

Lejun Jiang

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EDUCATION

University of Pennsylvania (Penn)

Master of Science in Engineering, Robotics (projected)

Coursework: Optimization Theory & Analysis; Machine Learning; Computer Vision & Computational Photography

Philadelphia, PA

May 2022

Shanghai Jiao Tong University (SJTU), (Dual Degree program with UMich)

Bachelor of Science in Engineering, Electrical and Computer Engineering (GPA: 3.8/4.0)

Coursework: Dynamics & Control of Connected Vehicles (Teaching Assistant); Solid Mechanics; Logic Design; Programming & Elementary Data Structures; Discrete Mathematics

Shanghai, China

Aug 2020

University of Michigan (UMich), (Dual Degree program with SJTU)

Bachelor of Science in Engineering, Mechanical Engineering (GPA: 4.0/4.0) w/ Minor in Electrical Engineering

Coursework: Linear Systems Theory; Control System Analysis & Design; Dynamic System Modeling, Analysis & Control; Engineering Acoustics; Fluid Mechanics; Design & Manufacturing; Data Structures & Algorithms; Probability & Statistics

Ann Arbor, MI

May 2020

PUBLICATIONS

- S. Wong, **L. Jiang**, R. Walters, T. G. Molnar, G. Orosz, R. Yu. "Physics-Guided Deep Learning for Traffic Forecasting using V2V Communication". Accepted by *NeurIPS 2020 Workshop on Autonomous Driving*, submitted to the *3rd Annual Learning for Dynamics & Control Conference*.
- **L. Jiang**, T. G. Molnar, G. Orosz. "On the Deployment of V2X Roadside Units for Traffic Prediction". Submitted to *Transportation Research Part C: Emerging Technologies*.
- Y. Kim, **L. Jiang**, L. Munoz, J. Luntz, D. Brei, P. Alexander, W. Kim. "Fiber-Reinforced Inflatable Torsional Actuator Design with Performance-Enhancing Axial Tension". Presentation at *ASME 2019 Conference on Smart Materials, Adaptive Structures and Intelligent Systems*, in preparation for submission to the *ASME Journal of Mechanical Design*.

RESEARCH EXPERIENCE

Traffic Prediction based on Vehicle-to-everything (V2X) Connectivity

Group of Gabor Orosz

Ann Arbor, MI

May 2019 – Aug 2020

- Developed Physics-Guided Deep Learning model for V2V traffic forecast with LSTM Recurrent Neural Network & Newell's model
- Established metrics to quantify amount of traffic prediction that roadside units (RSUs) can provide via V2I communication; developed optimal strategies for deploying RSUs along highways through evaluating proposed metrics numerically & analytically
- Modeled traffic flow with Markov Chain by establishing connection to continuum models; examined model through MATLAB simulations of single-lane traffic, attained robustness with 15% parameter variation tolerance

Characterization & Design Methodology of Inflatable Torsional Actuators

Smart Materials and Structures Design Laboratory

Ann Arbor, MI

Jan 2019 – May 2019

- Enhanced actuator's operation performance by quantifying and exploiting effect of applied axial tension
- Modeled actuator's performance against its design and operating parameters; based on model developed unprecedented systematic design methodology for actuator, including design space visualization and step-by-step design process

PROJECT EXPERIENCE

Machine Learning Algorithm Development with Python

Implemented with Python (Numpy, PyTorch, Scikit-learn)

Philadelphia, PA

Sep 2020 – Present

- Implemented YOLO algorithm to realize fast real-time multi object detection and semantic label classification
- Developed a Convolutional Neural Network (CNN) for the Fashion MNIST dataset with PyTorch, achieved 91% overall accuracy
- Trained Random Forest, Kernel SVM, MLP & Adaboost classifiers on MNIST digits dataset with Scikit-learn, reached 99.3% accuracy

Lane Detection for Autonomous Vehicles

Implemented with Python (Numpy, Cupy, OpenCV)

Philadelphia, PA

Sep 2020 – Present

- Established Straight Lane Detection algorithm based on Canny Edge Detection and Hough Transform
- Improved accuracy by Curved Lane Detection algorithm based on Sobel Filtering, Perspective Warping & Sliding Window Search

Creating Digital Twin Models for Tobacco Drying Processes

Capstone Design, Facilitator

Shanghai, China

May 2020 – Aug 2020

- Developed 2D and 3D Finite Element Analysis (FEA) models for the tobacco drying process based on four physics modules in COMSOL Multiphysics; achieved 9.45% accuracy error with final model

2020 SAE Aero Design Competition

M-Fly SAE and AUVSI Aerospace Design Team, Aerodynamics Lead

Lakeland, FL
Sep 2019 – May 2020

- Led aerodynamics design of high-lift plane through trade studies, which are based on evaluations & analysis of lift/drag performance and static/dynamic stability with XFOIL & AVL
- Reduced 30% of wingspan and 50% of takeoff distance by adopting bi-wing configuration

Glovebox Pressure Control System for Redox Flow Battery

Capstone Design, Sponsor Contact, Team Leader

Ann Arbor, MI
Jan 2020 - May 2020

- Created Gas Inflow/Outflow On/Off Control Algorithm, which achieved accuracy error within ± 0.1 mbar
- Analytically modelled the glovebox system and simulated its behavior by MATLAB to validate design

Drone Delivery Simulation

Implemented with C++

Ann Arbor, MI
Apr 2020

- Minimized cost of setting up beacons for fast drone by building Minimum Spanning Tree (MST) with Prim's algorithm
- Minimized total energy cost for regular drone to visit all desired locations and return back to original location by implementing Branch and Bound algorithm based on Traveling Salesperson Problem (TSP) insertion heuristics

Query Language Database Implementation

Implemented with C++

Ann Arbor, MI
Mar 2020

- Created relational database with object-oriented design to handle query language commands (insert, delete, generate index, join, etc) efficiently

Stocks Market Implementation

Implemented with C++

Ann Arbor, MI
Feb 2020

- Created implementation of stock market with object-oriented design and optimized its performance with priority queue
- Implemented priority queue with sorted array, binary heap and pairing heap; compared their performance against each other

Automatic Ball Collection Robot

Course Project, Team Leader

Ann Arbor, MI
Jan 2019 – May 2019

- Designed, modeled, simulated, and manufactured linkage system by SolidWorks and ADAMS
- Executed combined feedforward and PID feedback control algorithm using Arduino, achieved 97% accuracy for given task

Robotic Arm with Soft Robotics

Course Project

Shanghai, China
Feb 2018 – May 2018

- Designed and manufactured pneumatic silicone rubber gripper along with robotic arm based on Siemens NX that achieved high flexibility and efficiency for grabbing and transporting objects of different shapes and sizes
- Implemented remote control using PS2 wireless controller and Arduino microcontroller

9th SJTU Mechanical Innovation Competition for Freshmen

Runner-up

Shanghai, China
Apr 2017

- Designed and built robot with high efficiency of holding and transporting objects of different shapes to desired areas
- Implemented remote control using PS2 wireless controller and Arduino microcontroller
- Controlled robot on behalf of team to contest with 47 opponent teams and won the 2nd prize

TEACHING EXPERIENCE

"Dynamics & Control of Connected Vehicles"

Teaching Assistant

Shanghai, China
May 2020 – Aug 2020

- Managed MATLAB simulation codes for project and homework, including simulations of Adaptive or Connected Cruise Control, energy consumption, etc.
- Held office hours; Assisted instructor in class; Created rubrics for homework problems and graded 10 students' submissions

"Heat Transfer"

Grader

Ann Arbor, MI
Jan 2020 – May 2020

"Introduction to Solid Mechanics"

Grader

Ann Arbor, MI
Sep 2019 – Dec 2019

"Academic Writing II"

Teaching Assistant

Shanghai, China
Feb 2018 – May 2018

- Polished students' essays during office hours, collected and answered common questions to enhance communication

UM-SJTU JI Volunteer Teaching Group

Group leader

Eryuan, Yunnan, China
Dec 2017 – Jan 2018

- Planned, organized, and held various courses (Math, Science, English, Art, etc) and activities with local government and teachers to help local students, involving 4 primary schools and 1 vocational high school
- Led group to win title of “Outstanding Team of Aid Education” out of 4 volunteer teaching groups

AWARDS, SCHOLARSHIP & HONORS

Shanghai Jiao Tong University Outstanding Graduates

Overall outstanding performance in the undergraduate career

Shanghai Jiao Tong University
2020

Robert. M. Caddell Memorial Scholarship

Study in the area of materials and/or manufacturing and made significant contributions to relevant student activities

University of Michigan
2020

James B. Angell Scholar

Achieve an “A” record for two or more consecutive terms

University of Michigan
2020

University Honors

Earned a 3.5 GPA or higher during the term

University of Michigan
FA18, WI19, FA19, WI20

Dean's List

Achieved high scholastic standing for the term

University of Michigan
FA18, WI19, FA19

Volunteer Spirit Scholarship

Contribution to public welfare as a volunteer

Shanghai Jiao Tong University
2018

Undergraduate Excellent Scholarship

Overall outstanding performance during the year

Shanghai Jiao Tong University
2017, 2018

Dean's List

Achieved high scholastic standing for the term

Shanghai Jiao Tong University
FA16, SU17, FA17, SU18

Honorable Mention

Honorable performance in the contest

Mathematical Contest in Modeling / Interdisciplinary Contest in Modeling
2017

SKILLS

C++, C, Python (Numpy, PyTorch, Scikit-learn, OpenCV), MATLAB, Simulink, ROS, Arduino, LaTeX, COMSOL, SolidWorks, Verilog.