
Featured Topic: Intelligent Transport Systems (ITS) Technology Has Entered a New Phase

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1. Global Movement Surrounding Intelligent Transport Systems (ITS)

Japan, the U.S., and European countries are striving to improve both vehicles and infrastructure systems in order to reduce the environmental impact of the transportation sector, which constitutes 23% of global CO₂ emissions⁽¹⁾. More specifically, to reduce greenhouse gases and maintain a sustainable global environment, these countries are developing fuel-efficient, low-impact cars, such as plug-in hybrid vehicles, electric vehicles, and fuel cell vehicles, and promoting smarter and more efficient use of existing infrastructure by employing eco-friendly driving practices and fuel-saving route planning. While continuing the above research and development, they are also appropriately addressing existing and ongoing issues, such as measures for dealing with the aging society, the rehabilitation of old expressways, bridges, and tunnels, and the development of robust, disaster-resistant social infrastructure.

In addition to the above, more global efforts are required. For the first time in history, the urban population exceeded the rural population in 2008, intensifying urban concentration on a global scale⁽²⁾. The history of social and economic development in Japan and abroad in the late 20th century clearly indicates that the threshold of GDP per capita of US\$3,000 triggers the activation of motorization⁽³⁾. Many emerging countries typified by BRICs are suffering from serious air pollution caused by the increased numbers of motorcycles and automobiles there; economic growth does not match the pace of development of roads, safety education, and traffic regulations, resulting in increasing numbers of accidents and congestion and worsening concentration of greenhouse gases and fine particles (PM_{2.5}). According to the Global Road Safety Report 2013 issued by the World Health Organization (WHO) in March 2013, the number of deaths by traffic accidents throughout the world exceeds 1.2 million every year, being the top cause of death in the 15-29 age group. It was ranked 9th in all age groups in 2004, but is now expected to advance to 5th by 2030, passing AIDS, lung cancer, and tuberculosis. The report strongly warns political, economic, and academic leaders in the world to take immediate action to counter the issue.

2. The Latest Topics from the ITS World Congress Tokyo 2013

The 20th ITS World Congress Tokyo 2013, exploring the concept of “Open ITS to the Next” and offering hot topics such as automatic driving and big data, was held from October 14 to 18, 2013, at Tokyo International Forum and Tokyo Big Sight. The expert ITS conference was attended by 3,940 professionals from 69 countries around the world. The concurrently held exhibition displayed the products and services of 238 companies and attracted 21,030 visitors. During the event, a total of 210 sessions were held to discuss various transport-related issues, such as (1) safety measures aiming for zero traffic accidents, (2) reduction of congestion, (3) environmental conservation aiming to achieve a low-carbon society, and (4) aging transport infrastructure, in addition to (5) new beneficiary-pay schemes (payment according to traveling distance), which address the rapid reduction of maintenance funds for roadway infrastructure due to diminishing gasoline tax revenue according to the progress in fuel efficiency.

Meanwhile, the demonstrations and showcases featuring proposals for advanced intelligent driving support and automatic driving systems, as well as the joint developments by car manufacturers and the UTMS (Universal Traffic Management Systems) Society of Japan, to which we belong, attracted much interest from visitors. The proposals included (1) the prevention of accidents from right turns by passing road data to vehicles, (2) the Green Wave (optimum driving synchronized with green signals to lower CO₂ emissions), (3) maintenance of a safe distance between cars and prevention of arbitrary changes of driving lanes in expressways controlled by wireless communication between vehicles, (4) automatic braking to avoid collisions in open-air parking, and (5) automatic maneuvering in garage parking.

The conference’s public session discussed big data-related issues such as the large quantities of trajectory (probe) data transmitted, collected, and analyzed through GPS navigation systems and smart phones, the effective and versatile use of such data under an open data policy, and the associated security and privacy issues. Also, topics related to the social acceptability of the above new tech-



Photo 1. Sumitomo Electric Booth at the ITS World Congress Tokyo 2013

nologies, such as new traffic regulations and accident liability issues, which we may need to contemplate with the progress of automatic driving and advanced driving support systems, were discussed among domestic and international experts. The organizer of the Congress, ITS Japan, in which we play a key role as a permanent board member, presented its own future vision and approach, “Proposal of Future Creation through ITS—Realizing a Society Where Anyone can Travel Comfortably Anywhere.” This ITS vision together with a variety of associated information was disseminated from Odaiba, Tokyo, through more than 490 media representing newspapers, magazines, TV, and the Internet, and attracted much interest from a wide range of people throughout the world, from average citizens to senior political leaders.

3. Current Approach to ITS in the Sumitomo Electric Group

The Sumitomo Electric Group is aiming to provide a Smart Connected Society, a platform for safe, human- and environment-friendly transport and social infrastructure on a global scale, based on our technologies and know-how accumulated in the fields of traffic, mobility, and energy, and communication technologies to link these fields. For instance, we are currently the supplier of the world’s largest traffic control system installed in Tokyo, as well as the supplier of a real-time probe data control system, which handles huge quantities of vehicle trajectory data. Based on this experience and know-how, we are developing and marketing the Telematics Application, a human-vehicle communication system, which could lead to a solution to traffic and transport problems in the case of large-scale events (for instance, best route selection), by integrating big data currently left disconnected, such as legacy dynamic traffic data and the latest road probe data. In the meantime, we are also working to develop technology to reinforce the existing transport infrastructure, such as disaster control equipment: signal controllers with battery backups and controllers with wired and wireless dual controls.

In this issue, we would like to start with an introductory article outlining the history of the ITS-related activities by

the Sumitomo Electric Group, followed by seven technical articles covering the latest ITS technologies and product developments. These eight articles are grouped into the following four categories corresponding to the main themes and topics of the ITS World Congress Tokyo 2013:

- (1) Approach to ITS in mega cities:
 - Sumitomo Electric’s Approach for Intelligent Transport Systems
- (2) Safe and sustainable approach to ITS (Advanced driving safety support systems (DSSS) and automatic driving systems, reduction of traffic congestion to achieve a low-carbon society, and technology to effectively use big data under an open data policy to achieve the above goals):
 - Driving Safety Support Systems Utilizing ITS Radio System
 - Cooperative Inter-Infrastructure Communication System Using 700 MHz Band
 - Time Synchronization of Plural Roadside Units in 700 MHz Band Intelligent Transport Systems
 - Estimation of EV Power Consumption and Route Planning Using Probe Data
- (3) Resilient ITS infrastructure:
 - New Traffic Signal Controller for Improved Fail-Safe Functions
- (4) Global efforts towards ITS:
 - Automatic License Plate Detection and Recognition in Thailand
 - Improvement of Traffic Signal Control Using Probe Data

The news of Tokyo’s successful bid to host the 2020 Olympic Games and Paralympic Games was officially announced in September 2013. Tokyo hosted the last Olympic Games in 1964, around the time when Japan as an emerging economy was enjoying its growth, as depicted by a movie “Always 3-chome no Yuhi ’64,” in which young boys and girls are gazing at athletes in a black-and-white TV. In 2020, however, many of the post-war baby-boomers, then high school students 56 years ago, will be over 70 years of age, as will be the transport infrastructure built at that time, one of the issues we have to address from the perspective of fundamental design. The Sumitomo Electric Group started its ITS initiative almost 50 years ago, by experimenting with control systems for wide-area traffic signals in Ginza, Tokyo, and by measuring the traffic flows at three intersections between Hatagaya and Sasazuka on Route 20, part of the marathon course in the 1964 Olympics. Based on its engagement in ITS to date, the Group is dedicated to creating a Smart Connected Society on a global scale in the next 50 years. We welcome a broad range of opinions from readers regarding the methodology to achieve that goal.

References

- (1) Green House Gas Reduction Strategies in Transportation Sector (OECD/IETF, 2008)
- (2) World Urbanization Prospects, 2011 revision, United Nations, Dept. of Economic and Social Affairs
- (3) Environmental Issues Related to Automobiles and Their Handling in Asia, Japan Automobile Research Institute, Kiyoyuki Minato, Information Material from the Association for Environmental Policy of Tokyo University (June 2002)