Zheren Ma

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OBJECTIVE

Looking for a full-time position in algorithm/software development of control/data analytics

EDUCATION

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

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

SKILLS

- Programming Languages: Matlab, C#, WPF, C++, Python, VBA
- Commercial Softwares: Simulink, DeltaV, Microsoft Power BI, AutoCAD, NX Unigraphics
- Research skills: advanced control, system modeling, computational fluid dynamics, time series analysis and prediction, finite difference/volume analysis, signal processing

INTERN EXPERIENCE

Emerson DeltaV Process Control Intern *Summer 2015, Summer 2016*

- Developed a C#/WPF Windows Application for automating control performance evaluation for a chemical plant.
- Automated data collection from open platform communication (OPC) server, DeltaV continuous historian, event chronicle SQL Server, DeltaV configuration etc.
- Automated data analysis including top 10 bad control loops identifications, interacting or fighting loops detection, valve diagnostics, operator interference analysis etc.

Singapore Technologies Scholarship Intern *Summer 2012*

- Implemented an adaptive guidance law using C++ for automated guided vehicle (AGV).

SELECTED RESEARCH PROJECTS

Multi-Phase Gas Kick Modeling and Automation *9/2015-present*

- Proposed a novel multi-phase flow modeling methodology and hydraulic models for simulating different well control cases including managed pressure drilling (MPD), underbalanced drilling (UBD) and Wait & Weight method.
- Developed a Matlab Application for gas kick simulation that can handle many complexities which occur during a 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 vibration by using the wave propagation theory 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 power scheduling approach that applied model predictive control (MPC) to probabilistic wind speed prediction obtained by time-series analysis
- 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, fatigue loading mitigation, and better robustness against model uncertainties.
- Developed a wind turbine simulator as a Matlab/Simulink Application 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

- Zheren Ma, Ali Karimi Vajargah, Pradeep Ashok, Dongmei Chen, Eric van Oort, Roland May, David Curry, John MacPherson, Gerald Becker, "Multi-phase well control analysis during managed pressure drilling operations", *SPE Annual Technical Conference and Exhibition*, 2016.
- Zheren Ma, Brandon Li, Zeyu Yan, Dongmei Chen, Wei Li, "Wearable sleepiness detection based on characterization of physiological dynamics", *ASME Dynamic Systems and Control Conference*, 2016.
- Mohamed L. Shaltout, Zheren Ma, Dongmei Chen, "An economic model predictive control approach using convex optimization for wind turbines", *American Control Conference*, pp. 3176-3181, 2016.
- Zheren Ma, Brandon Li, Zeyu Yan, "Wearable driver drowsiness detection using electrooculography signal", *IEEE Topical Conference on Wireless Sensors and Sensor Networks*, pp. 41-43, 2016.
- Zheren Ma, 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.
- Zheren Ma, 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.
- Zheren Ma, Dongmei Chen, "Modeling of coupled axial and torsional motion of a drilling system", *ASME Dynamic Systems and Control Conference*, pp. V002T20A005, 2015.
- Zheren Ma, Dongmei Chen, "Optimal power dispatch and control of a wind turbine and battery hybrid system", *American Control Conference*, pp. 3052-3057, 2015.
- Zheren Ma, 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.
- Zheren Ma, 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, Zheren Ma, 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.
- Liang Gong, Yan Xi, Zheren Ma, 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.

GRADUATE COURSEWORK

- Time-series modeling/analysis/control
- Advanced vehicle powertrain system
- Convex optimization
- Stochastic systems and control
- Modeling of multi-energy system
- Computational fluid mechanics
- Digital signal processing
- Digital control
- Introduction to modern control
- Optimal control theory
- Multi-variable control system
- Linear system analysis