Zhiyong CUI

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RESEARCH INTEREST

- Machine Learning such as Deep Learning and Reinforcement Learning
- Traffic Control and Optimization
- Intelligent Transportation Systems and Smart Infrastructure Systems
- Transportation Data Science, Data Mining, and Urban Computing

EDUCATION

University of Washington, Seattle, USA   2015– 2020
Ph.D. in Civil and Environmental Engineering (Intelligent Transportation Systems)   (expected)
Dissertation: Deep Learning Methods for Short-term Network-wide Road Traffic Forecasting
Advisor: Prof. Yinhai Wang
Tools Developed: [TraffiX], [TPS], [DRIVE Net]

National Taiwan University, Taipei, Taiwan   Feb. – July 2014
Visiting M.S. Student in Computer Science
Advisor: Prof. Hsin-Mu Tsai

Peking University, Beijing, China   2012 – 2015
M.S. in Software Engineering
Thesis: Autonomous Front-Vehicle Taillights Detection and Signal Recognition
Advisor: Prof. Ying Huang and Prof. Tong Mo

Beihang University, Beijing, China   2008 – 2012
B.S.E in Software Engineering

HONORS AND AWARDS

Best Paper Award, IEEE International Smart Cities Conference	2020
CEE Department Chair's Award for recognizing the teaching contribution, University of Washington	2020
Student Paper Award, Transportation Statistics Interest Group, American Statistical Association	2020
Student Travel Award, Joint Statistical Meeting	2020
Second Place in Student Poster Award, PacTrans	CSET Region 10 Transportation Conference	2019
Outstanding Award, Transportation Forecasting Competition (TRANSFOR19)	2019
Outstanding Award, 3rd DI-TECH Transportation Algorithm Competition	2018
Graduate Student Travel Award, PacTrans	2016-2020
AASHTO High Value Research Project Award	2016
Outstanding master's thesis nomination (Peking University Software Engineering Communication)	2015
Second Place Award, International Contest of Network of Things	2011
Excellent Student Cadre Award, Beihang University	2008 – 2011
Scholarship of Innovation Work, Beihang University	2008 – 2012
Emergency Treatment Volunteer Award, Beihang University	2009

REFEREED JOURNAL PUBLICATIONS

J1.   **Cui Z**, Lin L, Pu Z, Wang Y*. (2020) Graph Markov Network for Traffic Forecasting with Missing Data. *Transportation Research Part C: Emerging Technologies* (**ASA TSIG Student Paper Award**) (doi: 10.1016/j.trc.2020.102671)

J2.   **Cui Z**, Ke R, Pu Z*, Wang Y. (2020) Stacked Bidirectional and Unidirectional LSTM Recurrent Neural Network for Forecasting Network-wide Traffic State with Missing Values. *Transportation Research Part C: Emerging Technologies* (doi: 10.1016/j.trc.2020.102674)

J3.   **Cui Z**, Ke R, Pu Z, Ma X, Wang Y*. (2020) Learning Traffic as a Graph: A Gated Graph Wavelet Recurrent Neural Network for Network-scale Traffic Prediction. *Transportation Research Part C: Emerging Technologies* (doi: 10.1016/j.trc.2020.102620)

J4.   **Cui Z**, Henrickson K, Ke R, Wang Y*. (2019) Traffic Graph Convolutional Recurrent Neural Network: A Deep Learning Framework for Network-Scale Traffic Learning and Forecasting. *IEEE transaction on Intelligent Transportation Systems* (doi: 10.1109/TITS.2019.2950416)

J5.   **Cui Z**, Long Y*. (2019) Perspectives on Stability and Mobility of Transit Passenger's Travel Behaviour through Smart Card Data. *IET Intelligent Transport Systems*. (doi: 10.1049/iet-its.2019.0212)

J6.   **Cui Z**, Henrickson K, Biancardo S, Pu Z, Wang Y*. (2019) Establishing a Multi-Source Data Integration Framework for Transportation Data Analytics. *Journal of Transportation Engineering, Part A: Systems* (in press). (doi: 10.1061/JTEPBS.0000331)

J7.   Ma X, Li Y, **Cui Z***, Wang Y. (2020) Forecasting Transportation Network Speed Using Deep Capsule Networks with Nested LSTM Models. *IEEE transaction on Intelligent Transportation Systems* (doi: 10.1109/TITS.2020.2984813)

J8.   Pu Z, **Cui Z**, Wang S, Li Q, Wang Y*. (2020) Time-Aware Gated Recurrent Unit Networks for Road Surface Friction Prediction Using Historical Data. *IET Intelligent Transport Systems*. (doi: 10.1049/iet-its.2019.0428)

J9.   Zhang J, Chen F*, **Cui Z**, Guo Y, Zhu Y. (2020) Deep learning Architecture for Short-term Passenger Flow Forecasting in Urban Rail Transit. *IEEE transaction on Intelligent Transportation Systems*

J10.   Ke R, Li W, **Cui Z**, Wang Y*. (2020) Two-Stream Multi-Channel Convolutional Neural Network (TM-CNN) for Multi-Lane Traffic Speed Prediction Considering Traffic Volume Impact. *Transportation Research Record* (doi: 10.1177/0361198120911052)

J11.   Ke R, Feng S, **Cui Z**, Wang Y*. (2020) An advanced framework for microscopic and lane-level macroscopic traffic parameters estimation from UAV video. *IET Intelligent Transport Systems* (doi: 10.1049/iet-its.2019.0463)

J12.   Pu Z, Zhu M, Li W, **Cui Z**, Guo X, Wang Y. (2020) Monitoring Public Transit Ridership Flow by Passively Sensing Wi-Fi and Bluetooth Mobile Devices. *IEEE Internet of Things Journal*

J13.   Zhu M, Zhu W, Lutin, J, Cui Z, Wang Y. (2020) Developing a Practical Method to Compute State-Level Bus Occupancy Rate. *Journal of Transportation Engineering*

J14.   Wang Y*, **Cui Z**. (2019) The Development of Smart Transportation in Urgent Need of Transportation Data Science (in Chinese). *Urban Transport of China*, 17(3), 8-10. (doi: 10.13813/j.cn11-5141/u.2019.0301)

J15.   Liang Y, **Cui Z**, Tian Y, Chen H, Wang Y*. (2018) A Deep Generative Adversarial Architecture for Network-Wide Spatial-Temporal Traffic State Estimation. *Transportation Research Record,* 2672(45), 87-105. (doi: 10.1177/0361198118798737)

J16.   Ke R, Li Z, Kim S, Ash J, **Cui Z**, Wang Y*. (2017) Real-time bidirectional traffic flow parameter estimation from aerial videos. *IEEE Transactions on Intelligent Transportation Systems*, 18(4), 890-901. (doi: 10.1109/TITS.2016.2595526)

J17.   Chen X, Li Z, Wang Y, **Cui Z**, Shi C, Wu H*. (2017). Evaluating the impacts of grades on vehicular speeds on interstate highways. *PloS one*, 12(9), e0184142. (doi: 10.1371/journal.pone.0184142)

PAPERS IN REVIEW

[1]   **Cui Z**, et al. (2020) Traffic Performance Score for Measuring the Impact of COVID-19 on Urban Mobility. IEEE Transactions on Big Data.

[2]   **Cui Z**, Fu M, Zhu M, Ban X, Wang Y*. (2019) Transportation Artificial Intelligence Platform for Traffic Forecasting. *Transportation Research Record*

[3]   **Cui Z**, Wang X, Wang Y*. (2020) Understanding Limits of Predictability in Free-floating Car Sharing Vehicles' Mobility. *Transportation*

REFEREED CONFERENCE PROCEEDINGS

C1.   **Cui Z**, et. al. (2021) Traffic Performance Score for Measuring the Impact of COVID-19 on Urban Mobility. *Transportation Research Board 100th Annual Meeting*

C2.   Ke R, **Cui Z**, Chen Y, Zhu M, Wang Y. (2021) IoT System for Real-Time Near-Crash Detection for Automated Vehicle Testing. *Transportation Research Board 100th Annual Meeting*

C3.   Pu Z, **Cui Z**, Wang S, Yang H, Wang Y. (2021) Multi-Modal Traffic Speed Monitoring: A Real-Time System Based on Passive Wi-Fi and Bluetooth Sensing Technology. *Transportation Research Board 100th Annual Meeting*

C4.   Yin S, Wang J, **Cui Z**, Wang Y. (2020) Attention-Enabled Network-level Traffic Speed Prediction. *IEEE International Smart Cities Conference (ISC2)* (**Best Paper Award**)

C5.   **Cui Z**, Lin L, Pu Z, Wang Y. (2020) Graph Markov Network for Traffic Forecasting with Missing Data. *Transportation Research Board 99th Annual Meeting*

C6.   **Cui Z**, Fu M, Zhu M, Ban X, Wang Y. (2020) Transportation Artificial Intelligence Platform for Traffic Forecasting. *Transportation Research Board 99th Annual Meeting*

C7.   Ke R, Li W, **Cui Z**, Wang Y. (2020) Two-Stream Multi-Channel Convolutional Neural Network (TM-CNN) for Multi-Lane Traffic Speed Prediction Considering Traffic Volume Impact. *Transportation Research Board 99th Annual Meeting*

C8.   Pu Z, Guo X, **Cui Z**, Zhu M, Wang Y. (2020) Mining Public Transit Ridership Flow and Origin-Destination Information from Wi-Fi and Bluetooth Sensing Data. *Transportation Research Board 99th Annual Meeting*

C9.   **Cui Z**, Henrickson K, Ke R, Dong X, Wang Y. (2019) High-Order Graph Convolutional Recurrent Neural Network: A Deep Learning Framework for Network-Scale Traffic Learning and Forecasting. *Transportation Research Board 98th Annual Meeting*

C10. **Cui Z**, Henrickson K, Pu Z, Guo G, Wang Y. (2019) A New Multi-Source Traffic Data Integration Framework for Traffic Analysis and Performance Measurement. *Transportation Research Board 98th Annual Meeting.*

C11. Ke R, Feng S, **Cui Z**, Wang Y. (2019) An Advanced Framework for Traffic Parameters Estimation from UAV Video. *Transportation Research Board 98th Annual Meeting* (No. 19-02564).

C12. Ke R, Li W, **Cui Z**, Wang Y. (2018) Multi-Lane Traffic Pattern Learning and Forecasting Using Convolutional Neural Network. *COTA International Symposium on Emerging Trends in Transportation (ISETT).*

C13. **Cui Z**, Ke R, Wang Y. (2017) Deep Bidirectional and Unidirectional LSTM Recurrent Neural Network for Network-wide Traffic Speed Prediction. *ACM SIGKDD International Workshop on Urban Computing* (UrbComp)

C14. Wang X, MacKenzie D, **Cui Z**. (2017) Complement or Competitor? Comparing car2go and Transit Travel Times, Prices, and Usage Patterns in Seattle. *Transportation Research Board 96th Annual Meeting* (No. 17-06234).

C15. Pu Z, Li Z, Zhu W, **Cui Z**, Wang Y. (2017) Evaluating Safety Effects of Variable Speed Limit System using Empirical Bayesian Before-After Analysis. *Transportation Research Board 96th Annual Meeting* (No. 17-05863).

C16. **Cui Z**, Zhang S, Henrickson K, Wang Y. (2016) New progress of DRIVE Net: An E-science transportation platform for data sharing, visualization, modelling, and analysis. *IEEE International Smart Cities Conference (ISC2),* (pp. 1-2).

C17. **Cui Z**, Long Y, Ke R, Wang, Y. (2015) Characterizing evolution of extreme public transit behavior using smart card data. *IEEE International Smart Cities Conference (ISC2),* (pp. 1-6).

C18. **Cui Z**, Long Y. (2015) Perspectives on Stability and Mobility of Passenger's Travel Behaviour through Smart Card Data. *ACM SIGKDD International Workshop on Urban Computing* (UrbComp).

C19. **Cui Z**, Yang S W, Tsai H M (2015) A vision-based hierarchical framework for autonomous front-vehicle taillights detection and signal recognition. *IEEE International Conference on Intelligent Transportation Systems* (ITSC)*,* (pp. 931-937).

C20. Gao Y, Swaminathan K, **Cui Z**, Su, L. (2015) Predictive Traffic Assignment: A New Method and System for Optimal Balancing of Road Traffic. *IEEE 18th International Conference on Intelligent Transportation Systems* (ITSC), (pp. 400-407).

C21. **Cui Z**, Wang C, Tsai H M. (2014) Characterizing channel fading in vehicular visible light communications with video data. *IEEE Vehicular Networking Conference (VNC)*, (pp. 226-229).

C22. **Cui Z**, Yang S W, Wang C, Tsai H M. (2014) On addressing driving inattentiveness: Robust rear light status classification using hierarchical matching pursuit. *IEEE 17th International Conference on Intelligent Transportation Systems* (ITSC), (pp. 2243-2244).

TECHNICAL REPORTS

R1. Wang Y, Ban X, **Cui Z**, Zhu M. (2019) An artificial intelligence platform for network-wide congestion detection and prediction using multi-source data. Connected Cities and Smart Mobility (C2SMART) Research Report (USDOT award number: 69A3551747124)

R2. Wang Y, **Cui Z**, Henrickson, K. (2018) Pilot Testing of SHRP2 Reliability Data and Analytical Products: Washington. SHRP2 Reliability Project L38 Report.

R3. Hallenbeck M, Ishimaru J, **Cui Z**, Wang Y, Wright D, Zhang W, Henrickson K. (2017) Implementing the Routine Computation and Use of Roadway Performance Measures Within WSDOT. SHRP2 PM Software Research Report. (Grant number: Agreement T1461, Task 16)

R4. Wang Y, Ke R, Zhang W, **Cui Z**, Henrickson K. (2016) Digital roadway interactive visualization and evaluation network applications to WSDOT operational data usage. Washington State Department of Transportation (WSDOT) Research Report (Report number: WA-RD 854.1).

ACADEMIC TALKS

T1. Oct. 2020, "Graph Markov Network for Traffic Forecasting with Missing Data", Reasoning in GeoAI, Mini-Workshop, UC Santa Barbara (online), CA, USA.

T2. Sep. 2020, "Graph Markov Network for Traffic Forecasting with Missing Data", American Statistical Association Transportation Statistics Interest Group meeting (online), USA.

T3. May. 2020, "Learning from Network-wide Traffic Sensor Data: Vehicle Travel and Traffic Performance Changes under the Influence of COVID-19", PacTrans Webinar, Seattle, USA.

T4. Jan. 2020, "Transportation Artificial Intelligence Platform", Transportation Research Board (TRB) ABJ70 Artificial Intelligence and Advanced Computing Standing Committee Meeting, Washington, DC, USA.

T5. Jan. 2020, "Artificial Intelligence in Transportation", COTA Young Professional Presentation, Transportation Research Board (TRB) Annual Meeting, Washington, DC, USA.

T6. Oct. 2019, "Learning Traffic as a Graph: Graph-based Neural Networks for Network-scale Traffic Prediction". *INFORMS* 2019, Seattle, USA.

T7. May 2019, "Artificial Intelligence based Transportation Analysis Platforms and Applications", *Institute of Transportation Engineers (ITE) Student Night*, Seattle, USA.

T8. Jan. 2019, "A Multi-Source Transportation Data Integration Framework based on High-resolution Geospatial Data for Transportation Analysis", *Transportation Research Board (TRB) AFB80 Standing Committee - Geospatial Control Subcommittee Meeting*, Washington, DC, USA.

T9.   Jan. 2019, "A New Multi-Source Traffic Data Integration Framework for Traffic Analysis and Performance Measurement". *Transportation Research Board (TRB) 98th Annual Meeting*. Washington, DC, USA.

T10. Jan. 2019, "Traffic Graph Convolutional Recurrent Neural Network: A Deep Learning Framework for Network-scale Traffic Learning and Forecasting". *Transportation Research Board (TRB) 98th Annual Meeting*. Washington, DC, USA.

T11. Dec. 2018, "Big Data Applications in ITS – Key Arterial Performance Project", *ITS Washington Annual Meeting*, Seattle, USA.

T12. Aug. 2017, "Deep Bidirectional and Unidirectional LSTM Recurrent Neural Network for Network-wide Traffic Speed Prediction". *ACM SIGKDD International Workshop on Urban Computing* (UrbComp), Halifax, Canada.

T13. Aug. 2016, "Predictability of Vehicular Mobility in Free-floating Car Sharing System", *PacTrans-Tongji PhD Student Research Symposium in Transportation Science and Technologies*, Seattle, USA.

T14. Oct. 2015, "Characterizing evolution of extreme public transit behavior using smart card data". *IEEE International Smart Cities Conference (ISC2).* Guadalajara, Mexico.

T15. Aug. 2015, "Perspectives on Stability and Mobility of Passenger's Travel Behaviour through Smart Card Data". *ACM SIGKDD International Workshop on Urban Computing* (UrbComp), Sydney, Australia.

T16. Sep. 2015, "Predictive Traffic Assignment: A New Method and System for Optimal Balancing of Road Traffic". *IEEE 18th International Conference on Intelligent Transportation Systems* (ITSC).

T17. Sep. 2015, "A vision-based hierarchical framework for autonomous front-vehicle taillights detection and signal recognition". *IEEE International Conference on Intelligent Transportation Systems* (ITSC).

PROPOSAL WRITING

P1.   USDOT UTC (PacTrans). Predict Near-term Traffic Performance like Weather Forecast. Submitted in Oct. 2020 (Pending).

P2.   NCHRP 03-138. Application of Big Data Approaches for Traffic Incident Management (TIM). Submitted in Feb. 2020 (Pending).

P3.   USDOT UTC (PacTrans). TRAFFIX: A Platform for Evaluating and Sharing Traffic Forecasting Datasets and Models. Submitted in Nov. 2019 (Pending).

P4.   USDOT Federal Highway Administration (FHWA). A Framework/Methodology to Support Data Fusion, Analysis, and Decision Making. Submitted in Aug. 2019 (Pending).

P5.   Transportation Cooperative Research Program (TCRP). TCRP G-18: Improving Access and Management of Transit ITS Data. Submitted in Sep. 2019 (Pending).

P6.   Washington State Department of Transportation (WSDOT). Real-Time Truck Parking Information Integration, Visualization and Prediction. (**Accepted**. Funds: $150,000. Funding Period: Sept. 2019-Mar.2021)

P7.   National Cooperative Highway Research Program (NCHRP). NCHRP 07-26: Update of Highway Capacity Manual: Merge, Diverge, and Weaving Methodologies. (**Accepted**. Funds: $400,000, Funding Period: June, 2019-Dec., 2021)

P8.   Center for Safety Equity in Transportation (CSET). Developing a Data-Driven Safety Assessment Framework for RITI Communities in Washington State. (**Accepted**. Funds: $120,000, Funding Period: July, 2018-Sept., 2019)

P9.   USDOT UTC (C2SMART). An artificial intelligence platform for network-wide congestion detection and prediction using multi-source data. (**Accepted**. Funds: $82,500, Funding Period: June,2018-July, 2019)

P10. Seattle DOT (SDOT). Performance Measurement for a Selected Pilot Urban Corridor in Seattle. (**Accepted**. Funds: $39,198, Funding Period: April, 2017-June, 2017)

TOOLS

Platforms

   TRAFFIX.AI: A Platform for Evaluating and Sharing Traffic Forecasting Datasets and Models. [website]
   Traffic **P**erformance **S**core (**TPS**) in Greater Seattle area. [website]

Digital **R**oadway **I**nteractive **V**isualization and **E**valuation **Net**work (**DRIVE Net**): A Transportation Big Data Analytics Platform [website]

Code

Spatiotemporal Data Modeling Algorithms

TGC-LSTM: Traffic Graph Convolution Recurrent Neural Network [150+ stars]

GRU-D: Gated Recurrent Unit (GRU) dealing with missing values [70+ stars]

SBD-LSTM: Stacked Bidirectional and Unidirectional LSTM [25+ stars]

GMN: Graph Markov Network [1 stars]

Datasets

Seattle Loop Detector Dataset [GitHub-version] [doi: 10.5281/zenodo.3258904]

TEACHING EXPERIENCE

Pre-Doctoral Instructor, University of Washington   Winter 2020
CEE 412/CET522 Transportation Data Management and Visualization
- 50 students including undergrads and grads; Course Evaluation Score: 4.1/5.0
  (**CEE Department Chair's Award**)

Teaching Assistant, University of Washington   Winter 2019
CEE 412/CET512 Transportation Data Management

Guest Lecturer, University of Washington   Winter 2019
CEE 412/CET512 Transportation Data Management
Lecture Topic: Introduction of Transportation Data Management

Guest Lecturer, University of Washington   2017 - 2019
Engineering Discovery Days
Lecture Topic: Transportation Big Data Analytics Platform

MEDIA COVERAGE

- Annual CEE Department award winners. UW CEE News   Jul. 2020
- Measuring Traffic Performance during COVID-19. UW CEE News   May. 2020
- 2018 Special TRB Meeting Newsletter. PacTrans.   Apr. 2018
- PacTrans Success Story: STAR Lab DRVIE Net. DRIVE Net 1, DRIVE Net 2   Oct. 2018
- PacTrans Develops a Practical Data Analytics Tool for Network Performance Measures. UTC Spoltlight   Jul. 2016

MENTORSHIP

Undergraduate Student Research Mentor at University of Washington
Longfei Lin Beihang University   Summer 2019
Muzhi Han, Tsinghua University (now at University of California, Los Angeles)   Winter - Spring 2019
Tian Wang, Beijing University of Posts and Telecommunications (now at Northeastern Univ.)   Summer 2018
Yijun Sun, Tsinghua University (now at Tsinghua University)   Summer 2017
Zhaoyi Li, Tsinghua University   Summer 2017

Graduate Student Research Mentor at University of Washington
Shuyi Yin, Stanford University (now at University of Washington)   Summer 2019
Mingjian Fu, University of Washington (now at INRIX)   Summer 2017

PROFESSIONAL SERVICES

Committee Member
TRB Standing Committee on Intelligent Transportation Systems (AHB15)   2020
TRB Standing Committee on Geospatial Data Acquisition Technologies (AFB80)   2020
ASCE T&DI Artificial Intelligence Committee   2020
ASCE ICTD 2020 Scientific Committee   2020

Academic Society Membership
American Statistical Association (ASA) Transportation Statistical Interest Group Member   2020

Institute of Transportation Engineers (ITE) member	2018, 2019
ACM-SIGKDD member	2015, 2017
IEEE student member	2017, 2018, 2019
ASCE student member	2018, 2019
Chinese Overseas Transportation Association (COTA) member	2017, 2018, 2019

REFEREE FOR JOURNALS AND CONFERENCES

JOURNALS

Transportation Research Part C: Emerging Technologies
IEEE Transactions on Intelligent Transportation Systems
IEEE Transactions on Vehicular Technology
IEEE Transactions on Knowledge and Data Engineering
IEEE Vehicular Technology Magazine
Information Science
Physica A: Statistical Mechanics and its Applications
IET Intelligent Transport Systems
Transportation Research Record
Journal of Intelligent Transportation Systems
International Journal of Geographical Information Science
ASCE Journal of Transportation Engineering, Part A: Systems
PLoS ONE
Annals of GIS

CONFERENCES

ASCE International Conference on Transportation & Development (ICTD)	2020
Transportation Research Board (TRB) Annual Meeting	2017, 2018, 2019
IEEE Global Communications Conference: Wireless Communications	2019
COTA International Conference of Transportation Professionals	2018
IEEE International Smart Cities Conference	2016
IEEE International Intelligent Transportation Systems Conference	2015

INDUSTRIAL EXPERIENCES

Alibaba, Cainiao Network, Artificial Intelligence Group (Hangzhou, China)　　　　Oct. 2019 – Present
Remote Research Intern　　　　　　　　　　　　　　　　　　　　　　　　　　*Mentor: Lixia Wu*
- Project: Reinforcement Learning based Adaptive Dynamic Bipartite Graph Matching for Task Assignment Problems

Accenture, Smart City Technology Lab (Beijing, China)　　Oct. 2013 – Jan. 2014 & Aug. 2014 – Nov. 2014
Research Intern　　　　　　　　　　　　　　　　　　　　　　　　　　　　*Mentor: Dr. Yan Gao*
- Project 1: Mobility pattern mining based on cellular data and taxi trajectories
- Project 2: predictive traffic assignment (ITSC 2015)

Intel Labs (Taipei, Taiwan)　　　　　　　　　　　　　　　　　　　　　　Feb. 2014 – Jul. 2014
Research Intern　　　　　　　　　　　　　　　*Mentor: Dr. Shao-Wen Yang & Prof. Tsin-Mu Tsai*
- Project 1: Vehicle taillights detection and signal recognition based on hierarchical framework (ITSC 2014, 2015);
- Project 2: Channel fading in vehicular visible light communications with video data (VNC 2015).

IBM, China Systems and Technology Laboratory (Beijing, China)　　　　　　Apr. 2013 – Oct. 2013
Intern　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　*Mentor: Xin Liu*
- Project: Tool development for formatting z/OS migration files in the workflow system.

IBM-Peking University Creative Laboratory (Beijing, China)　　　　　　　Sept. 2012 – Feb. 2013
Research Intern　　　　　　　　　　　　　　　　　　　　　　　　　　　*Mentor: Dexin Wu*
- Project: Evaluating the live virtual machine migration performance, KVM on Linux