# Zheren Ma

The University of Texas at Austin
Dynamic Systems and Control, Mechanical Engineering

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**EDUCATION**

**The University of Texas at Austin** *2013-present*
Ph.D. Candidate, Mechanical Engineering, GPA: 4.0/4.0
Expected Graduation Date: May 2017, Advisor: Dongmei Chen

**Shanghai Jiao Tong University, China** *2009-2013*
B.S., Mechanical Engineering, GPA: 91.07/100

**SKILLS**

- Programming Languages: Matlab/Simulink, C++, Python, Java, VB
- Commercial Softwares: AutoCAD, Unigraphics, DeltaV, Microsoft Power BI
- Research skills: System modeling, Advanced control, Computational fluid dynamics, Finite difference/volume analysis, Signal processing, Time series analysis and prediction

**INTERN EXPERIENCE**

**Emerson DeltaV Process Control Intern** *Summer 2015, Summer 2016*
- Developed VBA code for automating data analysis and report generation.
- Conducted power spectrum analysis for identifying interacting control loops.
- Created cloud-based dynamic reports using Microsoft Power BI.

**Singapore Technologies Scholarship Intern** *Summer 2012*
- Developed an adaptive Pure Pursuit guidance law for automated guided vehicle (AGV).

**SELECTED PROJECTS**

**Multi-Phase Gas Kick Modeling and Automation** *9/2015-present*
- Proposed a novel multi-phase flow modeling methodology that can be deployed in combination with suitable hydraulic models for managed pressure drilling (MPD) well control.
- Developed a software package for gas kick simulation that can handle many complexities which occur during a MPD well control incident such as handling multiple kicks from one or several formations, dynamic well control, automated choke control, sudden pump start up/shut off, non-Newtonian drilling fluids, arbitrary wellbore path (including directional and horizontal wells), area discontinuity, etc.

**Modeling and Simulation of Vibrations in a Drilling System** *2/2015-5/2015*
- Modeled drill string by using a distributed drill pipe model and a comprehensive rock-bit interaction model.
- Conducted vibration analysis including bit-bounce, stick-slip and bit whirl.

**Control of a Integrated Wind Turbine and Battery System** *6/2014-11/2014*
- Developed an efficient and reliable power scheduling approach that applied model predictive control (MPC) to probabilistic wind speed forecast.
- Proposed a real-time active power controller that enhances power reference tracking and optimizes the performances of hybrid system under instantaneously varying wind speed.

**Wind Turbine Control During Partial Load Operation** *9/2013-5/2014*
- Proposed an adaptive generator torque controller that improved turbine performances in terms of wind energy harvesting and fatigue loading mitigation, and better robustness against model uncertainties.
- Developed a wind turbine simulator for controller validation and fatigue analysis.

**TEACHING/ RESEARCH EXPERIENCE**

- Graduate Research Assistant in Petroleum Engineering *9/2015-present*
- Graduate Research Assistant in Mechanical Engineering *1/2015-5/2015*
- Teaching Assistant of Engineering Computational Methods *9/2013-12/2014*

**PUBLICATIONS**

### Journal Papers

- <u>Zheren Ma</u>, Zeyu Yan, Mohamed L. Shaltout, Dongmei Chen
  Optimal real-time control of wind turbine during partial load operation
  *IEEE Transactions on Control Systems Technology*, vol. 23, no. 6, pp. 2216-2226, 2015.

- <u>Zheren Ma</u>, Mohamed L. Shaltout, Dongmei Chen
  An Adaptive Wind Turbine Controller Considering Both the System Performance and Fatigue Loading
  *Journal of Dynamic Systems, Measurement, and Control*, vol. 137, no. 11, p. 111007, 2015.

- Liang Gong, Yan Xi, <u>Zheren Ma</u>, Chengliang Liu
  Modeling, identification and simulation of DC resistance spot welding process for aluminum alloy 5182
  *Journal of Shanghai Jiaotong University*, vol. 18, no. 1, pp. 101-104, 2013.

### Conference Papers

- <u>Zheren Ma</u>, Brandon Li, Zeyu Yan
  Wearable driver drowsiness detection using electrooculography signal
  *IEEE Topical Conference on Wireless Sensors and Sensor Networks*, pp. 41-43, 2016.

- <u>Zheren Ma</u>, Dongmei Chen
  Modeling of coupled axial and torsional motion of a drilling system
  *ASME Dynamic Systems and Control Conference*, pp. V002T20A005, 2015.

- <u>Zheren Ma</u>, Dongmei Chen
  Optimal power dispatch and control of a wind turbine and battery hybrid system
  *American Control Conference*, pp. 3052-3057, 2015.

- <u>Zheren Ma</u>, Mohamed L. Shaltout, Dongmei Chen
  Adaptive gain modified optimal torque controller for wind turbine partial load operation
  *ASME Dynamic Systems and Control Conference*, pp. V002T18A002, 2014.

- <u>Zheren Ma</u>, Liang Gong, Yanming Li, Chengliang Liu
  CMAC-based real-time calculation of the effective welding current during AC resistance spot welding
  *IEEE International Conference on Mechatronics and Automation*, pp. 1669-1674, 2013.

- Chengzhang Li, <u>Zheren Ma</u>, Lin Yao, Dingguo Zhang
  Improvements on EMG-based handwriting recognition with DTW algorithm
  *International Conference of Engineering in Medicine and Biology Society*, pp. 2144-2147, 2013.

- Mohamed L. Shaltout, <u>Zheren Ma</u>, Dongmei Chen
  An economic model predictive control approach using convex optimization for wind turbines
  *American Control Conference*, 2016.

- <u>Zheren Ma</u>, Ali Karimi Vajargah, Pradeep Ashok, Maggie Chen, Eric van Oort, Roland May, David Curry, John MacPherson and Gerald Becker
  Multi-Phase well control analysis during managed pressure drilling operations
  *SPE Annual Technical Conference and Exhibition*, 2016.

**COURSEWORK**

- Advanced Vehicle Powertrain System, Modeling and Simulation of Multi-energy System, Computational Fluid Mechanics, Digital Signal Processing, Introduction to Modern Control, Time-series Modeling/Analysis/Control, Optimal Control Theory, Multi-variable Control System, Digital Control, Stochastic Systems and Control