2013 IEEE International Conference on Intelligent Rail Transportation

(ICIRT 2013)

Beijing, China
30 August – 1 September 2013
TABLE OF CONTENTS

Welcome Message .................................................................................................................. I

August 30, 2013 (Friday)

13:30 pm-15:10 pm
Energy-efficient Train Operation
Chairs: Dewang Chen, Thomas Albrecht

Real-Time Scheduling for Single Lines in Urban Rail Transit Systems............1
Authors: Yihui Wang1, Bart De Schutter1, Ton van den Boom1, Bin Ning2, Tao Tang2
1. Delft University of Technology, Delft, The Netherlands
2. Beijing Jiaotong University, Beijing, China

Cooperative Train Control for Energy-saving.........................................................7
Authors: Shuai Su1, Tao Tang1, Clive Roberts2, Ling Huang3,
1. Beijing Jiaotong University, Beijing, China
2. University of Birmingham, Birmingham, UK
3. High Technology Research and Development Center, Beijing, China

Achieving Energy-efficiency and On-time Performance with Driver
Advisory Systems ............................................................................................................13
Authors: Li Yang, Tomas Lidén, Per Leander
Transrail Sweden AB, Stockholm, Sweden

Energy-efficient Driving in the Context of A Communications-based
Train Control System (CBTC) .................................................................19
Authors: Karsten Rahn1, Christian Bode1, Thomas Albrecht2
1. SIEMENS AG, Braunschweig, Germany
2. Technische Universität Dresden, Dresden, Germany

An Optimization Approach for Real-time Headway Control of Railway
Traffic .............................................................................................................................25
Authors: Jing Xun, Bin Ning, Keping Li, Tao Tang
Beijing Jiaotong University, Beijing, China

13:30 pm-15:10 pm
Communications and Signaling (1)
Chairs: Bo Ai, Simon Collart-Dutilleul

Wide Band MIMO Waveguide Design for Metro Application.........................32
Authors: Meng Ji, Jin Shi, Yao Hua, Ming Jiang, Huijun Che, Lei Chen
Beijing National Railway Research & Design Institute of Signal & Communication Co., Ltd.,
The Optimization Study of the On-board Antenna of BTM Based On Electromagnetic Model

Authors: Shuiqing Gong¹, Liyan Luo¹, Zhongtian Liu¹, Shumin Wang²
1. Beijing Jiaotong University, Beijing, China
2. Beijing Jiaoda Signal Technology Co., Ltd, Beijing, China

Research and Optimal Design for MVB Baseband Transmission System

Authors: Juan Song, Feng Zhou, Fengkai Xu, Xiao Gong
Industrial Control System Reliability Testing Center China Software Testing Center
Beijing, China

Train Movement High-level Model for Real-time Safety Justification and Train Scheduling Based on Model Predictive Control

Authors: Yonghua Zhou¹, Xun Yang¹, Qiancan Liu¹, Zhenlin Zhang²
1. Beijing Jiaotong University, Beijing, China
2. Taiyuan Satellite Launch Center, Taiyuan, China

An Intelligent Train Operation Algorithm via Gradient Descent Method and Driver’s Experience

Authors: Jiateng Yin, Dewang Chen
Beijing Jiaotong University, Beijing, China

16:00 pm - 17:40 pm
Safety and Security
Chairs: Martin Lauer, Tianhua Xu

Safety Assessment of COTS RTOS Based Computer Platform Applied in Train Control System

Authors: Guo Zhou, Huibing Zhao, Hongyu Quan
Beijing Jiaotong University, Beijing, China

Algorithms and Concepts for an Onboard Train Localization System for Safety-Relevant Services

Authors: Martin Lauer, Denis Stein
Karlsruhe Institute of Technology, Karlsruhe, Germany

Software Hardware Co-Simulation and Co-Verification in Safety Critical System Design

Authors: Jin Shi, Weichao Liu, Ming Jiang, Huijun Che, Lei Chen
Beijing National Railway Research & Design Institute of Signal & Communication Co., Ltd, Beijing, China
Analysis on EURORADIO Safety Critical Protocol by Probabilistic Model Checking

Authors: Hongyu Quan, Huibing Zhao, Guo Zhou
Beijing Jiaotong University, Beijing, China

A Sequential Heuristics Procedure Based Automatic Data Code Generation Method’s Application Study

Authors: Youneng Huang, Ge Zhu
Beijing Jiaotong University, Beijing, China

16:00 pm - 17:40 pm
Intelligent Techniques and Simulations (1)
Chairs: Yong Qin, Rob M. P. Goverde

Simple Ways to Pace Trains

Authors: Daniel Emery
École poly technique fédérale de Lausanne, Lausanne, Switzerland

The Design and Implementation of the Metro Driving Simulation System Based on Virtual Reality

Authors: Zhurong Wang, Yang Liu, Guo Xie, Xinhong Hei
Xi’an University of Technology, Xi’an, China

Nonlinear Dynamic Responses of Long-Span Suspension Bridge with the Action of Both Running Train and Cross Wind

Authors: Shaoqin Wang¹, He Xia¹, Zhun Yang¹, Qin Ma²
1. Beijing Jiaotong University, Beijing, China
2. CCCC Highway Consultants Co., Ltd, Beijing, China

Research on Distributed Simulation Framework of Train Control System Based on SOA

Authors: Jianqiu Chen, Tao Tang
Beijing Jiaotong University, Beijing, China

Energy-efficient Operation of Heavy Haul Trains in An MPC Framework

Authors: Lijun Zhang, Qi Li, Xiangtao Zhuan
Wuhan University, Wuhan, China

16:00 pm - 17:40 pm
Operation Quality
Chairs: Simon Tschirner, Haifeng Wang

Potential Railway Benefits According to Enhanced Cooperation
between Traffic Management and Automatic Train Operation
Authors: Xiaolu Rao1,2, Markus Montigel1, Ulrich Weidmann2
1. systransis AG, Rotkreuz, Switzerland
2. Swiss Federal Institute of Technology (ETH), Zurich, Switzerland

Improved Railway Service by Shared Traffic Information
Authors: Simon Tschirner, Arne W. Andersson, Bengt Sandblad,
Uppsala University, Uppsala, Sweden

The Impact of Signaling System Heterogeneity on Urban Transit Capacity
Authors: Wei Li, Tao Tang
Beijing Jiaotong University, Beijing, China

A Review of Online Dynamic Models and Algorithms for Railway Traffic Control
Authors: Francesco Corman1, Lingyun Meng2
1. Delft University of Technology, Delft, the Netherlands
2. Beijing Jiaotong University, Beijing, China

A Precise and Reliable Train Positioning System and Its Use for Automation of Train Operation
Authors: Thomas Albrecht1, Katrin Luddecke2, Jorg Zimmermann1
1. Technische Universität Dresden, Germany
2. German Aerospace Center, Braunschweig, Germany

August 31, 2013 (Saturday)

13:30 pm-15:10 pm
Communications and Signaling (2)
Bing Bu, Jacek Mocki

Generating an Electronic Track Map for Train Collision Early Warning System
Authors: Jiang Liu, Baigen Cai, Jian Wang, Zi Yang
Beijing Jiaotong University, Beijing, China

Railway Interlocking Process-Building A Base for Formal Methods
Authors: Jacek Mocki, Ljubo Vlacic
Griffith University, Australia

Research on Dynamic Pattern of Balise Up-link Signal Based on the Electromagnetic Field Theory
Authors: Di Liang, Huibing Zhao, Hongyu Quan
Research of 25 Hz Phase Sensitive Track Circuit Signal Based on CORDIC Algorithm
Authors: Rui Yao, Shenghua Dai, Zhengjiao Li
Beijing Jiaotong University, Beijing, China

Dynamic Simulation and Performance Optimization of Wireless Communication in Urban Rail Transportation
Authors: Wen Wei, Jin Shi, Ming Jiang, Huijun Che, Lei Chen
Beijing National Railway Research & Design Institute of Signal & Communication Co., Ltd.
Beijing, China

13:30 pm-15:10 pm
Safety Analysis for Train Control System
Chairs: Meena Dasigi, Wei Zheng

Application of UML Sequence Diagram in CTCS-3 Onboard System Hazard Identification
Authors: Xiaofei Yao, Kaicheng Li, Datian Zhou, Xiaofan Mo, Yuan Yao,
Beijing Jiaotong University, Beijing, China

Research and Application of the BFM-STAMP Hazard Analysis Method
Authors: Rui Wang, Wei Zheng
Beijing Jiaotong University, Beijing, China

Improving Safety of Level Crossings by Detecting Hazard Situations Using Video Based Processing
Authors: Houssam Salmane\(^1\), Louahdi Khoudour\(^2\), Yassine Ruichek\(^1\)
1. IRITES-SET, UTBM, Belfort cedex, France
2. CETE SO, Toulouse, France

Dynamical Sequence Generation Performance Testing Method and Its Application
Authors: Yongzhen Sun, Wei Zheng
Beijing Jiaotong University, Beijing, China

Model-Based Generation of Safety Test-Cases for Onboard Systems
Authors: Chenling Li\(^1\), Tao Tang\(^1\), Kaicheng Li\(^1\), Jidong Lv\(^1\), Ling Huang\(^2\)
1. Beijing Jiaotong University, Beijing, China
2. Ministry of Science and Technology of High Technology Research and Development Center,
Bayesian Nonparametric Reliability Analysis for a Railway System at Component Level

Authors: Payam Mokhtarian, Tin Kin Ho, Mohammad-Reza Namzi-Rad, Thomas Suesse
National Institute for Applied Statistics Research Australia, University of Wollongong, Wollongong, Australia

Implementation of the Normative Safety Case Structure for Satellite Based Railway Applications

Authors: Hansjörg Manz, Eckehard Schnieder,
Technische Universität Braunschweig, Braunschweig, Germany

RAMS Evaluation of GNSS for Railway Localisation

Authors: Debiao Lu, Federico Grasso Toro, Eckehard Schnieder
Technische Universität Braunschweig, Braunschweig, Germany

Reliability Analysis Based on the Statistical Models Method for the Subway Door System

Authors: Yong Qin¹, Shan Yu¹, Jingxuan Shi¹, Lingli Mao²
1. Beijing Jiaotong University, Beijing, China
2. Nanjing University of Science and Technology, Nanjing, China

A New Generation Algorithm of Fault Tree Minimal Cut Sets and Its Application in CBTC System

Authors: Zuoyu Miao¹, Ru Niu¹, Tao Tang¹, Jieyu Liu²
1. Beijing Jiaotong University, Beijing, China
2. Technische Universität Braunschweig, Braunschweig, Germany

Minimum Cost Deployment in Earthquake Early Warning System for High-Speed Railways

Authors: Yi Yuan, Dan Wang, Yiqing Ni
Hong Kong Polytechnic University, Hong Kong, China

Rail and Turnout Detection Using Gradient Information and Template Matching
A New Maintenance Model for High-speed Railway Signaling System
Authors: Daming Li
Beijing National Railway Research & Design Institute of Signal & Communication Co., Ltd, Beijing, China

Fault Detection Method for the Rolling Bearings of Metro Vehicle Based on RBF Neural Network and Wavelet Packet Transform
Authors: Xiulian Yu¹, Zongyi Xing¹, Yong Qin², Limin Jia², Xiaoqing Cheng²
1. Nanjing University of Science & Technology, Nanjing, China
2. Beijing Jiaotong University, Beijing, China

Study of Fault Diagnosis Method Based on Fuzzy Bayesian Network and Application in CTCS-3 Train Control System
Authors: Jingjing Zhao, Wei Zheng
Beijing Jiaotong University, Beijing, China

Fault Diagnosis of Train Sensors Based on Evolutionary Genetic Particle Filter
Authors: Weijie Kong, Wei Zheng
Beijing Jiaotong University, Beijing, China

16:00 pm - 17:40 pm
Intelligent Techniques and Simulations(2)
Chairs: Chuang Hee Lee, Jing Xun

Simulation on Passenger Evacuation under Fire Emergency in Metro Station
Authors: Xiudan Wang, Shaokuan Chen, Yangfan Zhou, Hongqin Peng, Yuan Cui
Beijing Jiaotong University, Beijing, China

A Realization and Simulation of ATO Speed Control Module —— Predictive Fuzzy Control Algorithm
Authors: Xiaofan Mo, Tao Tang, Chunzhao Dong, Yuan Yao, Xiaofei Yao
Beijing Jiaotong University, Beijing, China

Study on Influence of Contact Wire Design Parameters on Contact Characteristics of Pantograph-Catenary
Authors: Yifeng Bai¹, Wenzheng Liu¹, Jian Zhang¹, Xiankai Liu²
1. Beijing Jiaotong University, Beijing, China
2. CSR Qingdao Sifang Locomotive & Rolling Stock Co., Ltd, Beijing, China

**Model-based Test Generation Techniques Verifying the On-board Module of a Satellite-based Train Control System Model**

Authors: Daohua Wu, Eckehard Schnieder, Jan Krause
Technische Universitat Braunschweig, Braunschweig, Germany

**Design and Introduction of High Power Transfer System for Electrical Vehicles**

Authors: Chuang Hee Lee, Guho Jung, Seungyong Shin, Yangsu Kim, Boyune Song, Jaegue Shin, Sang Hoon Chung, Dang Oh Kim, Jahyun Lee
Wireless Power Transfer Technology Research Center, KAIST, Daejeon, Korea

16:00 pm - 17:40 pm
Planning and Scheduling
Chairs: Ingo A. Hansen, Keping Li

**Centrality Characteristics Analysis of Urban Rail Network**

Authors: Yingfei Tu
Tongji University, Shanghai, China

**The Optimization of Metro Vehicle Preventive Maintenance Cycle Based on the Reliability and Genetic Algorithm**

Authors: Xiulian Yu¹, Zongyi Xing¹, Yong Qin², Limin Jia², Xiaoqing Cheng²
1. Nanjing University of Science & Technology, Nanjing, China
2. Beijing Jiaotong University, Beijing, China

**Feature-Based Solution to Harmonics Interference on Track Circuit in Electrified Heavy Haul Railway**

Authors: Shiwu Yang¹, Clive Roberts², Lei Chen², Zhu Bei¹
1. Beijing Jiaotong University, Beijing, China
2. University of Birmingham, Birmingham, UK

**Performance Indicators for Railway Timetables**

Authors: Rob M.P. Goverde, Ingo A. Hansen
Delft University of Technology, Delft, the Netherlands

**Optimization of Subway Train Schedules with Dwell Time Model Using Lagrangian Duality Theory**

Authors: Xubin Sun, Shaobo Zhang, Hairong Dong, Hainan Zhu
Beijing Jiaotong University, Beijing, China