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THNS 2022
**“Mobility Re-Engineering under Technology
and Societal Transformation”**

**ABSTRACTS
OF
AWARD WINNERS**

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



Best Research Gold Award

POLICY PORTFOLIOS TO MITIGATE URBAN TRANSPORT GHG EMISSIONS IN 120 CITIES WORLDWIDE

Felix Creutzig, Vincent Viguié, Charlotte Liotta
Ecole des Ponts ParisTech, TU Berlin



Speaker Profile: Charlotte Liotta is a Ph.D. candidate at CIRED research center (École des Ponts ParisTech) and TU Berlin under the joint supervision of Felix Creutzig and Vincent Viguié. Her research focuses on urban economics and urban modeling, sustainable land-use and transportation in cities, and between-city comparisons, and she authored two papers on these topics published in Regional Science and Urban Economics and Environmental Science and Policy.

Keywords: Transportation Emissions Mitigation Policies, Urban Economics, Between-country comparisons

Abstract: City-level policies are increasingly recognized as key components of strategies to reduce transport greenhouse gas emissions. However, at a global scale, their total efficiencies, costs, and practical feasibility remain unclear. Here, we use a collection of spatially-explicit city models, systematically calibrated on 120 cities worldwide, to analyze the impact of four representative policies aiming at mitigating transportation GHG emissions, also accounting for their economic welfare impacts and health co-benefits. Applying these policies in all cities, we find that total transportation GHG emissions can be reduced by 28% in 15 years, compared with the baseline scenario. However, the consequences of the same policies vary greatly between cities. Impacts on transport emissions span from high to almost zero, and consequences in terms of welfare can either be positive or negative. Specific effects depend on the policy considered, income level, population growth rate, spatial organization, and existing public transport supply. We find that welfare-increasing policies exist in each city. Applying only welfare-increasing policies captures most of the emission reductions: in total, they reduce emissions by 21% in 15 years. Our results highlight that there is no one-size-fits-all optimal policy to mitigate urban transport emissions but that cities can match their specific situation with a selection of mitigation policies.

OPTIMAL EN-ROUTE CHARGING STATION LOCATIONS IN HIGHWAY NETWORKS FOR ELECTRIC VEHICLES

Chi XIE

Tongji University



Speaker Profile: Dr. Chi XIE is a professor and doctoral supervisor of the School of Transportation Engineering of Tongji University, a visiting professor of the School of Economics of Hainan University, and a visiting professor of the School of Civil and Environmental Engineering of the University of New South Wales. His main research directions include "traffic network management and control", "traffic demand analysis and prediction", "freight and logistics system optimization", "intelligent transportation system design", etc.

Abstract: Range anxiety prevails within the driving population of electric vehicles (EVs) in their long-haul intercity trips, due to the insufficient driving range and possibly scarce charging opportunities. In accordance, increasing the driving range of EVs and raising the distribution density of charging stations both pose effective remedies for this concern. This result suggests that it is vital for vehicle manufacturers to understand the relationship between the EV adoption rate and the battery technology level and for charging infrastructure investors to understand the relationship between the EV usage frequency and convenience and the number and distribution of charging stations. This talk synthetically discusses a set of resulting estimation/optimization problems from the network modeling perspective, as concerned about by the above stakeholders of the EV production and service sectors, and sheds light on how to optimally determine the charging station locations for highway networks.

Best Research Silver Award

A MULTI-LEVEL URBAN LAND-USE AND TRANSPORTATION SIMULATION SYSTEM BASED ON AN INTEGRATED MODELING FRAMEWORK

Ming ZHONG

Wuhan University of Technology



Speaker Profile: ZHONG Ming is a professor of Wuhan University of Technology, a distinguished expert of Hubei "Hundred Talents Program", and currently a professor of Intelligent Transportation System Research Center (ITS Center) of Wuhan University of Technology. He is now the chief editor of the Journal of Traffic Information and Safety, the editorial board member of domestic and international journals such as the Journal of Transport and Land Use, the Journal of Advanced Transportation, and the reviewer of many other international journals.

Abstract: An urban land-use and transportation simulation system (ULUTSS) has been developed based on a technical support project funded by the World Bank, which is to support various decision-makings at the macroscopic, mesoscopic and microscopic level. The system is developed based on an integrated modeling framework using a “connected structure”, which consists of a PECAS land-use model (LUM), a macroscopic transport demand model (MTDM), a mesoscopic and a microscopic traffic simulation model and several data exchange protocols between these models. In particular, the land use model within the system simulates urban land-use patterns and then provides forecasted population/employment data to a macroscopic transport model, which provides subarea OD matrices to a mesoscopic traffic simulation model (MTSM) for large-scale traffic simulations. The MTSM can also interact with microscopic simulation models by passing relevant OD data to or receiving updated friction data from the latter. The MTSM can also provide updated transport cost or land-use patterns tested to the MTDM, which will interact with LUM through newly computed transport cost/time. It is believed that the proposed multi-level urban simulation system should provide urban planners/engineers enhanced decision-making efficiency and capacity, due to its versatile policy analysis functionalities at multiple spatial scales.

AN ECONOMIC ANALYSIS OF INCORPORATING NEW SHARED MOBILITY INTO PUBLIC TRANSPORTATION PROVISION

Qing Shen, Yiyuan Wang
University of Washington



Speaker Profile: Qing Shen is Professor of Urban Design and Planning and Chair and Director of the University of Washington Graduate School’s Interdisciplinary PhD Program in Urban Design and Planning. He holds a PhD in City and Regional Planning from University of California, Berkeley. Professor Shen’s primary areas of interest are urban economics and metropolitan transportation planning and policy. Author of numerous scholarly publications, he has developed methodological frameworks for analyzing urban spatial structure, examined the social and environmental consequences of automobile-oriented metropolitan development, and investigated the differential impacts of information and communication technologies (ICT) on various population groups. A primary focus of his current research is on the opportunities and challenges created by mobile ICT-enabled new mobility services. Exploring the paths toward more efficient, equitable, and environmentally responsible urban transportation, he is working with colleagues and graduate students to conduct innovative research on travel behavior and its connections with shared mobility services, built environments, and transportation demand management policies.

Abstract: Transit agencies in the US have shown great interests in the possibility of incorporating on-demand shared mobility modes into their fixed-route transit services. However, the cost-effectiveness of on-demand modes has not been clearly demonstrated, and there lacks an effective method for transit agencies to compare the costs of different service provision options. This study develops an economic-theory-based framework that appropriately conceptualizes the total economic cost of incorporating on-demand modes into transit. Based on the theoretical framework, a simulation model is built to operationalize an approach for evaluating the cost-effectiveness of transit supplementing, on-demand mobility services. We demonstrate the applicability of this approach using Via to Transit program in the Seattle region. By accounting for both the service provider’s cost and the users’ cost, we obtain a more complete and accurate measure for the cost advantages of the on-demand modes in comparison to expanding fixed-route transit. The theoretical framework and the simulation model can support the decision-making of public transit agencies as they explore leveraging on-demand shared mobility to supplement traditional transit.

SHARED MOBILITIES TO SERVE PUBLIC TRANSIT: EMPIRICAL STUDIES IN SINGAPORE

Zhejing CAO
Tongji University



Speaker Profile: Zhejing CAO, got her PhD from Tsinghua University, is now an associate professor of College of Architecture and Urban Planning, Tongji University. Her research interests are response of rail transit network structure and urban planning, integration of new transport tools and urban public transport network, built environment and travel behavior of streets, green and sustainable travel, urban space design, comparison of planning system, etc.

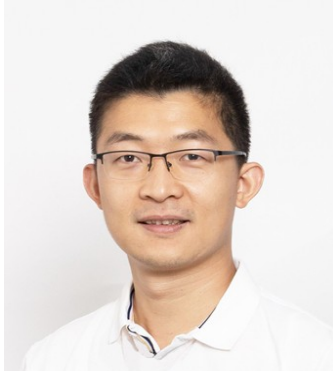
Keywords: Shared mobility, Micro mobility , Autonomous mobility on-demand , Public transit

Abstract: Shared mobility has emerged in megacities, including shared micro-mobility and shared autonomous mobility on-demand. How to harness shared mobility and integrate it with public transit has become an important question for urban planners and transport policy makers. In this presentation, we would like to share two recent research on the possibilities of using shared mobilities to serve public transit, with empirical studies in Singapore. The first one is to use shared e-scooters to replace short and less convenient transit trips in city center. Through a stated preference survey on shared e-scooter users, we investigate what factors shift users from transit to shared e-scooters and how many short and inconvenient transit trips can be replaced by shared e-scooters. The second one is to use shared autonomous mobility on demand (AMoD) to serve transit last mile. Using Tampines new town as an example, we simulate the scenarios that AMoD provides last-mile connections to a subway station, and explore the social benefit of different scenarios. The first research finds that fare, transit transfer, and transit access-egress walking distance greatly impact users' mode choices. E-scooters are perceived to replace more transit trips whichever have higher inconvenience levels of indirectness, transfer, and walking. The second research finds that when AMoD competes with buses to serve transit last mile, the general travel cost of passengers is reduced. The above research show that shared micro-mobility can provide a convenient alternative for short transit trips, and shared mobility on-demand can reduce passenger travel cost when serving transit last mile. This implies an opportunity to integrate shared mobilities with public transit for providing better services. Future directions include more discussions on coordination between different stakeholders.

Best Research Bronze Award

TRANSFER TIME ESTIMATION IN THE MULTIMODAL TRANSIT SYSTEM OF THE PARIS REGION USING THE HOUSEHOLD TRAVEL SURVEY

Fabien Leurent, BiaoYIN
Ecole des Ponts ParisTech



Speaker Profile: Biao Yin is research associate in the City, Mobility and Transport Laboratory (LVMT) at Ecole des Ponts ParisTech (ENPC), France. He received his Ph.D. in Automation from Université de Technologie de Belfort-Montbéliard, France, in 2015. His research interests include data mining for mobility analytics, traffic control, transport modeling and simulation. He is also with expertise in artificial algorithm development in transportation fields. During his research in ENPC-LVMT, Dr. Yin has participated in several projects of France ANR, FUI, the ENPC-IDFM Chair, and the VINCI- ParisTech Chair.

Keywords: Multimodal transit, Average wait time, Transit speed, Transfer time, Linear regression model

Abstract: A reliable public transport system is very important for people traveling and environment, especially in a metropolitan area. Many transport agencies put much effort into developing public transport and attempt to make it more attractive. In the literature, the transfer efficiency (or utility) has been highlighted as the important measure of public transport service quality, and the travel time estimation in multimodal public transport systems has been studied massively using the transit smart card data. In this paper, differently, we propose a novel method to emphasize the estimation of passengers' transfer time between the transit modes (i.e., train, metro, and bus) based on the 2018 Household Travel Survey in the Paris region, France. The transit trips with a single accessed transit mode are primarily studied, where average passenger waiting time and transit mode speeds are estimated through a simple linear regression model. Then, the transfer time in the trips with multiple transit modes is derived. The transfer variability is analyzed, regarding transfer modes, time periods, and operation space. Indeed, the decomposition process of trip time facilitates the estimation of its time components. From the results, we find that the transfer to the railway system, especially to metro mode, costs less time than the transfer to the bus system in the study area. Furthermore, the transfer patterns are various in the morning and evening peak hours, regarding transfer duration and locations. The findings would have the potentials to guide engineers and planners to make the public transport more coordinated.

STUDY ON BEHAVIOR CHARACTERISTICS OF YOUNG FEMALE TRAVEL SAFETY AND COUNTERMEASURES

Xiaoqian LIU

Transportation Planning & Designing Institute of Tongji Architectural Design (Group) Co., Ltd



Personal Profile: Xiaoqian LIU, Senior Engineer, National Registered Urban and Rural Planner, Shanghai Youth Science and Technology Rising-star Talent. She's working in Transportation Planning & Designing Institute of Tongji Architectural Design (Group) Co., Ltd. She also serves as a deputy director committee member of Shanghai Highway & Transportation Society and one of the first five youth committee members of Shanghai Institute of Traffic Engineering—two 5A academy institutes of Shanghai Association for Science & Tech, as well as a committee member of Shanghai Woman Engineer Association. After master graduated from major of Transportation Planning and Management in Tongji University, she's been working as the project leader for more than 30 large and medium size transport projects of many cities and awarded the titles of "Top 10 Quality Pacesetters" and "Excellent Employees" by the company, her major studying area includes urban comprehensive transportation planning, transport and space strategies, public transit system planning, tourism transport system planning, and transport organization and designing for big events etc. As the first author, she has published more than ten Chinese or English papers, participated in the preparation of one standard and one academic textbook. She has made speeches or presentations at academic conferences at home and abroad for many times as well. She has also won several awards, such as Shanghai Excellent Engineering Consulting Achievement Awards, Shanghai Traffic Engineering Institute Science and Technology Awards etc. as the main implementer.

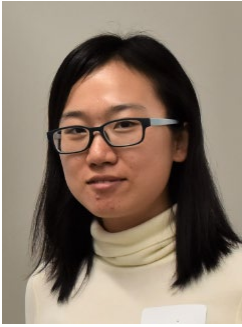
Keywords: young female, travel safety, travel behavior characteristics , She-demand

Abstract: In recent years, the increasingly frequent unsafe travel incidents of young female have gradually aroused widespread concern within the whole society. In order to make a further improvement on travel safety environment for young female from the perspective of the transportation system and environment, based upon the online investigation and the analysis of broad sense young female's behavior characteristics and preferences during travelling alone scenarios, their sensitivity features in terms of travel physical environment, mode-choice preferences and travel social security perception have been identified and summarized. Focusing on the basic characteristics of young female's travel safety problems, such as frequent occurrence, awareness and vigilance and the preferences for safety improvement measures, and combining relevant planning and designing studies and practices at home and abroad, four-dimensional transportation relevant countermeasures to improve young female's travel safety are also put forward, which includes paying more attention to "She-demand", weakening "She-space", fining "She-design" and setting up "She-standard". Some theoretical and practical references have been provided, which aiming at making a difference on building, improving and promoting the transportation safety guarantee system for young female, maintaining the freedom and security of young female's travel activities (especially travelling alone at night), as well as supporting the establishment of "Female-friendly Cities" and the development of people-oriented sustainable society.

Best Student Research

CAN RURAL COUNTIES BENEFIT FROM HIGH-SPEED RAIL INVESTMENTS? CASE STUDY OF THE DALLAS-HOUSTON BULLET TRAIN LINE

Ziqi Liu, Ming Zhang
The University of Texas at Austin



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Key Words: Economic impact, High-Speed Rail (HSR), Multi-Regional Input-Output Model, Rural Counties, Dallas-Houston Texas

Abstract: High-speed rail (HSR) services connect urban cores, traversing many rural counties along the rail lines. Having limited or no direct station connections, these rural counties do not enjoy much of the space-time shrinking benefits brought by HSR, but offer essential land spaces needed for HSR right-of-way. Lack of direct service benefits often prompts rural property owners to oppose HSR proposals with the rail lines going through their land. The opposing force could become significant enough to delay or derail HSR projects, as evidenced by the decades HSR efforts in Texas, the United States. A 200-mile HSR line connecting Dallas and Houston is currently under consideration by a privately financed firm, Texas Central Railroad (TCR). The project, however, has run into resistance, with lawsuits brought up by land owners in the rural counties between Dallas and Houston. TCR claims that investments in the Dallas-Houston line could generate \$35 billion in broad impacts. It is not clear how the impacts distribute spatially and to what extent the rural counties may benefit from the investments. This study applies Multi-Regional Input-Output (MRIO) modeling to estimate the spatial and sectoral distributions of impacts from the private investment in constructing the Dallas-Houston HSR line. Based on the study findings, the study draws implications for both TCR and public agencies to develop strategies aiming at equitable distribution of HSR investments.

IS PUBLIC BIKE-SHARING FEASIBLE IN GHANA? ROAD USERS' PERCEPTIONS AND POLICY INTERVENTIONS

Alimo Philip Kofi
Tongji University



Personal profile : Philip Kofi Alimo received BSc. Land Economy from Kwame Nkrumah University of Science and Technology, Ghana, in 2012, and the MSc. Logistics Management from Lanzhou Jiaotong University, China, in 2020. He is currently a third-year Ph.D. candidate in the College of Transportation Engineering at Tongji University, China, majoring in Transportation Engineering. His research interests include Sustainable Urban Transportation, Big Data Analytics, and Transport Policy. He has 16 publications including 7 SSCI/SCI and 2 EI-indexed papers in top transportation journals and Conferences (<https://orcid.org/0000-0003-3802-9872>). In 2021, he won the President's Scholarship of Tongji University and the Best Oral Presentation Award in the Sustainable Development Session at the International Postgraduate Conference organized by the University of Salford, United Kingdom. Philip is a Certified Member of the Institution of Engineering and Technology Ghana (IET-Ghana), the African Real Estate Society (AfRES), and the Coordinator of the Transportation and Logistics Research Group of the Organization of African Academic Doctors (OAAD).

Key Words: public bike-sharing schemes, cycling perception, cycling policies, sustainable transport, theory of planned behavior

Abstract: The over-reliance on motorized vehicles as a primary mode of urban transportation in sub-Saharan Africa has resulted in pollution, ultimately causing health hazards. The concentration of PM_{2.5} in sub-Saharan Africa has been estimated at around 100 µg/m³ compared to less than 20 µg/m³ in most European and North American cities. The annual mean concentration of PM_{2.5} pollutants in Ghana is 31.1 µg/m³. Consequently, the United Nations projects the life expectancy in Ghana to be around 64.42 years. The alarming negative consequences of transport emission on air quality emphasizes the need for more sustainable transport systems such as bike-sharing schemes. Accordingly, several organizations and researchers have recommended enhancing cycling interests and infrastructures. The extant research suggests that a bicycle is an ideal transport mode for travel distances at most 5km, and is sometimes more desirable than public transport. However, public bike-sharing is rare in sub-Saharan Africa. So far, only five African countries have implemented it.

Besides, road user perceptions of novel bike-sharing implementation remain underrepresented in the extant literature. The lack of data in sub-Saharan Africa makes planning and implementation difficult. To fill this gap, this study investigates 600 road users' perceptions about a proposed novel public bike-sharing scheme in Ghana's two largest cities. The study employed the Theory of Planned Behavior and a structural equation model. Overall, road users showed interest in adopting future bike-sharing schemes. However, this is dependent on cycling infrastructure and policies. Consequently, policies must address social norms, cycling interests, cycling training, pricing, station locations, and safety. Age, education, and bike ownership significantly affect intentions to adopt. These findings reinforce the need for a national cycling policy framework and enhanced transport infrastructure to support active mobility in Ghana.