**ABDELMONEM ELSAWY KHALIL**
Lecturer of Electrical Power Engineering | Postdoctoral Researcher
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## PROFESSIONAL SUMMARY

Electrical power engineer and postdoctoral researcher with over 13 years of progressive academic experience at Cairo University and a current postdoctoral appointment at Harbin Institute of Technology, Shenzhen (HITSZ) — ranked among China's top research universities. Research specializes in advanced control frameworks for isolated low-inertia microgrids with high renewable energy penetration, integrating Load Frequency Control (LFC), Automatic Voltage Regulation (AVR), Linear Active Disturbance Rejection Control (LADRC), Adaptive Virtual Inertia Control (AVIC), fractional-order control, and AI-driven Energy Management Systems (AI-EMS). Published in Q1 journals with impact factors up to 16 (Cite Score 38.0). Active international collaborator with researchers at Aalborg University (Denmark), Zhejiang University, Shenzhen University, and Brunel University London (UK). Supervising 2 Ph.D. and 4+ M.Sc. students at Cairo University.

## RESEARCH METRICS

Journal Articles: 7Conference Papers: 7Total Publications: 14Scopus ID: 57153447400Peer Reviews (Total): 30+

Google Scholar Citations / h-index / i10-index: <update from profile>

## RESEARCH INTERESTS

Load Frequency Control (LFC) | Automatic Voltage Regulation (AVR) | Linear Active Disturbance Rejection Control (LADRC) | Fractional-Order Control (FOPID, TID, FPTID) | Adaptive Virtual Inertia Control (AVIC) | Metaheuristic Optimization (SPO, I-GWO, GMO, ARO, DO, FDA) | Isolated Low-Inertia Microgrids | Renewable Energy Integration (PV, Wind, FC, BESS) | Smart Grid | Distributed Energy Resources (DERs) | AI-driven Energy Management Systems | Deep Reinforcement Learning for Power Systems | Power System Stability

## EDUCATION

Doctor of Philosophy (Ph.D.) — Electrical Power Engineering December 2023
Electrical Power and Machines Dept., Faculty of Engineering, Cairo University, Egypt
Thesis: Enhancing the Load Frequency Controllers of Low-Inertia Isolated Microgrids
Supervisor: Prof. Doaa Khalil Ibrahim

Master of Science (M.Sc.) — Electrical Power Engineering February 2017
Electrical Power and Machines Dept., Faculty of Engineering, Cairo University, Egypt
Thesis: Centralized Self-Restoration of Electric Distribution Systems

Bachelor of Science (B.Sc.) — Electrical Power Engineering May 2012
Electrical Power and Machines Dept., Faculty of Engineering, Cairo University, Egypt

## ACADEMIC & RESEARCH POSITIONS

Postdoctoral Researcher October 2025 – September 2026
School of Robotics and Advanced Manufacturing, Harbin Institute of Technology, Shenzhen (HITSZ), China

- Supervisor: Professor Zhang Xian

- Research mission funded through Cairo University international scientific mission program
- Research proposal (开题考核) officially approved by HITSZ evaluation committee, December 11, 2025
- Developing the Unified Coordinated Control and Management Framework (UCCMF) integrating LFC, AVR, LADRC, AVIC, and AI-EMS for grid-forming isolated microgrids
- Recipient of Shenzhen Government Postdoctoral Retention Allowance (Application ID: 20260313334266 — Public Notice Stage)

Postdoctoral Researcher (Planned — Year 2) October 2026 – September 2027
College of Mechatronics and Control Engineering, Shenzhen University (SZU), China

- Supervisor: Professor Guibin Wang
- Continuation of UCCMF research: intelligent control and deep reinforcement learning for power systems with high renewable penetration

Lecturer (Assistant Professor) of Electrical Power Engineering December 2023 – Present
Faculty of Engineering — Electrical Power and Machines Dept., Cairo University, Egypt

- Permanent faculty member; currently on approved postdoctoral scientific mission abroad
- Supervising 2 Ph.D. students, 4+ M.Sc. students, and multiple undergraduate graduation projects
- Co-authored and published 3 research papers with supervised students at MEPCON 2024 International Conference

Adjunct Assistant Professor September 2024 – Present
British University in Egypt (BUE) — Faculty of Energy and Environmental Engineering

Adjunct Assistant Professor September 2024 – Present
Future University in Egypt (FUE) — Faculty of Engineering and Technology

Adjunct Assistant Professor February 2024 – Present
Ahram Canadian University (ACU) — Faculty of Engineering

Assistant Lecturer February 2017 – December 2023
Faculty of Engineering, Electrical Power and Machines Dept., Cairo University, Egypt

- Delivered lectures and laboratory sessions across undergraduate power engineering courses

Teaching Assistant December 2012 – February 2017
Faculty of Engineering, Electrical Power and Machines Dept., Cairo University, Egypt

## PUBLICATIONS

A. Refereed Journal Articles — Published

[J4] S. M. Elnady, J. M. Guerrero, K. Louassaa, A. Azeem, X. Zhang, M. H. Alham, G. Wang, and A. E. Khalil, "Fractional-Order Techniques in Renewable Energy Microgrids: A Comprehensive Survey of Modeling, Control, and Forecasting Methods,," Renewable and Sustainable Energy Reviews, Vol. 239, Art. 117148, 2026. DOI: 10.1016/j.rser.2026.117148 [PUBLISHED — Q1 | IF: 16.3 | CiteScore: 38.0]

[J3] A. Elsawy Khalil, T. A. Boghdady, M. H. Alham, and D. K. Ibrahim, "A novel multi-objective tuning formula for load frequency controllers in an isolated low-inertia microgrid incorporating PV/wind/FC/BESS,," Journal of Energy Storage, Vol. 82, pp. 110606, 2024. DOI: 10.1016/j.est.2024.110606 [PUBLISHED — Q1 | IF: 9.5]

[J2] A. Elsawy Khalil, T. A. Boghdady, M. H. Alham, and D. K. Ibrahim, "A novel cascade-loop controller for load frequency control of isolated microgrid via dandelion optimizer,," Ain Shams Engineering Journal, Vol. 15, Issue 3, pp. 102526, 2024. DOI: 10.1016/j.asej.2023.102526 [PUBLISHED — Q1 | IF: 6.0]

[J1] A. E. Khalil, T. A. Boghdady, M. H. Alham, and D. K. Ibrahim, "Enhancing the Conventional Controllers for Load Frequency Control of Isolated Microgrids Using Proposed Multi-Objective Formulation via Artificial Rabbits Optimization Algorithm,," IEEE Access, Vol. 11, pp. 3472–3493, 2023. DOI: 10.1109/ACCESS.2023.3234043 [PUBLISHED — Q2 | IF: 3.9]

B. Journal Articles — Under Review / In Preparation

[J5] J. Ma, X. Zhang, G. Wang, Y. Ye, F. Wen, and A. E. Khalil, "Large Language Model-Enhanced Deep Reinforcement Learning for Voltage Control in Active Distribution Networks,," Q1 Journal, 2026. [UNDER REVIEW — Q1, 2nd Round]

[J6] A. E. Khalil, X. Zhang, G. Wang et al., "Stochastic Paint Optimizer-Based Tuning of an Exponential PID Controller for Combined Load Frequency and Automatic Voltage Regulation in an Isolated Microgrid,," Target: ISA Transactions / IJEPES, 2026. [SUBMITTED — Q1]

[J7] A. E. Khalil, X. Zhang, G. Wang et al., "Novel Adaptive Fractional-Order Controller for Combined Load Frequency and Automatic Voltage Regulation in an Isolated Microgrid,," Target: Q1 Journal, 2026. [IN PREPARATION — Q1]

C. Peer-Reviewed Conference Papers

[C7] A. E. Khalil, M. A. Mohamed, A. A. Hanafi, H. A. Taha, X. Zhang, G. Wang, and A. M. Zobaa, "Techno-Economic Analysis of a Hybrid Diesel-Wind-Battery System for a Case Study in Egypt,," Proc. 26th Int. Middle East Power Syst. Conf. (MEPCON 2025). DOI: 10.1109/MEPCON66918.2026.11360215

[C6] M. Al-Barashi, Y. Wang, A. Zou, Z. Tang, J. Yang, R. N. A. Algburi, A. M. Zobaa, A. E. Khalil et al., "Advanced Magnetic-Integrated Multi-Trap LCL Filter to Suppress Harmonics in Avionics Systems,," IET Conf. Proc., Vol. 2025, No. 30. DOI: 10.1049/icp.2025.3343

[C5] A. E. Khalil, H. M. Elsayed, O. S. Nassar, A. E. Azb, M. H. Botros, and Y. K. Hussein, "Spatial and Capacity Optimization of Grid-Connected Photovoltaic Systems Using Crayfish Algorithm,," MEPCON 2024. DOI: 10.1109/MEPCON63025.2024.10850278

[C4] A. E. Khalil, A. M. Abdellatif, A. A. Abdelrazek, A. G. AbuAlmajd, S. Selim, and A. M. Zobaa, "Enhancing Microgrid Energy Management Incorporating Renewable Energy and Energy Storage Systems via Geometric Mean Optimizer,," MEPCON 2024. DOI: 10.1109/MEPCON63025.2024.10850278

[C3] A. E. Khalil, K. H. Ali, and M. H. Alham, "Combined Voltage and Frequency Regulation for Isolated Microgrid via Flow Direction Algorithm,," MEPCON 2024. DOI: 10.1109/MEPCON63025.2024.10850440

[C2] A. M. Zobaa, A. A. H. Saleh, R. H. F. Mikhael, A. M. G. Abdulsalam, and A. E. Khalil, "Techno-Economic and Environmental Analysis of Hybrid Microgrids: A Real Case Study for An Industrial Application in Egypt,," MEPCON 2024. DOI: 10.1109/MEPCON63025.2024.10850456

[C1] A. E. Khalil, M. H. Alham, T. A. Boghdady, and D. K. Ibrahim, "Novel Single Loop Load Frequency Controller for Isolated Microgrid Via Geometric Mean Optimization,," MEPCON 2023. DOI: 10.1109/MEPCON58725.2023.10462456

## RESEARCH EXPERIENCE

Unified Coordinated Control and Management Framework (UCCMF) 2025 – Present

Harbin Institute of Technology, Shenzhen (HITSZ), China

- Developing a four-layer integrated control framework: (1) LFC-AVR coordinated control, (2) LADRC disturbance rejection, (3) Adaptive Virtual Inertia Control (AVIC), and (4) AI-driven Energy Management System (AI-EMS)
- Research proposal officially reviewed and approved at HITSZ evaluation committee, December 2025

- Target output: 2+ Q1 journal papers within the postdoctoral mission period

LLM-Enhanced Deep Reinforcement Learning for Voltage Control 2025 – Present
Joint work: HITSZ & Zhejiang University

- Contributing to collaborative research integrating large language models (LLM) with DRL agents for real-time voltage control in active distribution networks
- Currently under review in Q1 journal (2nd round), 2026

Fractional-Order Control for Isolated Microgrids 2020 – Present

- Designed and validated fractional-order cascaded loop controllers for LFC in isolated microgrids incorporating PV, wind, fuel cells, and BESS
- Developed novel multi-objective tuning formulations for simultaneous frequency and voltage loop optimization
- Results published in Journal of Energy Storage (Q1, IF 9.5) and Ain Shams Engineering Journal (Q1, IF 6.0)

Metaheuristic Optimization for Advanced Power System Controllers 2019 – Present

- Applied and benchmarked multiple optimization algorithms: ARO, Dandelion Optimizer, SPO, I-GWO, GMO, Flow Direction Algorithm
- Developed Sigmoid-based Adaptive PID (SPID) and Sigmoid Fractional-PID (SFPID) controllers with rigorous fair-bound comparison methodology

Fractional-Order Techniques Survey — Renewable Energy Microgrids 2024 – 2026

- Co-authored comprehensive survey spanning FO control, component modeling, optimization, and forecasting across five technical categories
- International collaboration with Prof. J. M. Guerrero (Aalborg University), HITSZ, Zhejiang University, and Cairo University
- Published in Renewable and Sustainable Energy Reviews, Vol. 239, 2026 [Q1, IF: 16.3, CiteScore: 38.0]

Graduate Student Supervision and Research Output 2023 – Present
Cairo University

- Ph.D. students (2): one Q1 paper currently under review; second focusing on demand response for isolated microgrid energy management
- M.Sc. students (4+): topics spanning hybrid microgrid EMS, traction-PV integration, distribution network reconfiguration, combined voltage-frequency regulation
- Undergraduate projects: co-authored and published 3 papers with students at MEPCON 2024 International Conference

## TEACHING EXPERIENCE

More than 13 years of continuous teaching at Cairo University (Teaching Assistant 2012–2017, Assistant Lecturer 2017–2023, Lecturer 2023–Present), with concurrent adjunct roles at BUE, FUE, and ACU since 2024.

Courses Taught:

- Electric Circuits Analysis (DC, AC, and Advanced levels)
- Electric Power Systems and Energy Conversion — power plant operation, solar cell design, electrical generation and protection
- Electrical Installations — Low and Medium Voltage; Lighting System Design
- Analog and Digital Measurements
- Electric Drives and Power Electronics
- Automatic Control Engineering
- Power System Protection

Laboratory Supervision:

- Circuit Breaker Testing — Molded Case Micro-Logic Circuit Breakers
- SEPAM S40 Substation Protective Relays (Schneider Electric) and SEL421 Protective Relays
- Grid-Tied and Isolated Photovoltaic Systems
- DC and AC Motor Speed Control, Starting Methods, Braking, and Special Machines

### STUDENT SUPERVISION

Ph.D. Supervision (2 students):

- Student 1: Optimal sizing and placement of DERs in active distribution networks incorporating RES (PV, fuel cells, wind); extracted journal paper currently under review in a Q1 journal
- Student 2: Integration of demand response programs with energy management strategies for isolated microgrids including battery energy management

M.Sc. Supervision (4+ students):

- Energy management of hybrid microgrids with diesel generators, PV, wind, and battery storage
- Traction system integration with photovoltaic and traditional power sources
- Self-restoration strategies for active distribution networks through optimal reconfiguration
- Combined voltage and frequency regulation for isolated microgrids using advanced optimization techniques — co-authored conference paper published

Undergraduate Supervision:

- Supervised graduation projects on techno-economic optimization of hybrid microgrids, PV capacity optimization, and advanced microgrid EMS
- Co-authored and published 3 research papers with students at MEPCON 2024 International Conference, Cairo

## PEER REVIEW ACTIVITIES

Completed 30+ peer reviews for IEEE, Elsevier, and Taylor & Francis journals and conferences:

- IEEE Access (IEEE) — 2 reviews
- ISA Transactions (Elsevier) — 2 reviews
- Computers & Electrical Engineering (Elsevier) — 5 reviews
- Electric Power Components and Systems (Taylor & Francis) — 5 reviews
- Electric Power Systems Research (Elsevier) — 2 reviews
- Energy Reports (Elsevier) — 1 review
- Ain Shams Engineering Journal (Elsevier) — 3 reviews
- MEPCON International Conference (IEEE) — 10 reviews

## TECHNICAL SKILLS

Simulation Software: MATLAB/Simulink (advanced — ODE solvers, optimization toolbox, custom algorithm implementation), HOMER Pro, PVSyst, ETAP, PSCAD, DIgSILENT PowerFactory

Control Design: LFC, AVR, LADRC, AVIC, FOPID, TID, FPTID, e-PID, Sigmoid Adaptive PID, Sliding Mode Control

Optimization Algorithms: SPO, I-GWO, GWO, ARO, Dandelion Optimizer, GMO, Flow Direction Algorithm, PSO, WOA, SSA

Programming & Tools: MATLAB scripting, Python (basic), LaTeX, Microsoft Office Suite, Elsevier EVISE, IEEE submission portals

Languages: Arabic (native), English (excellent — certified, American University in Cairo), Chinese (basic)

## AWARDS, GRANTS & FUNDING

Shenzhen Government Postdoctoral Retention Allowance 2026

Application ID: 20260313334266 — Public Notice (公示) Stage — Near-Final Approval

Cairo University International Scientific Mission Grant 2025 – 2027
Egyptian Ministry of Higher Education — funding postdoctoral research at HITSZ (2025–2026) and SZU (2026–2027)

## PROFESSIONAL CERTIFICATIONS & TRAINING

- English Language (Grade: Excellent) — The American University in Cairo, School of Continuing Education
- AutoCAD 2D (Grade: Excellent) — SYSNET, Faculty of Engineering, Cairo University
- PLC Programming (Grade: Excellent) — JELECOM Training Center, Faculty of Engineering, Ain Shams University
- Industrial Training — Steam, Gas & Combined Cycle Power Plants — South Station Training Center, Egypt (2011)
- Industrial Training — Substation & Transmission Line Protection — Ministry of Electricity, Egypt (2010)
- Industrial Training — Fossil Fuel Power Plant O&M — Egyptian Electricity Company (2009)

## PROFESSIONAL MEMBERSHIPS

- IEEE — Institute of Electrical and Electronics Engineers
- IEEE Power & Energy Society (PES)

## REFERENCES

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Full publication list: scholar.google.com/citations?user=HMRNXk0AAAAJ

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Scopus: https://www.scopus.com/authid/detail.uri?authorId=57153447400

Own website: https://elsawy-fec.github.io/abdelmonem-elsawy.github.io-/

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