

SUMMARY

- Career objective: seeking full-time positions of **Data Scientist** or **Machine Learning Scientist**, beginning fall 2020.
- Expertise in deploying **Machine Learning** and **Deep Learning** algorithms for pattern recognition and predictive modeling of complex engineering problems with **Python** and **SQL**.
- Proven experience in **optimization** and **optimal control** using **Reinforcement Learning** methods.
- Proficient in **data acquisition** with **NI devices** and **image processing** with **OpenCV**.
- 5+ years experience in **modeling** and **simulation** of **dynamical systems** (e.g. structure vibrations, biological processes, vehicle dynamics, etc.).

EDUCATION

Duke University | PhD: Mechanical Engineering

2016 – 2020: PhD | 2014 – 2016: Master of Science | GPA: 3.86/4.00 | Durham, NC, USA

Zhejiang University | Bachelor of Engineering: Ocean Engineering

2010 – 2014 | GPA: 3.71/4.00 | Hangzhou, Zhejiang, China

RESEARCH EXPERIENCE

Classification of Basins of Attraction (BoA) Using Hybrid Active Learning

 May 2019 – present  Duke University, Durham, NC, USA

- Built a margin-based **Active Learning** algorithm upon **Support Vector Machine (SVM)** and **K-means++** for efficient sampling of basins of attraction (BoA).
- Implemented **Gaussian process regression (GPR)** to predict “informativeness” of unlabeled samples for initial states.
- Obtained a classifier of basins of attraction using a **Neural Network**, which takes 88.7% less training data and 92.3% less computational time than the classifier which has an equal F1-score but was trained by random sampling.

Energy Harvesting Optimization Using Deep Reinforcement Learning

 Jul 2017 – Sep 2019  Duke University, Durham, NC, USA

- Designed and prototyped a linear-to-rotary energy harvester using **Fusion 360** and **3D printing**.
- Formulated a mathematical **model** and gave **simulation** analysis of the system’s vibration responses.
- Built classification models of the harvester’s dynamical patterns using **Machine Learning** methods (**SVM**, **KNN**).
- Implemented **Reinforcement Learning** algorithms (**CEM**, **DDPG**, **PILCO**) to **control** the system for the **optimization** of its energy harvesting efficiency.

Prediction of Maximum Heart Rate and Maximum Oxygen Uptake Using Genetic Algorithm

 Aug 2016 – May 2017  Duke University, Durham, NC, USA

- Built a mathematical model of heart rate and oxygen uptake dynamics in response to exercise intensities during cycling.
- Collected heart rate and oxygen uptake data; achieved **data cleansing**, **transformation** and **smoothing** with **Python**.
- Implemented **Genetic Algorithm** for estimating the maximum heart rate and maximum oxygen uptake.
- Built a **Graphical User Interface (GUI)** for tuning the algorithm’s hyperparameters and monitoring its convergence.
- Optimized the dynamical model and improved the testing efficiency by shortening its duration from 50 to 15 minutes.

Animated Data Visualization for Dynamical Behaviors of Forced Rocking Disks

 Nov 2015 – Feb 2017  Duke University, Durham, NC, USA

- Built a **Graphical User Interface (GUI)** for customizing geometry and mass distribution of a rocking disk.
- **Modeled** and **simulated** the system’s dynamical response and gave a **vibration analysis** using **MATLAB**.
- Created **animations** for the motion of rocking disks to visualize the simulation results.
- Established an **image processing** system using a high-speed camera and **OpenCV** to achieve non-contact **data acquisition** of the rocking disk’s motions in experiments.

EXTRACURRICULAR PROJECT

LendingClub Loan Interest Rate Prediction

📅 Aug 2019 – Oct 2019 📍 Duke University, Durham, NC, USA

- Built **regression models** for interest rate of potential customers using **Python** and LendingClub 2019 Q2 loan data with 130,000+ records and 150+ features.
- Performed **Exploratory Data Analysis (EDA)** to clean data, impute missing values and generate new features.
- Implemented **Ridge, LASSO** and **GBDT**, with hyper-parameters tuned by **Nested Cross-Validation**. GBDT provided the best performance with a RSME of 1.773.

Uber Passenger Tip Prediction

📅 May 2019 – Aug 2019 📍 Duke University, Durham, NC, USA

- Built **classification models** to predict whether a Uber trip will be tipped or not.
- Applied **Exploratory Data Analysis (EDA)** for missing data imputation, feature selection and feature engineering.
- Trained models using **Logistic Regression, AdaBoost, XGBoost** and **Random Forest**, with hyper-parameters tuned by **Grid-Search Cross-Validation**. XGBoost provided the best performance with an accuracy of 81.12%.

Design Engineer Intern - Design of a Cutter Suction Dredge and a Subsea Water-Jet Cutter

📅 May 2015 – Aug 2015 📍 Raymond-CBE Mechanical & Electric Technology, Beijing, China

- Modified the design of a cutter suction dredge and a subsea water-jet cutter using **ANSYS Fluent** and **Solidworks**.
- Provided a **risk assessment** of the cutter suction dredge working in Bohai Sea.
- Participated on-site testing for subsea instruments onshore and offshore.

PUBLICATIONS

- **Wang, Xue-She**, James D. Turner, and Brian P. Mann. "A Model-Free Sampling Method for Estimating Basins of Attraction Using Hybrid Active Learning (HAL)." *arXiv preprint arXiv:2003.10976* (2020) [under review]
- **Wang, Xue-She**, James D. Turner, and Brian P. Mann. "Constrained Attractor Selection Using Deep Reinforcement Learning." *Journal of Vibration and Control* (2020): 1077546320930144.
- **Wang, Xue-She**, and Brian P. Mann. "Dynamics of a Magnetically Excited Rotational System." *Nonlinear Structures and Systems*, Volume 1. Springer, Cham, 2020. 99-102.
- **Wang, Xue-She**, and Brian P. Mann. "Nonlinear dynamics of a non-contact translational-to-rotational magnetic transmission." *Journal of Sound and Vibration* 459 (2019): 114861.
- **Wang, Xue-She**, Michael J. Mazzoleni, and Brian P. Mann. "Dynamics of Unforced and Vertically Forced Rocking Elliptical and Semi-Elliptical Disks." *Journal of Sound and Vibration* 417 (2018): 341-358.
- Sequeira, Dane, **Wang, Xue-She**, and Brian P. Mann. "Analytical Method for Stroboscopically Sampling General Periodic Functions with Arbitrary Frequency Sweep Rates." *Journal of Vibration and Acoustics* 140.6 (2018).
- Sequeira, Dane, **Wang, Xue-She**, and Brian P. Mann. "On the Manifestation of Coexisting Nontrivial Equilibria Leading to Potential Well Escapes in an Inhomogeneous Floating Body." *Physica D: Nonlinear Phenomena* 365 (2018): 80-90.
- **Wang, Xue-She**. "Dynamics of the Disk-Pendulum Coupled System with Vertical Excitation." Diss. Duke University, (2016).

SKILLS

Data Science

Statistics • Machine Learning • Deep Learning • Reinforcement Learning • Data Visualization • Data Wrangling

Engineering

Nonlinear Dynamics • Mathematical Modeling • Simulation • Optimal Control • Finite Element Analysis • Computational Fluid Dynamics • Data Acquisition • CAE/CAD • Signal Processing • Image Processing • Arduino • 3D Printing

Programming Languages

Python • C/C++ • SQL • Java • TensorFlow • Keras

Softwares

LabVIEW • SolidWorks • AutoCAD • MATLAB • Mathematica • ANSYS • OpenFOAM • L^AT_EX • Git • Microsoft Office