Zheren Ma

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Ph.D. Candidate in Mechanical Engineering with expertise in advanced control, scientific programming and data analytics

EDUCATION

Mechanical Engineering, The University of Texas at Austin *2013-present*
Ph.D. Candidate majoring in Dynamic Systems and Control, GPA: 4.0/4.0
Publications: 3 IEEE/ASME journal papers, 9 conference papers
Expected Graduation Date: **May 2017**

Mechanical Engineering, Shanghai Jiao Tong University *2009-2013*
Bachelor of Science, GPA: 91.07/100, Rank: 3/121

SKILLS

- **Programming languages:** Matlab, C#, WPF, C++, Python, VBA
- **Commercial softwares:** Simulink, DeltaV, Microsoft Power BI, AutoCAD, NX Unigraphics
- **Research skills:** advanced control, multi-phase flow modeling, time series analysis and prediction, finite difference/volume analysis, convex optimization, stochastic system analysis

WORK EXPERIENCES

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

- Developed a control performance evaluation tool to automate Loop Service Express (LSE) for chemical plants.
- Automated data collection, analysis and generation of control performance report that identifies top 10 bad PID loops, interacting or fighting loops, valve issues, excessive operator interference etc.
- Got a $114k order from a mining company by conducting LSE with the tool and designing a new Model Predictive Control (MPC) strategy .

Automated Guided Vehicle (AGV) Intern, Singapore Technologies *Summer 2012*

- Developed and simulated an adaptive Pure Pursuit guidance law for AGV.

SELECTED RESEARCH PROJECTS

Multi-phase gas kick modeling (funded company research project) *9/2015-present*

- Proposed a novel transient multi-phase flow modeling methodology for simulating different well control cases including managed pressure drilling (MPD), underbalanced drilling (UBD) and Wait & Weight method.
- Developed a well control simulator that can run 20-30 times faster than real-time and handle many complexities such as multiple kicks from several formations, automated choke control, non-Newtonian drilling fluids, arbitrary wellbore path, area discontinuity, etc.
- Helped PI recognize over $300k in grant funding by completing tasks on time and creating the multi-phase well control simulator.

Modeling and control of wind turbine systems (Ph.D. dissertation project) *9/2013-present*

- Proposed an adaptive gain-scheduled generator torque controller that enhances wind energy harvesting, mitigates fatigue loading on turbine structure, and improves robustness against modeling uncertainties.
- Developed an power scheduling approach that optimizes over probabilistic wind speed prediction obtained from modified Autoregressive and Moving Average (ARMA) 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.
- Developed a wind turbine simulation platform for controller validation and fatigue analysis.

Electromyography (EMG)-based handwriting recognition *8/2012-5/2013*

- Applied Dynamic Time Warping (DTW) algorithm to EMG recognition of writing characters.
- Improved the average recognition accuracy by 4.65% after replacing Euclidean Distance with modified Mahalanobis Distance that minimizes the sample interclass variance.
- Proposed a real-time two-step signal segmentation method that filters out muscle noise and captures signal of writing characters.