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## DR. LIXIN TANG

### EDUCATION

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[ Feb. 2000- Mar. 2004 ]                      The University of New South Wales  
*Sydney, Australia*  
*Ph.D. in Electrical Engineering*  
Thesis title: Improvement of a direct torque controlled interior permanent magnet synchronous machine drive without a speed sensor.

- Winners of 2 travel awards and 2 paper competitions.

[ Sept. 1991- Jul. 1994 ]                      Nanjing Univ. of Aero. & Astro.  
*Nanjing, P. R. China*  
*Master's in Electrical Engineering*  
Thesis title: Improvement of a direct torque controlled induction motor drive at low speed.

- Winner of Excellent Thesis Award, 1994.

[ Sept. 1987- Jul. 1991 ]                      Nanjing Aeronautical Institute  
*Nanjing, P. R. China*  
*Bachelor's in Electrical Engineering*

- Title of final session project: Implementation of Magnetic Flux Controlled Pulse Width Modulation in Intel®8031 Microcontroller for Induction Motor Variable Voltage Variable Speed Inverter.

### PROFESSIONAL EXPERIENCE

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[July 2008-Now] Oak Ridge National Laboratory Universities, *Oak Ridge, TN, USA*

*Power Electronics Engineer, R&D staff member.*

- Multi-speed range motor development,
- xEV benchmark test,
- Novel high power motor control,
- Power factor correction circuit based on SiC MOSFET in a wireless power transfer (WPT) system
- Segmented drives, current source inverter to reduce dc bus capacitors.

[April 2005-July 2008] Oak Ridge Associated Universities, *Oak Ridge, TN,*

USA

*Post-doctorial research associate*

- Novel charger circuit based on two three phase motor and their power electronics circuits for PHEVs. I designed software and all hardware except the DSP card in a 14 kW prototype.
- Soft-switched multi-voltage bus DC/DC converter for fuel cell powered vehicles. Hardware design, including most PCBs and planar transformers and software design based on TI TMS320F2812 and TMS320F2808. I built a 4 kW and two 6 kW prototypes.
- Integrated inverter for future hybrid/electric vehicle traction drive and auxiliary drive, hardware test and debug, sensorless control algorithm development and verification. Also developed most of the real-time code based on TMS320F2812.

[April 2004-March 2005] Central Queensland University, *Rockhampton, Australia*

*Post-doctorial research officer*

- Maximum power point tracking of curved solar arrays, hardware design of an efficiency optimized DC-DC converter, software design based on MSP430 for maximum power point tracking and experimental method for calorimetry efficiency measurement.

[ Aug. 2000- Dec. 2003 ] The University of New South Wales  
*Sydney, Australia*

*Teaching Assistant (Part-time)*

- Tutored/demonstrated for ELEC4240/9240 (power electronics for undergraduate/postgraduate students) for the past 3 years (2001-2003);
- Tutored/demonstrated for ELEC4216/9216 (electric drive systems for undergraduate/postgraduate students) for the past 4 years (2000-2003);
- Tutored ELEC9350 (Computer Aided Analysis in Electrical Machine for postgraduate student) in 2001.

[ May 2000- Dec. 2001 ] Biomedical System Laboratory  
*Sydney, Australia*

*Research Assistant (Part-time)*

- System testing, hardware design of Home Clinical Work Station(HCWS);
- Sourcing of components.

[ Aug. 1998-Jan. 2000 ] GE Hangwei Medical Systems Co. Ltd.  
*Beijing, P. R. China*

*Senior Electrical Engineer*

- Electrical engineer in charge of the x-ray generator (XG) subsystem of CT scanner systems;
- Design, test, quality control, technical support of XG;
- XG real-time control software design, maintain and update;
- Representative in engineering dept. on EHS (Environment, Health and Safety);

- Received green belt training for design for six sigma;
- Recipient of two awards during my employment in GE Hangwei Medical Systems Ltd.

[ Apr. 1994-Aug. 1998 ] Beijing Institute of Mechanical Equipment  
Beijing, P. R. China

*Electrical engineer(1996-); Assistant electrical engineer (1994-1996)*

- Prototype, test and quality control of a 50kW, 50Hz to 400 Hz converter;
- Hardware and software design and debug;
- Recipient of Excellent Employee Award in 1997.

## PUBLICATIONS

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### Refereed Journal Publications

1. Gui-Jia Su and L. Tang, "A Reduced-Part, Triple-Voltage DC-DC Converter for EV/HEV Power Management," *IEEE Trans. on Power Electronics* Volume 24, Issue 10; Page(s): 2406-2410, October, 2009.
2. Gui-Jia Su and L. Tang, "A Multiphase, Modular, Bidirectional, Triple-Voltage DC-DC Converter for Hybrid and Fuel Cell Vehicle Power Systems," *IEEE Trans. on Power Electronics*, Volume 23, Issue 6; Page(s): 3035-3046, June 2008.
3. L. Tang and Gui-Jia Su, "High-performance control of two three-phase permanent magnet synchronous machines in an integrated inverter for automotive applications," *IEEE Trans. on Power Electronics*, Volume 23, Issue 6; Page(s): 3047-3055, Nov. 2008.
4. L. Tang and Gui-Jia Su, "An interleaved, reduced component count, multi-voltage bus DC/DC converter for fuel cell powered electric vehicle applications," *IEEE Transactions on Industry Applications*, Volume 44, issue 5; Page(s): 1638-1644, Sept/Oct., 2008.
5. L. Tang, Gui-Jia Su and X. Huang, "Experimental high-performance control of two permanent magnet synchronous motor in an integrated inverter for automotive applications," *IEEE Transactions on Power Electronics* volume 23 number 2; Page(s): 977-984, March 2008.
6. M. F. Rahman, M. E. Haque, L. Tang and L. Zhong, "Problems associated with the direct torque control of an interior permanent magnet synchronous motor drive and their remedies," *IEEE Transactions on Industrial Electronics*, Volume 51, Page(s): 799-809, August 2004.
7. L. Tang and M. F. Rahman, "An improved flux linkage estimator for a direct torque controlled interior permanent magnet synchronous machine drive," *Australian Journal of Electrical and Electronics Engineering*, vol. 1, No.3; Page(s): 199-205, June 2004.
8. L. Tang, L. Zhong, M. F. Rahman and Y. Hu, "A novel direct torque control scheme for interior permanent magnet synchronous machine drive system with low ripple in torque and flux, and fixed switching frequency," *IEEE Transactions on Power Electronics*, vol. 19, Page(s): 346-354, March 2004.

9. L. Tang, L. Zhong, M. F. Rahman and Y. Hu, "A novel direct torque control for interior permanent magnet synchronous machine drive system with low ripple in torque and flux-a speed sensor-less approach," *IEEE Transactions on Industry Applications*, Volume 39, Page(s): 1748-1756, Nov./Dec. 2003.
10. Y. Hu and L. Tang, "Fuzzy Observer Used in AC Servo System," *Chinese Journal of Aeronautics* Vol. 17 No. 1, 1996, in Chinese.
11. Y. Hu, Y. Xu and L. Tang, "Computer simulation of direct torque control system," *Transactions of Nanjing University of Aeronautics and Astronautics* Vol. 11 No. 2, pp189-196, DEC. 1994.

#### Conference Publications

1. G. J. Su and L. Tang, "An integrated onboard charger and accessory power converter using WBG devices," in *Proceedings of the 7th IEEE Energy Conversion Congress and Exposition (ECCE 2015)*, pp. 6306-6313, Montreal, Canada, September 20-24, 2015.
2. Gui-Jia Su and Lixin Tang, "An Integrated Onboard Charger and Accessory Power Converter for Plug-in Electric Vehicles," *Proceedings of the 2012 Energy Conversion Congress and Exposition (ECCE)*, 15-19 Sept. 2013, Page(s): 1592-1597
3. Gui-Jia Su, Lixin Tang, Curt Ayers and Randy Wiles, "An Inverter Packaging Scheme for an Integrated Segmented Traction Drive System," *Proceedings of the 2013 Energy Conversion Congress and Exposition (ECCE)*, , 15-19 Sept. 2013, Page(s): 2799-2804
4. Madhu Sudhan Chinthavali, Omer Onar, John Miller and Lixin Tang, "Single-phase Active Boost Rectifier with Power Factor Correction for Wireless Power Transfer Applications," *Proceedings of the 2012 Energy Conversion Congress and Exposition (ECCE)* , 15-20 Sept. 2012, Page(s): 3258-3265
5. Gui-Jia Su; Lixin Tang, "Using onboard electrical propulsion systems to provide plug-in charging, V2G and mobile power generation capabilities for HEVs," *Electric Vehicle Conference (IEVC), 2012 IEEE International* , vol., no., pp.1-8, 4-8 March 2012
6. Gui-Jia Su; Lixin Tang, "A segmented traction drive system with a small dc bus capacitor," *Proceedings of the 2012 Energy Conversion Congress and Exposition (ECCE)*, , 15-20 Sept. 2012, pp.2847-2853
7. Gui-Jia Su and L. Tang, "Current Source Inverter Based Traction Drive for EV Battery Charging Applications," *Proceedings of the 2011 Vehicle Power and Propulsion Conference (VPPC 2011)*, Chicago, Illinois, Sept. 7-11, 2011 Page(s): 1-6. (Won Best Paper Award).
8. L. Tang and Gui-Jia SU, "Novel Current Angle Control of a Current Source Inverter Fed Permanent Magnet Synchronous Motor Drive for Automotive Applications," *Proceedings of the 2011 Energy Conversion Congress Expo (ECCE2011)* Phoenix, Arizona, Sept. 2010, Page(s): 2358-2365
9. Gui-Jia Su and L. Tang, "A Current Source Inverter Based Motor Drive

for EV/HEV Applications,” *Proceedings of the 2011 SAE World Congress, Detroit, Michigan (SAE 2011)* April, 2011 Page(s): xxxx-xxxx.

10. L. Tang and Gui-Jia SU, “Control Scheme Optimization for a Low-Cost, Digitally-Controlled Charger for Plug-in Hybrid Electric Vehicles,” *Proceedings of the 2010 Energy Conversion Congress Expo (ECCE2010)* Atlanta, Georgia, Sept. 2010, Page(s): 3604 – 3610.
11. L. Tang and Gui-Jia Su, “Boost Mode Test of a Current-Source-Inverter-Fed Permanent Magnet Synchronous Motor Drive for Automotive Applications,” *Proceedings of the Twelfth IEEE Workshop on Control and Modeling for Power Electronics (COMPEL 2010)*, Boulder, Colorado, June 2010.
12. Gui-Jia Su and L. Tang, “Control of Plug-in Hybrid Electric Vehicles for Mobile Power Generation and Grid Support Applications,” *Proceedings of the 2010 Applied Power Electronics Conference and Exposition (APEC)*, Palm Springs, California, Feb., 2010, Page(s): 1152-1157.
13. L. Tang and Gui-Jia Su, “A low-cost, digitally controlled charger for plug-in hybrid electric vehicles,” *Proceedings of the 2009 Energy Conversion Congress Expo (ECCE2009)* San Jose California, Sept. 2009, Page(s): 3923-3929.
14. Gui-Jia Su, L. Tang and Z. Wu, “Extended Constant-Torque and Constant-Power Speed Range Control of Permanent Magnet Machine Using a Current Source Inverter,” *Proceedings of the 2009 Vehicle Power and Propulsion Conference (VPPC 2009)*, Dearborn Michigan, Sept. 7-11, 2009 Page(s): 109-115. (Won *Best Paper Award* on VPPC 2009).
15. Gui-Jia Su and L. Tang, “A Three-Phase Bidirectional DC-DC Converter for Automotive Applications,” *Proceedings of the Industry Application Society annual meeting 2008 (IAS 2008)*, Edmonton, Canada.
16. L. Tang and Gui-Jia Su, “Experimental Investigation of a Soft-switching Three-Phase, Three-Voltage Bus DC/DC Converter for Hybrid and Fuel Cell Vehicle Applications,” *Proceedings of the Power Electronics Specialists’ Conference 2008 (PESC 2008)*, Rhode island, Greece.
17. L. Tang and Gui-Jia Su, “An Interleaved, Reduced Component Count, Multi-voltage Bus DC/DC Converter for Fuel Cell Powered Electric Vehicle Applications,” *Proceedings of the Industry Application Society Annual Meeting 2007 (IAS 2007)*, New Orleans, Louisiana. (won *First Prize Paper Award*)
18. L. Tang and Gui-Jia Su, “High-Performance Control of Two Three-Phase Permanent Magnet Synchronous Machines in an Integrated Inverter for Automotive Applications,” *Proceedings of the 2007 Power Electronics Specialist Conference 2007 (PESC 2007)*, Orlando, Florida, page(s): 2001-2007.
19. Gui-Jia Su, J. P. Cunningham and L. Tang, “A reduced-part, triple-voltage DC-DC converter for electric vehicle power management,” *Proceedings of the 2007 Power Electronics Specialist Conference 2007(PESC 2007)*, Orlando, Florida, page(s): 1989-1994.
20. Gui-Jia Su and L. Tang, “A Bidirectional, Triple-Voltage DC-DC Converter for Hybrid and Fuel Cell Vehicle Power Systems,” *the IEEE Applied Power Electronics Conference and Exposition 2007 (APEC’07)*, February

25 – March 1, 2007, Anaheim, California vol. 2, Page(s): 1043–1049.

21. Gui-Jia Su, L. Tang and X. Huang, “Control of two permanent magnet machines using five-leg inverter for automotive applications” in *proceedings of the 41<sup>st</sup> IEEE Industry Application Society annual meeting 2006, Tampa, FL, USA*, ISBN:1-4244-0365-0, IEEE catalog number:06CH37801C.
22. L. Tang, Gui-Jia Su and X. Huang, “Experimental high performance control of two permanent magnet synchronous motor in an integrated inverter for automotive applications,” in *proceedings of the Tenth IEEE COMPEL Workshop, Albany, NY, 2006*, ISBN:0-7803-9725-8, IEEE catalog number: 06TH8893C, Page(s): 186-192.
23. J. Zhang, Z. Xu, L. Tang and M. F. Rahman, “A Novel Direct Load Angle Control for Interior Permanent Magnet Synchronous Machine Drives with Space Vector Modulation”, *Proceedings of the Sixth IEEE International Conference on Power Electronics and Drive Systems*, 28 Nov-1 Dec 2005, Kuala Lumpur, Malaysia.
24. P. Wolfs and L. Tang, “A Single Cell Maximum Power Point Tracking Converter without a Current Sensor for High Performance Vehicle Solar Arrays,” in *proceedings of the 2005 Power Electronics Specialist Conference*, IEEE Catalog Number: 05CH37659C, ISBN: 0-7803-9034-2, Page(s): 165-171.
25. J. Zhang, M.F. Rahman and L. Tang, "A Direct Flux Controlled Induction Generator with Space Vector Modulation for Integrated Starter Alternator", in *proceedings of the 2004 Industrial Electronics Annual Conference - IECON 2004, Busan, Korea, November 2 - 6, 2004*, ISBN: 0-7803-8731-7 (CD ROM).
26. P. Wolfs, L. Tang and S. Senini, “Distributed maximum power tracking for high performance vehicle solar arrays,” in *proceedings of Australasian University Power Engineering Conference, AUPEC'2004*, Brisbane, Australia, 2004, ISBN 10864-99775-3.
27. J. Zhang, M. F. Rahman and L. Tang, “A direct torque controlled integrated starter/alternator with space vector modulation,” in *proceedings of Australasian University Power Engineering Conference, AUPEC'2004*, Brisbane, Australia, 2004, ISBN 10864-99775-3.
28. J. Zhang, M.F. Rahman and L. Tang, "Modified Direct Torque Controlled Induction Generator with Space Vector Modulation for Integrated Starter Alternator", in *proceedings of the 4th International Power Electronics and Motion Control Conference (IPEMC 2004)*, Xi'an, China, 14 - 16 Aug., 2004, Page(s): 405-408.
29. L. Tang, M. F. Rahman, and M. E. Haque, “Low speed performance improvement of a direct torque controlled interior permanent magnet synchronous machine drive,” presented at *Applied Power Electronics Conference and Exposition, 2004. APEC '04*. Nineteenth Annual IEEE, 2004, Page(s): 558-564, Vol.1.
30. L. Tang, M. F. Rahman, “A Direct Torque Controlled Interior Permanent Magnet Synchronous Machine Drive with Compensation of the Forward Voltage Drops of the Power Switches,” in *Proceedings of the 38th IEEE Industry Applications Society Annual Meeting- IAS'03*, Salt Lake City, U.S.A., 2003, Page(s): 625-631.

31. L. Tang and M. F. Rahman, "A Direct Torque Controlled Interior Permanent Magnet Synchronous Machine Drive with A New Stator Resistance Estimator," in *Proceedings of the 38th IEEE Industry Applications Society Annual Meeting- IAS'03*, Salt Lake City, U.S.A., 2003, Page(s): 632-639.
32. L. Tang, M. F. Rahman and Z. Xu, "An Improved Flux Linkage Estimator For Direct Torque Controlled Interior Permanent Magnet (IPM) Synchronous Machine Drive," in *Conf. Rec. of the Australasian Universities Power Engineering Conference-AUPEC 2003*, Christchurch, New Zealand, Sept.-Oct. 2003.
33. L. Tang and F. Rahman, "Compensation of the Effects of the Forward Voltage Drop of Power Switches on Direct Torque Controlled Synchronous Machine Drive," in *Proceedings of International Electric Machines and Drives Conference-IEMDC'2003*, Madison, U.S.A., pp389-395.
34. L. Tang and F. Rahman, "A Novel Proportional-Integral (PI) Stator Resistance Estimator for a Direct Torque Controlled Interior Permanent Magnet Synchronous Machine Drive," in *Proceedings of International Electric Machines and Drives Conference-IEMDC'2003*, Madison, U.S.A., pp382-388.
35. L. Tang, L. Zhong, and M. F. Rahman, "Modeling and Experimental Approach of A Novel Direct Torque Control Scheme for Interior Permanent Magnet Synchronous Machine Drive System with Low Ripple in Torque and Flux, and Fixed Switching frequency," in *Proceedings of the Industrial Electronics Society Conference- IECON'02*, Spain, 2002.
36. L. Tang, L. Zhong, M. F. Rahman and Y. Hu, "A Novel Direct Torque Control for Interior Permanent Magnet Synchronous Machine Drive System with Low Ripple in Torque and Flux-A Speed Sensorless Approach," in *Proceedings of the 37th IEEE Industry Applications Society Annual Meeting- IAS'02*, Pittsburgh, U.S.A., 2002, Volume 1, Page(s): 104-111.
37. L. Tang, L. Zhong, M. F. Rahman and Y. Hu, "An Investigation of a Modified Direct Torque Control Strategy for Flux and Torque Ripple Reduction for Induction Machine Drive System with Fixed Switching Frequency," in *Proceedings of the 37th IEEE Industry Applications Society Annual Meeting- IAS'02*, Pittsburgh, U.S.A., 2002, Volume 2, Page(s): 837-844.
38. L. Tang and M. F. Rahman, "A Novel PI Stator Resistance Estimator For Direct Torque Controlled Permanent Magnet Synchronous Machine Drive," in *Conf. Rec. of Australasian Universities Power Engineering Conference, AUPEC'02*, Melbourne, Australia, 2002.
39. L. Tang and M. F. Rahman, "Compensation of the Effects of the Forward Voltage Drop of Power Switches on Direct Torque Controlled PM Synchronous Machine Drive," in *Conf. Rec. of Australasian Universities Power Engineering Conference, AUPEC'02*, Melbourne, Australia, 2002.
40. L. Tang, L. Zhong, M. F. Rahman and Y. Hu, "A Novel Direct Torque Control Scheme for Interior Permanent Magnet Synchronous Machine Drive System with Low Ripple in Torque and Flux, and Fixed Switching Frequency," in *Proceedings of the 33rd Power Electronics Specialists' Conference-*

*PESC'02*, Cairns, Australia, 2002, pp529-534.

41. L. Tang and M. F. Rahman, "A Matlab/Simulink Model Based on Power System Blockset-A New Direct Torque Control Strategy for Interior Permanent Magnet Synchronous Machine Drive System," in *Proceedings of Australasian Universities Power Engineering Conference- AUPEC'01*, Perth, Australia, pp281-286, 2001.
42. L. Tang and M. F. Rahman, "A New Direct Torque Control Strategy for Flux and Torque Ripple Reduction for Induction Motors Drive-A Matlab/Simulink Model," in *Proceedings of the International Electric Machines and Drives Conference-IEMDC' 2001*, Cambridge, USA, pp884-890, 2001.
43. L. Tang and M. F. Rahman, "A New Direct Torque Control Strategy for Flux and Torque Ripple Reduction for Induction Motors Drive by Space Vector Modulation," in *Proceedings of the 32nd Power Electronics Specialist Conference-PESC'2001*, Vancouver, Canada, volume 3, page 1440-1445, 2001.
44. Y. Hu and L. Tang, "A Resister On-line Fuzzy Observer of Induction Motor Direct Torque Control System," in *Proceedings of the first International Power Electronics and Motion Control Conference, IPEMC'94*, June 1994, Beijing, China, pp715-720.

#### PROFESSIONAL MEMBERSHIPS

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IEEE senior member since 2008; member 2005-2007; IEEE student member 2000-2004.

Member of Institute of Engineer, Australia (IEAust) since 2004.

#### LANGUAGES

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English (fluent speaker) and Mandarin Chinese(Mother tongue)

#### REFERENCES

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Available upon request.

#### FUTURE RESEARCH INTERESTS

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Speed sensorless control of AC machines;

Integrated inverter for automotive applications;

Soft-switched DC/DC converter for fuel cell applications;

New maximum power point tracking for solar cells.

#### AWARDS, ACHIEVEMENTS AND RECOGNIZATION (SELECTED)

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1. 2011 *Best Paper Award* at the 2011 vehicle power and propulsion conference (VPPC'11);
2. 2008 *First Prize Paper Awards* from Industry Application Society (IAS) Industrial



Power Converters Committee (IPCC) of IEEE;

3. Reviewer for *IEEE Trans. on Power Electronics, Industrial Electronics and Industry Applications*