2024 12th International Conference on Traffic and Logistic Engineering (ICTLE 2024)

2024 10th International Conference on Innovation and Industrial Logistics (ICIIL 2024)

Macau, China | August 23-25, 2024

Co-sponsored by

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Venue: Hotel Royal Macau

Address: Estrada da Vitoria No.2-4, Macau

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WELCOME MESSAGE

Dear all, we are delighted to welcome you to these conferences 2024 12th International Conference on Traffic and Logistic Engineering (ICTLE 2024), along with the workshop 2024 10th International Conference on Innovation and Industrial Logistics (ICIIL 2024) to be held in Macau, China, during August 23-25 2024. ICTLE 2024 is co-sponsored by Macau University of Science and Technology and IEEE, and technically sponsored by the Faculty of Science and Technology of the University of Macau.

The objective of these conferences is to provide a premium platform to bring together researchers, scientists, engineers, academics and graduate students to share up-to-date research results. We are confident that during this time you will get the theoretical grounding, practical knowledge, and personal contacts that will help you build a long term, profitable and sustainable communication among researchers and practitioners in the related scientific areas.

This year's program is composed of 3 keynote speeches delivered respectively by Prof. Bo Ai (IEEE Fellow), from Beijing Jiaotong University, China; Prof. Zongzhi Li, from Illinois Institute of Technology, USA and Prof. Xiaowen Fu, from The Hong Kong Polytechnic University, China; 4 onsite oral sessions and 4 online oral sessions. We would like to express our gratitude to all the speakers in these conferences. Special thanks to all of our committee members, all the reviewers, the attendees for your active participation. We hope these conferences will be proved to be intellectually stimulating to us all. Finally, we wish you very successful conferences!

Meanwhile, we received more than 110 submissions from research institutions, universities and industries. The papers in the proceedings are accepted after being peer-reviewed by conference committee, international reviewers based on the topic and quality. With the keynote speeches, oral sessions, we'll have an exciting program this year, which will allow participants to present and discuss the latest research and industrial developments in these fields.

On behalf of the organizing committee, we would like to deeply express our heartfelt appreciation to all our delegates, keynote speakers, session chairs, as well as all the committee members involved in the technical evaluation of conference papers and in the organization of the conference for their time, effort, and great contributions.

We also wish that this conference will be an unforgettable and wonderful experience for you.

Conference Organizing Committee

ICTLE 2024	ICIIL 2024
Ms. Cici Chen	Ms. Sukie Yao
Email: ictleconf@126.com	Email: iciil_conference@126.com

CONFERENCE COMMITTEE *(in no particular order)*

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GENERAL INFORMATION

A	Conference Venue

Venue: Hotel Royal Macau

Address: Estrada da Vitoria No.2-4, Macau

Web: https://www.hotelroyal.com.mo/

Tel: +853 2855 2222 / Fax: +853 2856 3008

B	On-site Registration

Registration desk→ Inform the staff of your paper ID→ Sign-in→ Claim your conference kits.

C	Devices Provided by the Organizer

Laptops (with MS-Office & Adobe Reader) / Projectors & Screen / Laser Sticks

D	Materials Provided by the Presenter

Oral Session: Slides (pptx or pdf version). Format 16:9 is preferred.

Presentation Language: English only.

E	Duration of Each Presentation

Keynote Speech: 45min, including 5 min Q&A.

Oral Session: 15min, including 3 min Q&A.

F	Notice

※ Please wear your delegate badge (name tag) for all the conference activities. Lending your badge to others is not allowed.

※ Please take good care of your valuables at any time during the conferences. The conference organizer does not assume any responsibility for the loss of personal belongings of the participants during conference day.

G	Zoom Meeting

	Room	Meeting ID	Link
zoom ✧ ICTLE Banner ✧ Zoom Background	A	891 5299 5952	https://us02web.zoom.us/j/89152995952
	B	817 1665 8207	https://us02web.zoom.us/j/81716658207

Note:

1. **We recommend to install the Zoom platform beforehand. New users can login the Zoom meeting without registration.**
2. **Please set your display name before joining the online meeting. For instance,**

   Author/Presenter: Paper ID_Name < TL001_Cici Chen >

   Delegate: Delegate_Name < Delegate__Cici Chen >

※ **UTC+8. Please be aware of time difference between this and your region/country.**

H	No-Show Policy

Papers unpresented at the conference, without prior written approval by the Conference Technical Program Chair, will be removed from the final conference proceedings before uploading to IEEE Xplore. No refund will be approved to authors of those papers.

AGENDA OVERVIEW

| Session Time	Friday, August 23, 2024 |Activity	Venue
13:30-17:00	On-site Registration	Lobby of Hotel Royal Macau
14:00-16:00	Zoom Pre-test for Online Presenters	Room A: 891 5299 5952 Link: https://us02web.zoom.us/j/89152995952

Zoom Test Timetable

◆ Presenters are required to join the rehearsal in Zoom on Friday, August 23, 2024. Duration: 2~3min apiece. Feel free to leave after you finish the test.

◆ We will test control panel including screen sharing, audio, video and "Raise Hand" feature, etc.

◆ Please get your presentation slides and computer equipment prepared beforehand.

14:00-14:30	TL605 TL671 TL636 TL680 TL417 TL415 TL704 TL601
14:30-15:00	TL641 TL607 TL663 TL405 TL423 TL622 TL640 TL682 TL408
15:00-15:30	TL643 TL6012 TL413 TL6014 TL420 TL6002 TL6005 TL424
15:30-16:00	TL620 TL632 TL672 TL633 TL6013 TL634 TL665 TL662
16:00-16:30	Alternative time for participants who are unavailable at allocated time. Other online participants, includes but not limited to keynote speaker, session chair, committee member, delegates.

You can join the meeting without sign-in process. Just put the meeting ID and join us.

URL: https://zoom.us/download
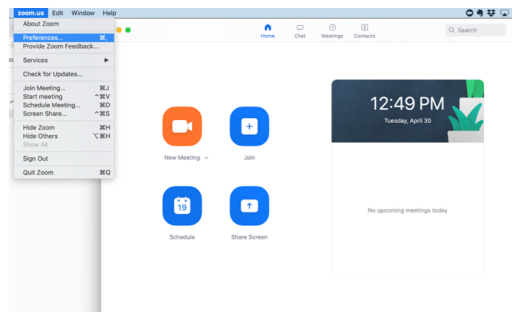
Each meeting has a unique **9, 10, or 11-digit** number called a **meeting ID** that will be required to join a Zoom meeting.

For any questions on the meeting day, you can text privately to "Assistant" for help.
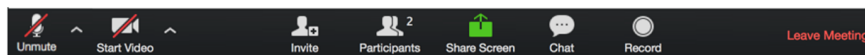
Audio muted and video off (both indicated by a red slash).

Click to open the Participants box. This will allow you to "Raise Hand".

To share screen or contents.

Click to open the Chat box. This will allow you to chat with Hosts and Participants.

Saturday, August 24, 2024		
Keynote Speech (Onsite & Online)	**Conference Room: Vitoria II+III, <2nd floor >**	**Room A: 891 5299 5952**
Host: Assoc. Prof. Chi Man VONG, University of Macau, Macau, China		
09:00-09:10	Opening Speech: Prof. Felix T. S. Chan, Macao University of Science and Technology, Macau, China	
09:10-09:55	Keynote Speech I: High-speed Rail's Dynamic Impacts on Regional Industrial Structure Upgrading and Its Mechanisms **Prof. Xiaowen Fu,** The Hong Kong Polytechnic University, Hong Kong, China	
09:55-10:40	Keynote Speech II: Temporal Instability and Unobserved Heterogeneity in Means and Variances of Random Parameters across Single-Vehicle Crash Severity Factor **Prof. Zongzhi Li**, Illinois Institute of Technology, USA (Online)	
10:40-11:10	Group Photo & Coffee Break (2nd Floor)	
11:10-11:55	Keynote Speech III: MIMO Channel Measurement and Modeling **Prof. Bo Ai,** (IEEE Fellow), Beijing Jiaotong University, China (Online)	
12:00-13:30	Lunch FADO Portugese Restaurant, M Floor/M 樓 FADO 葡萄牙餐廳	

Saturday, August 24, 2024 | Parallel Session (Onsite)		
13:30-15:15	**Onsite Session 1: Intelligent Traffic Signal Control and Safety Monitoring** TL651 TL635 TL648 TL652 TL650 TL659 TL602-A	Vitoria II 2nd Floor
13:30-15:15	**Onsite Session 2: Smart City and Transportation Infrastructure Construction, Safety Management and Services** TL6006-A TL661 TL610 TL616 TL618-A TL660 TL667	Vitoria III 2nd Floor
15:15-15:45	Coffee Break	2nd Floor
15:45-17:45	**Onsite Session 3: Traffic Data Analysis and Traffic Information Management** TL702 TL615 TL617 TL654 TL658 TL670 TL675 TL673	Vitoria II 2nd Floor
15:45-17:45	**Onsite Session 4: Urban Logistics and Delivery** TL701 TL425 TL668 TL623-A TL624 TL631 TL678 TL626	Vitoria III 2nd Floor
18:00-20:00	Dinner Vitoria Banquet Hall/2 樓維凱廳	

Sunday, August 25, 2024 (Onsite)	
9:00-16:00	One-day Tour in Macau * One day tour registration fee is: 100 USD/700 RMB; Payment link: http://confsys.iconf.org/online-payment/890003173 * The one day tour registration fee includes cost of lunch and tourism entrance ticket. Registration closes at August 20, 2024 (UTC+8h). More details please check page no. 39.

Sunday, August 25, 2024 | Parallel Session (Online)	
09:30-11:30	**Online Session 1: Urban Logistics and Delivery Services** TL605 TL671 TL636 TL680 TL417 TL415 TL704 TL601	Room A: 891 5299 5952
09:30-11:45	**Online Session 2: Traffic Mode Analysis and Transportation Capacity Assessment** TL641 TL607 TL663 TL405 TL423 TL622 TL640 TL682 TL408	Room B: 817 1665 8207
11:45-13:30	Break Time	
13:30-15:30	**Online Session 3: Vehicle Engineering and Vehicle Scheduling** TL643 TL6012 TL413 TL6014 TL420 TL6002 TL6005 TL424	Room A: 891 5299 5952
13:30-15:30	**Online Session 4: Vehicle Flow Control and Traffic Emergency Management** TL620 TL632 TL672 TL633 TL6013 TL634 TL665 TL662	Room B: 817 1665 8207

INTRODUCTION OF KEYNOTE SPEAKER

Prof. Xiaowen Fu

The Hong Kong Polytechnic University, China

High-speed Rail's Dynamic Impacts on Regional Industrial Structure Upgrading and Its Mechanisms

Abstract: High-speed rail (HSR) is a costly transportation infrastructure, and its investment can be better justified when it leads to long-term regional economic development. However, there is a lack of empirical investigations that quantify HSR's dynamic economic benefits, particularly considering the lagging and fading effects, as well as the changing effects resulting from the continuous expansion of the HSR network. This study represents one of the initial attempts to quantify the dynamic impacts of HSR on the upgrading of regional industrial structures. It distinguishes the sources of these impacts by considering the lagging/fading effects for individual cities and the staggered expansion of the HSR network that includes a more diverse range of cities. Using data from 278 Chinese cities over a span of 19 years, we employed a staggered synthetic control method (staggered SCM) for our empirical investigations. The results of our study indicate that HSR generally facilitates the upgrading of a city's industrial structure, although its dynamic impacts on "industrial structure servitization" and "industrial labor productivity" vary across cities. The effects of HSR on industrial structure servitization tend to fade quickly, while the impacts on improving industrial labor productivity are more persistent. Furthermore, our analysis of heterogeneity suggests that there is significant regional diversity in the effects of HSR on industrial servitization. This effect is more enduring in core cities, while the labor productivity-improving impacts of HSR remain consistent across different cities. Mechanism analysis reveals that HSR has a stronger incentivizing effect on the tertiary industry compared to the secondary industry, thus promoting servitization rather than directly transforming the secondary industry into the tertiary industry. In contrast, a city's industrial labor productivity is enhanced by HSR through improved productivity in both the secondary and tertiary industries.

Biography: Professor Xiaowen Fu is the Head of Department and Professor in Engineering Management at the Department of Industrial and Systems Engineering, the Hong Kong Polytechnic University. His main research areas include engineering management, data analytics, transport and logistics, which cover issues such as competition policy and government regulation, efficiency benchmarking, operation management, transport demand modelling and industrial organization. He has been the principal investigator of more than 20 research grants, the guest editor of 7 journal special issues, and the author of more than 110 journal articles. He is the Editor-in-Chief of the journal Case Studies on Transport Policy, associate editor of the book series "Advances in Airlines Economics". Prof. Fu has provided advisory and economic modeling services to many organizations such as the Boeing Commercial Aircraft, New Zealand Commerce Commission, Australian Competition and Consumer Commission, Government of British Columbia in Canada, Australian Competition Tribunal, Hong Kong Civil Aviation Department, Hong Kong Transport and Housing Bureau, Greater Bay Airlines, Japan Rail (East), and OECD. He is the director of the Behavior and Knowledge Engineering Research Center, founding chair of the Maritime Economy and Policy stream of the World Transport Convention, member of the Technical and Statistical Task Team on the Productive Capacities Index under the United Nations Conference on Trade and Development (UNCTAD), and an honorary professor of the University of Sydney Business School.

INTRODUCTION OF KEYNOTE SPEAKER

Prof. Zongzhi Li

Illinois Institute of Technology, USA

Temporal Instability and Unobserved Heterogeneity in Means and Variances of Random Parameters across Single-Vehicle Crash Severity Factors

Abstract: This study introduces a random parameter multinomial logit model with heterogeneity in means and variances across single-vehicle crash severity factors. Crash severities are classified property damage only (PDO), non-incapacitating injury or possible injury (NPI), and incapacitating injury or fatal (ICF) designations. Factors considered include personnel, vehicle, roadway, traffic, and crash-specific characteristics. Data from Illinois state-maintained highways (2018-2021) are used for model estimation and validation. Model estimation begins by evaluating the temporal instability of factors over the four-year period, then applying the data to both the proposed and traditional models for comparisons. Chi-square tests reveal temporal instability at a 5% significance level, leading to separate model estimation using the annual dataset. Results shows that the proposed models contain normally distributed random parameters with heterogeneity in means and variances of some crash severity factors. Better data fits are observed for the proposed model over the traditional model. Providing adequate nighttime lighting increases PDO crash potential, benefiting safety. This effect is higher for young drivers, passing maneuvers, and animal-related causes but is lower for crashes involving passenger cars, SUVs/minivans, medians, and airbag ejections. Cautious driving on wet roads increases PDO and decreases NPI crash potential, especially in distraction-related incidents. Safety improvements, indicated by increased PDO potential or shifts from severe ICF to less severe NPI crashes, are seen in male occupants and young drivers, attentive and cautious drivers in harsh weather, vehicles with superior features, and lower speeds. Roadways with wider cross-sections and effective control measures also contribute to safety benefits.

Biography: Zongzhi Li received BE from Chang'an University, Xi'an, China; MSCE and Ph.D. (December 2003) in transportation and infrastructure systems engineering, as well as MSIE in operations research (May 2002) from Purdue University, USA. After completing the Ph.D. study, he joined Traffic Operations and Safety Laboratory (TOPS Lab) at the University of Wisconsin-Madison, USA as a Postdoctoral researcher until August 2004 after accepting a tenure-track assistant professor position at Illinois Institute of Technology (IIT), USA. Currently, he holds full professor rank with tenure and serves as the Director of Sustainable Transportation and Infrastructure Research (STAIR) Center, and Transportation Engineering Laboratory at IIT. He has served as the Principal Investigator (PI) for over US$4.26 million of research studies on multimodal travel demand and transportation system performance modeling, asset management, and network economics funded by U.S. Federal and state agencies and the private sector. He has supervised nearly 80 M.S. and Ph.D. students; published 4 books, including Transportation Asset Management: Methodology and Applications (ISBN: 978-148-221-052-1) as the world's first graduate-level textbook in the area; and Megacity Mobility: Integrated Urban Transportation Development and Management (ISBN: 978-036-736-358-1), 3 book chapters, and nearly 80 referred papers; developed 3 software packages; and holds 7 U.S. patents. He is a member of the editorial board of the American Society of Civil Engineers (ASCE) Journal of Infrastructure Systems, an associate editor of the Elsevier Journal of Traffic and Transportation Engineering, and a handling editor of the TRB/Sage Journal of Transportation Research Record. Dr. Li was a recipient of numerous awards, including ASCE Arthur M. Wellington Prize (2011), IIT Sigma Xi Award for Research Excellence (2011), Charley V. Wootan Award given by the U.S. Council of University Transportation Centers (2000), and International Road Federation Fellowship Award (1998).

INTRODUCTION OF KEYNOTE SPEAKER

Prof. Bo Ai

IEEE Fellow, Beijing Jiaotong University, China

MIMO Channel Measurement and Modeling

Abstract: The future of wireless communication is set to be more diverse and dynamic, with a wider range of scenarios and services. The emergence of satellite internet, smart railways, maritime communications, and unmanned aerial vehicles has expanded the communication demands. The wireless channel is the medium through which communication occurs and is one of the fundamental factors determining wireless communication capacity and system performance. Consequently, the evolution of wireless communication technologies also presents new challenges and demands for channel modeling. This report, based on our team's research achievements in the field of wireless channel measurement and modeling, highlights the latest advancements and findings in three typical scenarios: massive MIMO, high-speed mobility, and millimeter-wave integrated communication and sensing. The report covers specific content such as channel measurement methods, analysis of measured results, channel modeling, and simulation methods. Finally, the report offers a perspective on the research prospects and development directions for channel modeling in future wireless systems.

Biography: Bo Ai (Fellow, IEEE) received the M.S. and Ph.D. degrees from Xidian University, Xi'an, China, in 2002 and 2004, respectively.,He received the Honor of Excellent Post-Doctoral Research Fellow from Tsinghua University, Beijing, China, in 2007. He was a Visiting Professor with the Electrical Engineering Department, Stanford University, Stanford, CA, USA, in 2015. He is currently a Full Professor with Beijing Jiaotong University, Beijing, where he is the Dean of the School of Electronic and Information Engineering. He is one of the directors for Beijing "Urban Rail Operation Control System" International Science and Technology Cooperation Base, and a Backbone Member of the Innovative Engineering based jointly granted by the Chinese Ministry of Education and the State Administration of Foreign Experts Affairs. He has authored or coauthored eight books and authored over 300 academic research articles in his research area. He holds 26 invention patents. He is the research team leader of 26 national projects. He has won some important scientific research prizes. Five papers have been the ESI highly cited paper. He has been notified by the Council of Canadian Academies. His research interests include the research and applications of channel measurement and channel modeling and dedicated mobile communications for rail traffic systems.,Dr. Ai is a fellow of the Institution of Engineering and Technology (IET). He received the Distinguished Youth Foundation and Excellent Youth Foundation from the National Natural Science Foundation of China, the Qiushi Outstanding Youth Award by the Hong Kong Qiushi Foundation, the New Century Talents by the Chinese Ministry of Education, the Zhan Tianyou Railway Science and Technology Award by the Chinese Ministry of Railways, and the Science and Technology New Star by the Beijing Municipal Science and Technology Commission. He has been listed as one of the Top 1% authors in his field all over the world, based on the Scopus database. He has also been feature interviewed by the Electronics Letters (IET). He is the IEEE VTS Beijing Chapter Vice Chair and the IEEE BTS Xi'an Chapter Chair. He was a co-chair or a session/track chair of many international conferences. He is an Associate Editor of the IEEE Antennas and Wireless Propagation Letters and IEEE Transactions on Consumer Electronics, and an Editorial Committee Member of the Wireless Personal Communications journal. He is the Lead Guest Editor of Special Issues on IEEE Transactions on Vehicular Technology, IEEE Antennas and Propagations Letters, and the International Journal on Antennas and Propagations. He is an IEEE VTS Distinguished Lecturer.

ONSITE SESSION 1

Saturday, August 24, 2024 <13:30~15:15>

Onsite Session 1: Intelligent Traffic Signal Control and Safety Monitoring

Chairperson:

Vitoria II
2nd Floor

13:30-13:45 TL651	Multi-Objective Adaptive Traffic Signal Control Using Fuzzy Control and Q-Learning **Naikan Ding**, Wuhan University of Technology, China Abstract-A multi-objective adaptive traffic signal control algorithm using fuzzy control and Q-learning was proposed to improve the efficiency, traffic safety, and operational stability of signalized intersections. In this algorithm, the signal cycle length was derived by fuzzy control, then, to minimize delay and conflicts, the green split of each phase was dynamically adjusted through Q-learning. A joint simulation of Python and VISSIM was adopted for traffic operational simulation and evaluation. The simulation results show that the proposed algorithm jointing fuzzy control and Q-learning, and compared with traffic actuated control and fixed timing, the delay, queue length and traffic conflict of the intersection are significantly and comprehensively optimized. In addition, the algorithm reduced the platoon crash risk at the intersection, improving the overall operational stability.
13:45~14:00 TL635	Visual Inertial Odometry with Fusion of Point and Line Features in Low Illumination Environments **Hao Xu**, School of Instrument Science and Technology, Southeast University, China Abstract-The increasing sophistication of robotic intelligence has spurred a growing demand for autonomous navigation and localization technologies, particularly in dimly lit and complex environments. Visual inertial odometry (VIO) has emerged as a popular solution owing to its simplicity and cost-effectiveness. However, traditional point feature tracking methods often suffer from diminished accuracy in challenging conditions such as low-texture environments and variable lighting, posing significant obstacles to effective positioning and navigation for intelligent devices. In this paper, we introduce rich line features into dim environments based on existing point feature tracking, improve feature extraction and matching algorithms, and construct a graph optimization nonlinear model that integrates point-line-IMU information fusion. To mitigate excessive line segment segmentation, we introduce a gradient density filtering mechanism to extract prominent line features, followed by a process of fitting and merging similar broken lines based on angle characteristics and spatial relationships between segments. Leveraging factor graph models, we formulate a comprehensive graph optimization framework for multi-state pose estimation, enabling a positioning system in dim environments that amalgamates point and line features with inertial navigation. Comparative analysis with conventional VIO methods relying solely on visual point features and inertial sensors underscores the superior accuracy and robustness of our proposed approach. Notably, during a 120-meter trajectory, our algorithm achieved a reduction of approximately 3 meters in the maximum positioning error.
14:00~14:15 TL648	Optimal Emergency Self-propel Strategy for High-speed Trains Considering Output Power Constrains of On-board Energy Storage Devices **Xinyu Lin**, Southwest Jiaotong University, China Abstract-When an unplanned stop occurs due to power supply interruptions, only the high-speed train equipped with on-board energy storage system (OESS) can be self-propelled. In this case, a rational operating strategy is required to ensure passengers' safety and transportation efficiency. In this paper, an operation strategy for high-speed

	trains under emergency self-propel with limited energy and power is presented to improve the success rate of train emergency self-propel. Firstly, a train emergency self-propel power model with the output power characteristics of OESS is proposed, and the power flow during emergency traction sourced from the energy storage device is described. Then, a dynamic planning algorithm considering the output power constrains of on-board energy storage devices is designed. And a multi-stage optimal control problem is built to realize the global optimization of the train operation. Finally, to verify the effectiveness and practicality of proposed strategy, simulation cases are conducted. The results show that the operation method generates feasible operation strategies with lower energy consumption under ensuring the safety of passengers' safety, and improves the efficiency in train emergency self-propel.
14:15~14:30 TL652	Effective Estimation of Histogram Differenced Value using Multiple Contiguous Virtual Layer (MCVL) for ITS Applications **S. Manipriya**, Indian Institute of Information Technology Sricity Chittoor, India Abstract-For successful operation, any video-based Intelligent Transportation Systems (ITS) application requires real-time road traffic information or characteristics such as speed, density, average delay, categorization, and so on. This paper proposes the Multiple Contiguous Virtual Layer (MCVL), a robust and unique vehicle identification framework that estimates any macroscopic traffic characteristics using computer vision algorithms on traffic video. This work mainly focuses on estimating a new parameter known as Histogram Differenced Value (HDV) for MCVL, which uses spatial color information to reveal substantial differences in traffic condition. Several benchmark traffic video datasets are used to test the performance and accuracy of estimations utilizing the proposed framework, with the results being discussed. The results indicate that using the proposed HDV parameter, the accuracy of the vehicle recognition process is improved with the combination of lowered computing cost of MCVL.
14:30~14:45 TL650	Metro Train-Network Integrated Optimization for Traction Power Supply System with Bidirectional Converter Devices **Zilu Huang**, Southwest Jiaotong University, China Abstract-In order to improve the utilization of regenerative braking energy(RBE) generated by braking trains in urban rail transit(URT), bidirectional converter devices(BCDs) are gradually being applied in traction power supply systems(TPSS), which can feed surplus RBE generated from the DC sides of the network to AC grid. Based on its voltage characteristics, this paper utilizes current-vector iterative method to calculate the power flow of DC network. Furthermore, considering the impact of time-varying train loads and BCD parameters design on transmission, utilization and feedback process of electrical energy, this paper proposes a metro train-network integrated optimization model for TPSS with BCDs to optimize train trajectories, timetable and voltage characteristics of BCDs coordinately, which aims to minimize electricity costs. And a two-layer heuristic algorithm (GA-PSO) is designed to solve the problem. In the case study, the optimization method proposed in this paper can reduce electricity costs by 6.96%, the rate of RBE utilized by vehicles has increased by 8.85% compared to the original case without optimization. And the rate of electrical energy savings is 33.69% compared to actual scenario with conventional TPSS.
14:45~15:00 TL659	Lane-Based Max-Pressure Traffic Signal Control **Hoi Kin CHENG**, University of Macau, Macao, China Abstract-Over the past decade, Max-pressure (MP) traffic signal control has evolved from a novel mathematical concept to a simple store-and-forward queuing model and has gained significant attention. However, the MP control in the past, which is based on

	traffic movements, has two problems. The first problem is the movement-based MP control aggregates the characteristics of lane groups, ignoring individual differences. The second problem is the movement-based MP control assumes that different movements are separate and do not block each other. To address these issues, this study proposes a lane-based MP control. This paper presents a series of numerical results comparing lane-based MP control with movement-based MP control at both an isolated intersection and a network comprising two intersections. The numerical results showed that lane-based MP control leads to a smaller number of queueing vehicles. At the isolated intersection, the number of queueing vehicles is reduced by up to 8.6%, while in the network with two intersections, the number of queueing vehicles decreases by up to 7.7%. This paper presents the proposed lane-based MP control also effectively handles intersections where movements are not strictly separate. By considering individual lanes and movements not strictly separate, this approach provides a more nuanced and efficient solution for traffic signal optimization.
15:00~15:15 TL602-A	A Disaggregated Spatiotemporal Traffic Assignment Method with System-Optimal Oriented for Road Reservation Service **Jiao Ye**, Shenzhen University, China Abstract-This study aims to propose a system-optimal oriented disaggregated spatiotemporal traffic assignment (SO-DSTA) method for road reservation service which requires generating stable route and departure time reservation schemes with uncertain total demand. Specifically, the objective of the study could be derived as follows: Firstly, the discretized description of road network supply conditions during reservation hours was present based on the system-optimal traffic assignment (SOTA) model with predictive origin-destination (OD) demand. Secondly, the following priorities for the travelers who make reservations earlier were set: 1) being able to depart later and arrive on time; 2) having more freedom to choose their departure time based on personal preferences. Thirdly, the route and departure time schemes are generated by reversely searching feasible spatiotemporal routes according to the discretized supply conditions following the priority rules. Finally, the predictive OD demand would be renewed by the latest total number of applicants for a more stable service the next day.

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ONSITE SESSION 2

Saturday, August 24, 2024 <13:30~15:15>

Onsite Session 2: Smart City and Transportation Infrastructure
Construction, Safety Management and Services
Chairperson:

Vitoria III
2nd Floor

13:30~13:45 TL6006-A	Business and Environmentally Sustainable Freight transport enabled by Intelligent and Collaborative Operations **Zou Guangrong**, VTT Technical Research Centre of Finland, Finland Abstract-Freight transport is the lifeblood of the global economy and plays an essential role in global social and economic prosperity. Due to the inherent complexity and collaborative nature, efficient and cost-effective freight transport requires close collaboration and data sharing across the entire logistics network. However, only limited amounts of data and information are practically shared among involved stakeholders because of the functional silos existing in global logistics networks and actual operational practices, which adds unnecessary complexities and uncertainties to the already highly complex and uncertain operating environments. This is especially true for seaports as the critical nodes and bottlenecks of the logistics networks. Lack of holistic considerations and collaborations has been the major cause for the inefficiencies of global port operations. This paper exemplifies a cross-border joint innovation action between Finland and China and presents a federated operation intelligence framework tailored to address the specific challenges and need faced in the siloed but highly-clustered multimodal operational environment, thus enabling and enhancing the data-centric collaboration and cloud-based orchestration among involved stakeholders for business and environmentally sustainable freight transport across ports and wider logistics networks.
13:45~14:00 TL661	Carbon-emission and Cost-benefit Analysis of Beibu Gulf Port Integrated Logistics Services **Yanni Liang**, Beibu Gulf University, China Abstract-To promote the green and low-carbon transformation of Beibu Gulf Port, this paper systematically analyzes the content composition, cost-benefit factors, carbon emissions of Beibu Gulf Port's integrated logistics services. It calculates the carbon emissions of port's integrated logistics services from the five aspects of transportation means, machinery and equipment, material consumption, energy consumption and other factors, and develop the carbon-emission and cost-benefit linkage model by combining the cost-benefit factors. The case analysis results indicate that, Qinzhou Port need to plant more than 29.76 million trees to achieve the goal of carbon emission reduction annually. Its transportation vehicle carbon emissions and costs are much higher than that of other parts. It is suggested to improve the port comprehensive benefits by increasing the electric power ratio of transportation vehicles or reducing the conversion standard coal coefficient of electric energy appropriately.
14:00~14:15 TL610	Evaluation and Improvement Strategies of Non-motorized Transportation System in Rail Station Areas under Two Dimensions **Mengmeng Yang,** Key Laboratory of Road and Traffic Engineering of the Ministry of Education, Tongji University, China Abstract-Large capacity, rapid, environmentally friendly and intensive rail transit is often

	the skeleton of mega-city transportation systems, and an efficient rail transit system must have a perfect feeder system, in which non-motorized transportation represented by walking and cycling is getting more and more attention as the most promising green and low-carbon transportation mode. This paper combines the quantitative indexes of non-motorized transportation with spatial analysis, constructs a comprehensive evaluation method with two-dimensional comparison, and selects two types of typical stations in Shanghai as cases - business-oriented Jing'an Temple Station and resident-oriented Anshan Xincun Station, and evaluates the non-motorized system in these two types of station areas from two dimensions. As the result shows, the values of quantitative factors are mapped on the spatial characteristics of non-motorized transportation, and in general, Jing'an Temple Station is better than Anshan Xincun Station in terms of quantitative indexes such as road network morphology, convenience and safety, as well as spatial morphology indexes such as integration and connectivity. The corresponding optimization strategies are proposed to address the differences in non-motorized transportation.
14:15~14:30 TL616	A Discrimination Method for Traffic Conflict Severity on Slow-moving Shared Paths **Feifei Liu,** Sun Yat-sen University, China Abstract-To analyze the traffic safety on slow-moving shared paths, this study proposes a method for discriminating the severity of conflicts in the scenario, using traffic conflicts as an alternative safety measure. Initially, utilizing video-based automatic recognition technology to extract conflict trajectories. Subsequently, indicators for conflict severity are computed and binary logit models are constructed to analyze the effectiveness of the indicators based on evaluators' assessments of conflict severity. Finally, an aggregate conflict index (ACI) that combines effective indicators is proposed to measure the severity of conflicts. The example results indicate that on slow-moving shared paths, the indicators of the minimum time to collision (TTCmin) and yaw rate ratio (YRR) can effectively discriminate conflict severity, while the deceleration rate to avoid collision (DRAC) indicator is ineffective. Considering multiple effective indicators yields better discrimination effects than considering a single effective indicator alone. The ACI combined by TTCmin and YRR can effectively discriminate conflict severity and demonstrate better discrimination effectiveness.
14:30~14:45 TL618-A	Resilience Evaluation Strategy for Containerized Sea-railway Multimodal Transport Network **Jiashan Yuan,** Southeast University, China Abstract-The resilience of transportation networks is defined as the capability to recover from partial failures caused by systemic disturbances such as severe weather, disease outbreaks, and road congestion. Containerized sea-railway multimodal transport networks typically span multiple geographic regions, and the reasons for the failure of freight hubs and corridors are complex, making recovery times difficult to predict. Therefore, in practical operations, decision-makers often utilize alternative hubs and corridors to replace the lost network functions in order to restore normal implementation of freight plans and minimize losses. To quantify the resilience of containerized multimodal transport networks, a model for optimizing alternative transport strategies in the event of network failure is constructed to design the optimal alternative transport plans post-failure, thus obtaining the recovery capabilities of hubs and freight corridors. Subsequently, the reliability index from the field of engineering structural safety is introduced to predict the failure probabilities of multimodal hubs and corridors. Finally, the resilience level of containerized multimodal transport networks is evaluated by assessing the recovery expectancy through the combination of recovery

	capabilities and failure probabilities. The China-Europe containerized sea-railway multimodal transport network is utilized for empirical analysis of the resilience evaluation strategies. The analysis results indicate that compared to traditional topological resilience evaluation methods, this strategy considers alternative transport strategies during network recovery, which better aligns with the practical situation of multimodal transport. Meanwhile, the introduction of the reliability index enables the evaluation results to incorporate predictions of risk probabilities, thus more accurately revealing the true resilience level under uncertain risks, which is more instructive for subsequent resilience optimization studies.
14:45~15:00 TL660	Optimizing Firefighting Airport Selection for Effective Forest Fires: A Case Study of Guangxi, China **Shiqi Wang**, Nanjing University of Aeronautics and Astronautics, China Abstract-Forest fires pose a significant threat to global forest ecosystems and economies. Air tankers are crucial tools for effectively managing forest fires. To address the problem of selecting firefighting airport locations for air tankers, this paper proposes an improved weighted P-center model that considers demand levels at various points to optimize airport selection for aerial firefighting, focusing on Guangxi Province, China—a region heavily impacted by forest fires. The study demonstrates that the multi-airport model effectively addresses the problem of selecting optimal airport locations for air tankers. Using the proposed model, we determined an optimal scheme that significantly reduces flight times to fire locations compared to a single-airport approach. Specifically, selecting two airports resulted in a 37.1% reduction in maximum flight time and a 31.6% reduction in average flight time. These improvements significantly enhance firefighting efficiency and reduce response times, providing more time to extinguish forest fires. The proposed model is crucial for the effective management of large-scale and frequent forest fire rescue missions and offers a valuable tool for developing future aerial firefighting strategies in Guangxi and other fire-prone regions.
15:00~15:15 TL667	Research on passenger flow prediction method of new high-speed railway line based on analogy method **Jing Yang,** Beijing Jiaotong University, China Abstract-It's important both in theory and reality for railway passenger transport organization to predict the passenger flow of newly-built high-speed railway lines accurately and reasonably. It proposes a new line passenger flow prediction method based on analogy, and takes the Lunan high-speed rail as a case to elaborate on the realization of key steps including selection of lines for analog, assignment of station attraction range and classification of stations, parameter fitting and passenger flow prediction. The prediction result shows that the method has good accuracy and operability.

ONSITE SESSION 3

Saturday, August 24, 2024 <15:45~17:45>
Onsite Session 3: Traffic Data Analysis and Traffic Information Management
Chairperson:

Vitoria II
2nd Floor

15:45~16:00 TL702	Construction of inland river hybrid tugboat based on K-means clustering **Liyun Fan**, Harbin Engineering University, China Abstract-In the research of hybrid electric ship, the sailing condition as the basis of each research is very important to the energy consumption test and the formulation of control strategy. Although there are mature conditions construction methods in the automotive field, the typical test conditions with high reliability are still lacking in the Marine field. Firstly, this paper collects more than 1000 hours of Chinese inland tugboat navigation data, and constructs a detailed tugboat navigation database. By pre-processing the data, ten key feature parameters are extracted. With PCA principal component analysis, the data dimension was reduced, and five typical working conditions were obtained through cluster analysis. By synthesizing fragments with the smallest error, a typical sailing condition conforming to the actual operating conditions of tugboats in inland river ports in China was finally established. After comparative analysis of relative errors, the average relative error between the established working conditions and the characteristic parameters of the database was 4.3%. From the error analysis results, the typical sailing conditions constructed in this study were highly similar to the original working conditions in the database. It can reflect the navigation characteristics of inland tugboat more accurately, and provide the basis for the study of the hybrid power system of inland tugboat in China.
16:00~16:15 TL615	Towards Enhanced Vessel Perception in Inland Waterways: Integration of Radar and AIS Data **Jinyu Lei**, Minjiang University, China Abstract-In inland waterways, characterized by high vessel traffic density and collision risks, there is an increasing demand for improved perception capabilities in vessel navigation. This paper addresses the issues of low tracking and identification accuracy of ship navigation radars and AIS in inland waterways, as well as the challenges of asynchronous data fusion. Firstly, we synchronize the sampling frequencies of radar and AIS target motion data. Subsequently, we employ a fast covariance intersection method to integrate data from multiple sensors, thereby obtaining high-precision target data. Finally, we deploy perception devices along the Wuhan section of the Yangtze River inland waterway, complemented by onboard high-precision GPS, to experimentally validate the accuracy of proposed multi-source fusion method in target recognition and tracking.
16:15~16:30 TL617	Ship Pose Estimation Based on Convex Hull: A Case Study of Ships Entering the Three Gorges Ship Lift **Jiafen Lan,** Wuhan University of Technology, China Abstract-Accurate estimation of ship pose is important. It serves as the foundation for ship navigation decision-making. However, it is difficult to extract accurate direction information when faced with incomplete point cloud data. This study proposes a ship pose estimation method based on convex hull. By designing a geometric shape classifier, the ship point cloud cluster is categorized into symmetric or asymmetric

	cluster. The extracted point cloud cluster is reduced to convex hull, significantly reducing the computational burden. Then, search-based algorithms are developed for symmetric and asymmetric clusters, respectively, utilizing new criteria of minimum symmetric area difference and minimum occlusion area. The effectiveness of the method was verified on three typical ships of the Three Gorges ship lift. The results show that compared with principal component analysis (PCA), L-shaped fitting, and minimized occlusion region (MOR) methods, the proposed method has higher accuracy and robustness, while maintaining real-time solution speed.
16:30~16:45 TL654	NACA-0006 Aerodynamic Characterization of Airfoil High-Speed Flow Field **Yuchen Li,** Nanjing University of Aeronautics and Astronautics, China Abstract-With the continuous expansion of China's civil aviation capacity, higher requirements have been put forward for the aerodynamic shape of aircraft wings in order to achieve higher economic efficiency and enhance the efficiency of aircraft transportation. When the Mach number of the airplane is increasing, the surface of the wing will exist supersonic region, subsonic region and transonic region, and present different aerodynamic properties. In this paper, the aerodynamic performance of NACA-0006 typical airfoil in supersonic region and subsonic region is analyzed in depth, and simulation experiments are carried out to obtain the aerodynamic performance parameters of this airfoil by GAMBIT and FLUENT software; the aerodynamic properties of NACA-0006 airfoil such as the coefficient of lift, the coefficient of drag, the coefficient of moment, as well as the position of the excitation wave generation on the wing, etc., are analyzed with the change of Mach number. The aerodynamic characteristics of NACA-0006 airfoil are analyzed under different Mach numbers, and the trends of the lift coefficient, drag coefficient, moment coefficient, and the location of surge generation on the airfoil are analyzed, and the critical Mach number of the airfoil is found.
16:45~17:00 TL658	Differential Impact of Working Memory and Inhibitory Control on Distracted Driving Performance among Experienced and Inexperienced Drivers **Shengqin Tao,** Sun Yat-sen University, China Abstract-Distracted driving poses a significant risk to traffic safety, mainly influenced by cognitive functions and driving experience. This work focuses on the impact of working memory and inhibitory control on distracted driving performance among experienced and inexperienced drivers. A car-following driving simulation experiment was conducted to gain data. Descriptive statistics and ANOVA of the experimental results show that among experienced drivers, those with higher working memory capacity have faster braking response and tend to have a more decentralized visual search pattern. Similarly, drivers with higher inhibitory control ability also showed faster braking reaction time. Conversely, among inexperienced drivers, both the group with high working memory capacity and the group with high inhibition control ability had a lower rate of change of steering wheel angle and a shorter braking reaction time. Notably, the interaction between working memory capacity and inhibitory control ability has a significant effect on the standard deviation of longitudinal acceleration among inexperienced drivers.
17:00~17:15 TL670	Comparative analysis and improvement measures of large passenger station capacity utilization at home and abroad **Chengzhi Lin**, Beijing Jiaotong University, China Abstract-China's railway passenger transport has developed rapidly, but there are still problems such as insufficient railway passenger transport capacity and poor utilization of transport capacity. The adverse effects of these problems on the passenger transport

	organization of large passenger stations in China have been further amplified. How to effectively improve the capacity utilization efficiency of large passenger stations in China has become a key issue that needs to be solved urgently. This paper fully analyzes the differences in the utilization efficiency of railway passenger capacity at home and abroad from the perspectives of passenger transport characteristics, train organization, station design, operation diagram compilation and signal system. At the same time, it summarizes the characteristics of China's large passenger stations and the deficiencies in capacity utilization. Based on this, the basic idea of improving the capacity utilization of passenger stations is given. The article gives relevant suggestions and methods to improve the capacity utilization of large passenger stations in China from the macro, meso, micro and management levels. This has important theoretical and practical significance for the improvement of China's passenger transport organization capacity.
17:15~17:30 TL675	Predicting Supply Chain Upstreamness Using An Ensemble Machine Learning Method **Siying Zhao,** City University of Macau, China Abstract-This study delves into the prediction of supply chain upstreamness using an ensemble machine learning approach. Leveraging insights from the analysis of trade credit and profitability in production networks, we develop a novel methodology to forecast the vertical position of firms within supply chains. These production networks are constructed based on supply chain relationships and accounting data from the FactSet and Compustat databases, with enterprise upstreamness correspondingly defined. By employing random forests, gradient boosting trees, and ensemble classifiers, and incorporating key variables such as various firm characteristics, our ensemble machine learning model aims to accurately predict the upstreamness of firms in complex production networks, demonstrating high accuracy and robustness. The findings shed light on the importance of upstreamness prediction methods for enterprises and offer valuable implications for supply chain management.
17:30~17:45 TL673	Delay Model Development of Median U-turn Intersections on a Multilane Divided Highway in Metro Manila **Bryan Allen J. Jose,** Mapua University, Philippines Abstract-This study provides a comprehensive analysis of traffic delays at U-turn slots in Metro Manila. The primary goal is to develop accurate traffic delay models that can assist traffic engineers in optimizing U-turn slot designs and operations. Data collection spanned two months, during which traffic operations were meticulously observed and recorded. A regression analysis was conducted using data from 40 carefully selected observations for all of the selected U-turn slots, ensuring minimal interference from external factors such as unusual traffic conditions. The findings indicate a strong linear association between conflicting traffic volume and turning delays while U-turning traffic volume shows a slightly less linear but still significant relationship. The study concludes that traffic delay models can predictively assess the effectiveness of a U-turn slot on different conflicting and U-turning traffic volumes. This study underscores the need for targeted interventions and ongoing research to mitigate traffic congestion in Metro Manila, providing valuable insights for traffic authorities and planners.

ONSITE SESSION 4

Saturday, August 24, 2024 <15:45~17:45>
Onsite Session 4: Urban Logistics and Delivery
Chairperson:

Vitoria III
2nd Floor

15:45~16:00 TL701	Artificial Intelligence in Intralogistics Potentials and Challenges **Hannes Winkler**, Esslingen University of Applied Sciences, Germany Abstract-Artificial Intelligence (AI) is considered a game changer in Operations and Supply Chain Management (OSCM). However, many industrial implementation projects fall short of these high expectations. This article presents the results of thirteen interviews with industrial representatives, focusing on their perspectives on the potential benefits and challenges of AI implementation in intralogistics.
16:00~16:15 TL425	Research on Optimization of Emergency Logistics Scheduling in Complex Disaster Relief Situations **Yanyan Wang**, Harbin Institute of Technology, China Abstract-Scientific emergency logistics scheduling is a crucial component in the emergency rescue process during sudden disasters. It significantly impacts the overall effectiveness of emergency rescue operations and is closely tied to their success or failure. In order to achieve efficient scheduling of emergency logistics in complex disaster relief scenarios, a method has been introduced for optimizing emergency logistics scheduling based on uncertain disaster information. The effectiveness and feasibility of this model have been validated through a case study of the Ludian earthquake in Yunnan Province, China. The results demonstrate that the proposed model can produce a scientifically optimized plan for emergency logistics scheduling in challenging disaster conditions. This offers valuable insights for practical emergency logistics scheduling and resource allocation in real-world scenarios.
16:15~16:30 TL668	Study on the Location Selection of the Logistics Distribution Center - Taking an E-commerce Company as an Example **Shiyu Chen,** Chengdu University of Information Technology, China Abstract-With the development of China's economy and the improvement of residents' living standards, the consumption of major supermarkets in our country is increasing year by year, and there have been many e-commerce shopping platforms represented by Y Company. Y Company has stores all over Chengdu. Therefore, choosing a reasonable location of the logistics center is of great significance to improve the distribution efficiency of the enterprise, reduce the transportation cost of the enterprise and increase the customer satisfaction. This paper takes the location of logistics distribution center of Chengdu Y Company as the research content, establishes the objective function of cost minimization, considers multiple constraints, adopts Genetic Algorithm to solve the model, and selects the optimal location from the four alternative nodes of Chengdu Railway Station, Chengdu East Railway Station, Chengdu South Railway Station and Shuangliu Railway Station, so as to ensure the better development of the company.
16:30~16:45 TL623-A	An Equity-Oriented Planning Method for Freight Carbon Tax Policy: An Integrated Modelling Approach **Zongbao Wang,** Wuhan University of Technology, China

Abstract-The transportation industry ranks among the top three largest contributors of carbon dioxide emissions in China, with freight transport contributing a substantial share of carbon emissions within the sector. Although the carbon tax policy helps reduce regional carbon dioxide emissions, it also increases the burden on enterprises and impacts the equity of regional development. Therefore, when formulating a carbon tax policy for freight transport, it is essential to consider its equitable impacts on industrial development across different regions. In order to analyze the equity impact of regional freight carbon tax policies, this study proposes an equity-based freight carbon tax planning model. The proposed model takes a bi-level programming method. The upper-level model focuses on analyzing the equity of policy impacts and optimizing regional freight carbon tax rates. The lower-level model builds upon the land use-transportation interaction model to develop an integrated land use-transportation-environmental planning model. This integrated approach facilitates the analysis of the influence of freight carbon tax policies on regional industrial locations by examining the interaction among land use, transportation, and the environment. Due to the complex relationship between decision variables and objective functions, this paper proposes a Bayesian optimization method to solve the model. The proposed equity-oriented freight carbon tax planning model not only expands existing land use-transportation interaction models in the applications of environmental policy analysis, but also considers the structure differences in multimodal transportation networks and industrial development in different regions during policy formulation. This approach aims to ensure equitable impacts and fairness within policy implementation. Taking the Yangtze River Economic Belt as a case, the modeling results show that implementing a uniform tax rate for freight carbon taxes will further exacerbate the adverse impact on the location utilities of manufacturing industries in western regions. Compared with a uniform tax rate for freight carbon taxes, the differentiated regional policies obtained by the model significantly improve the equity of policy impacts, providing decision support and reference for policy formulation.

16:45~17:00 TL624	A Comparative Study on the Policy of Multimodal Container Transport between China and Abroad Oriented by Low-carbon Concept **Yi Hua,** Shanghai Maritime University, China Abstract-Container multimodal transport is an inevitable choice for China's logistics industry to reduce costs and increase efficiency, and it is also the development trend of multimodal transport. The main driving force comes from national policy support. Since the existing comparative studies on multimodal transport policies are mostly based on qualitative analysis both in China and abroad, this paper uses a combination of qualitative and quantitative methods, and provides an empirical reference for the development of multimodal transport in China from the aspects of improving the legal system of multimodal transport, formulating guidance and supporting policies, establishing unified management departments, standardizing operations and constructing information platforms.
17:00~17:15 TL631	Site Selection for Public Container Return Points Based on Adaptive Genetic Algorithm **Yi He**, Southeast University, China Abstract-To enhance the accuracy of the site selection for public container return points, this paper integrates the specific characteristics of large logistics parks, constructs an objective function that comprehensively considers multiple cost factors including fixed investment costs, management costs, and variable costs. By incorporating various coefficients such as multimodal transportation accessibility and land prices into the function, it aligns more closely with real-world scenarios, thereby

	establishing a site selection model for public container return points. An optimized adaptive genetic algorithm is employed to improve the model's performance in terms of solution efficiency and quality. Utilizing Matlab2022a for empirical analysis of the algorithmic model, the results of this study validate the effectiveness and practical application value of the genetic algorithm model in addressing the site selection issue for public container return points.
17:15~17:30 TL678	Highway Traffic Safety Evaluation Based on TOPSIS-entropy Weight Method and Aerial Data **Chuyan Xu,** China Agricultural University, China Abstract-The research and assessment of traffic accident prevention risks primarily rely on analyzing historical accident data to conduct posture statistics and predict trends. Still, the occurrence of traffic accidents has a strong randomness and low probability, it is still highly unpredictable. Getting the accident data to meet the statistical analysis requirements takes a long time. This paper proposes a safety evaluation method for highway traffic, the evaluation index includes average speed, traffic flow, traffic composition, number of lane changes, Number of conflicts based on the TTC, Time Exposed Time to-collision and Time Exposed Time Headway. UAV (Unmanned Aerial Vehicle) aerial survey data is used in this paper, from which the driving track of vehicles on a section of highway, and traffic conflict indicators and their threshold can be extracted. What's more, TOPSIS-entropy weight method is proposed to establish the safety evaluation model of the highway dynamic scenario. Finally, the practical value of the evaluation model is verified through different scenario examples.
17:30~17:45 TL626	Modelling Urban Delivery Trip Chains from A Low Carbon Perspective **Shuaiqi Wang,** Southeast University, China Abstract-In recent years, the scale of the urban delivery industry has been expanding and its influence has become increasingly significant. Although urban delivery brings great convenience, it also introduces various problems, such as increased traffic congestion and exhaust emissions. This paper proposes two calculation models for carbon emission of urban delivery vehicle travel chain, including the carbon emission calculation model based on GPS data and the carbon emission calculation model based on travel chain characteristics. The research results show that the results of the two calculation methods are consistent, which can help the research on carbon emissions of urban delivery vehicles enrich relevant theoretical research results, and provide a model reference for the development of relevant practices.

ONLINE SESSION 1

Sunday, August 25, 2024 <09:30~11:30>

Online Session 1: Urban Logistics and Delivery Services
Chairperson:

Room A:891 5299 5952

09:30~09:45 TL605	Studies on the Simulation Optimization of Distribution Center Operations for Cold Chain Logistics Using Petri Nets and AnyLogic **Guangpeng Ji**, Xi'an University of Posts and Telecommunications, China Abstract-Aiming at the problems of long operation time, low utilization rate of forklift and easy blockage of inbound goods in the operation process of a cold chain logistics distribution center, this paper firstly establishes a Petri net model of the inbound and outbound operation process of cold chain logistics by adopting the Petri net modeling method and verifies the validity of the model by combining with the correlation matrix analysis method. Secondly, based on the Petri net model, AnyLogic software is used to simulate the model and optimize the number of forklift trucks, the arrangement of inbound and outbound warehousing area, and the operation process of warehousing, so as to improve the overall operational efficiency of the system. Finally, in view of the fact that the cold chain logistics distribution center is mainly operated by forklifts, in order to respond to the strategy of carbon peak and carbon neutrality, this paper constructs a carbon emission model about forklifts to measure the changes of carbon emissions of the distribution center after optimization. The results show that the operation time of the cold chain logistics distribution center has been shortened, the utilization rate of forklift trucks has been improved, and the carbon emissions have been reduced.
09:45~10:00 TL671	Application of Convolutional Neural Networks in Logistics Engineering and Supply Chain Management in Restaurants **Javier Romero Meneses**, Universidad Continental, Peru Abstract-Logistics optimization in the restaurant industry is important to improve efficiency and reduce operating costs as in any other sector, in this study presents the application of convolutional neural networks (CNN) in the accurate prediction of dishes, which resulted in a 26% improvement in logistics efficiency in a pilot restaurant. The developed system allows restaurants to identify dishes from images uploaded by users, using a CNN model trained with a dataset that includes images of Peruvian meals to achieve these results, several training experiments were implemented with different numbers of epochs (5, 10, 15 and 20 epochs), determining that 20 epochs offered the highest prediction accuracy where software such as TensorFlow and Keras were used for model building and training. The process included the loading and preprocessing of 5000 images, the use of an optimized convolutional neural network, and the prediction of the saucer based on the probabilistic output of the model. The technical approach involved the use of deep learning libraries and advanced image processing techniques to train the model, ensuring its ability to generalize and correctly predict new data, where the system not only improves saucer identification, but also optimizes supply chain and inventory management, enabling more accurate planning and significant waste reduction. The success of this implementation suggests that convolutional neural networks can be a valuable tool in industrial logistics, offering innovative solutions to complex operational challenges. The 26% improvement in logistics efficiency demonstrates the potential of artificial intelligence to transform traditional industrial processes, bringing tangible benefits in terms of both cost and customer satisfaction.

10:00~10:15 TL636	Research on Optimization of Emergency Material Distribution in Two Stages during Sudden Public Health Emergencies **Hang Fan**, Xi'an University of Posts and Telecommunications, China Abstract-Following the outbreak of a sudden public health incident, the rational distribution of supplies is crucial for halting the spread of the event and ensuring the efficiency of the rescue efforts. This paper investigates the emergency supply distribution problem in the context of a sudden public health emergency. Initially, considering the differences among various demand points, an urgency evaluation index for demand points is constructed from four perspectives: personnel, environment, facilities, and supplies. Subsequently, a two-stage model for emergency supply allocation and route optimization is established based on four criteria: equity, time, efficiency, and economy. Furthermore, a Grey Wolf Optimizer is designed to solve the model, which is enhanced with strategies such as reverse learning, polynomial mutation, and simulated annealing concepts. Finally, the model and algorithm's effectiveness is validated using the COVID-19 epidemic in Wuhan as a simulation case study.
10:15~10:30 TL680	Research on the Quality Evaluation of Drone Delivery Services under the Background of Digital Economy Transformation **Huichuan Dai**, Guangdong University of Science and Technology, China Abstract-With the transformation of digital economy in China, the demand for instant distribution is increasing. Intelligent and automated UAV distribution services will play an important role. Scientific evaluation of UAV (Unmanned Airborne Vehicle) distribution service quality will effectively promote its development and promote the transformation and upgrading of digital economy. At present, there is no mature evaluation method for UAV distribution service quality. On the basis of summarizing and analyzing the relevant achievements of logistics service quality evaluation, based on SERVQUAL (Service Quality) model and LSQ (Logistics Service Quality) model, combined with the actual situation of UAV distribution, this paper constructs the evaluation index system of UAV distribution service quality. The analytic hierarchy process (AHP) is used to determine the weight of each index. Questionnaire was used to investigate the customer's satisfaction with each index of UAV distribution service. The fuzzy comprehensive evaluation method is used to obtain the overall quality evaluation results. Finally, according to the evaluation results, some countermeasures and suggestions are put forward to improve the UAV distribution service, in order to promote the better development of UAV distribution service.
10:30~10:45 TL417	Reshaping Urban Logistics: Route Planning Strategies for Collaborative Delivery Using Autonomous Vehicles and Passenger-Freight Combined Buses **Cheng Zhao,** Xi'an University of Posts and Telecommunications, China Abstract-In recent years, the rapid growth of e-commerce has led to a surge in demand for urban logistics. The traditional truck-based delivery model, characterized by high energy consumption and limited delivery efficiency, is increasingly inadequate for urban express delivery requirements. This study proposes a collaborative delivery route planning model that integrates autonomous vehicles with passenger-freight combined buses to optimize urban express delivery routes, enhance delivery efficiency, and reduce logistics costs. Additionally, a single-parent genetic algorithm was developed for path optimization within this model. This algorithm evaluates delivery route quality by comprehensively considering factors such as delivery time, operational costs, and energy consumption. Finally, a case study conducted in Hanzhong City demonstrates

	that the collaborative delivery model, compared to the traditional truck-based delivery model, reduces operational costs for courier companies by ￥624.75, decreases travel distance by 13.48 kilometers, and increases daily net revenue for bus companies by ￥347.2. This study validates the efficiency and economic viability of the collaborative delivery model in modern urban logistics, providing robust support for optimizing urban delivery systems.
10:45~11:00 TL415	Application of the Entropy Weight and TOPSIS Method for Fruit Packaging Selection in Cold Chain Logistics **Noppakun Sangkhiew**, Silpakorn University, Thailand Abstract-The cold chain is indispensable for the fruit industry. Effective cold chain management is essential for maximizing the value of fruits and minimizing losses throughout the supply chain. Therefore, packaging in the cold chain is essential for ensuring the quality, safety, and shelf life of perishable goods. Normally, packaging vary in features, depending on the materials used. This study compares and analyzes fruit packaging in cold chain logistics using the entropy weighted technique and the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS). The seven criteria examined to determine packaging quality are: price, dimension, durability, temperature, easy-to-open design, ventilation, and environmental friendliness of material. Then, five initial-size alternative packaging options for fruit delivery are compared. Results show that dimension, price, and durability rank as the top three weighted criteria, and the best packaging options are paper box I (KA) and paper box II (KA), respectively. The findings of this study will be beneficial for packaging businesses or fruit sellers who are looking to improve the quality of their products.
11:00~11:15 TL704	Research on the Structure of Emergency Logistics Cooperation Network for Sudden Earthquake Disasters——Taking Sichuan 9·5 Luding Earthquake as an Example **Xiaoyan Wang,** Xi'an University of Posts and Telecommunications, China Abstract-The operational efficiency of emergency logistics of cooperation network has a direct impact on the effectiveness of emergency relief efforts. The immediate problem is how to coordinate and mobilize resources quickly in highly stressful and complex emergencies. Therefore, based on the social network analysis method, this paper selects the 9·5 Luding earthquake disaster in Sichuan province to quantitatively evaluate the characteristic of emergency logistics coordination network from three dimensions: overall network structure, node function and node location. The results show that: (1) the overall network density is small under sudden earthquake disaster, and this imply that the overall connection is not close; (2) the important tasks include the Comprehensive Coordination Group, The Rescue and Relief Group, and The Rescue Materials Group. And the work content of the Rescue and Relief Group and the Rescue Materials Group is highly integrated, and there is redundancy; (3) the cooperative network has a core-edge structure. Sichuan Emergency Department is located in the core of the network and the bridge position, responsible for coordinating the scheduling of various emergency resources in the province. This study provides a basis for emergency logistics collaborative networks and provides new ideas for improving the collaborative efficiency of emergency logistics network.
11:15~11:30 TL601	How does the pandemic affect the route optimization of container shipping? **Le Yu,** Shenzhen Technology University, China Abstract-The pandemic, such as COVID-19, has greatly impacted route of container shipping optimization across the world. Faced with these new challenges, optimizing the

existing route to reduce shipping costs is a pressing concern. Utilizing quantitative methods and IBM ILOG CPLEX solution, considering the impact of liner schedules on routes, this paper conducts an optimization study on target routes with the goal of minimizing operational costs. By employing these methods, the pandemic-related factors were ultimately quantified, known routes were optimized, and transportation costs were reduced. It is beneficial for optimizing container shipping routes in the context of the pandemic's influence.

ONLINE SESSION 2

Sunday, August 25, 2024 <09:30~11:45>

Online Session 2: Traffic Mode Analysis and Transportation Capacity Assessment

Chairperson:

Room B:817 1665 8207

09:30~09:45 TL641	Research on the Navigation Safety of Xiaoqing River Restoration Project Based on Simulation Model **Junhui Zhang**, China Waterborne Transport Research Institute, China Abstract-Given the issues of missing navigational management at ship lock hubs, operational risks from oversized vessels, narrowed navigation channels caused by bridge piers crossing the river, and the impact on vessel maneuvering during flood season drainage and waterlogging, a new approach is proposed for studying the navigational safety of the Xiaoqing River based on hydrodynamic and ship maneuvering simulation models. This approach includes assessing dangerous sections in the restoration project of the Xiaoqing River, constructing hydrodynamic and ship maneuvering simulation models for it, determining model parameters for dangerous sections, and solving the model. The experimental results indicate that the K18 curved channel experiences no flooding or overflowing in the presence of a 5-year flood discharge, with all floodwaters pooling within the channel without spilling onto the banks. The maximum longitudinal flow velocity within the channel is 1.23 m/s, and the maximum lateral flow velocity is 0.05 m/s; the recommended navigation speed for this curved channel ranges from 6 to 8 kn. By integrating the results from a hydrodynamics simulation model and a ship maneuvering simulation model, we propose operational techniques and management recommendations for navigating the hazardous sections of the Xiaoqing River, providing technical support for the safe and efficient restoration of navigation on the Xiaoxing River.
09:45~10:00 TL607	Integrated Speed Planning and Energy Management Optimization for Hybrid Electric Buses in Car Following Scenarios **Zheng Zhou**, Beijing Institute of Technology, China Abstract-The enhancing driving economy is a crucial pathway for promoting the development of electrified vehicles, wherein speed planning and energy flow management are two major ways to reduce energy consumption. Different from conventional solutions, this study proposes a coherent integrated methodology for simultaneously regulating the longitudinal speed and powertrain statues based on an improved model predictive control (MPC) method, aiming at further improving the optimization potential of the electrified vehicles. Sequential quadratic programming is integrated into the MPC architecture, and dynamic programming is utilized for generating optimized control sequences. The proposed method is applied to develop a coherent speed planning and energy management strategy for hybrid electric buses in diverse car-following scenarios with vehicle-to-vehicle communication contexts. Multiple objectives including energy economy, driving comfort, and safety are considered as the multiple optimization objectives. Simulation results suggest the proposed strategy achieved multi-objective optimization performance, achieving 98% energy economy compared to the offline global optimal strategy while exhibiting satisfactory real-time implementation ability.

10:00~10:15 TL663	Research on the Evaluation Index System of Train Timetable under the Dual Perspective of Transportation Supply and Demand **Luxi Xue**, Beijing Jiaotong University, China Abstract-The high-speed railway train timetable is the core technical document of the high-speed railway transportation organization. Accurately, scientifically and reasonably evaluating the quality of high-speed railway train timetables is of great significance for improving the quality of train timetables. This paper constructs the evaluation indexes of train timetable quality from the aspects of technical level, service capacity, transportation resources utilization level, service quality, etc., and puts forward the detailed calculation method of the indexes, and finally constructs the evaluation index system of train timetable under the dual perspectives of transportation supply and demand.
10:15~10:30 TL405	A Theoretical Framework of Digital Collaboration towards Port Resilience: Case of Indonesian Ports (Pelindo) Post-Merger **Rio Theodore Natalianto Lasse**, Sepuluh November Institute of Technology (ITS), Surabaya, Indonesia Abstract-Digitalization in various sectors, including maritime transport, has become more advanced since the world entered the Industrial Revolution 4.0. era. Post covid-19 pandemic, digitalization and digital collaboration are driven by the need to run port operations smoothly and efficiently, while at the same time concerns on port resilience increase. United Nations Conference on Trade and Development (UNCTAD) states that developing supply-chain resilience through robust maritime transport and logistics is crucial since future shocks or disruptions will be more common and frequent. Research on digital collaboration in supply chain and port resilience has been rising. However, there is a gap in research for exploring how digital collaboration would lead to port resilience. This paper aims to investigate the relationship between digital collaboration and port resilience. In addition, port integration and transformational leadership are included to examine whether they mediate or moderate in building port resilience. A case study approach is used to look at ports in Indonesia which is run by Pelindo. Qualitative interviews are used to capture perceptions from stakeholders with different backgrounds. Findings shows that digital collaboration uniquely leads to port resilience and the theoretical framework developed is put forward for further testing.
10:30~10:45 TL423	Research on Electric Vehicle Route Planning and Energy Consumption Prediction Based on CNN-LSTM Model **Qingrui Zhang,** Xi'an University of Posts and Telecommunications, China Abstract-In the field of logistics and transportation, balancing high-quality demand with economic benefits is a crucial issue. The introduction of electric vehicles offers new solutions to this challenge. However, the limited range of electric vehicles poses a significant challenge for logistics operations. To effectively address this problem, this paper proposes an electric vehicle path planning method based on convolutional neural networks and long-short-term memory (CNN-LSTM-EVPP). Specifically, the CNN-LSTM model is employed to predict the driving energy consumption for each route by combining traffic data and road data. Finally, the NSGA-II algorithm is used to optimize the predicted energy consumption values and find the optimal path. Experiments show that the method is effective. The algorithm has the potential to enhance distribution efficiency and reduce costs. The optimized path length is reduced by 8.87% and the driving energy consumption is reduced by 8.31%.

10:45~11:00 TL622	A Vehicle Speed Prediction Method Integrating Multi-Source Traffic Information Based on Informer **Heng Xu**, Beijing Institute of Technology, China Abstract-Vehicle speed prediction is of great significance for intelligent transportation and eco-driving. Currently, mainstream methods for speed prediction rely more on the vehicle's own historical data, ignoring the influence of the surrounding traffic environment. This paper proposes a vehicle speed prediction method based on Informer, which integrates real-time multi-source traffic information to improve prediction accuracy. K-means clustering is used to cluster the following mode and traffic flow mode. During prediction, a back propagation neural network is employed for recognition, and the recognition results are used as inputs to the prediction model, achieving the extraction and integration of traffic information. Experimental results demonstrate that the Informer-based vehicle speed prediction method outperforms current mainstream deep learning methods in prediction accuracy, and the integration of multi-source traffic information in speed prediction surpasses methods that do not integrate traffic information.
11:00~11:15 TL640	Economic Design of Cross-Border Fresh Agricultural Product Delivery Chain Based on Multivariate Control Charts **Chi Zhang,** Xi'an University of Posts and Telecommunications, China Abstract-To reduce product loss and decrease delivery chain costs in the cross-border fresh agricultural product delivery process, this paper utilizes the Variable Sample Size (VSS) T2 control chart to monitor the delivery chain. Firstly, the VSS T2 control chart scheme is introduced. Secondly, based on the VSS scheme and combined with the delivery chain, a T2 control chart economic model is constructed. Finally, a case study is conducted, and genetic algorithms are used to obtain the optimal parameters of the control chart and delivery chain costs. The results demonstrate that compared to traditional T2 control charts, the use of VSS T2 control charts exhibits better economy. This validates the correctness and effectiveness of the proposed statistical design economic model, which has the potential to provide practical guidance for enterprises.
11:15~11:30 TL682	The degradation mechanism of key components of fuel cell vehicles **Rongliang Liang,** School of Mechanical Engineering, Tianjin University, China; China Automotive Technology and Research Center Co., Ltd., China Abstract-Compared with traditional internal combustion engine vehicles, fuel cell vehicles (FCVs) contain more parts and more complex structure. The fuel cell stacks, on-board hydrogen systems, air supply systems, etc. are more susceptible to environmental, road conditions, driving conditions and other factors, resulting in performance degradation. This paper analyzes the possible performance degradation of the key components of FCVs when driving on load and the reasons, for providing reference for the improvement of the reliability and durability of FCVs.
11:30~11:45 TL408	Research on the Influence of Digital Quality Management on Sustainable Supply Chain Performance of Automobile Manufacturing Enterprises **Xinran Wang,** Xi'an University of Posts and Telecommunications, China Abstract-With the development of the economy, environmental pollution and social responsibility issues have arisen in the supply chains of enterprises, which have made their economic performance unsustainable, and the construction of sustainable supply chains has been seen as a way to address such issues. The digital quality management of automobile manufacturing enterprises is currently undergoing a period of significant

transformation and development, exploring the relationship between digital quality management and sustainable supply chain performance is of great significance to the current development of enterprises. This paper comprehensively applies the questionnaire survey method and structural equation modeling, and introduces supply chain integration as a mediating variable to explain the specific path of the role of digital quality management on sustainable supply chain performance. The results showed that supply chain integration was a significant factor in enhancing sustainable supply chain performance and played a significant mediating role between digital quality management and sustainable supply chain performance. The study provides a reference for automobile manufacturing enterprises to improve quality management and achieve sustainable supply chain development.

ONLINE SESSION 3

Sunday, August 25, 2024 <13:30~15:30>

Online Session 3: Vehicle Engineering and Vehicle Scheduling
Chairperson:

Room A:891 5299 5952

13:30~13:45 TL643	Status of Key Performance Indicators of Fuel Cell Vehicles in China **Guozhuo Wang**, CATARC Automotive Test Center (Tianjin) Co., Ltd., China; China Automotive Technology and Research Center Co., Ltd., China Abstract-With the development of fuel cell vehicle (FCV) industry and technological progress, the performance test system of FCV has been gradually improved, and the formulation of various performance indicators can promote the development of FCV technology. Based on the existing policies and standards of FCVs in China, this paper analyzes the requirements of various performance indicators of fuel cell vehicles, including safety, reliability and durability, environmental adaptability, economy, dynamic property, etc., and points out the shortcomings and improvement directions in the existing indicators system.
13:45~14:00 TL6012	Digital Technology and Agricultural Products E-commerce Supply Chain Quality Control Capability **Yanning Wang,** Guangdong University of Science and Technology, China Abstract-In the context of the national strategy of comprehensively promoting rural revitalization, how to improve the quality control ability of agricultural product e-commerce supply chain is an important issue for the high-quality and sustainable development of agricultural product supply chain. The study collected 331 sample data by implementing a questionnaire survey covering e-commerce enterprises with multiple operation modes to understand the current status of digitization of agricultural products supply chain and at the same time, to verify the impact of digital technology on the quality control capability of agricultural products e-commerce supply chain. The results found that the current level of digital technology application is medium, its positive impact on quality control is significant, and there are significant differences between different modes (e.g., front warehousing, community group purchasing, online + offline, etc.) in the application of digital technology and the effectiveness of quality control. The application of digital technology significantly improves the coordination ability of the supply chain, but there is a certain weakness in source control, packaging and processing, storage and transportation, and quality control. The study suggests that government leadership, financial support, industry mindset change, school and social talent empowerment, and concerted efforts to address the uneven application of technology, small and medium-sized farmers digital divide and other issues, in order to improve the quality control ability of the supply chain.
14:00~14:15 TL413	Evolutionary Game of Supply Chain Operation Decisions between E-commerce and Express Delivery Enterprises in Low-Carbon Development **Luying Wen**, Xi'an University of Posts and Telecommunications, China Abstract-Amid worsening global environmental degradation, the imperative for low-carbon development among e-commerce and express delivery enterprises is underscored. This paper explores consumer low-carbon preferences and examines the operational dynamics between e-commerce and express delivery enterprises under

government subsidies in China. Utilizing evolutionary game theory, we analyze stable strategies and conduct simulations to study the factors influencing strategy choices. Key findings include: (1) Eight evolutionary scenarios with varied stable strategies; (2) Increasing government subsidies drive both sectors towards low-carbon operations, particularly sensitizing express delivery enterprises; (3) Higher consumer carbon emission sensitivity prompts faster adoption of low-carbon strategies by e-commerce enterprises; (4) Rising additional freight costs lead express delivery enterprises from traditional to low-carbon operations gradually.

14:15~14:30 TL6014	Research on Power Grid Equipment Supply Chain Based on Lateral Transshipment Mechanism and Transshipment Coordination Center **Yuhe Lian**, Beijing University of Posts and Telecommunications, China Abstract-Power grid industry is the foundation of national economic development. Ensuring the reliable supply of power materials and equipment, building a supply chain with industry characteristics have become the focus of power grid enterprises. Therefore, this paper takes a typical three-level power grid equipment supply chain as the research object. The supply chain is composed of an equipment seller or agent with an online sales platform, several different provincial warehouses and city-level members. Through transfer between peers and replenishment between upstream and downstream, it can effectively cope with the daily operation needs of the power grid and various emergency support needs. This paper studies and constructs a hybrid strategy that integrates the lateral transshipment mechanism and the transshipment coordination center mechanism. The lateral transshipment mechanism realizes the inventory sharing among online and offline, upstream and downstream supply chain members and supply chain members at the same level, while the coordination center realizes the inventory surplus and shortage information sharing among supply chain members, and centrally and uniformly coordinates the transshipment and distribution of inventory, thus turning the complex many-to-many transshipment relationship among members into a one-to-many transshipment relationship, efficiently matching supply and demand, and effectively simplifying the complex form of transshipment price function, while making the supply chain performance approach the optimal value during coordination.
14:30~14:45 TL420	A genetic algorithm for the dual resource constrained flexible job shop scheduling problem considering preparation times **Di Fan,** Xi'an University of Posts and Telecommunications, China Abstract-A mathematical model is developed for the dual resource constrained flexible job-shop scheduling problem (DRCFJSP), considering worker proficiency and preparation times of jobs on machines with the objective of minimizing the maximum completion time. The model incorporates variations in worker skills and proficiency levels. To address the problem's complexity, a genetic algorithm (GA) is employed for solution generation. Finally, comparative experiments are conducted using simulation scenarios, validating that integrating the impact of worker proficiency on preparation times into the scheduling model significantly optimizes total production completion time.
14:45~15:00 TL6002	Clustering analysis of metro network components based on a completely directed model **Peipei Wang**, Soochow University, China Abstract-Research on the components' clustering of metro networks is a boon to urban transportation planning and development. The existing research on components' clustering cannot reveal the spatiotemporal features of directed platforms at the same station and directed tracks between two adjacent directed platforms. This paper first

	establishes a completely directed model to describe the metro system, where nodes and arcs represent directed platforms and tracks, respectively. The demand-supply level of directed platforms and tracks is evaluated by waiting time and in-vehicle crowdedness, respectively. After that, clustering analysis is conducted on the directed components to improve the metro's operational efficiency and enhance the passengers' travel experience. Historical data on the Shenzhen subway system was used to validate the superiority of the proposed method, and the results showed that the demand-supply level of metro network components is dynamically changing. The clustering of platforms and tracks reveals the spatiotemporal characteristics of their respective categories, which also provides a basis for urban planning and development.
15:00~15:15 TL6005	Prediction Optimization Study of Strapping Parameters for In-Vehicle Hydrogen Storage Cylinders under Random Vibration based on GA-XGBoost **Junqi Yao,** Tianjin University, China Abstract-In recent years, fuel cell vehicles have garnered increasing attention due to their zero emissions and zero pollution characteristics, and the application of in-vehicle hydrogen storage cylinders has become more and more common. During vehicle operation, factors such as uneven road surfaces and internal vibrations inevitably subject the in-vehicle hydrogen storage cylinders to vibrations. Consequently, it becomes imperative to conduct a mechanical analysis to assess their response to random vibration loads and subsequently optimize their structure. This article presents an approach to optimize the strapping parameters for in-vehicle hydrogen storage cylinders, utilizing the GA-XGBoost model. Ansys Workbench is employed to perform power spectral density-based random vibration analysis on in-vehicle high-pressure hydrogen storage cylinders (Type III) affixed with straps. A hundred sets of different strapping parameters (spacing, thickness, and width) were randomly generated The stress analysis of hydrogen storage cylinders under various strapping parameters was conducted, and an XGBoost model was established to predict the strapping parameters. The model achieved an $R2$ of 0.945. Additionally, Genetic Algorithm was utilized to predict the optimal strapping parameters, aiming to minimize the stress of hydrogen storage cylinders. The findings reveal that for the Type III hydrogen storage cylinder examined, the optimal strapping parameters are as follows: spacing of 625 mm, thickness of 17 mm, and width of 58 mm, resulting in a stress value of 1920.49 Pa. Validation analysis of the model demonstrates a stress value of 1921.5 Pa, with a prediction error of 0.52%. This study offers theoretical underpinning for the PSD random vibration analysis and aids in the selection of strapping parameters for in-vehicle high-pressure hydrogen storage cylinders.
15:15~15:30 TL424	A Real-Time Scheduling Method for Flexible Job Shop Considering Machine Fault Prediction **Yifeng Gu,** Xi'an University of Posts and Telecommunications, China Abstract-Machine fault have a significant impact on flexible job shop scheduling, causing disruptions in the existing production schedule. This directly affects production progress and delivery times, substantially reducing production efficiency and economic benefits. To address this issue, we propose a real-time scheduling method for flexible job shops that incorporates machine fault prediction (FJSRS). Firstly, Industrial Internet of Things (IIoT) and various sensor technologies were utilized to capture real-time production information. Two key features, the standard deviation of vibration signals and spindle temperature, were extracted. Secondly, a machine fault prediction method based on Long Short-Term Memory (LSTM) was proposed to predict the operational state of the machine. Finally, a flexible job-shop real-time scheduling method that

	incorporates machine fault prediction was proposed and optimized using the Non-dominated Sorting Genetic Algorithm II (NSGA-II) with the objective of reducing completion time and total load. This method establishes a theoretical foundation for optimization decisions in the field of flexible job shop scheduling.

ONLINE SESSION 4

Sunday, August 25, 2024 <13:30~15:30>

Online Session 4: Vehicle Flow Control and Traffic Emergency
Management   Room B:817 1665 8207
Chairperson:

13:30~13:45 TL620	Research on the Establishment of Water Emergency Rescue Standard System **Datao Weng**, China Academy of Transportation Science, China Abstract-In order to improve water emergency rescue capabilities, four-dimensional structure of water emergency rescue standard system has been established based on standardized system engineering methods, and it can solve the problems such as lack of water emergency rescue standard system, incomplete coverage of water emergency rescue standards, and so on. According to the model, the framework and structure diagram of water emergency rescue standard system have been constructed, and suggestions for construction of water emergency rescue standard system have put forward to provide support for the promotion of water emergency rescue standardization work.
13:45~14:00 TL632	Traffic safety improvement of a highway tunnel group based on visual requirements **Yang Gao,** CCCC Second Highway Consultants Co., Ltd., China Abstract-There is a significant difference between driving in a group of tunnels and in an ordinary single highway tunnel. The driver will experiences frequent alternations between light and dark environments when driving in a group of tunnels, which requires the driver to adapt to the changing light conditions. This can make it difficult for the driver to effectively perceive the driving environment, thus, increasing the risk of traffic accidents. This paper presents a case study of the Dayaoshan Tunnel Group, focusing on the special driving environment of the tunnel group section. The paper proposes a line of sight guidance programme that includes reflective rings, guide markers, contour markers, and other facilities. The effectiveness of the programme is evaluated quantitatively using driving simulation and psychology software E-prime.The experiment indicates that the line of sight guidance programme enhances the local luminance of the tunnel, enriches its internal visual environment, and provides drivers with necessary visual cues to improve driving speed stability, reduce reaction time, and enhance driving stability. Consequently, the programme effectively improves the safety level of the tunnel group.
14:00~14:15 TL672	Forecast of Typhoon Disaster Emergency Supplies Demand Based on Improved CBR **Zhecong Xu**, Xi'an University of Posts and Telecommunications, China Abstract-In recent years, typhoon disasters have frequently struck China, causing significant losses in coastal areas. To address the urgent issue of material demand during typhoon disasters, this paper comprehensively summarizes and analyzes the factors influencing the number of emergency resettlers post-typhoon. Utilizing an enhanced case reasoning method, we developed a typhoon emergency prediction model to estimate the number of evacuees and resettlers following a disaster. By integrating safety stock theory, we indirectly predict the demand for emergency supplies during typhoon disasters. Experimental results demonstrate that the model

	achieves high accuracy and can provide a theoretical foundation for typhoon emergency rescue operations.
14:15~14:30 TL633	Study for the improvement of traffic safety on motorway bend-slope combinations **Yang Gao**, CCCC Second Highway Consultants Co., Ltd., China Abstract-The traffic accidents of the curved slope section have been more frequent and concentrated, so how to improve the curved slope section has been an urgent problem to solve in the field of traffic safety at home and abroad. Aiming at a certain high-speed operation stage of the main line curved slope combination section, the existing road conditions of its influencing factors on traffic safety are analysed. The key factors are identified by analysing the influence of turning radius, sight distance and high curve on the safety of vehicle operation. The status quo of the road is investigated by field survey and the vehicle speed data of the road section is obtained by radar and the driving speed is analysed. Combined with the investigation and analysis of traffic accidents and CarSim modelling, the main causes of accidents and the rules of traffic accidents are found out, and suggestions for improving traffic safety are made.
14:30~14:45 TL6013	Spatio-temporal cooperative control Method of Highway Ramp Merge Based on Vehicle-road Coordination **Xiaoxue Xu,** Key Laboratory for Special Area Highway Engineering of Ministry of Education, Chang'an University, China Abstract-The merging area of highway ramps faces multiple challenges, including traffic congestion, collision risks, speed mismatches, driver behavior uncertainties, limited visibility, and bottleneck effects. However, autonomous vehicles engaging in depth coordination between vehicle and road in merging zones, by pre-planning and uploading travel trajectories, can significantly enhance the safety and efficiency of merging zones. In this paper, we mainly introduce mainline priority cooperation method to achieve the time and space cooperative control of highway merge. Vehicle-mounted intelligent units share real-time vehicle status and driving intentions with Road Section Management Units, which pre-plan the spatiotemporal trajectories of vehicle travel. After receiving these trajectories, Vehicle Intelligent Units strictly adhere to them. Through this deep collaboration between vehicles and roads, conflicts in time and space during vehicle travel are eliminated in advance.
14:45~15:00 TL634	Emergency Strategies for Guangzhou-Shenzhen Expressway Reconstruction and Expansion Project with Six Lanes Open to Traffic **Yue Wong**, CCCC Second Highway Consultants Co., Ltd., China Abstract-In order to cope with the adverse impact on traffic accident rescue caused by the phased occupation of emergency lanes in the reconstruction and expansion of six lane Expressway into ten Lane project, taking the project of Guangzhou to Shenzhen Expressway expansion as an example, this paper deeply analyzes the emergency rescue needs of typical work zones open to traffic, such as general roadbed work zones, extra-long bridge work zones, highway longitude profile adjustment work zones and pavement construction stages etc. The scheme of vehicle evacuation and personnel evacuation for specific situations from above sections are proposed, which provides ideas for traffic accidents emergency rescue and personnel evacuation of the highway reconstruction work zones open to traffic under multiple scenarios.
15:00~15:15 TL665	The study investigates the factors influencing the security system of medical materials using the DEMATEL-ISM methodology **Qi Chen,** Xi'an University of Posts and Telecommunications, China

Abstract-The medical supply support system plays an important role in ensuring the normal operation of medical institutions and responding to public health emergencies. In order to systematically identify and analyze the key factors affecting the medical material security system, this paper screened 13 influencing factors from the four links of the medical material security system, constructed an evaluation index system, and used the DEMATEL and ISM methods to evaluate the factors. The analysis of the evaluation results shows that the results obtained by the causality analysis of DEMATEL are basically consistent with the results obtained by the causal analysis of ISM. Finally, seven factors, such as a reasonable organizational structure, were determined to be the fundamental influencing factors affecting the medical material security system. It provides a new idea for medical managers to enhance the stability and reliability of the medical material security system.

15:15~15:30 TL662	Examining airplane accidents through the lens of fatalities in such catastrophes **Marina Romele,** Latvia University of Life Sciences and Technologies, Latvia Abstract-Safety systems in air transport are constantly being improved, making air travel one of the safest modes of transportation. Nevertheless, aviation accidents still occur and are the subject of extensive research, which emphasizes the need to analyze such phenomena. This has also become the basis for this article. It presents an analysis and assessment of aviation accidents from 2000 to 2023, examining the number of fatalities in such events and their variability over time. The aim of the article is to provide a mathematical analysis of aviation accidents, which may contribute to preventing similar incidents in the future and enhance overall aviation safety.

One day tour

8:50	Gather at the Lobby of Hotel Royal Macau
	(Shuttle bus will depart at 9:00 a.m. sharp, so please arrive on time)
9:00~10:00	Macau Fisherman Wharf
10:00~10:30	Guia Lighthouse
10:30~11:00	St. Dominic's Church
11:00~11:30	Ruins of St. Paul's
11:30~12:30	Lunch Time
12:30~13:30	Love Lane; Senado Square; Grand Lisboa
13:30~14:30	Penha Hill
14:30~15:20	Macau Tower
15:20~15:50	Rua do Cunha
The day will be finished at 16:00 by getting off at The Venetian Macao Resort Note: The tour itinerary may vary due to change of visitors' number.	

NOTE