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"Resilient City and Transport"

ABSTRACTS











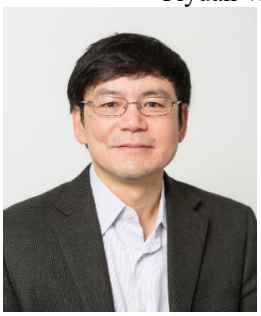
"Transports à Haut Niveau de Service"
The International Symposium on Sustainable Development of Urban Transport Systems

INDEX

Keynote Speeches

Keynote 1 Safeguarding Equitable Transportation: An Examination of ADA Paratransit Usage Change during COVID-19 Pandemic

Yiyuan Wang, Qing Shen (*),Lamis Abu Ashour, Andrew L. Dannenberg,



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Keywords: COVID-19 pandemic, Transportation equity, People with disabilities, ADA paratransit, Hurdle model

Abstract:ADA paratransit serves as a critical transportation means for persons with disabilities to meet their basic needs, but the COVID-19 pandemic poses an unprecedented challenge to service providers. To safeguard transportation equity, this study uses complete records of service trips and riders obtained from the Access Transportation Program in the Seattle region for an empirical analysis aimed at answering two research questions. First, how have the ridership and trip purposes of paratransit changed since the outbreak of COVID-19? Second, what factors explain the users' changing levels of service usage in response to the pandemic? Statistical methods, including a Hurdle model, are employed as the analytical tools. The results show that paratransit ridership has dramatically decreased with the most substantial reductions of working and non-essential personal trips, and that a majority of the remaining trips has been for medical purposes. The results also indicate that riders' service usage during a pandemic is associated with their sociodemographic characteristics, disability conditions, and pre-pandemic travel demand. Most importantly, when controlling for other factors, riders who live in neighborhoods with lower income and lower access to vehicles are more dependent on the service. These findings lead to several recommendations for public transit agencies and paratransit operators as they develop plans to prepare for future disruptive events.

Keynote 2 Shanghai Transport Development Strategy Under the Background of Carbon Neutrality

碳中和背景下的上海交通发展策略

ZHU Hong 朱洪

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上海市城乡建设和交通发展研究院

Personal profile： ZHU Hong, Vice President, Professorate Senior Engineer, Shanghai Urban-Rural Construction and Transportation Development Research Institute. He has participated in major projects on Shanghai Transport Development White Paper, Shanghai Comprehensive Transport Survey, Traffic Management Plan for World Expo Shanghai 2010 and Comprehension Transport Plan of Hongqiao Central Business District. He innovates research that will lead to the future on transportation energy conservation and emission reduction and low-carbon transportation. 朱洪，现任上海市城乡建设和交通发展研究院副院长，教授级高级工程师。曾参与完成上海市交通发展白皮书编制、上海市综合交通调查、《世博交通保障总体方案》、《虹桥商务区综合交通规划》等重大任务。创新开展了引领未来交通发展趋势的交通节能减排和低碳交通方面的研究。

Key Words： carbon peak, carbon neutrality, urban transport policy, comprehensive electrification of vehicles

Abstract： With the growth trend of transport emissions in the expansion of space activities, the impact of heavy trucks on urban environment is increasingly concerned. Three main ways to achieve carbon peak and carbon neutrality in urban transport: optimizing the structure of transportation modes to reducing the dependence on high-carbon modes; optimizing the energy structure to reducing the direct carbon emissions of transports and optimizing the supply structure of transport to improving the efficiency. In order to adhere to the intensive transport development modes, we should to guide the way of refined and differentiated travel and to promote the development of a green logistics construction. The key measures to optimize the energy structure are to promote the comprehensive electrification of vehicles, including emphasizing the synchronous adjustment of transport structure and energy structure in passenger electrification and seeking simultaneous breakthroughs in policy and technology management in freight electrification. Exploring a new approach on improving transport efficiency is a key to building a demand-responsive shared transport system.

Keynote 3 One-Way Station Based Carsharing Network Design

Kun AN 安琨

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Personal profile：安琨博士现任职于同济大学交通运输工程学院教授，博导。2014 年于香港科技大学获得工学博士学位， 2015 年赴美国伊利诺伊大学香槟分校从事博士后研究工作，2016-2019 年于澳大利亚莫纳什大学任高级讲师，并已通过终身制考核。 安琨博士长期致力于复杂交通网络分析与优化、共享出行、电动公交运营等研究，先后在香港特区、中国大陆、美国和澳大利亚主持及参与了 10 余个重要科研项目，包括澳大利亚国家基金探索项目。安博士发表 SCI 学术论文 30 余篇，参编专著 2 部。担任 Transportation Research Part B 等 12 个 SCI 期刊审稿人，以及澳大利亚国家基金探索项目、工业联合项目评审专家。 Dr. Kun An is currently professor with College of Traffic and Transportation Engineering at Tongji University. Dr. An received her Ph.D. degree in Civil Engineering from Hong Kong University of Science and Technology in 2014. After graduation, she joint University of Illinois at Urbana and Champaign as a Postdoctoral Researcher in 2015 and worked as lecturer, senior lecturer in the Institute of Transport Studies, Department of Civil Engineering at Monash University in 2016-2019. Dr. An has rich research experience in transit network design considering stochastic demand, logistic system management and design, shared mobility, and electric bus operation. She has published 2 book chapters and 30+ peer-reviewed papers on top journals including Transportation Research Part B, TR Part E, TR Part C and etc, and has obtained multiple research projects including an ARC Discovery Project in Australia. She served as referee for top journals in the field of Transportation, Discovery projects and Linkage projects for Australia Research Council.

Key Words：Imbalance problem, vehicle relocation

Abstract：Carsharing is a transport demand management measure that was first adopted in the 1940s, when groups of citizens needed to save travel costs due to a rise in gasoline price. In recent years, carsharing is becoming even more attractive around the world due to its low price and flexible car-return policies. Carsharing can be divided into two categories: round-trip and one-way, based on the operation mode. Traditional car rental companies typically provide round-trip carsharing services, in which the vehicle should be returned to the original rental station and is charged on daily rates. One-way carsharing allows users to return the vehicle to any designated spot and is usually charged based on a combination of trip duration and trip distance. Hence, one-way carsharing can attract more trip motives other than just the occasional shopping or leisure trip as is the case of the round-way systems. Due to the dynamic demand from hour to hour typical of urban areas, the one-way carsharing scheme cannot serve all potential demand. However, given the significant improvement in customer convenience, one-way carsharing is witnessing a soaring popularity in Europe, China and the USA with many companies expanding their services (e.g., Car2go, DriveNow, GoGet and EVCARD). At

this stage, the carsharing operators mainly focus on market penetration in each city and by adding more cities to their list, yet they face great challenges in planning and operating their systems. Only limited studies addressed the optimization of strategic planning & operational decision simultaneously, for the large-scale gasoline & electric carsharing system. In order to handle the carsharing imbalance problem, different approaches including operator-based & user-based relocation methods should be explored to understand their advantage and disadvantages. This study aims to fill the aforementioned research gaps. First, we propose a Mixed-integer Non-linear Programming (MINLP) model to optimize both the strategic planning and operational decisions. A logit model is constructed to represent the non-linear demand rate by using the ratio of carsharing utility and private car utility. Second, we establish a continuous State of Charge (SOC) distribution model to reduce the heavy computation burden caused by large-scale electric fleet size. It is verified by using a discrete simulation model and an optimization model by tracking individual vehicle SOC. Third, we compare the efficiency of two relocation methods: operator-based by dedicated staff or user-based through financial incentives. The operator-based model considers personnel movement and vehicle movement, whereas the user-based model is built on demand elasticity to optimize flexible pricing to achieve demand-supply equilibrium. The road network of SIP in Suzhou, China is used to demonstrate the applicability of the proposed models and algorithms. It shows that the strategic planning and operational decisions in the large-scale carsharing system can be jointly optimized via the developed customized gradient algorithm, and the near-optimal solutions are obtained in reasonable computation time; the time-varying battery capacity problem of electric vehicles can be handled by the proposed continuous SOC distribution model, and it is verified by an optimization model by tracking individual vehicle SOC and a discrete simulation model; the supply/demand imbalance problem can be addressed by using the price incentives and staff based relocation, and vehicle relocations on a trip basis pricing are more flexible and bring highest profits. Those findings have been published in high-quality journals: European Journal of Operational Research, Transportation Research Part C, Transportation Research Part E.

General Session

[A0020] Improving Public Transportation Safety in Covid-19 Era Through Crowdsourcing Technique

Tao Tao [1, 2] , Jin Zhonghua [3] , Zhao Shuang [4] , Pan Qisheng [1, 2, *] , **Pan Qisheng** [1, 2]
1.University of Texas ; 2. Arlington ; 3.Texas Southern University ; 4.Tongji university

Personal profile： Qisheng Pan is a Professor in Department of Public Affairs and Planning, College of Architecture, Planning, and Public Affairs, and Director of CTEDD Center, University of Texas at Arlington. He is also a visiting chair professor of of College of Architecture and Urban Planning, Tongji University.

Key Words： Public Transit, crowdsourcing, COVID-19, public transportation information system
Abstract： The novel coronavirus disease (COVID-19), which broke out in the end of 2019, has caused significant impacts on transportation society and led to a dramatic drop of public transit ridership. Transportation studies have not reached an agreement whether there is a connection between the use of urban public transit and the transmission of COVID-19. Many transit riders avoid taking public transit for commuting and other activities because of their concerns about the crowding environment on transit t

[A0029] Trip Generation for Mid-Long-Distance Travel in Megaregions

Zhang Ming

1.The University of Texas at Austin ; 2. USA

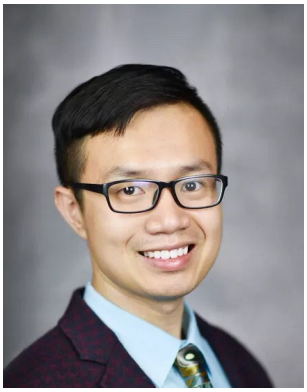
Personal profile： Prof. Zhang received his B.E. (Architecture) and M.E. (Urban Planning and Design) from Tsinghua University, Beijing and M.S. (Transportation) and Ph.D. (Urban and Regional Planning) from MIT. Prof. Zhang is program director and Professor of Community & Regional Planning at the University of Texas at Austin and Director of the US DOT University Transportation Center of Cooperative Mobility for Competitive Megaregions (CM2). His research and teaching interests include urban and regional planning (transportation), land use-transportation integration, and the built environment-travel behavior relationship. His recent research has focused on megaregional transportation issues, Transit-Oriented Development, and high-speed rail and spatial development in the international setting.

Key Words： trip generation, Mid-long-distance travel, megaregion, NPTS/NHTS

Abstract： This study focuses on trips between 100 and 500 miles one way, hereinafter referred to as mid-long distance (MLD) travel. MLD travel warrants a focal attention for two reasons. First, travel in the MLD range accounts for about three-quarters of all long-distance trips in the United States. While its share remains small (<4%) in the U.S. domestic travel market, MLD travel contributes more than 20% of total person-miles traveled and a similar amount of total transportation emissions. Second, MLD travel covers a distance range for the territory of megaregions in which different modes, include cars, airplanes, trains, and intercity buses, can offer competitive services. It is a market segment with the greatest potential to achieve multimodality, whereas cars dominate within-metropolitan travel and airplanes prevail for 500+ miles of trips. There is very limited knowledge on MLD travel in the United States, which prompted the U.S. Transportation Research Board to designate a special committee to look into travel issues and opportunities in the MLD market. This study makes the needed effort by analyzing trip generation characteristics for MLD travel. Data used for modeling was synthesized from eight U.S. national travel surveys conducted in 1969-2017. A zero-inflated modeling approach is taken to address the “excess zero” issue observed in the data. Lessons learned from the study are expected to support megaregional transportation planning in the United States and are informative to planning in megaregion-like territories in other countries such as city-cluster regions in China and mega-city regions in Europe.

[A0094] Does Ridesourcing Provide Equitable Accessibility?

Wang Sicheng
Michigan State University



Personal profile： Sicheng Wang earned a PhD from Edward J. Bloustein School of Planning and Public Policy at Rutgers University in 2021. He is now Research Associate in the Department of Geography, Environment, and Spatial Sciences at Michigan State University. With a background of urban and transportation planning, Wang's research interests include travel behavior of using emerging transportation technologies (e.g., autonomous vehicles, Mobility-as-a-Service, and shared micro-mobility), the social and economic impact of information and communications technology and autonomous vehicles, and opportunity accessibility and social justice in transportation in the Automation Age. Wang received the 2020 Regional Science Association International (RSAI) Czamanski Dissertation Award, the 2020 International Association for China Planning (IACP) Karen Polenske Best Student Paper Award, and was selected as the finalist of 2021 World Society for Transport and Land Use Research (WSTLUR) Best Thesis Award. He also received 2018 and 2019 American Public Transportation Foundation Scholarships. Before joining WEAVE, Wang taught GIScience in the Department of Geography at the University of South Carolina. He had extensive research experience at the Alan M. Voorhees Transportation Center and the National Center for Smart Growth. He also worked as an urban planner and designer for years in Shanghai, China.

Key Words： ride sourcing, accessibility, equity, spatial model

Abstract： In this study, we conduct a comprehensive evaluation of the accessibility offered by ridesourcing services. We measure accessibility of ridesourcing and transit to three types of destinations: healthcare facilities, restaurants, and grocery stores in Chicago. Realized ridesourcing trip data are used to calculate the average travel times between origins and destinations. Both the employment volume by sector and points of interest locations are used to measure the opportunity attractiveness for estimating accessibility. We estimate spatial autoregressive models to examine the associations between realized ridesourcing accessibility and census tract-level demographic and socioeconomic indicators. Results suggest that ridesourcing has a less equitable distribution compared to transit, based on the median household income of census tracts and minority populations in those

tracts. The analysis provides guidance for policymakers on the inequities associated with new mobility options and how best to offer improved accessibility for disadvantaged populations.

[A0095] Association between Perceived Transportation Disadvantages and Opportunity Inaccessibility: A Social Equity Study

Wu Xuanke [2] , Chen Yuche [2, *] , **Wang Sicheng** [1]

1.Michigan State University ; 2.University of South Carolina

Personal profile： Sicheng Wang earned a PhD from Edward J. Bloustein School of Planning and Public Policy at Rutgers University in 2021. He is now Research Associate in the Department of Geography, Environment, and Spatial Sciences at Michigan State University.

Key Words： transportation disadvantage, opportunity inaccessibility, perception-based measure, social equity, structural equation model

Abstract ： This study gathered empirical evidence of the associations between perceived transportation disadvantages and opportunity inaccessibility. Based on an online survey with a representative sample in South Carolina, we identified three latent factors of perceived transportation disadvantages: high travel costs and efforts (e.g., money and time spent for travel), limited travel ability, and safety concerns. We also constructed the factor of perceived inaccessibility of various essential opportunities. By estimating a structural equation model, we found that opportunity inaccessibility was positively associated with perceived transportation disadvantages such as high travel costs/efforts and limited travel ability. The factor of safety concerns did not directly affect inaccessibility but had positive covariance with the factors of high costs/efforts and limited ability. Perceived inaccessibility was distributed inequitably across population groups (e.g., race and age) and associated with the built environment. The paper provides insights into the multidimensional interrelationships between the perception-based factors of disadvantages and inaccessibility from a new perspective and discusses the policy implications for improving transportation equity.

Session 1 Resilient Transport and Space

[A0008] Agent-Based Simulation of Network Evacuation Problem With Dynamic Shelter Allocation

Rachedi Abderrezak [1, 5, 3, 4], Zargayouna Mahdi [1, 6, 7, 3, 4], Nguyen Van Phu Cyril [1, 6, 7, 3, 4], Ameli Mostafa [1, 6, 7, 3, 4, *], **Idoudi Hassan** [1, 2, 3, 4]

1.University Gustave Eiffel ; 2. GRETTIA & LIGM ; 3. Paris ; 4. France ; 5. LIGM ; 6. COSYS ; 7. GRETTIA

Personal profile： Idoudi Hassan received his Ph.D. degree in civil engineering at the University Paris-est, IFSTTAR, and the University of Lyon in 2019. He is currently an assistant professor at the University Gustave Eiffel Paris. His research interest lies at the intersection of operations research and computer science.

Key Words： Network evacuation, disaster management, shelter allocation, dynamic traffic assignment

Abstract： This study solves the evacuation problem dynamically, we solve the problem in multiple departure time intervals by considering the system optimum principle for the shelter allocation problem and the user equilibrium principle for the dynamic traffic assignment problem. For calculation of the vehicle evacuation time, we consider an agent-based dynamic simulator that provides us the travel information every second. Our methodology reduces 30% network clearance time in the Luxembourg network.

[A0051] The Impacts of Land Use on Urban Road Network Vulnerability—A Case Study in Wuhan

Zhao Liyuan

Huazhong University of Science and technology

Personal profile： Liyuan Zhao Ph.D Professor, Supervisor of Doctorate Candidates Dr. Zhao received her jointed Ph.D in urban and regional planning from University of Florida, U.S. and in transportation planning and management from Southwest Jiaotong University (SWJT), China. She has hosted two grants sponsored by National Natural (Social) Science Foundation of China, four grants sponsored by provincial and ministerial foundation, and over twenty practical projects in the area of urban planning and design. She has authored many publications in top journals in urban planning and transportation, including Transport Geography, Transport Policy, Journal of Urban Planning and Development, and Journal of Transport Geography. Research Fields: Urban transportation planning and design, Application of intelligent technologies in urban planning, Urban sustainable development.赵丽元 博士 教授，博导 研究方向：城市交通规划与设计，规划智能技术应用，城市可持续发展 研究成果：主持国家基金 2 项、省部级课题 4 项；参与国家级课题 6 项；主持规划设计项目 20 余项。以第一作者在城乡规划与交通规划学科领域国际著名期刊《Transport Policy》、《Journal of Transport Geography》等 SCI/SSCI 期刊发表十余篇，出版专著两部。

Key Words： transportation planning, land use, mobile phone signaling data, vulnerability

Abstract：Growth in travel demand exacerbates the road network vulnerability. This study aims to explore how the source of travel demand, that is, the land use spatial layout, impacts road network vulnerability. Based on the interaction between land use and transportation, this study develops a new raster-based road network vulnerability assessment model and employs a logistic model to quantify the correlation between land use and vulnerability. To assess the raster-based vulnerability, this study uses the change in the total travel time for all O-D pairs before and after the disruption of all intersecting links and nodes within the geographical extent of a grid. The central city in Wuhan, China, was selected as the case study which was divided into 2096 grids of uniformly shaped and sized cells. Highly vulnerable areas showed a centripetal distribution trend and were mainly concentrated in the areas around the bridges, expressways, and arterial roads. The logistic model revealed the statistical results that the closer to residential land, public service land, and water area, the higher the vulnerability. Intensive density and land use mix increase the vulnerability of road networks. High risk road links were identified for adapting strategies by overlapping the congested road maps with the vulnerability results. Police implications were summarized to mitigate road vulnerability. This method provided technical support for prioritizing the improvement of road network resilience.

[A0060] Estimating Stations' Vulnerability by Route Diversity Considering Travel Time: A Case Study of The Multi-Modal Public Transport Network In Beijing

JIA Jianlin , **LIU Zhuo**

Beijing University of Technology

Personal profile： Zhuo Liu received B.E. degree in Environmental Science from School of Environment, Beijing Normal University, China, in 2012, and the master's and Ph.D degrees in Environmental Design from Urban Planning Lab, Kanazawa University, Japan, in 2014 and 2017. He is currently with Department of Urban Construction, Beijing University of Technology. His research interests include Integrated Planning of Land use and Transportation, Elderly-care Facilities Planning, and Planning Support with Multi-source Data and Advanced Technologies.

Key Words： vulnerability evaluation, routes diversity, complex theory, multi-modal public transport network

Abstract： For multi-modal public transport network (MPTN), the impact of an accident happened in an individual station may not only disrupt the station itself but also spread over the whole network. Therefore, the count of connective routes for a station was used as the measurement for its vulnerability. Nevertheless, most of related researches constructed connective route sets for the stations with a fixed number of routes, which obviously ignored the constraints of passengers' acceptable travel time. Regarding this context, we proposed a route diversity-based approach to measure the vulnerability of stations in MPTN based on complex network theory. A route constraint parameter was established to reflect the travel time restriction in constructing the set of passengers' acceptable routes. Additionally, an algorithm was formulated to rapidly calculate the route diversity index and meanwhile avoid the "overlapping routes" problem. A simple virtual network was used as a numerical example to compare the proposed approach with the topology-based vulnerability evaluation approaches. Finally, the proposed approach was applied to the MPTN of Beijing to explain its effectiveness and potential applications. The results show that the route diversity of the stations obey the polynomial distribution. The vulnerability of the MPTN in Beijing generally presents spatial aggregation and eventually decreases from downtown to suburban area. The stations in South and East is more vulnerable than those in West and North. An interesting phenomenon is that the spatial distribution of the most vulnerable stations doesn't match with the area with higher average vulnerability. The top 20 vulnerable nodes are the transfer stations with large passenger flow and locate along the main streets of Beijing. The research output is expected to support the MPTN management against the systematic risk caused by accidents.

[A0071] Research on Urban Composite Development Axis Based on the Perspective of Traffic Resilience

Zhenang Song, **Cai Jun** , *
Dalian University of Technology

Personal profile： Professor and Doctoral Supervisor, Dalian University of Technology. Associate Dean of School of Architecture and Fine Art, Head of Urban and Rural Planning Department Member of the Liaoning Province Steering Committee of Postgraduate Education for Architecture Professional Degree Associate Chairman of the Urban Renewal Professional Committee of Liaoning Urban Planning Association Main achievements: presided two "National Natural Science Foundation of China" projects; published several academic monographs on road network planning. Research field: urban transportation planning, urban land use planning; He has long been engaged in urban and rural planning research and teaching. Research on the combination of road network planning theory at the macro level and traffic organization and design at the micro level, the supporting relationship between the road network carrying capacity and the intensity of urban land development, the impact of the road network system on travel modes, the planning theory and method for improving traffic and road network quality, the linkage mechanism of traffic resilience and the road network system, the construction of macro-planning models and micro-operations, and the micro-renewal of road network systems and land use. He has made corresponding results on the above theory.

Key Words： Urban Composite Development Axis, road netwokplanning

Abstract： The transportation system plays a vital role in urban development. A typical layout model dominated by public transportation is main center--axis belt--sub-center. The composite development axis（CDA）combines large-volume public transportation, expressways, and parallel arterial roads. "Resilient transportation" means that the ability of the urban transportation system to maintain its original functions and restore accessibility under interference; the road network system, land use, and urban development must be well coordinated and integrated to obtain transportation resilience. This research analyzes and draws on the advantages of multiple composite development axes, and proposes a new intensive and gradual construction model of composite development axes. This model helps to improve traffic resilience, and has advantages in sub-center cultivation, development axis cultivation, multiple travel modes, and multiple transportation systems.

[A0084] Urban Resilient Transportation Planning Strategy: A Case Study of Guangzhou

Zhuo Jian , **Liao Yanqing**
Tongji University

Personal profile： Yanqing Liao is a doctoral candidate in urban transport of urban mobility institute at Tongji University. Her research focuses on urban mobility, transport and land use.

Key Words： transportation resilience, transportation planning, planning strategy

Abstract： Transportation is one of the important guarantees for the normal operation of cities. However, climate change and traffic accidents often have adverse effects on the normal operation of urban traffic and cause certain serious consequences. Therefore, the resilience of urban transportation system needs to be improved. Firstly, this paper expounds the concept and theoretical development of resilience, and reviews the research on transportation . Secondly, taking Guangzhou as a case, this paper analyzes the evolution of Guangzhou traffic planning and traffic management under typical situations. Finally, the paper puts forward the resilient transportation planning strategy from the macro, meso and micro levels, in order to provide reference for the resilient transportation planning and construction of other cities.

[A0022] Should Bike Sharing Continue Operating During The Covid-19 Pandemic? Empirical Findings from Nanjing, China

Chen Jingxu [1] , Cheng Long [2] , Chen Xuewu [1,*] , **Hua Mingzhuang** [1]

1.Southeast University ; 2.Ghent University

Personal profile： Mingzhuang Hua is a Ph.D. candidate of Transportation Engineering, Southeast University. He has four published SCI papers as the first author. As a manager, he conducts the research projects “Evaluation Study of Dockless Bike Sharing in Nanjing, China”.

Key Words： COVID-19, Bike sharing, Travel demand, Transmission risk

Abstract： During the COVID-19 pandemic, how to meet user demand and avoid virus spreading has become an important issue for bike sharing. Based on the trip data of bike sharing in Nanjing, China, this study analyzes the travel demand and operation management before and after the pandemic outbreak from the perspective of stations, users, and bikes. The results show that pandemic control strategies sharply reduced user demand, and commuting trips decreased more significantly.

[A0027] Exploring the Impacts Of Covid-19 On Car Commuters' Travel Behavior Based on Large-Scale Gps Data In Beijing

Liang Zhiyuan [3, 4] , Geng Kexin [1, 2] , Wang Yacan [1, 2, *] , **Zhan Zilin** [1, 2]

1.Beijing Jiaotong University ; 2. School of Economics and Management ; 3.Beijing Jiaotong Universit ; 4.School of Economics and Management

Personal profile： Zilin Zhan is a Ph.D. Student at School of Economic and Management, Beijing Jiaotong University. Her research focuses on the area of transport economic and policy.

Key Words： COVID-19, Departure time choice, Discrete Choice Model, Schedule Delay, GPS data

Abstract： Urban transport and human mobility have been greatly affected due to the COVID-19 pandemic. Under the future uncertainty in the traffic system, it calls for a more in-depth understanding of individual travel behavior changes. Using the 2-year large-scale GPS data covering the periods before and during the pandemic in Beijing, this study examined the impact of COVID-19 on car commuters' travel behavior and evaluated the value of schedule delay early and late (VSDE/ VSDL). Departure time choice models based on mixed logit are employed. The results found that COVID-19 affects commuters' departure time choice by decreasing schedule delay sensitivity and valuation. And the impact varies for different types of commuters. For overall commuters, the pandemic outbreak causes a short-term decline in VSDE and a long-term decline in VSDL. This effect is more distinctive among high-frequency and low worktime elasticity commuters. This study provides insights for policymakers in formulating strategies to alleviate road congestion on on-road policies design in the post-COVID era.

[A0054] Prediction of Metro Ridership During The Covid-19 Pandemic: A Deep Learning Approach Based on Heterogeneous Graph

Peng Zhong-Ren [2] , Wang Hong-Wei [1] , Yang Jin-Ming [1] , **Fang Xiao-Rui** [1, *]

1.Shanghai Jiao Tong University ; 2.University of Florida

Personal profile： Xiao-Rui Fang Postgraduate Student Center for Intelligent Transportation Systems and Unmanned Aerial Systems Applications Research, State Key Laboratory of Ocean Engineering, School of Naval Architecture, Ocean & Civil Engineering, Shanghai Jiao Tong University.

Key Words： Metro Ridership Prediction, Deep Learning, COVID-19, Heterogeneous Graph Network, Attention Mechanism

Abstract： The COVID-19 pandemic has changed people's lives and travel patterns. During the pandemic, travelers prefer more to travel by private cars, which runs counter to the current sustainable development policies advocated by governments. Although current researches have studied the changes in people's travel behavior during the pandemic from different aspects, how to build a model predict metro ridership during the pandemic remains understudied. In this study, we innovatively propose a deep learning model called Heterogeneous graph attention network (HetGAN) for the prediction of metro ridership during the COVID-19 pandemic. Metro stations and geographical city blocks are formulated as heterogeneous nodes in a complex network which contains both metro ridership and infection information. Attention mechanism is then implemented to capture and aggregate information of the two types of nodes in the heterogeneous graph. Numerical experiments in New York show that, during the pandemic, the proposed heterogeneous graph network is able to capture the correlation between metro ridership and infection number and then make accurate metro ridership prediction. Comparing to baseline models which do not consider the pandemic infection number, the proposed HetGAN model acquired a performance gain of 11% on average. This study contributes technically to help researchers and policy makers to predict the possible change of metro ridership under the influence of the pandemic, and make corresponding countermeasures in advance.

[A0055] Influence of Covid-19 Pandemic on Private Car Purchasing Intention and Travel Mode Choice Behavior: Insights from Chinese Case Studies

Pan Xiaofeng

Wuhan University of technology

Personal profile： Xiaofeng Pan is currently an assistant professor in Intelligent Transportation Systems Research Center of Wuhan University of Technology. He received his doctoral degree from Eindhoven University of Technology, focusing on effects of social influence in tourism travel behavior. Now his research interests including advanced modeling techniques for travel behavior analysis and impact of COVID-19 pandemic on travel behavior.

Key Words： COVID-19, Car Purchasing Intention, Mode Choice Behavior, Discrete Choice Modeling

Abstract： This paper aims to investigate the influence of COVID-19 pandemic on people's travel-related behavior. In detail, two case studies, one was for people's private car purchasing intention and the other was for people's travel mode choice behavior, were provided. To this end, two online surveys were carried out in China. In the first survey, respondents were requested to report to which extent the COVID-19 pandemic has influence their willingness to purchase a private car. While in the second survey, respondents were requested to choose a travel mode they preferred the most from a choice set under a hypothetical condition of COVID-19 pandemic. Finally, 582 valid observations were collected regarding the first survey and applied to an ordered sobit (skewed logit) model to measure private car purchasing intention; 2984 valid observations were collected regarding the second survey and applied to a multinomial logit model to capture travel mode choice behavior. Results from both models confirmed acceptable model performance. Results from the ordered scobit model revealed that young people, people have not been married, people who have no driving license, people have no private cars, people who commute by bicycle or walk, or local people whose place of work and hometown is a same city are less likely to be influenced by the COVID-19 pandemic to purchasing a private car. Results from the multinomial logit model revealed that in the context of COVID-19 pandemic, people's travel mode choice behavior is largely influenced by the specific condition of COVID-19 epidemic and whether respondents are vaccinated but almost not influenced by alternative-specific attributes except waiting time for metro.

[A0085] Analysis of The Difference Between 2020 And 2021 Covid-19's Impact on Guangzhou Urban Travel Patterns

Chen Xianlong

Guangzhou Transport Planning and Research Institute

Personal profile： Xianlong Chen is the deputy director of the Transport Modelling Department of Guangzhou Transportation Planning and Research Institute, and a PhD candidate in the School of Transportation Engineering of Tongji University. He is mainly engaged in transportation development strategy research, transportation model development and application.

Key Words： Codid-19, tavel patterns, lockdown, travel demand

Abstract： The report sorts out and analyzes the various operating indicators of Guangzhou's private travel demand and public transport travel demand during the outbreak of the new crown in 2020 and the partial closure of the city in May 2021. On the one hand, this report analyzed and recalled the impact of the epidemic on traffic operation and the recovery process, and on the other hand. The difference in the impact of full suspension and partial lockdown on urban traffic operation is used to estimate the scale of urban basic travel demand. Finally, combined with the changes in urban economic operation indicators during the same period, the impact of the epidemic on urban economic activities is analyzed.

Session 2 Transport and Environment

[A0047] Impact of The Elevated Expressway on Vertical Distribution of Pm2.5 in Asymmetric Street Canyons

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Personal profile： Graduate student in the Department of Transportation Engineering, School of Naval Architecture, Ocean and Civil Engineering, Shanghai Jiao Tong University, is currently engaged in transportation and environmental research at the Intelligent Transportation and UAV Application Research Center.

Key Words： Asymmetric street canyon, Elevated expressway, Vertical distribution, PM2.5

Abstract： To meet the transportation needs under the current urbanization process, mega-city like Shanghai had built a large number of elevated expressways. PM2.5 is a great hazard to human health, and the existence of elevated expressways prevents it from spreading and gathering, which aggravates environmental pollutants. The study aims to explore the impact of the elevated expressway on the vertical distribution of PM2.5 in asymmetric street canyons. Firstly, a handheld mobile device was used to collect PM2.5 concentration data on the Golden Deer Building near the North-South viaduct in Shanghai, China. Secondly, the vertical distribution of PM2.5 and the diurnal variation were considered. This study found that the vertical profiles of PM2.5 exhibited bimodal distribution patterns, with the lower peak at 5 m under the elevated expressway, and the upper peak at 10 m above the noise barrier on the elevated expressway. The impact of the elevated expressway on the PM2.5 was the highest at 5 m under the elevated expressway, reaching 19%. This study revealed the general trends of the dispersion patterns of PM2.5 and the impact of the elevated expressway in asymmetric street canyons and gave advice to residents when selecting floors to live, avoid floors that are 5 m under the elevated expressways and floors 10 m above the noise barrier on the elevated expressway.

[A0088] Pollutant Source Locating Using Unmanned Aerial Vehicles

He Hongdi [1] , Peng Zhong-Ren [2, *] , Li Bai [1] , **Li Xing-Zhou** [1]

1.Shanghai Jiao Tong University ; 2.University of Florida

Personal profile： I graduated from Beijing Jiaotong University with a bachelor's degree in transportation engineering and a bachelor's degree in computer science and technology (double major degree). I have won the national scholarship, Beijing outstanding graduates, Beijing public transport talent scholarship and other titles. Currently, I am studying at Shanghai Jiaotong University, the research direction is air pollution monitoring based on UAV technology.

Key Words： UAV, Pollutant source localization, Simulation system, Simulated annealing algorithm

Abstract： The search for pollutant sources plays an increasingly prominent role in environmental monitoring and enforcement. Traditional searching tasks are most conducted by ground vehicles. UAVs (unmanned aerial vehicles) have the characteristics of strong maneuverability, easy deployment, and low cost, making them very suitable for pollutant sourcing missions. To test and train source localization algorithms and further reduce costs, this research proposes a simulation system for UAV pollutant sourcing based on the deep coupling of AirSim and Fluent. The system is divided into three subsystems: UAV flight simulation subsystem, pollutant diffusion subsystem, and system control subsystem. The UAV flight simulation subsystem is responsible for the flight simulation of multi-rotor UAVs. The pollutant diffusion subsystem is responsible for calculating the concentration distribution of pollutants in the research area. System control subsystem generate the UAV routing based on the outcome of the distribution of pollutant and pollutant source localization algorithms. It also sends the flight control instructions to the UAV flight simulation subsystem to complete the real-time simulation. Random path algorithm, reciprocating algorithm, inner spiral algorithm, gradient descent algorithm and simulated annealing algorithm are tested by the simulation system. The simulated annealing algorithm has the best source-seeking performance. The source-seeking success rate is high, the source-seeking efficiency is high, and the ability to jump out of the local optimum is high. It has excellent robustness to the distribution of pollutants and the starting point of sourcing.

[A0014] Activity Based Microscopic Traffic Simulation and Traffic Emission Calculation

Cui Yi [2, *] , Pan Haixiao [1]

1.Tongji University ; 2. Shanxi transportation planning, survey and Design Institute Co., Ltd

Personal profile： Cui Yi, senior engineer, obtained a doctorate in urban and rural planning from Tongji University in June 2019. His research direction is sustainable development of urban transportation and good at micro simulation of transportation. He works in Shanxi transportation planning survey and Design Co., L

Key Words： Activity;traffic simulation;MATSim;traffic emission

Abstract： The activity-based microscopic traffic simulation model can simulate the travel behavior dynamically and reproduce the mobile travel behavior in the real road network environment. By combining the "free flow" and "go&stop" states of motor vehicles with emission factors, the real-time traffic emissions of each individual using motor vehicles can be calculated. Based on the travel survey data of Nanning, this paper simulates the residents'travel behavior in Nanning at the micro-level by MATSim platform, calculates the quantity, time and spatial distribution characteristics of traffic emissions of Nanning residents, and provides a basis for the formulation of low-carbon and low-carbon spatial planning strategy and traffic management policy.

[A0021] Spatio-Temporal Variation Induced Group Disparity of Intra-Urban No2 Exposure In Shanghai

Liu Chao , Wang Huizi , Luo Xiao
Tongji university

Personal profile： Dr.Xiao Luo is now currently an associate professor of Transportation Environment in the college of Transport Engineering, Tongji university, China. Xiao LUO firstly worked in industry as deputy director planner in Shanghai Tongji Urban Planning and Design Institute after he get Phd degree from Nagoya university in 2015, and then started work as associate professor in Tongji university in 2018 because of his excellent performance in research and teaching, he had led more than 10 important projects on urban planning and transport environment with big data technology. He is now gest editor of "Technological Forecasting and Social Change", he serves as chairman of Special interest Group F3 (Smart transport, Smart city and Quality of Life) in World transport Research Society, technical committee member of WTC (World transport Convention). His current research areas focus on smart transport, transport environment, quality of life, and related IOT techniques.

Key Words： Land Use Regression (LUR), Mobile Phone Signal Data, NO2, Population Exposure, Group Disparity

Abstract： Previous studies on exposure disparity focused more on spatial variation but ignored the temporal variation of air pollution, and, thus, it is necessary to explore group disparity in terms of spatio-temporal variation to assist policymaking regarding public health. This study employed the dynamic Land Use Regression (LUR) model and mobile phone signal data to illustrate the variation features of group disparity in Shanghai. The results showed that NO2 exposure follows a bimodal, diurnal variation pattern and remains at a high level on weekdays but decreases on weekends. The most critical at-risk areas lie within the central city in areas with a high population density. Moreover, women and the elderly proved to be more exposed to NO2 pollution in Shanghai. Furthermore, the results of this study showed that it is vital to focus on land-use planning, transportation improvement programs, and population agglomeration to attenuate exposure inequality.

[A0017] Charging Infrastructure for Electric Vehicles – Nowadays Technologies and Verification of Protective Measures

Lothar Fickert , Ernst Schmautzer , Robert Schürhuber , **Daniel Herbst**
Graz University of Technology

Personal profile： Daniel Herbst is with Graz University of Technology (Austria). As part of his work at the Institute of Electrical Power Systems, he is working in the fields of protection in low voltage grids, protection against electric shock, standardization and safety of electric vehicle charging stations.

Key Words： electric vehicle charging

Abstract： This contribution is intended to provide an overview of the charging technologies for electric vehicles currently in use as well as possible future ones. With the multitude of the different used technologies, there is also a need for periodic verification of charging stations in order to ensure their long-term safe operation with regard to protection against electric shock as well as the protection of livestock and property.

[A0038] Metro Proximity and Built Environment on Commuting Co2 Emissions in Shanghai

Wang Zizhan [1] , Zheng Yuming [2, *] , **Pan Haixiao** [1]

1.Tongji University ; 2.Guangzhou Urban Planning Design and Survey Research Institute

Personal profile： Yuming Zheng received the B.S. degree in Transportation Engineering from Tongji University in 2018 and the M.S. degree in Urban and Rural Planning from Tongji University in 2021. He is currently working at Guangzhou Urban Planning Design and Survey Research Institute.

Key Words： Commuting CO2 Emissions, Built Environment, Metro Proximity, Shanghai

Abstract： Through a multiple linear regression model, factors including gender, occupation, housing size and the distance from compounds to the nearest metro station were found to influence commuting CO2 emissions significantly, whereas the built environment, such as parking space and employment density, had a weak impact. In addition, even when living near a metro station, a few number of travellers' CO2 emissions can account for approximately 80% of the total CO2 emissions.

[A0061] The Effect of Land Transport Facilities on Household Carbon Emission from Daily Travel: A Case Study of Wuhan City, China

Huang Jingnan
Wuhan University

Personal profile： Associate Professor Jingnan Huang holds a Bachelor of Science from Wuhan Technological University of Surveying and Mapping (WTUSM), China in 1996, a Master of Urban Planning from Wuhan University (WHU), China in 2001, and doctorate in Geography from National University of Singapore (NUS) in 2008. He began to service WTUSM as an assistant lecturer in 1996, and a lecturer in 2001. During 2008 and 2010, he worked as a senior fellow at the Centre for Sustainable Asian Cities (CSAC) in NUS of Singapore after his PhD graduation. He was appointed as an associate professor of School of Urban Design at WHU in 2010 and the vice dean of school in 2016. Till now, Professor Huang has published more than 40 papers in various international and Chinese journals. His study areas include urban & rural planning, application of information technology (GIS and RS) to urban Planning, and low carbon city, etc.

Key Words： Land Transport Facilities, Carbon Emission, Low Carbon Community, Wuhan

Abstract： With an improved living standard and a higher level of private car ownership, urban households generate more carbon dioxide from daily travel. Despite a common belief that household daily travel is associated with land transport facilities, there is little effort in the literature to assess the relationship. By using Wuhan as an example, this paper examines the effects of land transport facilities on household daily-travel-related carbon emission. The household carbon emission from daily travel was calculated using data gathered from a questionnaire survey, which also included land transport facilities data such as the number of bus routes, bus stops and road crossings in the immediate surroundings of a sample household. GIS mapping, correlation and regression analysis were used in analyzing the data. The results show that in Wuhan the number of bus routes had an inverse relationship with household carbon emission from daily travel. This inverse relationship was also observed between the number of road crossings and the emission level. However, the results were mixed when analyses were organized at district level by the three towns – Wuchang, Hankou and Hanyang. These findings provide useful input to policy formulation for the planning and development of low carbon cities.

[A0005] Energetic Optimization of Stirling Engines for the Valorization of Exhaust Gas Issue from Ice and Its Use in Transport and Sustainable Energy

Aloui Fethi

INSA Hauts-de-France

Personal profile： Fethi AOUI is a full Professor of Mechanical Engineering and Energy Systems since September 2011 at the Engineering School INSA Hauts-de-France of Valenciennes (UPHF), Laboratory LAMIH (UMR CNRS 8201), France. He has published more than 230 journal and conference papers so far.

Key Words： Transport, Stirling engine, Micro-cogeneration, Heat transfer, Optimization

Abstract： In the energy and environmental context, the interest in improving the thermal performance of piston machines, has known recently important developments. Indeed, piston machines have been used to develop several engineering applications: energy production, cogeneration and micro-cogeneration, automotive propulsion, and many another industrial systems. The improvement of these machines can be done only by understanding the flow transport / transfer phenomena and especially the heat transfer.

Session 3 Planning and Policies for Sustainability

[A0105] A “Green” Integrated Land-Use Transport Model as A Tool For Supporting Policymaking on Urban and Regional Climate And Environmental Resilience

Deng Guihua , Zhong Ming
Wuhan University of Technology

Personal profile： Dr. Ming Zhong is a Professor at Intelligent Transportation Systems Research Center (ITSC), Wuhan University of Technology (WHUT). His research interests include land use transport interaction modeling, travel behavior analysis and travel demand modeling, traffic monitoring program and data analysis, intelligent transportation systems (ITS), and remote sensing/GIS applications in transportation. To date, he has published more than 90 journal papers (with 60+ SCI), more than 140 conference papers and 100 other publications & presentations. To date, Dr. Ming Zhong have been granted over $700K research funding from various federal, provincial and local organizations in Canada and China, including Natural Science and Engineering Research Council (NSERC) of Canada and Natural Science Foundation of China (NSFC). He is also the editorial board member for several international journals (such as Journal of Advanced Transportation and Journal of Transport and Land Use) and the Editor-in-Chief of the Journal of Transportation Information and Safety (in Chinese).

Key Words： green, ILUTM, Climate and environmental resilience

Abstract： Urban and regional resilience has become a popular notion among policymakers and scientists, as a way to deal with related challenging, yet complicated issues (e.g., heatwave, air pollution, flooding, rising sea level etc.) that cities and regions are facing. Given the urgent need to reduce air pullutents (e.g., PMs and others) and greenhouse gas emissions, and transform the built environment on a yet unparalleled timescale, this, in turn, requires developing the decision-making support tools for evaluating urban and regional resilience policies. In addition, it is well known that the tools developed should be able to address a busket of policies, such as those related to economy, land-use, transport, and environment, as they naturely have a significant impact on or will be significantly impacted by urban and regional air pollution, greenhouse gas emissions and then to environment/climate. In this regard, integrated land use transport models (ILUTMs) are found to be a good fit as such tools because of their nature of modeling the interactions among the above “driving forces” in integrated ways. However, a literature review indicates that integrated models have rarely been used as resilience evaluation tool. With this, this study focuses on proposing a modeling approach, which has been used to design and develop a city-level and a regional-level “green” integrated land use transport model linked with the relevant environmental/climate factors (e.g. energy consumption, greenhouse gas emissions, air and noise pollution, and land consumption), in order to support the

planning of a transition toward low-carbon and resilient cities and regions. As well, it also presents the processes for the design and development of the two models and then proves its utility by carrying out two separated case studies, with one for the City of Wuhan and with the other for the Yangtze River Economic Belt (YREB), China. The proposed approaches outline how to incorporate environmental factors into the design and development of city-level and regional-level models developed based on the Production Exchange Consumption Allocation System (PECAS) framework and measure the effectiveness of the city-level and regional-level climate and environment policies using the corresponding models developed. In the process of designing and developing such models, the historical totals of socio-economic activities by sector are collected and forecasted to future years, then they are allocated into either land-use zones (LUZs) or transportation analysis zones (TAZs). In addition, various observed "externalities" of the transport system resulted from the interactions between transport demand and supply, such as congestion, accidents, and environmental pollution will be fully considered through relevant components of the "utility functions" for the transport modes considered, including passenger car, bus, metro, bike/e-bike and walking considered at the city-level and water, railway and highway considered at the regional level. In addition, the environmental footprints or impacts related to producing/consuming goods and services through a particular technology and locating an activity at a particular location (e.g., environmentally sensitive area) will also be systematically considered using the utility functions for simulating corresponding choice behaviors of various agents, including first/secondary/tietiary industries, households, governments and organizations. Moreover, the potential capability of analyzing the corresponding basket of policies, including economy, land use, transportation infrastructure development, tolling, subsidy, taxation and environment/climate, in a systematic way will be demonstrated and illustrated at the city-level and regional-level through the two case studies.

[A0064] Analysis on The Built Environment Characteristics of Metropolitan Rail Transit System Based on Sustainable Development

Guo Liang

Huazhong University of Science and Technology

Personal profile： Deputy director, Professor, doctoral advisor, Department of Urban Planning, School of Architecture and Urban Planning, Huazhong University of Science and Technology, Member of the Transportation Department of the Historical and Cultural Cities Committee of the Chinese Academy of Urban Science

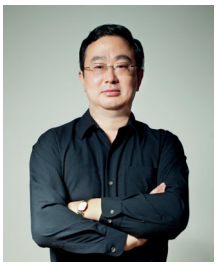
Key Words： Rail transit, Sustainable development, Built environment, Characteristics

Abstract： The construction of rail transit system is an important way to solve the traffic problems in big cities.At present, China's large-scale urban rail transit system construction is difficult to sustain due to financial difficulties, which leads to rethinking on improving the threshold of urban rail transit construction and promoting the sustainable development of urban rail transit.In addition,it also urges people to further examine the impact of the built environmental characteristics of big cities on the sustainable development of rail transit system. Taking typical cities as the object, combined with the characteristics of their built-up environmental elements (including physical environment such as rail transit system layout and land space layout,and soft environment such as policy support related to land development), and based on the analysis of their differentiation pattern, this paper explores the action mechanism of built-up environmental elements of typical cities on the sustainable development of rail transit, Provide reasonable built environment guarantee for promoting the sustainable development of urban rail transit in China.

[A0097] A Study on Evolution Rules of Underground Space in Key Areas of Shanghai with Underground Rail Transit Stations as the Core

Cui Ziying [3, 2, *] , **Tang Yuqing** [1, 2]

1.Vice- professor in College of Architecture and Urban Planning ; 2. Tongji University ; 3.Postgraduate Student in College of Architecture and Urban Planning



Personal profile： Yuqing TANG,Vice-Prof. and Master Degree Candidate Supervisor of Department of Urban Planning, College of Architecture and Urban Planning, Tongji University Registered urban planner of Tongji Urban Planning and Design Institute , One-level registered architect Member of Chinese Society of Urban Planning and Shanghai Society of Urban Planning Courses: Urban Road and Transportation, Planning and Design of Residential District and Urban Design (Bachelor Degree Candidate Students' Course) Urban Transportation Course (Master Degree Candidate Students' Course) Research interests: 1. Urban Comprehensive Transportation Planning 2. Urban Logistics Space Planning 3. Urban Underground Space Planning Achievement： The team leading by the author has completed more than 100 planning and design projects, covering land spatial planning (urban and rural master planning), regulatory detailed planning and urban design, comprehensive transportation planning, underground space planning, logistic space planning and design and many other fields. Nearly 20 projects have won provincial and ministerial science and technology or planning and design awards, including "Key Technology for Construction and Operation of BRT in Zaozhuang City", "Scheme Design of Hangzhou Agricultural Products Logistics Center", "Regional Development Planning and Design of Botanical Garden in Shijiazhuang City" and "Urban Public Transport Planning of Baoding City" .The team joined the national key R & D projects such as "Research on Collaborative Planning of Urban Underground Space Development" and "Key Technologies and Applications of Intelligent Planning and Simulation of Resilient Cities"; The author has published more than 10 monographs and more than 30 papers, including "Urban Underground Space Planning", "Residential Traffic Flow Theory and Virtual Simulation Experiment", "Research on the Development Trend and Planning Layout of Urban Logistic Space", and "Research on Urban Logistic Space" and so on.

Key Words： Evolution Rule, Underground Space, Rail Transit Station, Key Areas of Shanghai

Abstract： The development of underground rail transit promotes the advance of underground space around the station. The rail transit station blends with the surroundings, such as pedestrian channels, underground commerce, underground parking, cultural exhibition, municipal facilities, etc., which have built a complicated underground complex, especially in key urban areas. This report takes five key areas as the research objects, including People's Square, Jing'an Temple, Jiangwan-Wujiaochang, World Expo Park and the core area of Shanghai Hongqiao Business District. Through the induction and analysis of the exploitation scale, development intensity, upper and lower coordination, mutual connectivity and spatial openness, this report studies the evolution process and of its underground space, explores its evolution rules, and analyzes the reasons for its evolution. Thus, the development trend of overall scale, functional diversification, upper and lower integration, channel network and space humanization facing public transportation resilience can be obtained, so as to provide reference for the development of underground space in such kind of area in the future.

[A0056] Building Resilient Cities under the Impact of Covid-19

Pan Haixiao , **Zhang Xiaohe**
Tongji University

Personal profile： Xiaohe Zhang is a PhD student in the College of Architecture and Urban Planning at Tongji University. Her research interests include resilient city and transport planning, and she is doing research related to the impacts of the COVID-19 pandemic on people's commuting travel.

Key Words： resilient city, COVID-19 pandemic, public transport, basic function

Abstract： In recent years, global disasters have occurred frequently, including typhoons, floods earthquakes and the COVID-19 pandemic, have brought great threats to people's lives. The concept of 'resilient city' originated from the study of ecosystem, now it has attracted extensive attention in the field of urban planning and social governance. A resilient city must consider social fairness, absorptive capacity, adaptive and restore ability. When some urban systems are damaged by external shocks, the city should still maintain its operation, so as to ensure that people, especially vulnerable groups, can maintain their work and life in the city. Thus, the research on resilient cities has great academic and practical significance in the post-COVID period. This paper studies the resilient city from four perspectives: object, problem, stage and strategy. Firstly, the objects that we should focus on in the construction of resilient cities were introduced, then the key problems were identified, and the strategies were put forward in different stages (preparation, absorption, recovery and adaptation). In the preparation stage, attention should be paid to the importance of data monitoring and early warning. Based on the network connectivity, it's important to accurately identify the important nodes of the traffic network, so as to take key measures in case of disasters. In the absorption stage, the transportation system should ensure the effective operation of urban basic functions, community life functions and urban logistics system. In this process, as a necessity to protect the interests of vulnerable groups, the supply quantity and service level of public transport should be guaranteed. In the recovery and adaption stage, we should develop a multi-mode balanced green transportation system from a long-term perspective. The redistribution of road space and the future development of various transportation modes should be reconsidered.

[A0101] The Climate and Resilience Act - Towards A More Environmentally Friendly Vehicle Fleet

Delcourt Philippe

Personal profile： Philippe DELCOURT, studies engineer,Information and telecommunication networks, project manager, Urba 2000

Key Words： Resilience, Climat, low-emission ,

Abstract： On Tuesday, July 20, 2021, Parliament definitively adopted the Climate and Resilience act project, after a long legislative process that began six months before. It is the result of the work of the Citizen Convention for the Climate, initiative of the President of the Republic launched in 2019 and implemented by 150 people drawn by lot. Its objective was to work on accelerating the fight against climate change. The Climate and Resilience Act takes up many of the work carried out under the Citizen Convention and focuses in particular on informing and educating citizens on sustainable development, the regulation of advertising for polluting and emitting greenhouse gas, a call for sobriety and a change in consumption, support for renewable energy, better isolated housing, more environmentally friendly transport and use of mobility, less artificialization of soils, stronger environmental justice. The transport component is extensively developed in this act because the transport sector is the biggest greenhouse gas producer. The law provides for the end of the sale of thermal vehicles used to transport people and goods from 2040. Other measures are advocated such as the increase of the modal share of the bicycle, the prohibition of domestic flights when an alternative by train exists in less than 2h30, the creation of lanes reserved for carpooling, the possibility for the regions to create an eco-road tax from 2024… The establishment of a low-emission zone is mandatory before 31 December 2024 in all urban agglomerations with a population of more than 150,000 located in the metropolitan area. The competent authority have to take traffic restriction measures on vehicles for the transport of persons or goods, generally for the most polluting vehicles. Financial help measures will be put in place for the most modest households.

[A0019] Regulatory Detailed Planning Strategy for Short-Distance Commuting Oriented——A Case of Shanghai

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Key Words： short distance, commuting travel, regulatory detailed planning, elements of control，planning strategy

Abstract： From the perspective of regulatory detailed planning, this paper takes an empirical analysis of Shanghai and discuss the relationship between regulatory indicators and commuting distance of residents, in order to achieve short-distance commuting through the control of indicators in the regulatory detailed planning, and reduce the need for cars. That is conducive to carbon peaking and green sustainable urban development.

[A0023] A “Green” Integrated Land-Use Transport Model as A Tool for Supporting Policymaking on Urban And Regional Climate and Environmental Resilience

Zhong Ming , Deng Guihua
Wuhan University of Technology

Personal profile： Dr. Ming Zhong, an expert listed in Hubei’s “Hundred Talents Program”, is now a Professor at Intelligent Transportation Systems Research Center (ITSC), Wuhan University of Technology (WHUT). Before he joined WHUT, he was an Associate/Assistant Professor University of New Brunswick (UNB) .

Key Words： Urban & regional modeling, Urban & regional environmental resilience, Climate change, Integrated land-use transport models (ILUTMs), PECAS framework

Abstract： This study focuses on proposing a modeling approach, which has been used to design and develop a city-level and a regional-level “green” integrated land use transport model linked with the relevant environmental/climate factors , in order to support the planning of a transition toward low-carbon and resilient cities and regions. As well, it also presents the processes for the design and development of the two models and then proves their utility by implementing two separate case studies.

[A0026] Research on the Pedestrian Access of The Periphery of Large-Scale Railway Passenger Traffic Hub Based on Tod Model

Lu Yuan , **Wang Shuangying**
Beijing Jiaotong University

Personal profile： Wang Shuangying (1995-), master, school of Architecture and Art, Beijing Jiaotong University, research direction: rail transit design, urban planning and design

Key Words： Large-scale Railway Passenger Traffic Hub , walking accessibility, target

Abstract： The paper focuses on seven large-scale railway passenger traffic hubs in Beijing and Shanghai, starting with the surrounding of hubs and taking ten-minute walk in the first circle of railway accessibility as the research standard, evaluating the pedestrian access of the first circle of seven hubs by means of PCA and analyzing the spatial influencing factors on the accessibility of seven hubs.

[A0083] Unlocking the Long-Term Potential of Land Value Uplift in New Subsidiary Centres: How Does Planning Matter?

Yang Tianren

University of Hong Kong

Personal profile： Tianren Yang is an Assistant Professor in the Department of Urban Planning and Design at the University of Hong Kong. He is interested in developing advanced urban analytics and modelling to provide an all-round understanding of how cities evolve, particularly in relation to technology, policy and human behaviour. His current research explores integrated policy perspectives to measure and predict how to maximise economic, environmental and social benefits through the spatial coordination of various urban developments (e.g. housing, jobs and transport).

Key Words： Land value capture, Urban spatial structure

Abstract： New subsidiary centres tend to be planned in currently low demand areas, where the potential of radical urban transformation is high, but the prima facie prospects of land value capture are poor. This research develops a spatial equilibrium framework to predict how sub-centre planning can lead to higher economic prospects of land value gains and improved lives for residents. Applying the model to Shanghai reveals that the annual land price increment will range from 0.5% for a purely residential development to 14.2% for an employment-oriented growth. Furthermore, economic and social trade-offs matter in where to locate these large-scale developments.

Session 4 Accessibility and Logistics in City

[A0062] Spatial Economic Vitality of Tod: Regional Planning And Design Strategy of Urban Rail Station Based on "Passenger Flow-Space-Economy" Mechanism, Taking Chengdu, China As An Example

CUI Xu

SOUTHWEST JIAOTONG UNIVERSITY

Personal profile： CUI Xu, Vice-Dean of the School of Architecture and Design, Southwest Jiaotong University, Professor, Doctoral supervisor, He served as an director of China Urban Planning Society， executive director of underground space Academic Committee of the Architectural Society of China (ASC), executive director of computational design academic committee of ASC, and member of TOD integrated planning and management committee of World Transport Convention. He also enjoys titles of academic and technical leader of Sichuan Province, the leader of scientific research and innovation team & platform of higher educations in Sichuan Province, the director of innovation platform of traffic architecture design and planning, and the expert of professional committee of Chengdu urban and Rural Planning Commission.

Key Words： Passenger flow；economic vitality；built environment

Abstract： With the rapid development of rail transit construction in mainland China, some progress has been made in the planning and design of the station area. but the research on passenger flow distribution, economic vitality and the interaction of the space environment is insufficient, resulting in the mismatch between the allocation of spatial resources and the actual needs of users. Taking Chengdu, China as an example, this study used multi-source big/open data (e.g.,bus swipe, POI, and built environment data) and investigated the spatial distribution characteristics of subway station passenger flow, economic vitality and built environment, and the correlation effects between them. Then, it proposed improvement strategies for the optimization of the built environment with joint consideration of “passenger flow”, “space” and “economy”.

[A0201] Urban Logistics Resilience Challenges

Michel ROSTAGNA

General Council for Environment and Sustainable Development (CGEDD), Ministry for an Ecological Transition

Personal profile： Paris Polytechnique Alumnus, member of the French « Bridges » Senior Civil Servants' Corps, Michel Rostagnat has pursued his career within the French State Service in charge of Regional Development and Environment.

He's for a long time committed in Transport issues. So, he participated on behalf of State authorities in Paris Charles De Gaulle Airport outskirts planning at time of the decision of building two additional runways, planned transport infrastructures in the Massif Central, led the public consultation on the Big Paris Metro project.

He's member of the Ministerial High Level Senior Advisers' Team to the Minister of Ecological Transition, reporting on Transport issues. He released there about twenty reports on various subjects: to the Prime minister on the Big Paris Metro work schedule, to ministers in charge on river and rail transport issues, on airports land service, on the smart airport, on mobility after Covid pandemics…

He's in charge of follow-up of a Sino-French Agreement on Transport and chairs the Alpine Convention Transport Working Group.He's author of two essays: The New Frontiers of Environment (1993) and Christian and French State Senior Civil Servant (2007) (French).

Abstract： Urban logistics resilience challenges

Having grown regardless of their logistic needs, French big cities have sprawled warehouses and logistic facilities, decommissioned railway rights-of-way and made urban motorized traffic ever more difficult. It is not a good basis to build a "quarter-of-hour city" devoted to soft traffic.

Urban logistics now represents 39% of freight transport emissions in France, and cannot be ignored as a phenomenon. And both the economic growth and the change in consumer's behaviour, boosted by the Corona crisis, in favour of online purchasing, that has grown up to a market share of 13% of retail trade in France, induces new traffic inside and around the city and compels authorities to rethink urban space share for logistic purpose.

Deregulated last mile delivery can have perverse effects on traffic, on environment and on social welfare, and thus threaten urban resilience. Concerning traffic, the multiplication of light transport vehicles induces traffic jams and threatens road safety. Concerning environment, their greenhouse and pollutants emissions are notably higher than those of trucks, related to the mass of goods delivered. Concerning social balance, they give poor jobs to undergraduate young people without granting them safety nor future.

The challenge is to find the right place of the e-commerce in the sustainable and resilient city. Local authorities ought to come back claiming a fair return from e-commerce operators from the benefit they have using public facilities. Actors ought to industrialize their processes that are by now too much client oriented and thus waste big amounts of packaging, capacities of public infrastructures and time of delivery people.

This topic has not yet been addressed in French national policies, but two recent laws (mobility act and resilience and climate act) give authorities the first tools for tackling the problem head on.

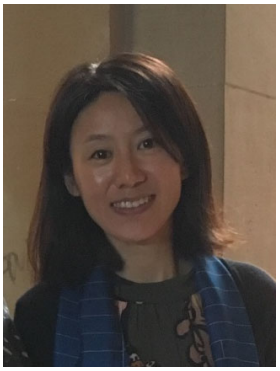
[A0007] Innovative Forms of Housing And Mobility for Paris 2024

Mazzoni Cristiana [1, *] , Magliacani Flavia [2, 3] , FAN Lang [4] , **Mazzoni Cristiana** [1]

1.ENSA Paris Belleville ; 2.University Roma La sapienza ; 3. ENSA Paris Belleville ; 4.ORIA Paris

Personal profile：

Cristiana Mazzoni is an architect, urban designer and Professor of Architecture and Urban design in the National Architectural school of Paris-Belleville (ENSA PB). During her academic career she has been teaching as visiting professor in Italy, Germany, France, Spain, USA and China. She is the Director of the Research Center UMR AUSser, in the framework of the French Scientific Research Center (CNRS). She is in the scientific committee of the Chinese and French “Innovative metropolitan mobility” Chair (IMM Chair) and scientific director of the “Metropolitan Architecture and Great Events” Chair (MAGE Chair).She directs several research projects funded by the French Ministry of Environment (MEDDE) and the French Ministry of Culture (MC) on the topics of: 1. Metropolitan development, regional planning and urban design, innovative and integrated mobility, railway infrastructures and railway stations; 2. Historical courtyards blocks in European heritage cities; 3. Architectural and urban European theories (20th Century). She edited more than 80 scientific publications (books, thematic magazines and articles).



Fan Lang is an architect and urban designer (China and France). In 2018, she defended his doctoral thesis (PhD) in the Strasbourg university about « Neighbourhood relations in today's Asian metropolis. Types of housing and forms of cohabitation analysed through the prism of the notion of Harmony », under the supervision of prof. Cristiana Mazzoni.

She is actually lecturer in the field of urban design in the Architectural School of Strasbourg and researcher in the AMUP Laboratory (since 2011). She is part of the research team of the Shanghai Academy of Social Sciences (SASS).Since 2016, she is in the teaching staff of the Sino-French Chair on Metropolitan Innovative Mobility (IMM Chair - ENSA Strasbourg, CAUP Tongji/Shanghai, SYSTRA). She is the co-coordinator of the Double Master Degree Program, France-China, « Architecture, urban planning and design », ENSAS-CAUP Tongji/Shanghai (since 2015).

Flavia Magliacani is architect graduated in the University of Rome La Sapienza. She is a doctoral candidate of cycle XXXIV, Rome La Sapienza in co-tutorship with ENSA Paris Belleville - Université Paris Est, IPRAUS-AUSser laboratory. She is currently working on housing and urban density in the contemporary European metropolis, as part of a thesis work entitled “Urban Density in the Contemporary Metropolis. Urban forms and housing in Greater Paris”.

Key Words： innovative mobility , housing, JO Paris 2024

Abstract： The aim of the conference is to present the research work we are currently carrying out on the evolution of housing and mobility in Greater Paris by questioning the notion of sharing, density and urban intensity. A focus will be made on the work in progress for the Paris 2024 Olympic Games.

[A0025] “Passenger Transportation + Logistics” Practice Based on Urban-Rural Public Transportation: A Case Study of Yongkang in Zhejiang Province

GONG Dijia

Zhejiang Normal University

Personal profile： Dijia Gong obtained his bachelor degree of urban planning in Tongji University and master degree of architecture in Hunan University. He worked as a planner in Nanjing Institute of City and Transport Planning from 2009 to 2010, and participated in many projects of integrated land use and transport planning. Since 2010, he has been working as lecturer in the department of urban and rural planning in Zhejiang Normal University. Meanwhile, he also serves as an anonymous review expert of "Urban Transport of China" and member of planning project review expert database of Jinhua Natural Resources and Planning Bureau. His research interest includes integrated planning and design of urban space and public transit, urban public transit planning, operation and management, and non-motorized transport, etc. He has presided a series of research projects for Zhejiang provincial department of education as well as for Jinhua social science association， and education reform projects of Zhejiang province. He has been awarded “excellent paper award in natural science in Jinhua city” twice, and has published more than 20 academic papers and 3 books.

Key Words： urban-rural logistics, urban-rural public transportation, passenger transportation + logistics, network layout, service quality

Abstract： The increasingly closer links between urban and rural areas increase the circulation demand of production and goods of daily use, while traditional rural logistics is far from satisfactory. The new service mode of “passenger transportation + logistics” based on urban-rural public transportation in Yongkang of Zhejiang province, meets the transportation demand with low cost, high efficiency and reliability. To make the follow-up application more mature and efficient, it is necessary to select typical cases for in-depth study. Taking the K303, the first line with “passenger transportation + logistics” service as the example, this paper analyzes the positive benefits of the service from the perspectives of residents, city managers and operating companies. Using field observation, questionnaire survey, interview and other methods, the paper quantitatively analyzes the existing problems such as inadequate logistics outlets, inconvenient delivery,

simple packaging, opaque logistics information, poor service experience when discussing logistics network layout in both urban and rural areas and service quality throughout the whole process of logistics. Based on the concept of synchronous improvement of passenger transportation and logistics service quality, the paper puts forward the methods and optimization scheme in several aspects: logistics outlets increase, layout optimization, operation mode adjustment, service quality improvement throughout the whole process with intelligent logistics. Finally, the paper suggests achieving the long-term development goal of the integration of “city-town-village” passenger transportation and logistics based on village buses and community buses.

[A0057] The Research on The Evaluation of Street Space Friendliness of Residential Blocks

Wei Zixiong , **Zhou Yang** , Qian Caiyun

Nanjing tech university

Personal profile： QIAN Caiyun, PhD, is the dean of School of Art and Design, a professor and doctoral supervisor of School of Architecture, Nanjing Tech University. He is the young and middle-aged academic and technical leader in Jiangsu Province, a decision-making consulting expert of the Research Office of the People's Government of Jiangsu Province, an excellent teacher of the "Qinglan Project" of Universities in Jiangsu Province. He is also the standing member of Environmental Behavior Academic Committee of Architectural Society of China, member of Underground Space Academic Committee of Architectural Society of China, member of Landscape Environment Planning and Design Academic Committee of Urban Planning Society of China, youth editorial committee of Famous City of China magazine. He has presided over 7 national, provincial and ministerial scientific research projects and more than 30 urban planning and architectural design projects. He has been nominated for "Qian Xuesen Gold Award for Urbanology" for three times, gold award for "Young Designer Award" of Chinese Architecture and Art, and won more than 20 international, provincial and ministerial awards.

Key Words： walking-friendly, residential blocks, streetspace, Semantic Differential, Subjective Observation

Abstract： This paper takes 20 residential streets in Hexi district of Nanjing as the research objects, investigates pedestrians' subjective perception and object environment data of the street space environment, analyzes pedestrians' psychological evaluation structure of the street which includes social interaction, spatial atmosphere, vegetation and facilities. On the basis of each evaluation score of the streets based on the common factors, the paper studies the correlation between the subjective evaluation of the street and the object index, concludes the influence mechanism of street object indicators on residents' psychological perception, and explores the street space environment indicators that are conducive to pedestrian-friendly residential blocks.

Session 5 AI and Mobility Analytics

[A0009] A New Smart Decomposition of The Optimization Problem for Dynamic Ride-Sharing

Leclercq Ludovic [4, 5, 6, 7, 8, 3] , Zargayouna Mahdi [4, 9, 2, 3] , Ameli Mostafa [4, 9, 2, 3] , **Alisoltani Negin** [1, 2, 3, *]

1.GeoTwin SAS ; 2. Paris ; 3. France ; 4.Univ. Gustave Eiffel ; 5. Univ. Lyon ; 6. ENTPE ; 7. LICIT ; 8. Lyon ; 9. COSYS-GRETTIA

Personal profile： Mostafa Ameli received his Ph.D. degree in civil engineering at the University Paris-est, IFSTTAR (The French Institute of Science and Technology devoted to Transport, Planning, and Networks), and the University of Lyon, Lyon in 2019. He is currently a research officer of the French Ministry for the Ecological Transition (eq. Assistant Professor) in applied mathematics, computer science, and transportation science at the Transportation Engineering and Computer Science Lab (GRETTIA), University Gustave Eiffel Paris (France). His research interest lies at the intersection of operations research and computer science, especially with applications in transportation management systems.

Key Words： Dynamic ride-sharing, clustering, shareability function, optimal fleet management

Abstract： In this paper, we propose a clustering method based on a “Shareability Function” that considers all the trips’ possible matching situations. Two trips can be shared either in parallel or in sequence. The function computes the extra travel time that the vehicle has to spend to service each matching situation, compared to the situation where each trip is serviced independently without sharing. We propose a clustering method based on the function to put the most shareable trips in separate clusters

[A0035] What Motivates Drivers to Comply With Guidance Information at Signalized Intersections?

Chen Xumei

Beijing Jiaotong University

Personal profile： Dr. Xumei Chen is a professor at Beijing Jiaotong University. She was a visiting scholar at UC Berkeley, Texas Southern University, and University of Waterloo. Dr. Chen has extensive experience on urban transportation planning, managed lane capacity analysis, emission modeling, and transit operation evaluation. She has been a primary investigator or co-investigator in more than 40 projects, which were sponsored by a variety of national and municipality level agencies such as National Natural Science Foundation of China (NSFC), Ministry of Education of China, Beijing Environmental Protection Bureau, Beijing Transportation Research Institute, and Beijing Public Transport Holdings Co., Ltd. Dr. Chen has authored and co-authored over 80 peer-reviewed journal papers and conference papers. Dr. Chen is the international peer reviewer for national fund sponsored by Singapore and Chile. She also currently serves as a reviewer for journals and conferences such as Transportation Research (TR) - Part A, C, D, E, and TRB annual meeting etc. Dr. Chen has rich experience on organizing international workshops, including a workshop held at Newcastle University in UK, which was jointly funded by the British Council Newton Fund Scheme and National Natural Science Foundation of China. Dr. Chen is a member of the Transportation Research Board (TRB) committee on Managed Lanes, Institute of Transportation Engineers (ITE), and a number of other professional organizations.

Key Words： Driving Behaviour, Latent Class Analysis, Intrinsic Motivation

Abstract： This presentation focuses on a study in which the intrinsic motivation of drivers most likely to accept guidance information at signalized intersections has been explored by using a mixed model approach. The proposed approach contains a Multiple-Indicator Multiple-Cause model with a Latent Class Analysis. The MIMIC model was used to quantify intrinsic motivations according to individual heterogeneity. From a group similarity perspective, the LCA was employed for the latent classification of drivers. The features and possibility of accepting guidance information of each class were also analyzed according to the intrinsic motivation of drivers. Data were collected from the Stated

Preference online surveys, in which the questionnaire was designed according to the Diffusion of Innovation, in 2015 and 2019 in China. Four subjective perceptions of drivers were identified: the perception of innovating guidance information, the perception of convenience regarding guidance information transmission, the perception of surrounding complexity, and individual innovation. The estimation results show that age, driving experience, education levels, and the familiarity with road network are significant factors of compliance behavior. The proportion of conservatives gradually decreased from 2015 to 2019, while the proportion of early followers and late followers increased through market penetration, familiarity with the internet of vehicles, and social networks in the same period. This prevalence demonstrates that guidance information at signalized intersections is gradually becoming acceptable in China.

[A0043] Exploring Cost-Effectiveness And Environment Impacts of Different Microtransit Modes

Wei Xiao-Fan [1] , Wang Hong-Wei [2, 3] , Zhai Wei [4] , Peng Zhong-Ren [5, *] , **Yang Jnming** [1]

1.Shanghai Jiao Tong University ; 2.Huawei Technologies CO. ; 3. Ltd ; 4.Hong Kong Baptist University ; 5.University of Florida

Personal profile： Jin-ming Yang received the B.S. degree in Traffic Engineering from Sun Yat-Sen University, in 2020. He is now a Master student from Center for Intelligent Transportation Systems and Unmanned Aerial Systems Applications Research, School of Naval Architecture, Ocean and Civil Engineering, Shanghai Jiao Tong University. His research currently focuses on urban computing, intelligent transportation systems, and machine learning.

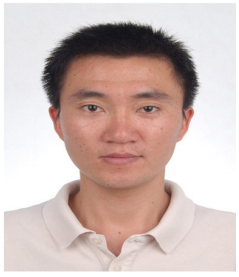
Key Words： Microtransit, Demand Responsive Transit, Bus Network Design, Data-Driven, Transportation and Environment

Abstract： Microtransit is emerging as an important supplement mode of addressing short-distance travel and first-mile/last-mile issues, particularly in low density environment. But the question remains under what conditions the microtransit system makes economic sense, comparing with fixed route service, and what the environment benefits are. This paper develops a set of data-driven methods, namely, a transit network design model and a dynamic demand allocation model, to analyze and simulate rider demand, and compare the cost-effectiveness and carbon emission between ride-hailing type and fixed route/stop mini-bus type of the microtransit system. Data from ride-hailing services (aka the Downtowner Service) provided in the downtown area of Tampa, Florida are used as a case study. It is found that under the current travel demand and population density in Tampa, ride-hailing is the most cost-effective and environment friendly microtransit mode which has 37.2% higher benefit-cost ratio comparing to mini-bus and could reduce CO_2 emissions by 61.9% comparing to travel by private cars. But with the increase of travel demand and population density, the effectiveness and efficiency of fixed route/stop mini-bus microtransit rises and exceeds that of ride-hailing when demand exceeds 953/(day·mile^2) under which mini-bus microtransit could reduce carbon emission by 81.2% comparing to travel by private cars. The results show that a data-driven transit network design model and a dynamic demand allocation model developed are effective for designing and evaluating micro-transit systems, and that ride-healing microtransit is more effective in meeting user demand than a fixed route/stops mini-bus system under a lower demand and lower population density conditions, when user demand and population density increases, the effectiveness and efficiency of the ride-hailing microtransit drops.

[A0015] Next Generation of Metro Train Control System

Gao Xiang

Thales SEC transportation system limited company 上海电气泰雷兹交通自动化系统有限公司



Personal profile： GAO Xiang is Engaged in product and engineering design of urban rail transit signal system, responsible for technology transfer and absorption of CBTC system and interlocking system, CBTC system program research, new product development and project promotion, system engineering technology management, etc.

Key Words： signaling system

Abstract： What is the next Generation of train control system for China metro is a hot topic, there were many discussion in the industry in the pervious years. The speaker will summarize the discussions and pointed out that the next generation of train control will have the feathers of environment awareness, intelligent train control, and the final goal will always benefit the end user to provide more efficiency, lower life cycle cost.

[A0098] Data Analysis and Operational Impact Analysis of Urban Rail Transit Failure and Emergency: Evidence from Credible Internet

Zhang Lun , **Shen Ze**
Tongji university

Personal profile： Shen Ze, Student of Tongji University

Key Words： Credible Internet Information, Data Processing, Urban Rail Transit, Failure Data Analysis, Analytic Hierarchy Process

Abstract： With the continuous increase of open lines and operational mileage, the operational safety and efficiency of urban rail transit have attracted more and more attention from experts and the society. To reveal the law of occurrence of various failures and emergencies and provide support for further research and decision-making, this paper selects credible Internet information as the data source, uses keyword screening method, regular extraction method and other methods to extract urban rail failure information, and refers to relevant literature and documents to reclassify the data. The statistical analysis method is used to analyze the attribution of the data from the annual occurrence, the time period of the occurrence and the troubleshooting time. It reveals that the failures and emergencies occurrence period is mainly concentrated in the morning peak period, and there is another small peak in the evening peak period. The difference in the troubleshooting time of various types of failures and emergencies is analyzed. The analytic hierarchy process was used to evaluate the impact of various failures and emergencies on operations. We suggest establishing a standardized failure and emergency information format and setting up a database for further research.

[A0099] FOT Simulation Testing Method for Automated Driving Systems

Zhu Xichan [1, *] , **Liu Lin** [1, 2]

1.Tongji University ; 2. School of automotive studies

Personal profile： Lin Liu, Ph.D. Candidate of School of Automotive Studies of Tongji University.

Key Words： Automated vehicle, test and evaluation

Abstract： Testing and evaluation method is the foundation of automated driving technology. The current simulation test method could test the automated driving system quickly and safely. However, the testing scenarios are quite different from the real driving environment, especially, these scenarios lack the dynamic behavior correlation between vehicles, and the background vehicles in these scenarios do not take stochastic actions like real human drivers. The biasedness between the testing scenarios and the real driving environment will lead to the biasedness of testing results. To solve this problem, in this research, we proposed the 'FOT simulation test'. Here, FOT refers to the field operational test where the automated driving systems are tested in the real driving environment. In the 'FOT simulation test', with a human-like driving behavior model as background testing vehicles and a simulation platform that can realize the behavior correlation between vehicles, the automated driving system is tested in the scenarios, which has high similarity with the real dynamic traffic flow so that the simulation results could be similar to the results of FOT. In this way, the FOT results could be estimated accurately through the proposed FOT simulation test method even at the primary development stage of the automated driving system.

[A0100] Identification of Subway Track Irregularities Based on Detection Data of Portable Detector

Wu Cui-Lin [1] , He Hong-Di [1] , Wang Zhi-Peng [2] , Wang Fu-Tian [2] , **LIU RUN** [1, *]

1.Shanghai Jiao Tong University ; 2.Beijing Jiaotong University

Personal profile： Educational background: 2017-2021 Beijing Jiaotong University Traffic and Transportation bachelor 2018-2021 Beijing Jiaotong University Finance the second bachelor degree 2021-2023 Shanghai Jiao Tong University Traffic and Transportation master Main Awards: First prize of the 15th National Transportation Science and Technology Competition Outstanding Graduate of Beijing(2021)

Key Words： Track geometry irregularity; Portable detector; Wavelet transform; Hybrid sampling; Unbalanced data set classification

Abstract： At present, the detection of subway track irregularities is mainly carried out by track inspection vehicles and track inspection trolleys. Such detections are restricted by subway service time, so they can only be carried out once in a few months. This study explored the possibility of using the vibration of the vehicle body to detect track geometry irregularities. It made a certain contribution to the dynamic detection of track conditions and the reduction of maintenance costs. Firstly, wavelet transform was used to analyze the vibration of the vehicle body collected by a novel portable detector. It was found that wavelet transform was effective in enhancing the correlation between vibration accelerations and track irregularities. Then the data set processed by wavelet transform was resampled by hybrid sampling based on clustering. In this way, the imbalance ratio of the data set was reduced without changing the original dataset structure. Finally, Random Forest algorithm and Gradient Boost Decision Tree algorithm were used for classifying. The results show that the two algorithms both achieve good classification results for two types of irregularities. And the performance of Random Forest algorithm is better than Gradient Boosting Decision Tree algorithm in this study.

[A0042] Research on The Framework of Multi-Mode Fusion Intelligent Public Transport System

Xu Zhongwei , **Liu Chuanzhen**

Tongji university

Personal profile： Liu Chuanzhen, Doctoral candidate, School of electronic and information engineering, Tongji University. The research direction is reliable communication and control of rail transit.At present, the research focus is urban rail transit -Train Autonomous Circumambulate System.

Key Words： Multi-mode fusion, Urban transportation, Smart public transport, Smart travel

Abstract： The contradiction between global ecological environment and human survival and development is becoming increasingly fierce. Urban transportation congestion is often regarded as the inevitable cost of progress and is hard to solve. Developing urban multi-mode fusion public transport system is the fundamental method and development trend to solve the traffic problems in big cities. In particular, with the rapid development and application of new technologies such as Internet of things, cloud computing , big data and artificial intelligence, it is possible for people-oriented intelligent travel services. The potential space for incremental expansion depending on transportation infrastructure is constrained by resource environment and investment capability. For the future development of urban transportation , priority should be given to the development of public transportation system to guide the transformation of urban transportation structure, which depends more on the application of advanced science and technology. Improve the service capacity and operation efficiency through the coordinated development of multi-mode transportation operation, and realize the upgrading development of urban transportation system.

[A0058] Development and Future Prospects of Roadside Detection Technology for Intelligent Transportation

BI Xin

Tongji University School of Automobile Studies

Personal profile： BI Xin is a Researcher / Ph.D. supervisor of Tongji University. Former researcher of Shenyang Institute of automation, Chinese Academy of Sciences. The visiting scholar of Massachusetts Institute of Technology (MIT) in 2014. Expert member of ISO / TC204-WG14, member of SAC / TC268, member of SAE International Technical Committee and member of Shanghai Artificial Intelligence Technology Association. He has published more than 60 SCI \ EI articles, authorized more than 40 patents and 3 monographs. Scientific and technological achievements are widely used in the fields of automobile driverless and active safety, vehicle road collaborative perception and planning, rail transit active safety system, UAV autonomous obstacle avoidance and industrial intelligent measurement and control.

Key Words： Roadside detection, intelligent transportation

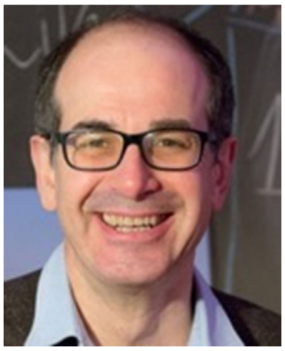
Abstract： Autonomous driving and intelligent transportation system based on vehicle infrastructure cooperation have gained increasing attention and importance in the industry. Roadside detection as the core technology of intelligent transportation system, has been well developed relying on advanced technologies such as AI, the commercial use of 5G, and big data. Roadside detection is a comprehensive technology that involves target recognition, trajectory prediction and tracking, low-latency data transmission in different environments. Depending on the circumstances, different technical solutions apply to different scenarios. Considering cost and economic benefits, the roadside detection system can be constructed in a hierarchical manner to provide early warning, collaborative sensing, remote control and other services for autonomous vehicles at different stages. This core technology provides effective support for the optimization of intelligent traffic efficiency and the final resolution of traffic accidents and congestion.

[A0204] Articulating the Anthropocene Era, the Aalborg Charter, ODD 17, Urban Resilience

Francine Depras (Communication author), Olivier Réaud (Speaker)
Association Française de Prospective (AFpP)

Personal profile:

Francine DEPRAS, Sociologist - Independent researcher (Sociology and public policies)
Recent consultant and commitment in various associations:
2019, member of the management board of the French prospective company
2016, founding member of the International Campus for an Ecological Civilization (CICE)
2015 vice-president CMA, delegate to UNESCO



Olivier Réaud,PDG In Principo, Former eBusiness Director at Saint-Gobain group has a firm belief in the power of collaborative approaches to move forward human collective. In 2002, he creates in Principo a facilitation services company focused on collaborative management transformation.Collaborative prospective to activate continuous collective intelligence in teams, organizations and ecosystems to help them to address opportunities. He helps corporate companies or government in collaborative transformation, online community management, managerial practices, co-leadership, co-design and open innovation.

Abstract: Faced with the “Anthropocene” fact as the geological and scientific reality of the Earth which constitutes our soil and our environment, it is up to us to take seriously the alarming observations which have been drawn up over time: Report Meadows, Brundtland, IPCC, UNDP, IPBS

which attribute links between land use modes (town planning, transport) production (industrial, agricultural, scientific) lifestyles (training, work, consumption, sociability and recreational activities) the economy, social justice, the need for solidarity which redesigns our modes of action and our relational modes, our modes of sharing knowledge and know-how (ODD 17 and the 19 targets)

Our presentation will be based on the Aalborg Charter, as a counter model to the Athens Charter

On various concepts including: “Nature” capital and the “sustainable charge” , urban resilience is an integral part of various official texts and operational procedures (the Climate and Resilience Bill of France) In 2013, the Rockefeller Foundation paved the way with the 100 Resilient Cities initiative, UN Habitat and its Urban Resilience Profiling Tool, the Urban Resilience Center, Climate City, “Climate birds”, etc.

Session 6 Demand Studies

[A0030] Spatial Equity of Chinese High-Speed Rail Accessibility

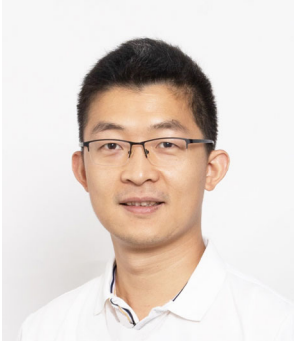
Zhao Shengchuan , **Luo Huanhuan**
Dalian University of Technology

Personal profile： Huanhuan Luo is a doctoral student at the Dalian University of Technology. Her research focuses on transportation behavior analysis, transport geography analysis, and public transit systems.

Key Words： high-speed rail accessibility, spatial equity, spatial distribution, gravity-based model
Abstract： This paper uses an integrated accessibility measure (which is comprised of the gravity-based model and cumulative opportunity model) and three spatial equity measures (weighted variation coefficient, weighted Gini coefficient, and weighted Theil index) to study the characteristics and evolutions of spatial distribution and spatial equity of Chinese high-speed rail (HSR) accessibility of the year 2015, 2020, and 2025.

[A0041] Multimodal Patterns of Individual Mobility In the Paris Region From The 2018 Household Travel Survey

Leurent Fabien , **YIN Biao**
Ecole des Ponts ParisTech



Personal profile： Biao YIN is currently research associate at the City Mobility Transport Laboratory (LVMT) in Ecole des Ponts ParisTech (ENPC). He obtained his Ph.D. in Automation from Université de Technologie de Belfort-Montbéliard, France, in 2015. Then, as post-doctoral research associate he took part to the ANR-VITE project and the Geolytics project at ENPC-LVMT (from 2016 to spring 2018), before joining the Engineering Division of New York University Abu Dhabi for the rest of 2018. From 2019 to present, he participates the project of Chair IDF-Mobility and joins the team of MATSim at LVMT for the mobility scenario studies in the Paris region. His research interests include data science for mobility analysis, multi-agent transportation modeling and simulation, land-use and transport integration modeling, adaptive traffic signal control, connected and automated vehicle control, and artificial intelligent algorithms.

Key Words： Travel Time Budget, Travelled Distance, Daily Mobility Pattern, Multimodal Trip Cluster, Socio-demographics

Abstract： In territories, the joint development of urbanization and transportation networks induces the diversity and complexity of individual mobility. This paper aims to reveal the patterns of individual daily mobility in the Paris region, based on the 2018 Household Travel Survey. A two-stage statistical analysis is proposed. First, 15 trip types are identified with respect to three main travel modes (car, transit, and active mode), three levels of trip lengths and durations (low, medium, and high), and two levels of trip departure times (before and after noon). Second, at the day level, the individuals are characterized by their daily mobility profiles. Each profile consists in the respective frequencies of the different trip types that are derived from the first stage. Based on the individual daily profiles in the sample, six clusters, i.e., six daily mobility patterns, are obtained. The k-means clustering method is applied to each step above. Among the patterns, results find that the daily travel distance has wide ranges, as does the daily travel time budget. The patterns come along with specific features of car ownership and transit subscription. Using odds-ratio analysis, socio-demographic associations to the clusters are studied. The specific patterns of the different people groups, which represent the typical travel behaviors, are also discussed. The home-based patterns for the grouped individuals are discovered in a spatial distribution.

[A0087] Study of 15-Minute-City Based on Bicycle-Sharing Activities in Shanghai

Zhu Junyu [2, 3, *] , **Liu Bing** [1]

1.Tongji University ; 2.Shanghai Tongji Urban Planning and Design Institute Co. ; 3.LTD.

Personal profile： Graduated from University of Southampton as MSc in Transport Planning and Engineering. Currently being Transport Planner in Shanghai Tongji Urban Planning and Design Institute Co.,LTD. His main research direction focusing on transport modeling, spatio-temporal analytics and big data mining. Under the guidance of Professor Liu Bing, he participated in several National Natural Science Foundation projects and other related research projects.

Key Words： 15-minute-city, bicycle sharing, Shanghai

Abstract： Taking Shanghai Central City as an example, the temporal-spatial distribution of cycling activities is analyzed with bicycle-sharing big data. Then, different patterns of 15-minute-city by cycling-mode based on OD-cluster characteristics is recognized. Finally, typical patterns are selected to compare their different spatial layout structures, and suggestions on the improvement of cyclists' 15-minute-city are put forward.

[A0091] Origin-Destination Matrix Estimation: A Bayesian View on Traffic Assignment Using Probe Trajectory Data and Link Counts

Xie Xiaoyan [2] , **Leurent Fabien** [1] , Sun Danyang [1, *]

1.Ecole des Ponts ParisTech ; 2.CY Cergy Paris Université

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Key Words： Origin Destination Matrix Estimation, Bayesian Assignment, Heterogenous Sampling Rates, Probe Vehicle Trajectories, Link Flow Counts, Cross Entropy Minimization

Abstract： Being a fundamental metric of the transportation network, the origin-destination flow matrix is a critical input for various transportation models and studies. This paper deals with the estimation of an OD matrix of trip flows based on two kinds of data: probe trajectory data and local traffic counts. A Bayesian assignment framework is developed for demonstrating the relationship between the link probe sampling rates and the fractional contributions from the sampling rates on different OD pairs. The unknown OD matrix is estimated by applying cross entropy minimization using a prior matrix from the probe trajectories, along with the Bayesian assignment rules on link sample rates as the constraints. The methodology was applied using Floating Car Data and camera link flow counts for a numerical experiment. The results show that the method can achieve in a robust estimation of OD matrices, even using different prior matrices. The issue of the heterogenous sampling rates can be well addressed with link count constraints, effectively correcting the unknown bias in the probe sampling. The case study using real data also proves the feasibility of mining observed trajectory data to obtain the assignment fractions and estimate the OD matrix inversely, avoiding conventional sophisticated process of traffic assignment modeling.

[A0031] Impacts of Urban Rail Transit Lines on Car Ownership: Evidence from the Opening of the Circle Line in Singapore

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Key Words： Urban rail transit; Car ownership; Difference-in-differences; Two-dimensional propensity score matching; Singapore.

Abstract： Urban rail transit system has been considered an important component of the policy package of today's cities in addressing transport challenges and reducing car dependency. In this research, we use the opening of fourth Mass Rapid Transit (MRT) Line in Singapore, the circle line (CCL), as a quasi-natural experiment to assess the impact of new urban rail transit lines on car ownership. We perform a difference-in-differences analysis based on two national household travel surveys conducted before and after the operation, respectively. To control for the demographic heterogeneity, we adopt a two-dimensional propensity score matching approach to create matched samples so that we can compare car ownership levels of the same type of households in the treatment and control areas as well as before and after the opening of CCL to isolate the treatment effect of CCL. We find that the opening of CCL can reduce the car ownership level of households who located within 500 meters from CCL stations relative to those living farther away from the stations. With matched samples, the treatment effect of CCL becomes more profound than that estimated with the unmatched samples. The findings can withstand a set of robustness checks. We also find that CCL reduces car ownership of households with both home and work locations close to rail transit stations, while its impact on other households is insignificant. Furthermore, the opening of CCL shows significant impact on households' decisions on whether to purchase the first car, while its impact on the number of cars given car ownership is insignificant. The research findings provide new evidences that support the effectiveness of urban railtransit investment in reducing car ownership.

[A0090] Cell Phone Signaling Data and Its Implication for Urban Planning in Hangzhou, China

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Key Words： big data, cell phone signaling data, transport model, GIS

Abstract： In this paper, it is introduced how cell phone location tracking data from a large cell phone network database to estimate travel demand data as well as commuting traffic. The case study is in City of Hangzhou, a well-developed area in China. The cell phone signaling database is from China Mobile, which has more than 70% market share in China, and its observation period is two months. Our study identifies several distinctive advantages of applying cell phone data. First, mobile data can detect home – job location distribution and estimate the dynamic commuting origin-destination (O-D) traffic flow in 24 hours and 365 days. Secondly, mobile data are able to measure travel flow across the check-line drawn in any geometric form (traditional survey can only be along real physical limits like main road, river or railway). The results show approximately 92% daily traffic data compared to the AADT survey data along the check-line corridor. Thirdly, while the traditional travel survey cannot obtain data on the floating population and travel demand, mobile data can use the frequency of occurrence to estimate floating population. Our results indicate that in Hangzhou, floating population is 1.3 million per day and 20-25% of travelers on the metro system do not live in the city. Cell phone signaling data as a new data resource to supplement traditional travel survey enhance urban transport modeling.