

Ahmed M. A. Oteafy, PhD, SMIEEE

Assistant Professor of Electrical Engineering

EE Department, College of Engineering

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Education

Ph.D. Electrical and Computer Engineering, 2011, Boise State University, Idaho, USA

Supervisor: John N. Chiasson (FIEEE), *Co-Supervisor:* Said Ahmed-Zaid.

External Examiner: George Verghese (FIEEE), EECS department, MIT

M.Sc. Electrical Engineering, 2007, Kuwait University, Kuwait.

Supervisor: Mohamed Zribi (EE), *Co-Supervisor:* Nejjib Smaoui (Math)

B.Sc. Electrical Engineering, 2004, Kuwait University, Kuwait.

Research Areas

In the fields of Smart Power Grids and Electric Machines: Modeling, parameter identification, control, and design of Cyber Physical Power Systems, generators and motors. Specifically, large synchronous generators, switched reluctance machines, induction motors, and DC Microgrids. The techniques I developed include nonlinear least-squares parameter identification, equivalent circuit modeling, Lyapunov stability, and nonlinear control.

Teaching Areas

Renewable Energy Systems, Electric Power Systems, Power Electronics, Electric Energy Conversion, Modern Control Theory, and Economics and Management for Engineers.

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 CPS student project funded by Boeing that encompassed the design of its electrical, mechanical, and software modules; in addition to curriculum enrichment, lab development, and HQP skills-training. Website: <http://BSCP.Alfaisal.edu>
- Proposed and participated in the development of **MS-REM**: a Master of Science program in Renewable Energy Management.
- Chair of a **workshop on Smart grids and Microgrids** in the **IWCMC 2020** Conference.
- Oversaw major revisions of the EE program at Alfaisal University as the **Chair of the Scientific & Curriculum Committee**, and a member in the College Committee.
- Developed the Renewable Energy, Electrical Energy Conversion, Power Electronics, Solar Car, and JSEC Smart grids and Microgrids **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 department pursuit of ABET (awarded) and Saudi-NCAAA.

Recent Awards

College of Engineering Teaching Award 2016 and 2018, Alfaisal University.

College of Engineering Services Award 2016, Alfaisal University.

Grants

I was the PI on awarded grants amounting to over US\$ 800,000 over the past 7 years, targeting student-centered projects that emphasized team-based development across a number of engineering disciplines.

- NET Grant to establish JSEC at AU, Amount: SAR 2,000,000 (~US\$ 533,333)
- Boeing Cybergrant and Office of Research 2015-2020, Amount: US\$ 160,000
Title: Boeing Solar Car Project
Project Supervisor: Ahmed Oteafy
- 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: Controllable Speed Motor 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.

Publications

Journals and Conferences

1. **Ahmed Oteafy**, and Habib Farooq “An Active Current-Controlled Battery Pack Balancing Technique for Online Operation.” *IEEE Transportation Electrification Conference and Expo ITEC 2020, Chicago, USA*.
2. Tarek Mokhtar, **Ahmed Oteafy**, Abd-Elhamid Taha, Nidal Nasser, and Samer 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.
3. **Ahmed Oteafy**, John Chiasson, and Said 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.
4. Said Ahmed-Zaid, Danyal Mohammadi, and **Ahmed Oteafy**, “A New Equivalent Circuit of a Salient-Pole Synchronous Machine and its Phasor Interpretation.” *Proceedings of*

the 47th North American Power Symposium (NAPS) 2015, Charlotte , USA, 4-6 October 2015.

5. **Ahmed Oteafy**, John Chiasson, and Said Ahmed-Zaid, "A Standstill Parameter Identification Technique for the Synchronous Generator." *Proceedings of the IEEE International Conference on Electric Machines & Drives IEMDC 2015*, Idaho, USA, 14-16 May 2015.
6. **Ahmed Oteafy**, and John 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.
7. John Chiasson, and **Ahmed 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.
8. Saleh Alshamali, Mohamed Zribi, and **Ahmed Oteafy**, "Sliding Mode Controllers for the Benchmark Bioreactor System," *Kuwait Journal of Science & Engineering*, vol. 38, issue 1, 2011.
9. **Ahmed Oteafy**, and John 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.
10. Mohamed Zribi, **Ahmed Oteafy**, and Nejib Smaoui, "Controlling chaos in the permanent magnet synchronous motor," *Chaos, Solitons and Fractals*, vol. 41, issue 3, pp. 1266-1276, Aug. 2009.
11. **Ahmed Oteafy**, John Chiasson, and Marc 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.
12. **Ahmed Oteafy**, and John Chiasson, "Lyapunov stability of an open-loop induction machine," *Proceedings of the American Control Conference 2009*, pp.3452-3457, 10-12 June 2009.
13. **Ahmed Oteafy**, Mohamed Zribi, and Nejib 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.
14. Mohamed Zribi, and **Ahmed Oteafy**, "Control of a Bioreactor Using Static and Dynamic Sliding Mode Controllers," *Proceedings of the 3rd IEEE-GCC*, Bahrain, March 2006.

Ph.D. Dissertation

15. Ahmed 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.

M.Sc. Thesis

16. Ahmed 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.

Project Reports

17. Ahmed Oteafy, “The Chess Playing Robot,” Graduation Project Course, EE Department, Kuwait University, 2004. Supervisor: Mohamed Zribi.
18. Ahmed Oteafy, and Ahmed Al-Najar, “Liquid Level Management System,” Capstone Project, EE Department, Kuwait University, 2004. Supervisor: Mohamed Fahim Hassan.

Academic Positions and Teaching Experience

Alfaisal University

Assistant Professor, College of Engineering (2012 – present)

EE426 – **Renewable Energy** (Every Spring 2013-2019)

EE420 – **Power Electronics** (Every Fall 2012-2018)

EE308 – **Electrical Energy Conversion** (Every Spring 2013-2019)

EE428 – **Modern Control Theory** (Fall 2013, 2014, 2015, 2016)

EE405 – **Electric Power Systems** (Fall 2012, 2016, 2017, 2018)

EE490 – **Capstone Design Project** (2013-2014, 2015-2016, 2017-2018, 2018-2019)

EE304 – **Microelectronic Circuits** (Spring 2015, 2017)

GE203 – **Economics and Management for Engineers** (Fall 2012)

Technical Lectures and Seminars

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

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

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

Graduate 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)
2. Aram Abdul Rahman (2018-present)
3. Abdul Rahman Abu Mazyad (2018-2019)
4. Habib Farooq (2019-present)

Project Supervision:

5. H. Farooq, M. Anwar, A. Abujamous, “Autonomous Indoor Delivery Robot.” Capstone Project, EE Department, Alfaisal University, 2018-2019. Supervisor: Ahmed Oteafy.
6. A. Abu Mazyad, M. Al-Humoud, and I. Alajlan, “Design and Implementation of a DC Microgrid,” Capstone Project, EE Department, Alfaisal University, 2017-2018. Supervisor: Ahmed Oteafy.
7. A. Alyemni, F. Albeshr, and A. Alnukta, “Solar Car Motor Control,” Capstone Project, EE Department, Alfaisal University, 2015-2016. Supervisor: Ahmed Oteafy.
8. K. Alsaleh, and M. Alghanim, “Maximum PV Power Supply for a Solar Car,” Capstone Project, EE Department, Alfaisal University, 2015-2016. Supervisor: Ahmed Oteafy.
9. M. Habli, and A. Mohamed, “Solar Tracking System for a Water Pump,” Capstone Project, EE Department, Alfaisal University, 2013-2014. Supervisor: Ahmed Oteafy, Co-Supervisor: Abd El-Hamid Taha.
10. M. Almansouri, and M. Krimly, “A Two-Axis Automated Solar Panel with a Power Processing Unit,” Capstone Project, EE Department, Alfaisal University, 2013-2014. Supervisor: Abd El-Hamid Taha, Co-Supervisor: Ahmed Oteafy.
11. Boeing Solar Car Project, College of Engineering, Alfaisal University 2015-2020
Twenty students from EE, ME, IE, and SE developing seven modules:
EE1 – Motor, Drive circuit, and Control (Motor Control)

EE2 – Photovoltaic Array Maximum Power Point Tracking (PVA MPPT)

EE3 – Battery Pack and management system (BMS)

ME1 – Chassis Design (Chassis)

ME2 – Aerodynamic body design and CFD (Body)

ME3 – Steering, Suspension, and Braking systems (SSB)

SE1 – Driver Interface and Communications (Interface)

Supervisor: Ahmed Oteafy

Technical expertise

Control Software:

- SCADA: Supervisory control and data acquisition development in Java Swing.
- MATLAB and Simulink: Modeling and control of various systems.
- Arduino: Data acquisition and control for various projects.

Programming languages:

- C, C++, and ACL Win (robotics language by Intelitek®)

Hardware Programming languages:

- VHDL, Verilog, and System Verilog

Other Software development

- Single-handedly designed and implemented a program for a robot (SV3 by Intelitek®) to play chess with a human, with three main modules:
 - o **Vision module:** Scanned the chessboard to detect the piece that moved, and errors if any, i.e., violation of chess rules.
 - o **Brain module:** Took the current chess map from the vision module, and assigned “scores” for four levels of moves and counter moves, to decide on the optimal next-move, and instructed the robotic-arm module to execute it.
 - o **Robotic arm module:** Performed the required action (capture, castling, or simple move) on pieces of various sizes avoiding collisions.

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, August 2011.

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.

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.

Conference Session Chair

- American Control Conference 2009, St. Louis, Missouri, USA
- Undergraduate Conference 2009, Boise State University

Teaching Workshops

Prepared and Delivered:

1. Seminars on “**Engineering Teaching and Learning**” (Fall 2013, Spring 2016, Spring 2018, Fall 2018)
2. Engineering Teaching and Learning workshop at Alfaisal University (Spring 2013)

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. Curriculum Committee – EE department
3. Library Committee – both EE department and College of Engineering
4. Social and Public Seminar Committee – EE department

Committee member at Alfaisal University:

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

Academic Achievements & Awards

2017 – 2018 Faculty Teaching Award, College of Engineering, Alfaisal University

2015 – 2016 Faculty Teaching Award, College of Engineering, Alfaisal University

2015 – 2016 Faculty Services Award, College of Engineering, Alfaisal University

**2010 – 2011 College of Engineering Dean’s Award for Outstanding Graduate Student–
Boise State University (For Outstanding Scholarship and Graduate Research)**

2009 - 2010 Teaching Fellowship – Boise State University

2007 - 2009 Micron PhD Fellowship – Boise State University

2007 - 2009 Graduate Residential Scholarship Program Fellowship – Boise State Univ.

2004 - 2007 Graduate Teaching Assistantship – Kuwait University

**1999 - 2004 Received the Minister of Higher Education’s Grant to study at Kuwait
University (awarded annually to top 50 non-Kuwaiti high-school graduates in the country).**

Affiliation

IEEE - Power and Energy Society, and Control Systems Society – Senior Member.

Languages

Arabic and English (First language), **Persian** (Moderate), **French** and **Spanish** (Basic).