Kuofu Liu

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EDUCATION

University of Southern California - Viterbi School of Engineering   **Los Angeles, U.S.**
Bachelor of Science in Industrial and Systems Engineering (ISE),
Specialization in Applied Analytics   *09/2022-Present*
- **GPA:** 3.81/4.00
- **Core Courses:** Operations Research: Deterministic Model (A), Supply Chain Design (A), Operations Research: Stochastic Model (A), Applications of Machine Learning (A)
- **Research Assistant** at Center for Undergraduate Research in Viterbi Engineering (*09/2022-05/2024*)

Sichuan University - Pittsburgh Institute (SCUPI)   **Chengdu, China**
Bachelor of Engineering in Industrial Engineering (IE)   *09/2020-06/2024*
- **GPA:** 3.88/4.00; 91.2/100.0
- **Core Courses:** Statistical Testing & Regression (A), Productivity Analysis (A), Information Systems Engineering (A), Human Factors (A), Matrices & Linear Algebra (A), Differential Equations (A)

RESEARCH EXPERIENCE

Design and Optimization of Electric Vehicle (EV) Battery Recycling Closed-Loop Supply Chain (CLSC) in the U.S.   **Los Angeles, U.S.**
Supervised by Prof. Randolph Hall | USC   *08/2023-Present*
- Awarded by the Center for Undergraduate Research in Viterbi Engineering (CURVE) Fellowship.
- Conducting literature review and text analysis to investigate the EV battery Closed-Loop Supply Chain (CLSC) in the United States and the generally used optimization methods in CLSC.

Parameters Estimation and Global Sensitivity Analysis of Time Varying SEIRD Compartmental Model Based on State-level Covid-19 Data in the U.S.   **Los Angeles, U.S.**
Supervised by Prof. Randolph Hall & Dr. Mingdong Lyu | USC   *01/2023-Present*
- Awarded by the Center for Undergraduate Research in Viterbi Engineering (CURVE) Fellowship.
- Fitted 8 parameters (4 shape parameters of 2 sigmoid functions, reproduction number and fatality rate at the start and end of the simulation period) for each state using Covid-19 case and death data to an extended SEIRD compartment model which transmission rate (beta) and fatality rate (alpha) changing following 2 sigmoid functions chronologically, with the model reaches the average relative root mean square errors (RRMSEs) of 1.54% for cases and 1.20% for deaths.
- Conducted the sensitivity analysis based on Monte Carlo simulation, and investigated scenarios of 8 parameters following uniform, normal, lognormal, gamma, and truncated normal distribution based on pre-fitted values inspecting 245 days in California and New York State starting from March 13, 2020.
- Established country level sensitivity analysis with 410 parameters for the SERID model considering the transportation effect between states on the Covid-19 transmission among 50 states in the United States.

Investigation of Optimal Chest Compression Point During Cardiopulmonary Resuscitation (CPR)   **Chengdu/Nanjing, China**
Supervised by Prof. Jan Reinhardt | Sichuan University & Jiangsu Province Hospital   *12/2022-Present*
- Formulated 9 Linear Mixed Effects Models to analyze the variations in chest compression point detection during CPR across 3 distinct measurement methods (Optimal chest compression level, Inter-nipple level, Lower 1/4 sternum level) within 3 cohorts (ECMO, Healthy, Inpatients) from affiliated hospitals of Jiangsu Province Hospital.
- Formulated 3 Linear Mixed Effects Models to analyze the variations in chest compression point between 3 cohorts (ECMO, Healthy, Inpatients).

Development of Outcome Prediction Models for Acute Diquat Poisoning   Chengdu/Nanjing, China
Supervised by Prof. Jan Reinhardt | Sichuan University & Jiangsu Province Hospital   10/2022-08/2023
- Established 2 outcome prediction models using Cox proportional hazards regression to predict 28-day survival outcomes based on self-reported information at admission (triage model, including age, oral exposure dose, heart rate, and exposure time) and biomedical indicators (prognostic model, including plasma diquat concentration, white blood cell count, neutrophil count, and serum creatinine concentration) to achieve AUC of 0.95 and 0.90 on the testing set respectively.
- Created 2 corresponding online nomograms using shinyapps.io for both the triage model and the prognosis model to facilitate clinical application and accessibility.

Reform of Health Insurance Payment System for Rehabilitation Services   Chengdu/Nanjing, based on WHO's International Classification of Functioning, Disability, and   China Health (ICF)
Supervised by Prof. Jan Reinhardt | Sichuan University & Jiangsu Province Hospital   06/2022-Present
- Performed multivariate imputation to fill in missing values of 17 admission ICF indices and 17 discharge ICF indices for 1,279 patients.
- Conducted model-based clustering and *k*-prototypes clustering to group inpatients for prospective budgeting based on information at admission and discharge, including age, gender, expense, hospitalization days, and ICF indices.
- Tried 10 classification algorithms to confirm group allocation based on information at admission, in which SVM with RBF kernel performed best with accuracy of 92.31% on the testing set.
- Calculated Minimal Important Difference (MID) to define threshold level of ICF sum changing before and after hospitalization with identification of clinical minimal difference group based on Barthel Index classification.

Demand Prediction and Capacity Planning for Emergency Department   Chengdu/Nanjing, China
Supervised by Prof. Jan D. Reinhardt | Jiangsu Province Hospital   03/2022-Present
- Collected daily climate data, air quality data, COVID-19 pandemic data in Nanjing, and daily related data from the electronic medical record of JPH from January 1st, 2019, to December 31st, 2021.
- Established a distributed lag non-linear model to estimate independent and joint effects of 3 factors on daily emergency department visits, including heat waves, COVID-19 cases, and air pollution.
- Developed a prediction model to forecast daily emergency department visits by comparing algorithms including random forest, ridge regression, SVM, ARIMA, SARIMA, XGBoost, CNN, LSTM, in which Single-layer bi-direction LSTM performed best with MAPE of 9.08% on the testing set.
- Simulating the emergency department based on fitted model, number of staffs, and the layout of emergency department of Jiangsu Province Hospital.

Investigation on Trends in Platelet (PLT) Counts with Age Variation   Chengdu, China
Supervised by Prof. Zheng Yang | SCUPI & West China Hospital   09/2021-08/2022
- Built a group-based trajectory model (GBTM) based on expectation-maximization (EM) algorithm investigating trends of PLT counts with age, gender, and the influencing factors causing variations among 7808 individuals' longitudinal data.
- Adjusted and determined the number of sub-groups as 4 and the polynomial order as 3 for each sub-group by achieving the best value of 5 evaluation metrics (AIC/BIC/CAIC/ssAIC/HQIC).

PROJECTS

Reduction of Peak Electricity Usage for ASCO Sintering Co.   Los Angeles, U.S.
Supervised by Prof. Paul Lu | USC & ASCO Sintering Co.   08/2023-Present
- Senior design training for Daniel J. Epstein Department of Industrial & Systems Engineering (ISE) at University of Southern California.
- Cooperating with ASCO Sintering Co. to gather data on the operational duration and power consumption of sintering machines to construct a simulation model for identifying the underlying factors contributing to peak electricity consumption.

An AI-Based Management Platform for Experimental Apparatus   **Chengdu, China**
Supervised by Prof. Zheng Yang | SCUPI   *09/2020-08/2021*
- Awarded by China's Undergraduate Innovation & Entrepreneurship Training Program.
- Developed the maintenance early-warning function for the platform using CNN based on SCUPI's lab equipment's data including used time and records of abnormal performances.
- Tested the functionality of the database of the platform using SQL.

PUBLICATIONS
- Integration of Dynamic Disease Transmission Modeling with Spatial Interaction Analysis (In composition; Will submit to *Transportation Research Part A: Policy and Practice*)
- Optimal Vaccine Allocation Methods Considering Dynamic Transmission in the United States (In composition; Third author; Will submit to *European Journal of Medical Research*)
- It Is Time to Reconsider the Optimal Point for Chest Compression During Cardiopulmonary Resuscitation: Lessons Learnt from the Chinese ECMO-CPR Cohort (In composition; Fifth author)
- Survival Prediction Models for Triage and Prognosis in Acute Diquat Poisoning (Third author; Submitted to *Annals of Emergency Medicine*)
- Investigation on the Dynamic Trajectory of Platelet Count in Healthy Population from 2010 to 2021 in Sichuan Han Adult by Group Based Trajectory Model (Fourth author; Submitted to *Medical Care*)

HONORS & AWARDS
USC Dean's List (*Fall/2022, Spring/2023*)
SCUPI Outstanding Student of the Year (*2021-2022*)
Third Prize, Sichuan Provincial Undergraduate Safety & Emergency Innovative Competition (*11/2021*)
SCUPI Dean's List (*2021-2022*)
Third Prize, SCU Comprehensive Performance Scholarship (*2021-2022*)
First Prize, SCUPI Academic Scholarship (*2020-2021*)

OTHER INFORMATION
- **Standardized Tests:** TOEFL 105: R 28, L 29, S 24, W 24
- **Programming Skills:** Proficient in Python, R; Advanced in MATLAB, SQL, Arena
- **Technical Skills:** Proficient in MS Office (Word, Excel, PowerPoint, Access)
- **Teaching Experience:** TA for *Analytical Geometry & Calculus 3* (*02/2022-06/2022*)