Toru Seo

Curriculum Vitae, as of November 29, 2018

Personal Information

Name: Toru SEO

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Affiliation

Assistant Professor, *Regional Planning and Information Lab., Department of Civil Engineering, The University of Tokyo, Japan*

Contact and Personal Links

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ResearchGate: https://www.researchgate.net/profile/Toru_Seo2

Google Scholar: https://scholar.google.com/citations?user=CAxkSpwAAAAJ

Degree

[Sep. 25, 2015] Doctor of Engineering, *Department of Civil Engineering, Graduate School of Science and Engineering, Tokyo Institute of Technology, Japan*

Working Experience

[Jun. 2018–] Assistant Professor, *The University of Tokyo, Japan*
- Traffic state estimation
- Traffic flow theory
- Mobile sensing
- Remote sensing
- Congestion pricing

[Apl. 2016–May 2018] Research Staff, *Tokyo Institute of Technology, Japan*
- Traffic state estimation
- Traffic flow theory
- Behavioral data collection
- Social adaptation of emerging mobility systems

[Aug. 2017–May 2018] Research Associate, *University of Michigan, The United States*
- Departure time choice equilibrium
- Static network traffic equilibrium
- Congestion pricing
- Connected vehicle data

[Jun. 2017–Aug. 2017] Visiting Scholar, *University of Michigan, The United States*
- Something interesting

[Oct. 2015–Mar. 2016] Research Fellow (PD), *Japan Society for the Promotion of Science, Japan*

- Traffic state estimation
- Traffic flow theory
- Mobile sensing

[Apl. 2014–Sep. 2015] Research Fellow (DC2), *Japan Society for the Promotion of Science, Japan*
- Traffic state estimation
- Mobile sensing

Education

[Sep. 2015] Dr.Eng., *Department of Civil Engineering, Graduate School of Science and Engineering, Tokyo Institute of Technology, Japan*
Doctoral dissertation: Traffic estimation with vehicles observing other vehicles
Supervisor: Prof. Yasuo Asakura

[Mar. 2013] M.Eng., *Department of Civil Engineering, Graduate School of Science and Engineering, Tokyo Institute of Technology, Japan*
Master thesis: Traffic state estimation with Lagrangian observation (in Japanese)
Supervisors: Prof. Yasuo Asakura and Dr. Daisuke Fukuda

[Mar. 2011] B.Eng., *Department of Civil and Environmental Engineering, School of Engineering, Tokyo Institute of Technology, Japan*
Graduation thesis: Pedestrian behavior modeling in a train station based on the concept of "Plan-Action" (in Japanese)
Supervisor: Dr. Daisuke Fukuda

Honors and Awards

[Nov. 4, 2017] Outstanding Paper Award, *Committee of Infrastructure Planning and Management, Japan Society of Civil Engineers*

[Jul. 2017] TRC Best Paper Award, *Transportation Research Part C: Emerging Technologies*

[Nov. 25, 2016] Kometani–Sasaki Prize (for Dissertation), *Institute of Systems Science Research*

[Jun. 20, 2016] The 30th Japan Society of Traffic Engineers Paper Award, *Japan Society of Traffic Engineers*

[Sep. 16, 2015] Best Paper Award, *IEEE 18th International Conference on Intelligent Transportation Systems*

[Aug. 8, 2014] Research Encouragement Award, *The 34th Conference of Japan Society of Traffic Engineers*

[Dec. 5, 2013] Outstanding Paper Award, *The 30th Japan Road Conference*

Competitive Research Funding

Ongoing

[Apl. 2018–Mar. 2021] Research Fund by Committee on Advanced Road Technology, Ministry of Land, Infrastructure, Transport and Tourism, Japan, *Tourism Congestion Management using Learning-based Monitoring and Prediction of Traffic*, PI: Takashi Fuse.

[Apl. 2017–Mar. 2019] KAKENHI Grant-in-Aid for Challenging Research (Exploratory), Japan Society for the Promotion of Science, *Market diffusion and social influences of automated cars: Integrated approach from traffic engineering and transport economics*, PI: Daisuke Fukuda.

[Apl. 2017–Mar. 2021] KAKENHI Grant-in-Aid for Scientific Research (A), Japan Society for the Promotion of Science, *Research on mathematical models for management of large-scale transportation network under mega disaster*, PI: Yasuo Asakura.

[Apl. 2017–Mar. 2020] KAKENHI Grant-in-Aid for Scientific Research (B), Japan Society for the Promotion of Science, *Integrated Analytical Modeling of Urban Rail Transit System with High-Frequent Operations*, PI: Daisuke Fukuda.

[Apl. 2016–Mar. 2020] KAKENHI Grant-in-Aid for Young Scientists (B), Japan Society for the Promotion of Science, *Development and verification of model describing spatiotemporal dynamics of traffic flow consists of heterogeneous vehicles*, PI: Toru Seo.

Completed

[Apl. 2014–Mar. 2016] KAKENHI Grant-in-Aid for JSPS Fellows, Japan Society for the Promotion of Science, *Road network traffic state estimation using information from cameras on probe vehicles*, PI: Toru Seo.

Affiliated Societies

IEEE, IEEE Intelligent Transportation Systems Society

Japan Society of Civil Engineers

Japan Society of Traffic Engineers

Information Processing Society of Japan

The Japan Statistical Society

Academic Services

Editor

[2017] JSTE Traffic Engineering, Vol.52, No.4 (Guest editor),

Journal reviewer

Transportation Research Part A: Policy and Practice

Transportation Research Part B: Methodological

Transportation Research Part C: Emerging Technologies

IEEE Transactions on Intelligent Transportation Systems

IEEE Intelligent Transportation Systems Magazine

Journal of Japan Society of Civil Engineers, Ser. D3

JSTE Journal of Traffic Engineering

Conference session chair

[2018] JSCE Infrastructure Planning and Management Conference,

[2017] IEEE International Conference on Intelligent Transportation Systems,

Teaching Experience

Classes

[2018] Applied Project III (partial), *the University of Tokyo*

[2018] Fieldwork Exercise (partial), *the University of Tokyo*

[2018] Fieldwork in Spatial Information Engineering (partial), *the University of Tokyo*

[2011] Infrastructure Planning and Design (teaching assistant), *Tokyo Institute of Technology*

Publications

Refereed International Journal Articles

9. Thaithatkul, P., Seo, T., Kusakabe, T., and Asakura, Y. Evolution of a dynamic ridesharing system based on rational behaviour of users. *International Journal of Sustainable Transportation*, 2018, in press
8. Seo, T., Kusakabe, T., Gotoh, H., and Asakura, Y. Interactive online machine learning approach for activity-travel survey. *Transportation Research Part B: Methodological*, in press (Selected paper from IATBR2015)
7. Lykov, S., Seo, T., and Asakura, Y. Analysis of spatiotemporal dependencies in two-dimensional traffic flow in large-scale urban area with probe vehicle data. *Journal of the Eastern Asia Society for Transportation Studies*, Vol. 12, pp. 1676–1696, 2017
6. Seo, T., Bayen, A. M., Kusakabe, T., and Asakura, Y. Traffic state estimation on highway: A comprehensive survey. *Annual Reviews in Control*, Vol. 43, pp. 128–151, 2017

5. Thaithatkul, P., Seo, T., Kusakabe, T., and Asakura, Y. A passengers matching problem in ridesharing systems by considering user preference. *Journal of the Eastern Asia Society for Transportation Studies*, Vol. 11, pp. 1416–1432, 2015
4. Seo, T. and Kusakabe, T. Probe vehicle-based traffic state estimation method with spacing information and conservation law. *Transportation Research Part C: Emerging Technologies*, Vol. 59, pp. 391–403, 2015 (Selected paper from ISTTT21)
3. Seo, T., Kusakabe, T., and Asakura, Y. Estimation of flow and density using probe vehicles with spacing measurement equipment. *Transportation Research Part C: Emerging Technologies*, Vol. 53, pp. 134–150, 2015 **[Best Paper Award]**
2. Fukuda, D., Seo, T., Yamada, K., Yaginuma, H., and Matsuyama, N. An econometric-based model of pedestrian walking behavior implicitly considering strategic or tactical decisions. In Weidmann, U., Kirsch, U., and Schreckenberg, M. (Eds.), *Pedestrian and Evacuation Dynamics 2012*, pp. 615–624. Springer International Publishing, 2014
1. Narioka, N., Seo, T., Kusakabe, T., and Asakura, Y. Incident detection method using longitudinal occupancy time-series data. *Journal of the Eastern Asia Society for Transportation Studies*, Vol. 10, pp. 1720–1733, 2013

Refereed Japanese Journal Articles

12. Aiko, S., Thaithatkul, P., Seo, T., and Asakura, Y. Optimum routing of ride share vehicles for given activity patterns. *Journal of Japan Society of Civil Engineers, Ser. D3 (Infrastructure Planning and Management)*, Vol. 73, No. 5, pp. I_1233–I_1242, 2017. (in Japanese)
11. Wada, K., Seo, T., Nakanishi, W., Satsukawa, K., and Yanagihara, M. Recent advances in kinematic wave theory of traffic flows: variational formulation and network extension. *Journal of Japan Society of Civil Engineers, Ser. D3 (Infrastructure Planning and Management)*, Vol. 73, No. 5, pp. I_1139–I_1158, 2017. (in Japanese)
10. Fukuda, D., Mizuguchi, M., Seo, T., Kusakabe, T., and Asakura, Y. Evaluation of area level travel time reliability using large-scale probe vehicle trajectories recorded for a long period. *Journal of Japan Society of Civil Engineers, Ser. D3 (Infrastructure Planning and Management)*, Vol. 73, No. 5, pp. I_1105–I_1118, 2017. (in Japanese)
9. Seo, T., Kusakabe, T., and Asakura, Y. Trip purpose estimation method for probe person survey using sequential learning. *Journal of Japan Society of Civil Engineers, Ser. D3 (Infrastructure Planning and Management)*, Vol. 73, No. 5, pp. I_517–I_526, 2017. (in Japanese) **[Outstanding Paper Award]**
8. Kawasaki, Y., Seo, T., Kusakabe, T., and Asakura, Y. Estimation of fundamental diagram using probe vehicle trajectories: EM-algorithm-based method and field validation. In *Proceedings of the 36th Japan Society of Traffic Engineers Conference*, 2016. (in Japanese)
7. Seo, T., Kusakabe, T., and Asakura, Y. Methodology for calibration of fundamental diagram based on trajectories of sampled vehicles: Concept and numerical experiment. *JSTE Journal of Traffic Engineering*, Vol. 2, No. 2, pp. A_1–A_10, 2016. (in Japanese)
6. Narioka, N., Seo, T., Kusakabe, T., and Asakura, Y. A method for detecting incidents from traffic detector data based on the non-parametric statistics. *JSTE Journal of Traffic Engineering*, Vol. 1, No. 1, pp. 11–20, 2015. (in Japanese) **[JSTE Paper Award]**
5. Yanagihara, M., Kusakabe, T., Seo, T., and Asakura, Y. An estimation method for cyclic period of vehicle speed during car-following situation using probe vehicle data. In *Peer Review Proceedings of the 12th ITS Symposium 2014*, 2014. (in Japanese)
4. Seo, T., Kusakabe, T., and Asakura, Y. Field experiment of traffic flow observation by using probe vehicles with spacing measuring equipment. In *Proceedings of the 34th Japan Society of Traffic Engineers Conference*, pp. 277–283, 2014. (in Japanese) **[Research Encouragement Award]**
3. Seo, T., Kusakabe, T., and Asakura, Y. Estimation of traffic state using probe vehicles that equipped with spacing measurement devices. *Journal of Japan Society of Civil Engineers, Ser. D3 (Infrastructure Planning and Management)*, Vol. 69, No. 5, pp. I_809–I_818, 2013. (in Japanese)
2. Narioka, N., Seo, T., Kusakabe, T., and Asakura, Y. Incident detection by nonparametric model using

traffic detectors' long term observation data. In *Proceedings of the 33rd Japan Society of Traffic Engineers Conference*, 2013. (in Japanese)

1. Seo, T., Yaginuma, H., and Fukuda, D. Modeling pedestrian behavior based on the concept of "Plan-Action" structure: An application in a train station. *Journal of Japan Society of Civil Engineers, Ser. D3 (Infrastructure Planning and Management)*, Vol. 68, No. 5, pp. I_679–I_690, 2012. (in Japanese)

Refereed International Conference Presentations

32. Seo, T. and Yin, Y. Optimal pricing for departure time choice problems with unknown preference and demand: Trial-and-error approach. In *Transportation Research Board 98th Annual Meeting*, 2019, forthcoming
31. Seo, T. and Kusakabe, T. Use of small satellites and connected vehicles for large-scale traffic monitoring in road network. In *IEEE 21st International Conference on Intelligent Transportation Systems*, Maui, The United States, 2018
30. Thaithatkul, P., Seo, T., Kusakabe, T., and Asakura, Y. Adoption of dynamic ridesharing system under influence of information on social network. In *Transportation Research Procedia*, 2018, forthcoming. (The 21st EURO Working Group on Transportation Meeting, 17-19 September 2018, Braunschweig, Germany)
29. Seo, T. and Kusakabe, T. Traffic state estimation using small imaging satellites and connected vehicles. *Transportation Research Procedia*, 2018, forthcoming. (ISTS and IWTDCS 2018, 4–6 August 2018, Matsuyama, Japan)
28. Thaithatkul, P., Seo, T., Kusakabe, T., and Asakura, Y. User equilibrium model of ridesharing transport with high-occupancy vehicles lane. In *Proceedings of the 14th International Conference on Advanced Systems in Public Transport*, Brisbane, Australia, 2018
27. Kusakabe, T., Seo, T., Nakanishi, W., and Asakura, Y. Implementation of interactive online machine learning approach for smart phone based activity-travel survey. In *The 15th International Conference on Travel Behaviour Research*, Santa Barbara, The United States, 2018
26. Seo, T. and Yin, Y. Estimating individual congestion externality using connected vehicle data. In *2018 Global Symposium for Connected and Automated Vehicles and Infrastructure*, Ann Arbor, The United States, 2018
25. Seo, T. and Bayen, A. M. Traffic state estimation method with efficient data fusion based on the Aw–Rascle–Zhang model. In *IEEE 20th International Conference on Intelligent Transportation Systems*, Yokohama, Japan, 2017
24. Kawasaki, Y., Seo, T., Kusakabe, T., and Asakura, Y. Fundamental diagram estimation using GPS trajectories of probe vehicles. In *IEEE 20th International Conference on Intelligent Transportation Systems*, Yokohama, Japan, 2017
23. Lykov, S., Seo, T., and Asakura, Y. Analysis of spatiotemporal dependencies in two-dimensional traffic flow in large-scale urban area with probe vehicle data. In *The 12th International Conference of Eastern Asia Society for Transportation Studies*, Ho Chi Minh City, Vietnam, 2017
22. Aiko, S., Itabashi, R., Seo, T., Kusakabe, T., and Asakura, Y. Social benefit of optimal ride-share transport with given travelers' activity patterns. *Transportation Research Procedia*, Vol. 27, pp. 261–269, 2017. (20th EURO Working Group on Transportation Meeting, EWGT 2017, 4-6 September 2017, Budapest, Hungary)
21. Seo, T. and Asakura, Y. Endogenous market penetration dynamics of automated and connected vehicles: Transport-oriented model and its paradox. *Transportation Research Procedia*, Vol. 27, pp. 238–245, 2017. (20th EURO Working Group on Transportation Meeting, EWGT 2017, 4-6 September 2017, Budapest, Hungary)
20. Seo, T., Wada, K., and Fukuda, D. A macroscopic and dynamic model of urban rail transit with delay and congestion. In *Transportation Research Board 96th Annual Meeting*, Washington DC, The United States, 2017
19. Seo, T., Tchrakian, T. T., Zhuk, S., and Bayen, A. M. Filter comparison for estimation on discretized PDEs modeling traffic: Ensemble Kalman filter and Minimax filter. In *IEEE 55th Conference on Decision and Control*, pp. 3979–3984, Las Vegas, The United States, 2016

18. Thaithatkul, P., Seo, T., Kusakabe, T., and Asakura, Y. Field experiment on traveler's behavior in smart ridesharing system. In *The 21st International Conference of Hong Kong Society for Transportation Studies*, Hong Kong, 2016
17. Seo, T., Wada, K., and Fukuda, D. A simplified model of urban railway system for dynamic traffic assignment. In *Proceedings of the 21st International Conference of Hong Kong Society for Transportation Studies*, pp. 357–364, Hong Kong, 2016
16. Thaithatkul, P., Seo, T., Kusakabe, T., and Asakura, Y. User equilibria for ridesharing transportation. In *The 5th symposium arranged by European Association for Research in Transportation*, Delft, The Netherlands, 2016
15. Thaithatkul, P., Seo, T., Kusakabe, T., and Asakura, Y. Simulation approach for investigating dynamics of passenger matching problem in smart ridesharing system. *Transportation Research Procedia*, Vol. 21, pp. 29–41, 2017. (Selected paper from ISTS&IWTDCS, Jeju, Korea, July 7–8, 2016)
14. Seo, T., Kusakabe, T., and Asakura, Y. Calibration of fundamental diagram using trajectories of probe vehicles: Basic formulation and heuristic algorithm. *Transportation Research Procedia*, Vol. 21, pp. 6–17, 2017. (Selected paper from ISTS&IWTDCS, Jeju, Korea, July 7–8, 2016)
13. Thaithatkul, P., Seo, T., Kusakabe, T., and Asakura, Y. Day-to-day dynamics of passenger matching problem in smart ridesharing systems. In *Proceedings of the 20th International Conference of Hong Kong Society for Transportation Studies*, pp. 449–456, Hong Kong, 2015
12. Thaithatkul, P., Seo, T., Kusakabe, T., and Asakura, Y. A numerical study on the effect of variety of user preference to ridesharing system's performance. In *The 7th Regional Symposium on Infrastructure Development*, Bangkok, Thailand, 2015 **[Best Presentation Award]**
11. Ozaki, N., Ueno, H., Sato, T., Wada, S., Ooba, Y., Suzuki, Y., Takahashi, Y., Sakai, H., Warita, H., Matsushita, M., Seo, T., Kusakabe, T., and Asakura, Y. Image recognition based OBU probe system for traffic monitoring. In *Proceedings of the 22nd ITS World Congress*, Bordeaux, France, 2015
10. Seo, T., Kusakabe, T., and Asakura, Y. Traffic state estimation with the advanced probe vehicles using data assimilation. In *IEEE 18th International Conference on Intelligent Transportation Systems*, pp. 824–830, Gran Canaria, Spain, 2015 **[Best Paper Award]**
9. Thaithatkul, P., Seo, T., Kusakabe, T., and Asakura, Y. A passengers matching problem in ridesharing systems by considering user preference. In *Proceedings of the 11th International Conference of Eastern Asia Society for Transportation Studies*, Cebu, Philippines, 2015 **[Outstanding Poster Presentation Award]**
8. Seo, T. and Kusakabe, T. Probe vehicle-based traffic flow estimation method without fundamental diagram. *Transportation Research Procedia*, Vol. 9, pp. 149–163, 2015. (Selected paper from ISTTT21 Poster Session, Kobe, Japan, August 5–7, 2015)
7. Kusakabe, T., Seo, T., Goto, H., and Asakura, Y. Interactive online machine learning approach for activity-travel survey. In *Proceedings of the 14th International Conference on Travel Behaviour Research*, Windsor, The United Kingdom, 2015
6. Kusakabe, T., Seo, T., Goto, H., and Asakura, Y. Improving activity-travel survey using on-line machine learning and smartphone-based interactive system. In *International Workshop on Activity-Travel Behavior Analysis and Multi-State Supernetwork Modeling*, Hong Kong, 2014
5. Nguyen, L. X., Seo, T., Van, H. T., Kusakabe, T., and Asakura, Y. Mixed flow observation using video cameras on probe vehicles: A case study in Ho Chi Minh City. In *Proceedings of the 19th International Conference of Hong Kong Society for Transportation Studies*, pp. 374–381, Hong Kong, 2014
4. Narioka, N., Seo, T., Kusakabe, T., and Asakura, Y. Incident detection method using longitudinal occupancy time-series data. In *Proceedings of the 10th International Conference of Eastern Asia Society for Transportation Studies*, Taipei, Taiwan, 2013
3. Seo, T., Kusakabe, T., and Asakura, Y. Traffic flow monitoring utilizing on-vehicle devices of spacing measurement. In *The 2nd Symposium of the European Association for Research in Transportation*, Stockholm, Sweden, 2013
2. Seo, T., Kusakabe, T., and Asakura, Y. Traffic state estimation method using probe vehicles equipped with spacing measurement system. In *Proceedings of International Symposium on Recent Advances in Transport*

Modelling, Kings Cliff, Australia, 2013

1. Fukuda, D., Seo, T., Yamada, K., Yaginuma, H., and Matsuyama, N. An econometric based pedestrian walking behaviour model implicitly considering strategic or tactical decisions. In *Proceedings of the 6th International Conference on Pedestrian and Evacuation Dynamics*, Zürich, Switzerland, 2012

Others

5. Seo, T., Kawasaki, Y., Kusakabe, T., and Asakura, Y. Fundamental diagram estimation by using trajectories of probe vehicles. *arXiv preprint arXiv: 1804.05927*, 2018, Published at arXiv
4. Seo, T. and Yanagihara, M. Multi-class multi-lane traffic flow models. In *Traffic Engineering*, Vol. 52, No. 4, pp. 30–36. Japan Society of Traffic Engineers, 2017. (in Japanese)
3. Seo, T. Kinematic wave theory is a car-following model. In *Traffic Engineering*, Vol. 52, No. 3, pp. 18–24. Japan Society of Traffic Engineers, 2017. (in Japanese)
2. Seo, T., Wada, K., and Fukuda, D. Fundamental diagram of rail transit and its application to dynamic assignment. *arXiv preprint arXiv: 1708.02147*, 2017, Published at arXiv
1. Seo, T. *Traffic Estimation with Vehicles Observing Other Vehicles*. PhD thesis, Tokyo Institute of Technology, 2015