

# MITHAT KISACIKOGLU

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## Education

- Ph.D.** Electrical Engineering, May 2013, The University of Tennessee, Knoxville, TN  
 Dissertation: “Vehicle-to-grid reactive power operation analysis of the EV/PHEV bidirectional battery charger”, Advisor: Leon M. Tolbert
- M.S.** Electrical Engineering, May 2007, University of South Alabama, Mobile, AL  
 Thesis: “Fuzzy logic control of a fuel cell/ultra-capacitor hybrid electric vehicle”
- B.S.** Electrical Engineering, June 2005, Istanbul Technical University, Istanbul, Turkey, with honors

## Employment

- Aug. 2016 – present      Assistant Professor, Electrical and Computer Engineering, University of Alabama, Tuscaloosa, AL.
- Aug. 2015 – May 2016      Research Engineer, Electric Vehicle Grid Integration Group, Transportation and Hydrogen Systems Center, National Renewable Energy Laboratory, Golden, CO.
- Apr. 2014 – Jul. 2016      Assistant Professor, Electrical and Electronics Engineering, Hacettepe University, Ankara, Turkey.
- Oct. 2013 – Apr. 2014      Research Specialist, The Scientific and Technological Research Council of Turkey (TUBITAK), Ankara, Turkey.
- Aug. 2011 – May 2013      *Research Member*, Center for Ultra-Wide-Area Resilient Electric Energy Transmission Networks (CURENT), an NSF&U.S. DOE Eng. Research Center, The University of Tennessee, Knoxville, TN. (<http://curent.utk.edu>)
- Aug. 2007 – May 2013      *Research Assistant*, Power Engineering Laboratory, The University of Tennessee, Knoxville, TN.
- May 2008 – May 2013      *Researcher (part-time)*, Power and Energy Systems Group (2008-2011) and Power Electronics and Electric Machinery Group (2011-2013), Oak Ridge National Laboratory, Oak Ridge, TN.
- Aug. 2005 – May 2007      *Research Assistant*, Fuel Cell Operated Smart Home Laboratory, University of South Alabama, Mobile, AL.

## Teaching

### University of Alabama:

- **Special Topics: Electric Drive Vehicles (ELE693, Ph.D. Level, New Course):** Plug-in electric vehicle operation and their grid interconnection principles, series/parallel hybrid power train design, modeling EV power-train in Matlab/SIMULINK, energy storage system modeling, and modeling of power electronic systems used in EVs.

### Hacettepe University:

- **Electrical Machines I (ELE 361, 3<sup>rd</sup> year):** Fundamental operation principles of electromechanical energy conversion devices. Fundamental principles of power electronics. Transformers, AC machinery principles and DC machines. Laboratory demonstration of the principles.
- **Electrical Machines II (ELE 477, 4<sup>th</sup> year):** Applications of induction motors, synchronous machines, and

drives. Industry visit to learn real machine design and development stages. Students are responsible to prepare a research paper in IEEE format as a team summarizing the literature in a popular topic. Laboratory experiments.

- **Electrical Energy Systems (ELE 481, 4<sup>th</sup> year):** Fundamentals of electric power system operation, per-unit calculations, modeling of power systems, operation and grid interconnection principles of renewable energy systems (wind and solar). In class guest lectures from government and industry. Students (as teams) are responsible of preparing a 30 min research presentation of a conference paper/journal published recently.
- **Capstone Project (ELE 401-402, 4<sup>th</sup> year):** Supervising senior level undergraduate students to design projects especially related to electric vehicle-grid integration problems. Students learn how to prepare capstone projects to be submitted to and get funded by TUBITAK (NSF of Turkey) under capstone project funding program (2209B). In 2014-2015, my first group won the TUBITAK grant (for the first time in the department) to design an EV charging station. The team (comprising six students) developed hardware and software for smart management of the charging station via communicating the charging signal with a distribution level grid server. Their project appeared in a local newspaper. In 2015-2016, two separate student teams also applied for TUBITAK funding under my supervision and both of the projects were funded.
- **Special Topics: Electric Drive Vehicles (ELE669, Graduate Level, New Course)**

## Projects (completed)

### **National Renewable Energy Laboratory (NREL):**

- Aug. 2015 – May 2016, “Integrated Network Testbed for energy Grid Research and Technology Experimentation (INTEGRATE),” funded by DOE, serving as research member

Functional modeling of Vehicle Test and Integration Facility (VTIF) to use it as a microgrid (MG) system. The MG is expected to operate in emergency (off-grid) and grid-connected modes. The novel electric vehicle grid integration (EVGI) capabilities investigated are black-starting the MG in emergency mode, UPS operation during short-term outages/disturbances, and P-f&Q-V droop control.

- Aug. 2015 – present, “Wireless Power Transfer for On-board Vehicle Charging,” Laboratory Directed Research and Development (LDRD), serving as research member

Project involves setting and demonstration of three 3.3 kW WPT charging systems developed by WiTricity.

### **Hacettepe University:**

- Feb. 2015 – present, “Impact Analysis of Distribution Grid Embedded Systems,” funded by Baskent Electric Distribution Company, \$400,000, serving as a consultant.

The project investigates the modeling of the local distribution utility grid for a pilot region in Ankara and integrating on-board charging systems to the grid to understand the distribution level impacts. The Baskent DisCo (the biggest DisCo in Turkey) provides the field data. 12 BMW i3s are being tested for grid charging power quality and daily driving energy need. The project also involved installation of two charging stations at Hacettepe University campus to develop communication systems between Baskent DisCo and charging station servers. The project outputs seek solutions of smart charging management of EVs.

- Oct. 2013 – Oct. 2015, “Analysis of Vehicle-to-grid (V2G) Ancillary Services Provided by Plug-in Electric Vehicles,” TUBITAK, \$10,000, **PI: M. C. Kisacikoglu (credit: 100%)**

This project is funded under a Return Fellowship Award by TUBITAK (2239) presented to the Turkish scholars to encourage them to continue their career in Turkey. The project funding includes a research seed money and salary compensation to start a research ground in a specific area. In this project, I investigated the cost and viability of ancillary services provided by EVs in Turkish electricity market.

### **University of Tennessee and Oak Ridge National Laboratory (ORNL):**

- Jan. 2013 – May 2013, “Off-board Three-phase 30 kVA Fast-charging Station for Smart Grid Applications,” served as research staff.

The project consisted of simulation, controller development, and experimental grid connection of a three-phase

off-board ac-dc charging station to achieve bidirectional power operation using a 30 kW VACON motor drive unit.

- May 2008 – Dec. 2012, “Analysis of an On-board Single-phase EV/PHEV Bidirectional Charger for Advanced Grid Support for Smart Grid Applications,” served as research staff.

The project aimed a complete design of a 3.3 kW single-phase, ac-dc and dc-dc cascaded bidirectional battery charger to utilize it for advanced grid support operations such as voltage control and reactive power support.

#### **University of South Alabama:**

- August 2005 – May 2007, “Fuel Cell-Powered Smart Home Using Smart Energy Management Control System,” served as research member

Heavily involved in testing a 5 kW Proton Exchange Membrane (PEM) Fuel Cell assisted with internal batteries to provide power for a laboratory home. Worked also in analysis and control of fuel cell and ultracapacitor hybrid vehicular power tractions systems using fuzzy logic analysis.

### **Publications**

#### **Journal articles:**

- B. Li, **M. C. Kisacikoglu**, C. Liu, M. Erol-Kantarci, “Big data analytics for electric vehicle integration: A roadmap for vehicle-to-grid and grid-to-vehicle,” under review, *IEEE Network*
- F. Erden, **M. C. Kisacikoglu**, N. Erdogan, “Adaptive V2G peak shaving and smart charging control for grid integration of PEVs,” under review, *IEEE Tran. Indust. Informat.*
- **M. C. Kisacikoglu**, F. Erden, N. Erdogan, “A distributed smart charging algorithm based on forecasted mobility energy demand,” under review, *IEEE Tran. Indust. Informat.*
- **M. C. Kisacikoglu**, M. Kesler, L. M. Tolbert, “Single-phase on-board bidirectional PEV charger for V2G reactive power operation,” *IEEE Tran. Smart Grid*, vol. 6, no. 2, pp. 767-775, Mar. 2015.
- M. Kesler, **M. C. Kisacikoglu**, L. M. Tolbert, “Vehicle-to-grid reactive power operation using plug-in electric vehicle bidirectional off-board charger,” *IEEE Tran. Indust. Electr.*, vol. 16, no. 12, pp. 6778-6784, Dec. 2014.
- M. Kesler, E. Ozdemir, **M. C. Kisacikoglu**, L. M. Tolbert, “Power converter-based three-phase non-linear load emulator for hardware test-bed system,” *IEEE Tran. Power Electr.*, vol. 29, no. 11, pp. 5806-5812, Nov. 2014.
- **M. C. Kisacikoglu**, B. Ozpineci, L. M. Tolbert, “EV/PHEV bidirectional charger assessment for V2G reactive power operation,” *IEEE Tran. Power Electr.*, vol. 28, no. 12, pp. 5717-5727, Dec. 2013.
- **M. C. Kisacikoglu**, M. Uzunoglu, M. S. Alam, “Load sharing using fuzzy logic control in a fuel cell/ultra-capacitor hybrid vehicle”, *Internat. J. Hydrogen Energy*, vol. 31, no. 3, pp. 1497-1507, Feb. 2009. (Number of citations: **105**)

#### **Technical reports:**

- **M. C. Kisacikoglu**, A. Bedir, B. Ozpineci, L. M. Tolbert, “PHEV-EV charger technology assessment with an emphasis on V2G operation,” Oak Ridge National Laboratory, Tech. Rep. ORNL/TM-2010/221, Mar. 2012.

#### **Peer-reviewed conference papers:**

- E. Y. Ucer, N. D. Aksu, I. H. Hokelek, **M. C. Kisacikoglu**, “EV-Grid Integration Emulation for V2G Power Transfer Using IEC 15118” submitted to *Internat. Smart Energy Conf.*
- **M. C. Kisacikoglu**, F. Erden, N. Erdogan, “A distributed smart PEV charging algorithm based on forecasted mobility energy demand,” to be presented in *IEEE Global Conf. Signal and Informat. Processing*, Dec. 2016.
- F. Erden, **M. C. Kisacikoglu**, O. H. Gurec, “Examination of EV-Grid integration using real driving and transformer loading data” in ELECO, Bursa, Turkey, Nov. 2015.
- T. S. Ustun, U. Cali, **M. C. Kisacikoglu**, “Energizing microgrids with electric vehicles during emergencies” to in IEEE INTELEC, Osaka, Japan, Oct. 2015.
- **M. C. Kisacikoglu**, B. Ozpineci, L. M. Tolbert, “Reactive power operation analysis of a single-phase EV/PHEV bidirectional battery charger” in *IEEE Internat. Conf. Power Electron. ECCE Asia (ICPE&ECCE)*,

Jeju, South Korea, May 2011, pp. 585-592.

- **M. C. Kisacikoglu**, B. Ozpineci, L. M. Tolbert, F. Wang, “Single-phase inverter design for V2G reactive power compensation,” in *IEEE Applied Power Electron. Conf. Expo. (APEC)*, Fort Worth, TX, Mar. 6-11 2011, pp. 808-814.
- **M. C. Kisacikoglu**, B. Ozpineci, L. M. Tolbert, “Effects of V2G reactive power compensation on the component selection in a plug-in hybrid electric vehicle bidirectional charger,” in *IEEE Energy Conversion Cong. Expo. (ECCE)*, Atlanta, GA, Sep. 12-16 2010, pp. 870-876.
- **M. C. Kisacikoglu**, B. Ozpineci, L. M. Tolbert, “Examination of a PHEV bidirectional charger system for V2G reactive power compensation,” in *IEEE Applied Power Electron. Conf. Expo. (APEC)*, Palm Springs, CA, Feb. 21-25 2010, pp. 458-465. (Number of citations: **176**)
- **M. C. Kisacikoglu**, M. Uzunoglu, M. S. Alam, “Fuzzy logic control of a fuel cell/battery/ultra-capacitor hybrid vehicular power system,” in *IEEE Vehicle Power Propulsion Conf.*, Arlington, TX, September 9-17 2007, pp. 591-596.
- **M. C. Kisacikoglu**, M. Uzunoglu, M. S. Alam, “Fuzzy logic control of a fuel cell/ultra-capacitor hybrid vehicular power system,” in *IEEE Vehicle Power Propulsion Conf.*, Windsor, England, UK, September 6-8 2006, pp. 1-5.

### **Computer-aided Engineering Tools**

- Real time digital simulation using RTDS.
- Altium Designer: Extensive PCB layout design of gate drive circuit, main power circuit, and controller interface circuit.
- Code Composer Studio: strong background on TI-F28335 DSP controller implementation.
- System simulation using PSIM by developing C code that is ready for DSP implementation.
- Other related softwares: DIgSILENT, MATLAB, Simulink, SimPowerSystems, Saber, Pspice, and PLECS.

### **Professional Memberships**

- IEEE Member 2014 – present, Student Member 2004 – 2013.
- Member of the following IEEE societies:
  - Industry Applications Society
  - Industrial Electronics Society
  - Power Electronics Society
  - Power & Energy Society
  - Vehicular Technology Society

### **Service Activity**

- Advisor to the Ministry of Energy and National Resources of Turkey on electric vehicle integration and adoption in the nation, 2014.
- Associate Editor, IEEE Transactions on Industry Applications, 2014 – present
- Proposal Reviewer, The Scientific and Technological Research Council of Turkey (TUBITAK), 2014, 2015
- Proposal Reviewer, Hacettepe R&D Incubation Company, 2014, 2015
- Proposal Reviewer, Small and Medium Enterprises Development Organization, Ankara, Turkey, 2015
- Member, Undergraduate Education Committee, University of Alabama, Electrical and Computer Eng. 2016
- Member, ABET Committee, Hacettepe University, Electrical and Electronics Eng., 2014 – 2015
- Member, Graduate Education Committee, Hacettepe University, Electrical and Electronics Eng., 2015
- Member, Graduate Admissions Committee, Hacettepe University, Electrical and Electronics Eng., 2015
- Tutorial on Electric Vehicles and Grid Integration at the Chamber of Electrical Engineers (EMO), Ankara Branch, 27 May 2015.
- Invited instructor of the half-day tutorial entitled “Overview of Electric Energy Systems” at the Electricity Markets Certificate Program organized by Electric Distribution Services Society (ELDER), 15-19 Dec. 2014

- Session Chair, Power Electronics for Utility Interface, IEEE Applied Power Electronics Conference, 2011.
- Member, Technical Committee on Sustainable Energy Systems, Power Electronics Society, IEEE, 2014 – present
- Editorial Review:
  - IEEE Transactions on Power Electronics, 2010 – present
  - IEEE Transactions on Industrial Electronics, 2009 – present
  - IEEE Transactions on Vehicular Technology, 2008 – present
  - IEEE Transactions on Power Systems, 2015
  - IEEE Transactions on Smart Grid, 2012 – present
  - IEEE Transactions on Transportation Electrification, 2014
  - IEEE Transactions on Sustainable Energy, 2014 – present
  - IET Generation, Transmission, and Distribution, 2013 – present

### **Honors and Awards**

- Hacettepe University International Conference Travel Award, 2014.
- Postdoctoral Return Fellowship Award, TUBITAK, 2013.
- Siemens Future Professionals Fellowship, 2001 – 2005.
- Several travel and education grants to attend conferences: VPPC 2009, ECCE 2010, and APEC 2010.
- Educational achievement scholarship from the Council of Higher Education in Turkey, 2000-2005.