Program (Day 1)

5th Nov（Thu）（AI）	
13:45 ～	**Opening Address** Prof. Hiroyuki Osaki（Dean, Graduate School of Frontier Sciences The University of Tokyo）
14:00 ～	**Keynote Speech Ⅰ** **“Issues Related to AI Applications in Railway Transportation”** (Language: English) Empowering railway transportation, artificial intelligence(AI) can improve the safety, efficiency, economy, and convenience of the design, construction, operation as well as maintenance of the rail system considerably. Starting from several typical AI applications in high-speed, urban and heavy haul railway, this presentation introduces the rail transportation AI technical framework and its key modules involving data sensing and acquisition, storage and transmission, processing and visualization, control and execution, with the focus on the discussion of essential techniques including building information modeling(BIM), sensor design, 5G connections, massive-connection internet of things(IoT), edge computing, knowledge map, image and video processing, integrated circuit design, wireless positioning and so on. Eventually, this presentation discusses several issues to be addressed in the development of AI applications in railway transportation, such as obtaining more useful data, guaranteeing the reliable and high rate transmission of dynamic data, enabling the interconnection among various data sources, ensuring the security of AI applications etc. Prof. Li Hao（Dean, the School of Information Science & Technology, Southwest Jiaotong University, China）
14:30 ～	**Lecture I** **“Safety of AI and Service Robots in Stations”** (Language: English)

	The use of autonomous robots and/or AI in stations or public transport infrastructure is expected to become a reality soon. However, safety will be an issue. Unlike the conventional use of robots for manufacturing or in a restricted private area, it is extremely difficult to ensure safety of AI or robots in public spaces where third party, ordinary people are present. This presentation will introduce the development of the "Guidelines for Safety of Service Robots in Stations" and other recent efforts to solve this problem. Mr. Yoshihiro Nakabo （Team Leader, Industrial CPS Research Center, National Institute of Advanced Industrial Science and Technology (AIST)）
15:00 ～	**Lecture II** **“The research and application of AI in China railway”** (Language: English) Currently, AI has become a trending technology within scientific and IT community. The construction scale of China railway system has become a high level means of transportation, and has been a great support to the public and the country’s economy in general. In the next generation, the new construction strategy will be carried out with the leverage of IT progress and its applications, such as AI, Big Data, IoT and more others. In this topic, we are introducing some cases of AI applications in China railway system, and discuss our team research interest, as well as some future directions. Prof. Xinghong Hei （The Faculty of Computer Science and Engineering, Xi’an University of Technology, Xi’an, China）
15:30 ～	**Lecture Ⅲ** **“Guideline for service robot implementation to railway stations”** (Language: Japanese) Service robot implementation to railway stations is considering for improvement

	customer service and solve lack of service staff; however, it is difficult to make rule for utilizing service robot to railway stations because countermeasure against risks shall consider all the possibilities due to characteristics of the stations; therefore, even demonstration was difficult to perform in operation hours at the station. This presentation is basic philosophy and development process about “Guideline for service robot implementation to railway stations” which is summarized essential items to define rule for implementation service robot to railway stations. Mr. Kosuke Suzuki （Deputy Manager, Field Service Headquarters, Japan East Mechatronics Co., Ltd）
16:00 ～ 17:00	**Panel Discussion** **“Application of AI Technology to Railways and Safety”** (Language: English) Moderator：Prof. Sei Takashi （Department of Computer Engineering, College of Science and Technology, Nihon University） Panelist：Prof. Li Hao, Mr. Kosuke Suzuki, Prof. Xinghong Hei, Mr. Yoshihiro Nakabo）

Program (Day 2)

6th November (Fri)（ATO）	
10:15 ～	**Opening Address** Prof. Takafumi Koseki （Professor, School of Engineering, The University of Tokyo）
10:30 ～	**Lecture Ⅰ** **"Bombardier Transportation Automatic Train Operation development strategy and experience"**(Language: English) This presentation will show the development history and describe the customer experience using BT ART systems. It will also ‘skim the surface’ of the strategy roadmap for BT ATO with a high-level technical description of the ATO components

	currently in-use. A discussion of ATO project engineering based on the experience of the author over the last 15 years will also be discussed. Mr. Keith Guente （ Mechanical Architecture Engineer, Bombardier Transportation, Canada）
11:00 ～	**Lecture Ⅱ** **“Assessment method on introducing autonomous driving in Japan”** (Language: English) In the 1980s, Automatic Train Operation systems were realized mainly in the new transportation system in Japan. Currently, in response to the effectiveness of the railway business and the request for productivity reform, efforts are being made for automatic train operations of Japanese conventional railways. In this presentation, the assessment methods for safety in practical application of automatic train operations are described in Japan. Prof. Takeshi Mizuma （Project Professor, Graduate School of Frontier Sciences, The University of Tokyo）
11:30 ～	**Keynote Speech Ⅰ** **“Development Status and Prospect of Automatic Train Operation Technology for Rail Transit in China”** (Language: English) This report is intended to introduce the development status and prospect of Automatic Train Operation technology for rail transit in China. The contents of the report are divided into three aspects: automatic train operation and full automatic operation of urban rail transit, automatic train operation of intercity railway（CTCS2+ATO） and automatic train operation of high-speed railway（CTCS3+ATO）. Based on the specific rail transit automatic train operation lines (Shanghai Metro Line 10, Pearl River Delta Intercity Railway, Beijing -Zhangjiakou high speed railway), the report will introduce the above three kinds of rail transit automatic train operation system architecture, equipment composition, system interface, system function, key technology, work

	mode and operation scenario, compares and analyzes the technical characteristics and differences of different automatic train operation systems. Based on the classification of rail transit automation level in IEC62290 standard, this report looks forward to the development trend of China's rail transit automatic train operation technology. Prof. Jin Guo (Southwest Jiaotong University, China)
12:00 ～	**Lunch Break**
13:00 ～	**Keynote Speech Ⅱ** **"Efforts of the Ministry of Land, Infrastructure, Transport and Tourisms for realizing Automatic Train Operation for Heavy Rails in Japan"** (Language: Japanese) As the population starts to decline, it becomes more and more difficult to recruit and train railroad workers such as licensed train drivers and maintenance workers for wayside equipment as well as for rolling stocks. In order to promote efficiency and labor savings in business operations, the introduction of automatic train operation on common routes which include level crossings, is required. The Ministry of Land, Infrastructure, Transport and Tourism (MLIT) has set the "Study Group on Automatic Operation Technology for Railways", which investigates a technical requirement for maintaining and improving safety and convenience toward the realization of the automatic train operation for general routes. In this presentation, we will report on the status of the governmental study. Mr. Katsumi Kishitani (Director, Engineering Planning Division, Railway Bureau, Ministry of Land, Infrastructure, Transport and Tourism)
13:30 ～	**Lecture Ⅲ** **"Practical Application of Automatic Train Operation System Based on an ATS (Automatic Train Stop Device)"** (Language: Japanese)

	Currently, all automated driving system on Japanese railways is based on ATC (Automatic Train Control Device, which means Automatic Train Protection based on continuous train location acquisition in international terminology). However, the ATC is expensive, and only about 10% of conventional railways in Japan are equipped, mainly in urban areas. In order to popularize automated driving on railways in Japan, especially in rural areas, it is necessary to develop another type of automatic train operation at a lower cost. We are working on the development and commercialization of such an automatic train operation system based on the ATS (Automatic Train Stop, which means Automatic Train Protection based on intermittent train location acquisition), which is an existing facility. Mr. Kenji Oba （Deputy Director, Safety Creation Department, Kyusyu Railway Company）
14:00 ～	**Lecture Ⅳ** **“Investigation for fostering safety and security of automatic train operation in japanese subways”** (Language: Japanese) Firstly, I will present JSA's basic policy for the automatic operation of subways. Next, I will present the results of interviews with Japanese subway operators on the topic of "fostering safety and security" for automatic subway operation and the results of surveys of actual conditions overseas. In addition, the possibility of forward monitoring based on the current state of sensor technology necessary for the practical application of automatic subway operation, and the actual conditions and the results of experiments of fire and smoke generation are presented, and the way forward and how to proceed are proposed. Mr. Eisuke Isobe （General Manager, Linear promoting Division, Japan Subway Association）
14:30 ～	**Break**
15:00 ～	**Lecture Ⅴ**

	“Start the journey from automated metro to autonomous conventional train” (Language: English) Speaking about autonomous train we often think of Grade of Operation from 0 to 4 for the train and forget it is about the complete rail system including rail, platform, trains, communications, … Moving from a close metro environment to an open conventional rail environment force us to export safety constraints from the trackside to the train itself. New functions and subsystems have to be define in order to mitigate the former trackside constraints. A first step has been achieved when moving from driverless metro to Rio Tinto Autohaul. For this first robot train we have introduced various perception sensors to allow operators to understand autonomous train behavior and react appropriately. During this upgrade, supporting the change in the organization was more important than the technical challenge itself. Now in the context of Shift2Rail and the SNCF Autonomous Freight Train we are addressing the autonomous train in a public open environment. For this journey we have initiated several innovation programme related to Perception sensors, geo-localization, Video signal reading, multiple kind of air gap connection, etc. Mr. Frederic Bernaudin（Vice President French Innovative Project, HITACHIRAIL STS, France）
15:30 ～	**Lecture Ⅵ** **※Mr.Oliver Fruh's speech has been canceled due to various reasons.** **“10 year automated guided transit in Nuremberg”** (Language: English) The VAG has been successfully operating a fully automatic train operation for now more than 10 years. As the first city in the world in 2010 two metro lines were converted from conventional to fully automatic operation without interruption. A system of computers sends the automatic trains of the U2 and U3 onto the line. These can run in 100-second intervals– twice as often as in conventional operation. This pleases the Nuremberg passengers, who have since had to wait much shorter for the next train. If everything runs normally, the U2 and U3 metro lines run without human support. In an operation control center the threads for the complete public transport system

	converge. The employees in the OCC only intervene in an emergency. As part of automation, all trains, lines and signal boxes were networked with each other. Driving, stopping, opening the door - everything is controlled automatically. Special computers along the line monitor the track, and interlocking software controls switches and signals. There are also computers in the tracks themselves. They control the departure, brake when an obstacle is noticed on the track and ensure sufficient distance to the preferred. Mr. Oliver Fruh (Traffic Management engineer, VAG (public transportation company in Nuremberg), Germany）
16:00 ～	**Lecture Ⅶ** **“Security-informed safety assessment in train operation”** (Language: English) The goal of any electrical or electronic control system is to measure, monitor, and control a process and one way in which we can accurately control the process is by monitoring its output and “feeding” some of it back to compare the actual output with the desired output so as to reduce the error and if disturbed, bring the output of the system back to the original or desired response. Data, as a general concept refers to all information entity, is the key in a closed-loop control system, especially the system in an automatic operation mode. There are many successful stories of automatic train operation systems nowadays. However, there are still some new challenges in order to ensure the train services are always safely and efficiently operated in a much richer data environment (big data). In addition to safety, the data are also collected and processed for other purposes, e.g., for smart maintenance. The workshop will be organised to review the characteristics of data in railway operation, especially to support ATO, and the challenges in safety assessment and assurance; and to discuss the architecture and best practices of data management. Dr. Xiaocheng Ge (Institute of Railway Research, University of Huddersfield, United of Kingdom)
16:30 ～	

17:45	**Panel discussion** **“Towards the Realization of Automatic Train Operation in Japan”** (Language: English) Moderator：Prof. Takafumi Koseki Panelist：Mr. Kenji Oba, Mr. Eisuke Isobe, Mr. Frederic Bernaudin, Mr. Oliver Fruh, Dr. Xiaocheng Ge
17:45 ～ 18:00	**Closing Address** Mr. Tsutomu Tokodai （Representative Director, President, CEO, Kyosan Electric Mfg. Co., Ltd.）