engagement: BAU actively participates in policy discussions and advocates for sustainable practices at institutional, local, national, and international levels, contributing to research and policy briefs related to SDG 9, among other Sustainable Development Goals.

These achievements collectively demonstrate BAU's unwavering commitment to fostering innovation, promoting sustainable development, and advancing SDG 9 objectives, thereby contributing to Lebanon's journey towards a more prosperous and sustainable future.

Some examples of publications by BAU faculty that serve SDG9:

2. Research and Innovation for Sustainable Development:

Faculty of Business Administration
Digital Leadership and Innovation Mediated by Employees' Satisfaction: A Recovery Strategy after the Pandemic
(PDF) Digital Leadership and Innovation Mediated by Employees' Satisfaction: A Recovery Strategy after the Pandemic (researchgate.net)
Transforming Human Resources with AI: Empowering Talent Management and Workforce Productivity
https://www.igi-global.com/chapter/transforming-human-resources-with-ai/338072
Faculty of Engineering
A Secure and Resilient Smart Energy Meter
A Secure and Resilient Smart Energy Meter IEEE Journals & Magazine IEEE Xplore
Characterization and optimization of mechanical properties in design materials using convolutional neural networks and particle swarm optimization
Characterization and optimization of mechanical properties in design materials using convolutional neural networks and particle swarm optimization Asian Journal of Civil Engineering (springer.com)
Control of a Novel Parallel Mechanism for the Stabilization of Unmanned Aerial Vehicles
Applied Sciences Free Full-Text Control of a Novel Parallel Mechanism for the Stabilization of Unmanned Aerial Vehicles (mdpi.com)
Control of MR damper using ANFIS and PID controller for optimum vehicle ride comfort
"CONTROL OF MR DAMPER USING ANFIS AND PID CONTROLLER FOR OPTIMUM VEHICL" by Mohammad Faisal Yakhni, Mohamad Ali et al. (bau.edu.lb)
Data-driven modeling using Convolutional Neural Network for Experimental Velocity Fields of an Impinging Jet
pdf (cal-tek.eu)
Dynamic Response of Steel-Concrete Beams with Partial Interaction due to Moving Loads
https://www.authorea.com/users/670803/articles/670597-dynamic-response-of-steel-concrete-beams-with-partial-interaction-due-to-moving-loads
Evaluation and Prediction of Design-Time Product Structural Analysis Assistance using Xgboost and Grey Wolf Optimizer
Evaluation and prediction of design-time product structural analysis assistance using XGBoost and Grey Wolf Optimizer Asian Journal of Civil Engineering (springer.com)
Innovative Model-Free Onboard Diagnostics for Diesel Particulate Filter
Innovative Model-Free Onboard Diagnostics for Diesel Particulate Filter (sae.org)
Online Condition Monitoring of a Vacuum Process based on Adaptive Notch Filters

Online Condition Monitoring of a Vacuum Process Based on Adaptive Notch Filters SpringerLink
Physical, Mechanical and Transfer Properties at the Steel-Concrete Interface: A Review
Buildings Free Full-Text Physical, Mechanical and Transfer Properties at the Steel-Concrete Interface: A Review (mdpi.com)
Trapped Mass Estimation in Automotive Diesel Engines Based on In-Cylinder Pressure Signal Projection
Trapped mass estimation in automotive diesel engines based on in-cylinder pressure signal projection - Youssef - 2020 - International Journal of Adaptive Control and Signal Processing - Wiley Online Library
Variable Speed Induction Motors' Fault Detection Based on Transient Motor Current Signatures Analysis: A Review
Variable speed induction motors' fault detection based on transient motor current signatures analysis: A review - ScienceDirect
Faculty of Sciences
Electronic Structure with Spin-Orbit Coupling Effect Of HfH Molecule for Laser Cooling Investigations
Electronic structure with spin-orbit coupling effect of HfH molecule for laser cooling investigations - ScienceDirect
Influence of Samarium on the Structural, Magnetic, and Gas Sensing Performance of Cadmium Zinc Ferrites
Influence of samarium on the structural, magnetic, and gas sensing performance of cadmium zinc ferrites - NASA/ADS (harvard.edu)
Local Time Fractional Reduced Differential Transform Method for Solving Local Time Fractional Telegraph Equations
Local Time Fractional Reduced Differential Transform Method for Solving Local Time Fractional Telegraph Equations Fractals (worldscientific.com)
On Partial Exact Controllability of Fractional Control Systems in Conformable Sense
On Partial Exact Controllability of Fractional Control Systems in Conformable Sense (hindawi.com)
Processing the Controllability of Control Systems with Distinct Fractional Derivatives via Kalman Filter and Gramian Matrix
Fractal Fract Free Full-Text Processing the Controllability of Control Systems with Distinct Fractional Derivatives via Kalman Filter and Gramian Matrix (mdpi.com)
Results on Partial Approximate Controllability of Fractional Control Systems in Hilbert Spaces with Conformable Derivatives
Results on partial approximate controllability of fractional control systems in Hilbert spaces with conformable derivatives AIP Advances AIP Publishing
Theoretical electronic structure with spin-orbit coupling effect of the molecules SrAt and BaAt for laser cooling studies
Theoretical electronic structure with spin-orbit coupling effect of the molecules SrAt and BaAt for laser cooling studies Scientific Reports (nature.com)

Faculty of Health Sciences
Valorization of Sesame (Sesamum Indicum L.) Seed Coats: Optimization of Polyphenols' Extraction using Ired-Irrad® and Assessment of their Biological Activities
Valorization of sesame (Sesamum indicum L.) seed coats: Optimization of polyphenols' extraction using Ired-Irrad® and assessment of their biological activities - ScienceDirect

3. Industry-Academia Collaboration:

- A recent collaboration initiative with IRALEB (formerly known as LIRA: Lebanese Industrial Research Achievements)

[A Cooperation Agreement between BAU and the Lebanese Industrial Research Achievements Program | Beirut Arab University](#)

- Dr. Amira Zaylaa, Assistant Professor at the Faculty of Engineering, Beirut Arab University, participated in LIRA 2024 with two Biomedical Engineering projects. These two projects were shortlisted nationally among several submitted projects from different universities. [Amira Zaylaa | Beirut Arab University \(bau.edu.lb\)](#)

Track 1: Revolutionizing Breast Cancer Diagnosis through Breast Mass Images, AI and Web Development [Sensors | Free Full-Text | Advancing Breast Cancer Diagnosis through Breast Mass Images, Machine Learning, and Regression Models \(mdpi.com\)](#)

Track 2: Development of A Smart Bionic Prothesis Arm

Dr. Amira Zaylaa, Underwent the Building Capacity Training in April 2024 and was certified after the training. [Dr. Amira Zaylaa received the prestigious "Women Researcher Award" | Beirut Arab University \(bau.edu.lb\)](#)

4. Curriculum Integration:

- Conferences and Projects integrated with SDG9:

[17.3: SDG9 | Beirut Arab University \(bau.edu.lb\)](#)

[Science - Course - Artificial Intelligence | Beirut Arab University \(bau.edu.lb\)](#)

[Seminar Talk - 9 | Beirut Arab University \(bau.edu.lb\)](#)

[Seminar Talk Series – 3 | Beirut Arab University \(bau.edu.lb\)](#)

[Data Acquisition Workshop and LabVIEW Hackathon | Beirut Arab University \(bau.edu.lb\)](#)

[Engineering - Course - Introduction to Artificial Intelligence and Machine Learning | Beirut Arab University \(bau.edu.lb\)](#)

6. Integration of Artificial Intelligence (AI):

- AI-focused Initiatives:

[Artificial Intelligence At Beirut Arab University - Tripoli Branch | Beirut Arab University \(bau.edu.lb\)](#)

[Participation of Dr. May Itani and Dr. Loyal Abu Daher in International Conference | Beirut Arab University \(bau.edu.lb\)](#)

7. Capacity Building and Technical Training:

- BAU offers training programs and workshops designed to equip students and professionals with skills and knowledge relevant to sustainable infrastructure development, industrialization, and innovation.

- Innovation HUB - SDG9: [Innovation hub | Beirut Arab University \(bau.edu.lb\)](#)

8. Community Engagement and Outreach:

- BAU engages with local communities through awareness campaigns, workshops, and collaborative projects to promote sustainable practices, infrastructure development, and innovation.

- The establishment of the Digital Fabrication Lab at the Faculty of Architecture

[The Launching of the Digital Fabrication Lab At Beirut Arab University | Beirut Arab University \(bau.edu.lb\)](#)

<https://www.bau.edu.lb/Research/Digital-Technology-in-Architecture>

Text and Examples provided to IAU by Hania Nakkash, Dean of Graduate Studies and Research, Beirut Arab University, 30.04.2024.



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Deanship of Graduate Studies
and Research