

# CHEN LIANG

liangch93@gmail.com ◊ [Website](#) ◊ (541)-650-8467

## EDUCATION

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**California Institute of Technology**, Pasadena, USA *2016 - Present*  
Ph.D. in Computing and Mathematical Sciences<sup>1</sup>

**Tsinghua University**, Beijing, China *2012 - 2016*  
B.Eng. in Automation

## RESEARCH EXPERIENCES

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**California Institute of Technology**, Pasadena, USA *Sept. 2016 - Present*  
*Research Assistant, Department of Computing and Mathematical Sciences*

Advisor: **Prof. Steven H. Low**

### **Spectral Characterization of Power Redistribution**

- Applied spectral graph theory methods to study the monotonicity and structural properties of power redistribution in the process of cascading failures.
- Unified many useful quantities in contingency analysis and provided graphical interpretations.

### **Control and Mitigation of Cascading Failures in Power Systems**

- Proposed the *tree partition* of power network that provides an analytical characterization of line failure localizability in transmission systems.
- Proposed a distributed control framework by combining frequency regulation and tree partition that offers strong guarantees in both the mitigation and localization of cascading failures in power systems.

**Carnegie Mellon University**, Pittsburgh, USA *July 2015 - Sept. 2015*  
*Research Assistant, Bimagic Lab, Department of Electrical and Computer Engineering*

Advisor: **Prof. Jelena Kovačević**

### **A Study on Graph Signal Processing (GSP): Localization of the Graph Fourier Basis**

- Observed independently and compared localization property of graph Fourier basis based on different graph representation matrices, and proposed a novel localization measure for a graph signal.
- Provided an upper bound on the benefit of experimentally designed sampling, which achieved fast convergence rates in terms of recovery errors when signals are localized.
- Studied systematically the frame theory, and proposed a method to design an approximately tight frame with prescribed vector norms, which possessed additional structural properties.

**Tsinghua University**, Beijing, China *May 2015 - Feb. 2016*  
*Research Assistant, Future Communication & Internet Lab, Department of Electrical Engineering*

Advisor: **Prof. Yong Li**

### **Data Analysis on User Behaviors in Large-Scale Online Video Systems**

- Pre-processed the original video data, including cleaning non-authentic page views and identifying the same contents on different websites using the video titles.
- Tracked and compared users' different cross-site watching behaviors and numerically assessed the impact on video content consumption.
- Analyzed the connection between the users' behavior and social ecology, recognized video access patterns in different functional zones of the city.

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<sup>1</sup>A multidisciplinary program involving computer science and applied math. Official website: <http://cms.caltech.edu/>

## PROJECT EXPERIENCES

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**Tala**, Santa Monica, USA

*June 2018 - Sept. 2018*

*Data Science Intern*

Advisor: **Peter Sugimura**

### **Transfer Learning in Loan Disbursements**

- Compared transfer learning models, and selected most appropriate algorithms for loan disbursements.
- Developed a transfer learning framework to leverage insights from mature markets to emerging markets.

**Tsinghua University, Beijing, China**

*Feb. 2016 - June 2016*

*Team Leader, Institute of System Integration, Department of Automation*

### **Traffic Sign Recognition System**

- Implemented a detection model based on color segmentation, shape matching and traffic sign validation.
- Implemented a classification model with additive kernel based SVM, improved the accuracy with feature fusion techniques.

**Tsinghua University, Beijing, China**

*Sept. 2014 - Jan. 2015*

*Team Leader, Center for Intelligent and Networked Systems, Department of Automation*

### **Two-wheeled Self-balancing Electric Vehicle**

- Analyzed the stability of the system, designed a closed-loop stable system based on state-feedback and simulated with Matlab.
- Implemented the control algorithms with NI myRIO, enabled the vehicle to move following instructions.

## PUBLICATIONS

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C. Liang, L. Guo, A. Zocca, S. Yu, S. H. Low, and A. Wierman, "An integrated approach for failure mitigation & localization in power systems," *Electric Power Systems Research*, vol. 190, 2021

C. Liang, F. Zhou, A. Zocca, S. H. Low, and A. Wierman, "Mitigating cascading failures via local responses," in *2020 IEEE International Conference on Communications, Control, and Computing Technologies for Smart Grids (SmartGridComm)*, IEEE, 2020

L. Guo, C. Liang, A. Zocca, S. H. Low, and A. Wierman, "Less is more: Real-time failure localization in power systems," in *2019 IEEE Conference on Decision and Control (CDC)*, IEEE, 2019

L. Guo, C. Liang, A. Zocca, S. H. Low, and A. Wierman, "Failure localization in power systems via tree partitions," in *2018 IEEE Conference on Decision and Control (CDC)*, pp. 6832–6839, IEEE, 2018

L. Guo, C. Liang, and S. H. Low, "Monotonicity properties and spectral characterization of power redistribution in cascading failures," in *2017 55th Annual Allerton Conference on Communication, Control, and Computing (Allerton)*, pp. 918–925, IEEE, 2017

## SKILLS

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**Programming**

Python, Matlab, C/C++

**Math**

Optimization, Graph theory, Control