Jinyu Xie

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Summary

Creative geek with roots in the open source movement, an entrepreneurial mindset and a passion for delivering value by developing maintainable software.

Graduate-level courses study in mathematics, dynamic system control, machine learning and computer programming. Pick up scientific research mindset with critical thinking and independent problem-solving skills.

Education

Pennsylvania State University, University Park, PA — GPA 3.91/4.00
Ph.D. Mechanical Engineering (Major), Computational Science (Minor) — *Aug 2012 – present*
M.S Mechanical Engineering — *Aug 2012 – May 2016*

Tsinghua University, Beijing, China — GPA 3.70/4.00
B.S. Instrumentation and Controls Engineering — *Aug 2008 – July 2012*

Skills

Programming: Matlab/Simulink (daily use, 5 years), C/C++ (course projects/campus competitions), Version Control (Git, daily use), LaTeX(daily use), Linux/Unix Shell Command Line (Basic Knowledge)

Industrial Software (Internship Daily Use): PI Processbook, Production Universe (Shell Oil&Gas)

Control Systems Design (2 relevant publications): Classical Control Theories (Laplace Transform, Bode/Nyquist Plot, PID Loop Tuning), Modern Control Theories (State Space, Model-Based Optimal Control, Linear Quadratic Regulator, Robust Control, Model Predictive Control)

Signal Processing (6 relevant publications): (Extended) Kalman Filter, Finite Impulse Response (FIR) Filter, Fault Detection and Estimation

Statistics (6 relevant publications): Time Series Analysis/Modeling (AR, ARX, ARMAX, Box-Jenkins), Estimation Theories, Hypothesis Test

Machine Learning (Course Projects): Principal Component Analysis, Supervised Learning (Linear/Quadratic Discriminant Analysis, Logistic Regression, CART, K-Nearest-Neighbor), Unsupervised Learning (K-means, Mixture Models)

3D Modeling/FEA (Course Projects): AutoCAD, Solidworks, COMSOL

Work Experience

Information & Controls Lab, Pennsylvania State University — University Park, PA
Research Assistant - Control Algorithm Development for Artificial Pancreas — *Aug 2012 – present*

- NSF Funded Project with 3 journals and 3 conference proceedings: Modeling, Identification, and Control towards Adaptive Personalized Glucose Management for Insulin-Deficient Diabetes.
- Designed data collection experiment protocols that are both clinically practical and highly excited for system identification.
- Proposed a nonlinear data-driven model with multiple physiological inputs to capture the blood sugar dynamics of the diabetic patients. Validated the model with large scale of time-series data (3-day-length data from 30 virtual patients and 5 real patients).
- Applied signal processing algorithms (Extended Kalman Filter, FIR Filter) and time series analysis (ARMAX) and for data preprocessing, model parameter estimation and state estimation. Predicted the blood sugar level in 30 minutes with accuracy as high as 85% in terms of FIT values.
- Developed an Adaptive Model Predictive Controller that can "intelligently learn" the model of the patient in real time and deliver personalized therapy regimen.
- Introduced an innovative adaptive filtering algorithm (Variable State Dimension Filter) to detect and estimate the meals taken by patients with a successful detection rate of 96% and false alarm rate of 8%.

Process Automation Control & Optimization Group, Shell Oil Company — Houston, TX
Deepwater R&D Engineer, Post Grad Intern — *May 2015 – Aug 2015*

- Delivered an enhanced pipeline leak detection system together with technical reports ready for commission and deployment in time and quality.
- Highlighted intern project by a General Manager at Shell US PhD Intern Symposium. Received a prestigious award nominated by Process Automation Control & Optimization Group.
- Worked in a project team (3 people across 2 different functionality groups). Weekly meet up for brain storming and task distribution. Biweekly report to project managers and line managers. Exposure to risk management, algorithm prototyping (using Matlab) and hands-on implementation (using PI Processbook and Shell Production Universe).
- Enhanced the existing pipeline leak monitor system (only detect oil leakage in steady-state flow) to detect leakage during noisy transient states by introducing model-based fault detection methodologies. The enhanced monitor system covers the full operation time (100%) compared with 60% of time with the original monitor system.
- Identified the bias of the existing estimation algorithm by going through 2 years of plant data, and presented a compensation strategy that achieved 5% improvement of estimation accuracy.
- Sped up the system deployment and replication procedure by modifying the system structures and eliminating redundant codes (Visual Basic).
- Prepared simulation demo videos for operator education purposes.

Related Projects

Machine Learning – Satellite Image Semantics Classification — Aug 2014 – Dec 2014

- Data Set: 2400 images of 8x8 pixels labeled with 14 semantic categories (beach, mountain, etc.). Project team size: 2.
- Implemented multiple classification (linear/quadratic discriminant analysis, logistic regression, k-nearest-neighbor, CART) and clustering (k-means, k-center, mixture Gaussian) algorithms in Matlab for supervised/unsupervised learning.
- Performed k-fold cross validation to evaluate the prediction performance of each learning algorithm.
- Improved the prediction performance (running time & prediction accuracy) by leveraging Principal Component Analysis (PCA).

Mechatronic Car – Maze Runner — Feb 2012 – May 2012

- A smart car that searches feasible paths to target zones in a maze. Project team team size: 4.
- Designed and assembled sensor arrays and Printed Circuit Board (PCB) of the power system.
- Programmed (embedded C) a motor control algorithm and a path searching algorithm on a microchip (MSP430).

Shopping Assistant Robot — Aug 2011 – Dec 2011

- A robot that assists the disabled shopping in supermarkets. Project team size: 4.
- Designed and assembled the grasp mechanism (hand) of the robot. Work included rigid body design, material strength check, technical drawing (AutoCAD, Solidworks), manufacturing process design.