Bai Liu

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EDUCATION

June 2019 – Current
Massachusetts Institute of Technology, Cambridge, MA
- Ph.D. Candidate at Laboratory for Information and Decision Systems (LIDS)
- Major: Communications and Networks
- Minor: Machine Learning
- Also in Interdisciplinary Doctoral Program in Statistics (IDPS)
- Advisor: Eytan Modiano

August 2017 – May 2019
Massachusetts Institute of Technology, Cambridge, MA
- Master of Science in Aeronautics and Astronautics
- Laboratory for Information and Decision Systems (LIDS)
- GPA: **5.0/5.0**

August 2013 – July 2017
Tsinghua University, Beijing, China
- Bachelor of Engineering in Automation
- Bachelor of Economics in Economics (Second Degree)
- GPA: **93/100** Ranking: **1st/118**
- Graduated with Outstanding Honor (Top 1%)

COURSES AT MIT

Prob & Stat	6.436 Fundamentals of Probability, 6.437 Inference and Information, 6.434 Statistics for Engineers and Scientists, 9.S914 Mathematical Statistics: A Non-Asymptotic Approach
Optimization	6.251 Introduction to Mathematical Programming, 6.252 Nonlinear Optimization
Networks	6.263 Data Communication Networks

RESEARCH INTERESTS

Fields	Learning and control methods in networked systems
Tools	Reinforcement learning, stochastic optimization, statistics

PUBLICATIONS & MANUSCRIPTS

September 2019
Reinforcement Learning for Optimal Control of Queueing Systems
Bai Liu, Qiaomin Xie, and Eytan Modiano.
To appear at *IEEE Allerton Conference*.

August 2016
Efficiently Reaching the Largest Wireless Capacity with the Fewest Relays
Bai Liu, Xiugang Wu, and Ayfer Özgür
Presented at *Stanford UGVR Program Workshop*. [Poster]

May 2016
Global Optimization Framework for Real-time Route Guidance via Variable Message Sign
Bai Liu, Ke Han, and Jianming Hu [ArXiv]

RESEARCH EXPERIENCE

October 2017 – Current **Laboratory for Information and Decision Systems**, Massachusetts Institute of Technology, Advisor: Prof. Eytan Modiano
- Applied model-based reinforcement learning and Lyapunov analysis
- Designed algorithm for queueing networks with unbounded state spaces
- Proved that the average queue back- log can get arbitrarily close to the optimal result

June 2016 – September 2016 **Information Systems Laboratory**, Stanford University, Advisor: Prof. Ayfer Özgür
- Proposed and rigorously proved six original properties of layered Gaussian relay network
- Designed adaptive algorithms based on a dynamic programming method that can locate optimal global sub-network exponentially faster

January 2016 – March 2016 **Centre for Transport Studies**, Imperial College London, Advisor: Prof. Ke Han
- Introduced feedback scheme into a transportation network model and applied the linear decision rule and heuristic optimization approach to design optimization algorithm
- Established a simulation platform (based on `MATLAB`, >3,000 lines of codes) and conducted a simulation case study on a real-life test network in China

August 2015 – July 2016 **Institute for Interdisciplinary Information Sciences**, Tsinghua University, Advisor: Prof. Longbo Huang
- Applied both discrete model and fluid model to vehicle scheduling problem
- Utilized dynamic programming and stochastic networks methods and proved the upper bound of the total number of vehicles required for balancing
- Proposed a polynomial-time algorithm to obtain the optimal scheduling policy

PATENT & SOFTWARE COPYRIGHT

June 2016 **Global Optimization Framework for Real-time Route Guidance via Variable Message Sign**
Jianming Hu, Xin Pei, **Bai Liu**, *et al*.
Chinese Invention Patent. Publication Number: CN105303856A.

February 2016 **Intelligent Networking Transportation Guidance System Platform V1.0**
Computer Software Copyright. Registration Number: 2016SR252223.

HONORS

July 2017 **Excellent Graduate Award(s)**
Won Excellent Graduate Award for three times (Beijing City, Tsinghua University and Department of Automation respectively).

June 2016 **Fellowship of Stanford Undergraduate Visiting Researcher Program**, Stanford University
Top undergraduate research program, only 18 students in China are selected annually.

March 2016 **Qualcomm Scholarship**, Tsinghua University
Awarded to students with excellent scientific potential (top 0.3%).

October 2014 **China National Scholarship**, the Ministry of Education, China
Highest level of scholarship set by the government of China (< top 0.1%).

October 2012 **1st Prize in the National Mathematical Olympiad**, Chinese Mathematical Society (CMS)

October 2012 **2nd Prize in the Chinese Physics Olympiad**, Chinese Physical Society (CPS)

PROGRAMMING SKILLS

Proficient `Python`, `Keras`, `MATLAB`, `C/C++`, `C#`, LaTeX

Familiar `Mathematica`, `SQL`, `Oracle`, `Git`, `Javascript`, `HTML/CSS`