Ahmed M. A. Oteafy, Ph.D., SMIEEE

Director of the Joint Smart Grids and Electric Vehicles R&D Center (JSEC)
Assistant Professor, EE Department, College of Engineering, Alfaisal University, Riyadh, K.S.A.
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Education

Ph.D. Electrical and Computer Engineering, 2011, Boise State University, Idaho, USA.
M.Sc. Electrical Engineering, 2007, Kuwait University, Kuwait.
B.Sc. Electrical Engineering, 2004, Kuwait University, Kuwait.

Research Areas

In Power and Systems Theory using a Cyber Physical Power Systems (CPPS) methodology: Modeling, parameter identification, control, hierarchical control, embedded systems design, electric machines (motors and generators), renewable systems, and CPPS. Specifically, synchronous, induction and switched-reluctance machines, photovoltaic systems, battery-energy storage systems, and DC Microgrids.

Teaching Areas

I developed an approach to build on engineering principles, as I guide my students to leverage theories and practical techniques in addressing engineering challenges. This helps them build a deeper, and more practical, understanding of these areas, including, Renewables, Power, Electric Machines, Electronics, Power Electronics, Control Theory, Robotics, and Engineering Economics & Management.

Initiatives and leadership

- Founder and director of the Joint Smart Grids and Electric Vehicles R&D Center **JSEC** which is in collaboration with AGH University in Poland.
- Initiated and supervised the **Boeing Solar Car Project (BSCP)**, a multidisciplinary student project funded by Boeing that encompassed the design of its electrical, mechanical, and software modules; in addition to curriculum enrichment and HQP skills-training. Produced the car Areej 1, which was featured both nationally and internationally, e.g., representing Alfaisal University and Saudi Arabia in the Formula 1 event's exhibition in December 2021, and on the BBC in a technology show.
  Website: http://BSCP.Alfaisal.edu YouTube: https://tinyurl.com/3sdudpw3
- Proposed and participated in developing an **M.Sc. in Renewable Energy Management program**.
- Oversaw major revisions of the EE program at Alfaisal University as the **Chair of the Scientific & Curriculum Committees** at both the College and Program levels.
- Developed three teaching labs and two R&D labs: Renewable Energy, Electrical Energy Conversion, Power Electronics, JSEC Electric Vehicles, and JSEC Smart grids **labs**.
- Established **industry links** with **Boeing** and **Siemens** that resulted in student project sponsorship, internships and career opportunities for my graduating students.
- Actively engaged in the EE program's pursuit of **ABET**, which was awarded in 2020.
- **Professional Engineers exam** development and revision in Electric Power Engineering for the National Center for Assessment (Qiyas).
- **Invited speaker** on future technologies in venues such as the IEEE Smart Mobility Conference 2023 and the Solar and Future Energy Show 2023.

Awards

College of Engineering Faculty Services Awards 2016 and 2023, Alfaisal University.
College of Engineering Faculty Teaching Awards 2016 and 2018, Alfaisal University.

College of Engineering Dean's Award 2011, Outstanding Graduate Student, Boise State University.
College of Engineering Dean's Honor List 2004, B.Sc. program, Kuwait University.

Main R&D Projects

- **Boeing Solar Car Project**: Developed a single passenger solar power electric vehicle to participate in long distance (over 2500 km) international competitions. Overseen and partaken in the development of Electrical Modules: Motor Control, PV MPPT, Li-Ion Battery Pack Design and Management Circuit, Software: Graphical User Interface development in python, with CAN communication to electrical modules, and transmission of data to the internet. Overseen Mechanical Modules: Aluminum Chassis, Carbon fiber body, Steering, Suspensions, Braking, and Drive Train.
- **Battery Pack Design for Microgrids**. Designed a new power electronic converter methodology for fast active balancing of battery packs made of homogenous or heterogenous cells.
- **DC Microgrid Development**. Designed and partaken in the development of an autonomous lab-based DC microgrid with PV and wind turbine DERs, SCADA, Loads, and an ESS connected through a power electronic bidirectional converter with droop control.
- **Switched Reluctance Motor Setup**. Designed and oversaw the development of a test setup for the Switched Reluctance Motor, which is a candidate for EVs and other applications.
- **EV BLDC Motor Setup**. Oversaw the development of a four-quadrature control setup of the BLDC motor as a lab scale version of EV motor controller development and testing.
- **Chess Playing Robot**. Developed and programmed vision, brain, interface, and arm modules controlling an SV3-intellitek robotic arm to play vs. a human opponent.
- **Robotic Arm with Wireless Wearable Controller.** Oversaw the development of a wearable controller device for a robotic manipulator. This included embedded system design, haptic feedback, inertial measurement unit calculations, inverse kinematics, and wireless two-way communication.
- **RoboCar.** Developing CPS educational and training modules for undergraduate students using a low-cost robot car platform. These modules teach CPS fundamentals such as embedded systems, control, state machines, power electronics, sensors, and communication in a fun and accessible way.

Grants

I have been the PI on awarded grants amounting to over US$ 2,000,000 that emphasize team-based research and development across several engineering disciplines.

- Research Development and Innovation Authority (RDIA) 2024-2027,
  Title: Reactivating & Rebuilding Grant for JSEC, Amount: SR 3,998,000 (~US$ 1,000,000),
  PI: Ahmed Oteafy.
- NET Co. Grant to establish JSEC at AU, Amount: SR 2,000,000 (~US$ 533,333)
- Boeing Cybergrant and Office of Research 2015-2025, Amount: US$ 220,000
  Title: Boeing Solar Car Project, Project Supervisor: Ahmed Oteafy
- President's Innovation Fund Grant 2024-2026, Amount: SR 50,000 (~US$ 13,333)
  Title: Development of Distributed Energy Resource Modules and Control Schemes for DC Microgrids, PI: Ahmed Oteafy
- Alfaisal-Internal Research Grant 2021-2023, Amount: SR 50,000 (~US$ 13,333)

Title: DC Microgrid Design, Modeling, and Control
PI: Ahmed Oteafy, Co-PI: Abd El-Hamid Taha, Duration: February 2021 to April 2023.

- Alfaisal-Internal Research Grant 2014-2016, Amount: SR 50,000 (~US$ 13,333)
  Title: New Parameter Identification Techniques for Synchronous Generators
  Principal Investigator: Ahmed Oteafy, Duration: January 2014 to May 2016.
- Alfaisal-Strategic Research Grant 2015, Amount: SR 500,000 (~US$ 133,333)
  Title: iCE: An intelligent Classroom Environment to enhance education in student centered higher educational institutions. PI: Tarek Mokhtar, Co-PIs: Abd El-Hamid Taha, Nidal Nasser, Samer Mansour, & Ahmed Oteafy, Duration: Jan. 2015 to Dec. 2016.
- Boeing Cybergrant 2013-2014, Amount: US$ 10,000,
  Title: Motor Control with Wireless Power Transfer
  Project Supervisor: Ahmed Oteafy
- Alfaisal-Internal Research Grant 2013, Amount: SR 49,000 (~US$ 13,100)
  Title: Parameter Identification Techniques for Electric Machines
  Principal Investigator: Ahmed Oteafy, Duration: Jan. to Dec. 2013.

Design and Programming Skills

- **Circuit simulation and design:** LTSPICE, Simulink (Simscape),
- **Overall Electrical System modeling and controller design:** Matlab and Simulink**.**
- **Embedded Systems:** Programming with C++ on Atmega and ARM Cortex microcontrollers (Control, data acquisition, digital filtering, CAN, SPI, I2C, etc.)
- **Circuit skills:** Design of power electronic converters, Motor drivers, Sensing circuits, etc.
- **HDL:** VHDL, Verilog, System Verilog,
- **GUI development:** Python, Visual Basic.

Publications

1. **A. M. A. Oteafy**, "On the Necessity of DCM Operation for Buck and Boost Converters Between Constant Voltage Buses," in ***IEEE Access***, ***2026,*** DOI: 10.1109/ACCESS.2026.3657242.
2. **A. M. A. Oteafy**, "On the Necessity of DCM Operation for Buck Converters Between Constant Voltage Buses." ***IEEE International Conference on Smart Mobility 2024*****,** *Niagara Falls, Canada, 16-18 September, 2024*.
3. S. Ahmed-Zaid and **A. M. A. Oteafy**, "A New Interpretation of the Steady-State Two-Reaction Theory of a Salient-Pole Synchronous Machine," in ***IEEE Access***, vol. 10, pp. 128187-128194, 2022.
4. **A. M. A. Oteafy**, A. Abomazid, and A. Monawar, "Fast Online Parameter Identification for Current Source Operated PV Modules in DC Microgrids." in ***IEEE Access***, vol. 10, pp. 11432-11442, 2022.
5. **A. M. A. Oteafy**, "Fast and Comprehensive Online Parameter Identification of Switched Reluctance Machines," in ***IEEE Access***, vol. 9, pp. 46985-46996, 2021.
6. **A. M. A. Oteafy**, and H. Farooq "An Active Current-Controlled Battery Pack Balancing Technique for Online Operation." ***IEEE Transportation Electrification Conference and Expo ITEC 2020*****,** *Chicago, USA*.

7. T. Mokhtar, **A. M. A. Oteafy**, A. Taha, N. Nasser, and S. Mansour, "iCE: An intelligent Classroom Environment to Enhance Education in Higher Educational Institutions." ***Proceedings of the Human Computer Interaction International Conference (HCII)***, Nevada, USA, 15-20 July 2018.
8. **A. M. A. Oteafy**, J. Chiasson, and S. Ahmed-Zaid, "Development and Application of a Standstill Parameter Identification Technique for the Synchronous Generator." ***International Journal of Electrical Power & Energy Systems (JEPE)***, vol. 81-c, pp. 222-231, 2016.
9. S. Ahmed-Zaid, D. Mohammadi, and **A. M. A. Oteafy**, "A New Equivalent Circuit of a Salient-Pole Synchronous Machine and its Phasor Interpretation." ***Proceedings of the 47th North American Power Symp. (NAPS) 2015***, Charlotte , USA, 4-6 October 2015.
10. **A. M. A. Oteafy**, J. Chiasson, and S. Ahmed-Zaid, "A Standstill Parameter Identification Technique for the Synchronous Generator." ***Proceedings of the IEEE International Conf. on Electric Machines & Drives IEMDC 2015***, Idaho, USA, 14-16 May 2015.
11. **A. M. A. Oteafy**, and J. Chiasson, "A Standstill Parameter Identification Technique for the Divided Winding Rotor Synchronous Generator." ***Proceedings of the IEEE Power and Energy Conference PECON 2014***, Malaysia, 1-3 December 2014.
12. J. Chiasson, and **A. M. A. Oteafy**, "Elimination Theory for Nonlinear Parameter Estimation," Jean Lévine, Philippe Müllhaupt (eds.), **edited book chapter** in Advances in the Theory of Control, Signals and Systems with Physical Modeling, Springer-Verlag, Berlin/Heidelberg, pp. 65-75, 2011.
13. S. Alshamali, M. Zribi, and **A. M. A. Oteafy**, "Sliding Mode Controllers for the Benchmark Bioreactor System," ***Kuwait Journal of Science & Engineering***, vol. 38, issue 1, 2011.
14. **A. M. A. Oteafy**, and J. Chiasson, "A Study of the Lyapunov Stability of an Open-Loop Induction Machine," ***IEEE Transactions on Control Systems Technology***, vol. 18, issue 6, pp. 1469-1476, Nov. 2010.
15. M. Zribi, **A. M. A. Oteafy**, and N. Smaoui, "Controlling chaos in the permanent magnet synchronous motor," ***Chaos, Solitons and Fractals***, vol. 41, issue 3, pp. 1266-1276, Aug. 2009.
16. **A. M. A. Oteafy**, J. Chiasson, and M. Bodson, "Online identification of the rotor time constant of an induction machine," ***Proceedings of the American Control Conference 2009***, pp.4373-4378, 10-12 June 2009.
17. **A. M. A. Oteafy**, and J. Chiasson, "Lyapunov stability of an open-loop induction machine," ***Proceedings of the American Control Conference 2009***, pp.3452-3457, 10-12 June 2009.
18. **A. M. A. Oteafy**, M. Zribi, and N. Smaoui, "Chaos Control through an Instantaneous Lyapunov Exponents Targeting Control Algorithm," ***International Journal of Bifurcation and Chaos***, vol. 18, no. 8, pp. 2319-2344, August 2008.
19. M. Zribi, and **A. M. A. Oteafy**, "Control of a Bioreactor Using Static and Dynamic Sliding Mode Controllers," ***Proceedings of the 3rd IEEE-GCC***, Bahrain, March 2006.
20. **A. M. A. Oteafy**, "Novel Parameter Identification Techniques for Large Synchronous Generators," Ph.D. Dissertation, ECE Department, Boise State University, 2011. Supervisor: John N. Chiasson (FIEEE), Co-Supervisor: Said Ahmed-Zaid. External Examiner: George C. Verghese, EECS department, MIT.

21. **A. M. A. Oteafy**, "From Chaos to Order, and Vice Versa: An Instantaneous Lyapunov Exponent Targeting Control Algorithm," M.Sc. Thesis, EE Department, Kuwait University, 2007. Supervisor: Mohamed Zribi, Co-Supervisor: Nejib Smaoui.
22. **A. M. A. Oteafy**, "The Chess Playing Robot," Graduation Project Report, EE Department, Kuwait University, 2004. Supervisor: Mohamed Zribi.
23. **A. M. A. Oteafy**, and A. Al-Najar, "Liquid Level Management System," Capstone Project Report, EE Department, Kuwait University, 2004.Supervisor: Mohamed Fahim Hassan.

Academic Positions and Teaching Experience

Alfaisal University

Assistant Professor, College of Engineering (2012 – present)

EE303 – **Introduction to Electronics** (Every Fall 2021-2024)
EE304 – **Microelectronic Circuits** (Spring 2015, Spring 2017, and every Spring 2023-2025)
EE308 – **Electrical Energy Conversion** (Every Spring 2013-2026)
EE405 – **Electric Power Systems** (Fall 2012, and every Fall 2016-2025)
EE420 – **Power Electronics** (Every Fall 2012-2020, Fall 2025)
EE426 – **Renewable Energy** (Every Spring 2013-2022, Spring 2026)
EE428 – **Modern Control Theory** (Every Fall 2013-2016)
EE495/6 – **Capstone Design Project** (Every academic year 2013-2014 to 2015-2016, every academic year 2017-2018 to 2018-2019, and every academic year 2020-2021 to 2025-2026)
GE203 – **Economics and Management for Engineers** (Fall 2012)

Technical Lectures, Seminars, and Invited Talks

European Institute of Innovation EIT InnoEnergy Lecture entitled "Microgrid Architectures and Enabling Technologies," in a graduate course on Smart Grids, hosted by AGH University, Krakow, Poland (Fall 2018)

IEEE PES Seminar "Microgrid Architectures and Enabling Technologies," Boise State University, Idaho, USA (Summer 2019)

IEEE International Smart Mobility Conference (IEEE SM'23) Invited talk "A Car for the Future: Enabling Technologies for Solar Cars," KAUST, Thuwal, Saudi Arabia (Spring 2023).

Solar and Future Energy Show 2023 Invited talk on "Solar Cars and their Enabling Technologies," and panelist on "Breaking barriers: overcoming funding challenges for the development of clean energy technologies."

Boise State University

Adjunct Professor, College of Engineering
ENGR 120 – **Introduction to Engineering** (Fall 2010)

Teaching Fellow, ECE Department, College of Engineering
ECE/ME 360 – **System Modeling and Control** (Spring 2010)

Teaching Assistant for ECE/ME 360 – **System Modeling and Control** (Fall 2009)

Micron Ph.D. Fellow, ECE Department, College of Engineering
Volunteer Teaching Assistant for ECE/ME 461/561 –**Control Systems** (Spring 2009)

Kuwait University

Teaching Assistant, EE Department, College of Engineering and Petroleum
Lab Instructor for the EE334 – **Electronics II Lab** course (Fall 2006)
Lab Instructor for the EE207 – **Electrical Engineering Fundamentals Lab** course (Fall 2004, Spring 2005, Fall 2005, Spring 2006)
Matlab® & Simulink® volunteer tutor for the IEEE-Student chapter at KU.

HQP Training & Student Supervision

Graduate Research Assistants in JSEC-Smart Grids and Microgrids Lab:

1. Reem Mahmoud (2017-2018) later earned a Ph.D. in ECE from the American University of Beirut.
2. Abdulrahman Abomazid (2018-2019) later earned an M.S. in EECS from York University.
3. Aram Monawar (2018-2020) later earned an M.S. in ECE from Georgia Institute of Technology.
4. Habib Farooq (2019-2022) later earned an M.S. in ECE from Purdue University.

Capstone Project Supervision, EE Department, Alfaisal University

1. G. Aljuwaed, L. Alhedaithy, and A. AwadElseed "A Hybrid Supercapacitor and Battery Energy Storage System for DC Microgrids." Academic year 2025-2026. Supervisor: Ahmed Oteafy.
2. A. Al-Saud "Development of a Battery Management System for Safety and Reliability in Li-ion Battery Packs." Academic year 2024-2025. Supervisor: Ahmed Oteafy.
3. Z. Badran "Smart Power Load for DC Microgrids." Academic year 2024-2025. Supervisor: Ahmed Oteafy.
4. L. Alhgbani and W. Almubadal "A grid-forming battery energy storage system for DC Microgrids." Academic year 2023-2024. Supervisor: Ahmed Oteafy.
5. N. Farhoud and A. Kim "An Automated Robotic Arm Manipulator with Object Recognition." Academic year 2022-2023. Supervisor: Ahmed Oteafy, Co-Supervisor: Shinkyu Park.
6. L. Alshammari and O. Bertozzi "Battery Energy Storage System Modeling." Academic year 2022-2023. Supervisor: Ahmed Oteafy, Co-Supervisor: Shehab Ahmed.
7. K. Kanaan, N. Basha, A. Qasim, and M. Akhtar "A Wearable Device for Robotic Arm Control." Academic year 2021-2022. Supervisor: Ahmed Oteafy.
8. A. Kobboch, D. Al-Fuhaid, and T. Alshubyli, "Electric Vehicle Motor Control." Academic year 2020-2021. Supervisor: Ahmed Oteafy.
9. H. Farooq, M. Anwar, and A. Abujamous, "Autonomous Indoor Delivery Robot." Academic year 2018-2019. Supervisor: Ahmed Oteafy.
10. A. Abu Mazyad, M. Al-Humoud, and I. Alajlan, "Design and Implementation of a DC Microgrid," Academic year 2017-2018. Supervisor: Ahmed Oteafy.
11. A. Alyemni, F. Albeshr, and A. Alnukta, "Solar Car Motor Control," Academic year 2015-2016. Supervisor: Ahmed Oteafy.
12. K. Alsaleh, and M. Alghanim, "Maximum PV Power Supply for a Solar Car," Academic year 2015-2016. Supervisor: Ahmed Oteafy.
13. M. Habli, and A. Mohamed, "Solar Tracking System for a Water Pump," Academic year 2013-2014. Supervisor: Ahmed Oteafy, Co-Supervisor: Abd El-Hamid Taha.

14. M. Almansouri, and M. Krimly, “A Two-Axis Automated Solar Panel with a Power Processing Unit,” Academic year 2013-2014. Supervisor: Abd El-Hamid Taha, Co-Supervisor: Ahmed Oteafy.

Extra-curricular Project Supervision, College of Engineering, Alfaisal University

15. Boeing-funded Solar Car Project. Academic years 2015-2026
16. Wind tunnel development. 2022-2023.

    Students: Abeer Khan, Doha Melliti, Mohanad Shamsan, Wafa Kentab, Omar Sultan, Aisha Elwy, Latifa AlHgbani, and Nouf Farhoud.
17. RoboCar: A cyberphysical educational system. 2023.

    Students: Lama Alhedaithy and Leen Abu-Raida.
18. Car CAN communication emulator platform. 2022-2023.

    Students: Zeina Badran and Wojoud Almubadal.
19. Boeing-funded motor control with wireless power transfer, Academic year 2013-2014

    Students: M. Abdelaty, A. Aboutaleb, A. Abdelaty, and R. Mahmoud.

Postdoctoral Research

Boise State University, USA, 2011. Supervisor: Dr. Said Ahmed-Zaid,

The main task of the project was to review the DSP-based Electric Drives lab developed by the ECE department at the University of Minnesota. In addition to training two graduate students to further pursue this research project. The resulting recommendations were presented in the following US-DoE workshop: Said Ahmed-Zaid, Ahmed Oteafy, and John Chiasson, "New Power Lab Developments at Boise State University," ***Poster presentation at the University of Minnesota 2011 DoE Workshop,*** Minneapolis.

Conference Organization

Workshop Chair

- Workshop on Smart grids and Microgrids in the IWCMC 2020.
  Chairs: Zbigniew Hanzelka, Ahmed Oteafy.

Technical Program Committee Member

- EPQU 2020: The 12th International Conference and Exhibition on Electrical Power Quality and Utilization, Krakow, Poland.
- APPEEC 2018: The 10th IEEE PES Asia-Pacific Power and Energy Engineering Conference, Malaysia
- I4CT 2018: The 4th International Conference on Computer, Communication, and Control, Thailand
- PECON 2016: IEEE 6th International Conference on Power and Energy, Malaysia.
- CyPhy 2014: 4th Workshop on Design, Modeling and Evaluation of Cyber Physical Systems, Berlin, Germany.
- CyPhy 2013: 3rd Workshop on Design, Modeling and Evaluation of Cyber Physical Systems, Philadelphia, Pennsylvania, USA.

Session Chair

- IEEE Smart Mobility 2024, Niagara Falls, Ontario, Canada.
- American Control Conference 2009, St. Louis, Missouri, USA

- Undergraduate Conference 2009, Boise State University

Peer Reviewer

- IEEE Transactions on Control Systems Technology.
- IEEE International Symposium on Industrial Electronics.
- American Control Conference.
- IEEE Multi-Conference on Systems and Control.
- IEEE Conference on Decision and Control.

Workshops

Prepared and Delivered:

1. Seminars and workshops on "**Engineering Teaching and Learning**" (Fall 2013, Spring 2013, Spring 2016, Spring 2018, Fall 2018)
2. Seminar on Course Learning Outcomes at Alfaisal University (Spring 2018)

Attended:

1. Planning and Implementation of Self-Study for Program Accreditation, NCAAA (2016)
2. Introduction to Course Design (2010)
3. Teacher Talk: Best Practices for Lectures that Work (2010)
4. Using Midterm Assessment Process (MAP) to support student learning (2009)
5. Active Learning (2009)

Service Activities

Chaired *the following committees at Alfaisal University:*

1. Teaching and Learning Committee – College of Engineering
2. Scientific & Curriculum Committee – both College and EE department
3. Library Committee – both College and EE department
4. Social and Public Seminar Committee – EE department

Committee member at Alfaisal University:

5. Awards Committee – College of Engineering
6. Graduate Studies Committee – EE department
7. Research Committee – EE department
8. Scheduling Committee – EE department
9. Laboratories and Facilities Committee – EE department
10. Recruitment Committee – EE department
11. Hiring Committee – EE department

Affiliation

IEEE Senior Member – Power and Energy, Control Systems, and Industrial Electronics Societies.

Languages

English and **Arabic** (First language), and **Persian** (Intermediate).