Transportation Research Record: Journal of the Transportation Research Board

Volume 2674, Issue 11

November 2020

ISBN: 978-1-7138-2073-4

Printed from e-media with permission by:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Published by Sage Publications USA

Copyright© (2020) by Transportation Research Board of the National Academies All rights reserved.

ISBN (Print) 978-1-7138-2073-4

Printed with permission by Curran Associates, Inc. (2021)

For permission requests, please contact sagepub.com/journals-permissions

Additional copies of this publication are available from:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571 USA Phone: 845-758-0400

Phone: 845-758-0400 Fax: 845-758-2633

Email: curran@proceedings.com Web: www.proceedings.com



Contents

Research Articles

Role of Attitudes in Transit and Auto Users' Mode Choice of Ridesourcing Ghazaleh Azimi, Alireza Rahimi, Hamidreza Asgari, and Xia Jin	I
Long-Term Vehicle Speed Prediction via Historical Traffic Data Analysis for Improved Energy Efficiency of Connected Electric Vehicles Mohammad Reza Amini, Yiheng Feng, Zhen Yang, Ilya Kolmanovsky, and Jing Sun	17
Effects of Operating Speed and Traffic Flow on Severe and Fatal Crashes using the U.S. Road Assessment Program Methodology and Field Data Verification Fahmid Hossain and Juan C. Medina	30
Evaluating the Dynamic Accessibility of Metro Systems in Overcrowded Conditions Wei Li, Qin Luo, Samwel Zephaniah, and Zhaoran Liu	42
Laboratory Evaluation of Rubberized Binder and Mix Containing a Low Content of Devulcanized Rubber Modifier Yanlong Liang, David Jones, John T. Harvey, and Jeffery Buscheck	53
Mechanistic Modeling and Economic Analysis of Piezoelectric Energy Harvesting Potential in Airport Pavements Jingnan Zhao and Hao Wang	64
Modeling Crosstie-Ballast Load Distribution in a Railroad Trackbed using a Linear-Elastic Analysis Brent D. Thompson, David B. Clarke, and Jerry G. Rose	76
Multiple Uses of Big Data for Model Validation and Express Lanes Traffic Forecasts Amar Sarvepalli and Barbara Davis	87
Non-Parametric Association Rules Mining and Parametric Ordinal Logistic Regression for an In-Depth Investigation of Driver Speed Selection Behavior in Adverse Weather using SHRP2 Naturalistic Driving Study Data Md Nasim Khan, Anik Das, and Mohamed M. Ahmed	101
Performance Analyses of Information-Based Managed Lane Choice Decisions in a Connected Vehicle Environment Xiaoyu Guo, Yongxin Peng, Sruthi Ashraf, and Mark W. Burris	120
Using Performance Measures to Strengthen Public Involvement in Identifying Targeted Transportation Investments Amy A. O'Leary, John S. Miller, Rick D. Youngblood, David B. Cook, Shelley L. Wynne, and Tanya Denckla Cobb	134
Exploring Individual Preferences and Willingness to Pay for Mobility as a Service Amalia Polydoropoulou, Ioannis Tsouros, Ioanna Pagoni, and Athena Tsirimpa	152
Multi-Player Dynamic Game-Based Automatic Lane-Changing Decision Model under Mixed Autonomous Vehicle and Human-Driven Vehicle Environment Yuewen Yu, Shikun Liu, Peter J. Jin, Xia Luo, and Mengxue Wang	165
Role of Aggregate Gradation in Balancing the Performance of Asphalt Concrete Mixtures	184

Measuring Streetscape Features with High-Density Aerial Light Detection and Ranging Yaneev Golombek and Wesley E. Marshall	192
Assessment of Transportation System Vulnerabilities to Tidal Flooding in Honolulu, Hawaii Suwan Shen and Karl Kim	207
Automated Real-Time Roadway Asset Inventory using Artificial Intelligence Nima Kargah-Ostadi, Ammar Waqar, and Adil Hanif	220
Comparisons in Cell Phone Use Rates between Talking and Manually Manipulating the Handheld Device Fatemeh Fakhrmoosavi, Mohammadreza Kavianipour, Peter T. Savolainen, and Timothy J. Gates	235
Designs, Application and Performances of Asphalt/Bituminous Trackbeds in European, Asian, and African Countries D. Ramirez Cardona, H. Di Benedetto, C. Sauzeat, N. Calon, and J. G. Rose	245
Effect of Temperature Difference on the Thickness Design of Pervious Concrete Pavements Othman AlShareedah, Md Mostofa Haider, and Somayeh Nassiri	263
Estimating the Safety Effects of Congestion Warning Systems using Carriageway Aggregate Data Hans van Lint, Tin Thien Nguyen, Panchamy Krishnakumari, Simeon. C. Calvert, Henk Schuurman, and Marco Schreuder	278
Evidence for Acceptance of Ride-Hailing Services in Iran Morteza Akbari, Nader Seyyed Amiri, Miguel Ángel Zúñiga, Hamid Padash, and Hodjat Shakiba	289
Scalable and Actionable Performance Measures for Traffic Signal Systems using Probe Vehicle Trajectory Data Jonathan M. Waddell, Stephen M. Remias, Jenna N. Kirsch, and Stanley E. Young	304
Effect of Urban Rail Transit Lines Linking the New Towns on Land Value Uplift in the Megacity Based on Difference-in-Difference Model Junfang Li, Zhigang Liu, Jie Yu, and Hua Hu	317
Social Equity and Bus On-Time Performance in Canada's Largest City Matthew Palm, Amer Shalaby, and Steven Farber	329
Driver Reactions to Uphill Grades: Inference from a Stochastic Car-Following Model Tu Xu and Jorge Laval	343
Freight and Service Parking Needs in Historical Centers: A Case Study in São João Del Rei, Brazil Kaique Silva, Renato da Silva Lima, Roberta Alves, Wilfredo F. Yushimito, and José Holguín-Veras	352
Improving Traffic Flow Efficiency at Motorway Lane Drops by Influencing Lateral Flows Hari Hara Sharan Nagalur Subraveti, Victor L. Knoop, and Bart van Arem	367
Analytical Method to Estimate Railroad Spike Fastener Stress Marcus S. Dersch, Matheus Trizotto Silva, J. Riley Edwards, Arthur de O Lima, and Tom Roadcap	379
Estimation of Average Annual Daily Bicycle Counts using Crowdsourced Strava Data Bahar Dadashova, Greg P. Griffin, Subasish Das, Shawn Turner, and Bonnie Sherman	390
Marginal Impacts of Park-and-Ride Facilities in the Twin Cities Region of the US Michael Duncan and Jason Cao	403
Quantifying the Mobility Benefits of Express Lanes using Real-Time Traffic Data Cecilia Kadeha, Priyanka Alluri, and Thobias Sando	414
Efficient and Stable Road Maintenance Strategy Evaluation Algorithm Utilizing a Trigger Horizon Fritz J. Jooste and Seosamh B. Costello	424

Analysis of Spontaneous Order of Pedestrian–Vehicle Conflicts at Signalized Intersections Abhinav Kumar and Indrajit Ghosh	440
Assessing the Efficiency of Household Residential Location Choices Catherine Morency and Hubert Verreault	455
Multi-Objective Trajectory Optimization for Freight Trains Based on Quadratic Programming Baoxue Bai, Zhuang Xiao, Qingyuan Wang, Pengfei Sun, and Xiaoyun Feng	466
Results from Phase I of a Pilot Study on Dynamic Ramp Metering in Houston Hongmin "Tracy" Zhou and Magdy Kozman	478
Road Load Based Model for Vehicle Repair and Maintenance Cost Estimation Muluneh Sime, Gary Bailey, Elie Y. Hajj, and Rami Chkaiban	490
Internal and External Costs of Motor Vehicle Pollution Mengying Cui and David Levinson	498
Performance of Visible-Light-Driven Photocatalytic Pavement in Reduction of Motor Vehicles' Exhaust Gas Zhuoying Jiang and Xiong (Bill) Yu	512
Potential of Private Autonomous Vehicles for Parcel Delivery Tilmann Schlenther, Kai Martins-Turner, Joschka Felix Bischoff, and Kai Nagel	520
Using Deficit Function to Determine the Minimum Fleet Size of an Autonomous Modular Public Transit System Tao Liu, Avishai (Avi) Ceder, and Andreas Rau	532
Use of Vehicle Telematics Data to Characterize Drayage Heavy-Duty Truck Idling Reza Farzaneh, Jeremy Johnson, Rohit Jaikumar, Tara Ramani, and Joe Zietsman	542
Case Study using Probe Vehicle Speeds to Assess Roadway Safety in Georgia David J. Ederer, Michael O. Rodgers, Michael P. Hunter, and Kari E. Watkins	554
Total Cost of Ownership Analysis of the Impact of Vehicle Usage on the Economic Viability of Electric Vehicles in India Parveen Kumar and Subrata Chakrabarty	563
Activity Participation and Perceptions on Informal Public Transport and Bus Rapid Transit in Dar es Salaam Lucy Joseph, An Neven, Karel Martens, Opportuna Kweka, Geert Wets, and Davy Janssens	573
Analysis of Thermal Runaway Incidents Involving Lithium Batteries in U.S. Commercial Aviation E. Andrew Kapp, David S. Wroth, and J. Thomas Chapin	584
Assessing Minimum Parking Requirements and Parking Capacities of Residential Development in the Bangkok Metropolitan Region Chakaphan Chullabodhi, Saksith Chalermpong, Apiwat Ratanawaraha, and Hironori Kato	593
Benefits of Technology Adoption for Enhanced Integration of Port–Hinterland Operations Agustina Calatayud, Mario Monsreal, John Mangan, and Juan Villa	606
Cybersecurity Vulnerabilities in Mobile Fare Payment Applications: A Case Study Kevin Dennis, Maxat Alibayev, Sean J. Barbeau, and Jay Ligatti	616
Deep Learning-Based Lane Marking Detection using A ² -LMDet Chunmian Lin, Lin Li, Zhixing Cai, Kelvin C. P. Wang, Danny Xiao, Wenting Luo, and Jian-gang Guo	625
Designing and Implementing Real-Time Bus Time Predictions using Artificial Intelligence Benny Wai and Winston Zhou	636

Estimation of the Change in Cumulative Flow over Probe Trajectories using Detector Data Paul B. C. van Erp, Victor L. Knoop, Erik-Sander Smits, Chris Tampère, and Serge P. Hoogendoorn	649
Evaluation and Optimization of Responsibility-Sensitive Safety Models on Autonomous Car-Following Maneuvers Chen Chai, Xianming Zeng, Xiangbin Wu, and Xuesong Wang	662
Intermodal Connection of High-Speed Rail with Interregional Bus Services in Japan Ryosuke Yashiro and Hironori Kato	674
Measurement Data-Driven Life-Cycle Management of Railway Track Johannes Neuhold, Matthias Landgraf, Stefan Marschnig, and Peter Veit	685
Microscopic Modeling of the Effects of Autonomous Vehicles on Motorway Performance George Mesionis, Mark Brackstone, and Natalie Gravett	697
Microstructure-Based Random Finite Element Method Model for Freezing Effects in Soils and Cold Region Retaining Walls	708
Shaoyang Dong and Xiong (Bill) Yu	
Reliability of Microsurfacing Mix Subjected to Variation in Aggregate Gradation Nishant Bhargava, Anjan Kumar Siddagangaiah, and Teiborlang Lyngdoh Ryntathiang	720
Spalling in Continuously Reinforced Concrete Pavement in Texas Pangil Choi, Lochana Poudyal, Fouzieh Rouzmehr, and Moon Won	731
Feasibility Study on Independent Instrument Approach Operations between Runways 36L/18R and 01/19 at Beijing Capital International Airport Lili Wang, Shengnan Lu, and Fang Wei	741
Modeling Mode Choice of Air Passengers' Ground Access to Brisbane Airport Md Mosabbir Pasha, Mark D. Hickman, and Carlo G. Prato	756
Queue-Based Headway Distribution Models at Signal Controlled Intersection under Mixed Traffic Satyajit Mondal and Ankit Gupta	768
Simulation-Based Evaluation of a New Integrated Intersection Control Scheme for Connected Automated Vehicles and Pedestrians	779
Tanja Niels, Nikola Mitrovic, Nemanja Dobrota, Klaus Bogenberger, Aleksandar Stevanovic, and Robert Bertini	
Friction and Snow-Pavement Bond after Salting and Plowing Permeable Friction Surfaces Michelle Akin, Laura Fay, and Xianming Shi	794
Simulating Passenger Evacuation in Railway Station under Fire Emergency using Safe Zone Approach Amir Hossein Salarian, Aida Mashhadizadeh, and Morteza Bagheri	806
Cross-State Comparison of Income and Vehicle-Ownership Effects on Household Mobility Yi-Shih Chung and Chi-Hung Wu	813
Primer on Aircraft Induced Clouds and Their Global Warming Mitigation Options Lance Sherry and Terrence Thompson	827
Analysis of Vehicle-Following Behavior in Mixed Traffic Conditions using Vehicle Trajectory Data Madhuri Kashyap N. R., Bhargava Rama Chilukuri, Karthik K. Srinivasan, and Gowri Asaithambi	842
Comparison of LED-Embedded Pedestrian Crossing Signs with Rectangular Rapid Flashing Beacons and Pedestrian Hybrid Beacons Emira Rista and Kay Fitzpatrick	856

Driver Behavior at a Freeway Merge to Mixed Traffic of Conventional and Connected Autonomous Vehicles Sneha Chityala, John O. Sobanjo, Eren Erman Ozguven, Thobias Sando, and Richard Twumasi-Boakye	867
Modeling Destination Choice Behavior of the Dockless Bike Sharing Service Users Muntahith Mehadil Orvin and Mahmudur Rahman Fatmi	875
Pedestrian Fatal Crash Location Analysis in Ohio using Exploratory Spatial Data Analysis Techniques Rebekka E. Apardian and Bhuiyan Monwar Alam	888
Performance Evaluation of Reflective Crack Mitigation Techniques for Soil-Cement Bases Mohammad Reza-Ul-Karim Bhuyan and Mohammad Jamal Khattak	901
Q-Learning-Based Coordinated Variable Speed Limit and Hard Shoulder Running Control Strategy to Reduce Travel Time at Freeway Corridor Weiyi Zhou, Mofeng Yang, Minha Lee, and Lei Zhang	915