119TH YEAR NO. 41,739 ISSN 0289-1956 ©THE JAPAN TIMES, LTD., 2015

The Japan Times

WECC2015

Monday, November 30, 2015

Clockwise from top: engineering is creating something contributing to society using science and technology; The Lake Biwa Canal, which enabled water to be transported from Lake Biwa to Kyoto, was built in the Meiji Era when Japanese engineering was very advanced; Turning high technology into something to enrich human life is the role of engineering; Former Slovenia President Danilo Turk (front row, second from right) listens during a conference at the World Engineering Forum 2012, held in Ljubljana, Slovenia, in September 2012. ISTOCK, TERUHIKO YODA, KAZUMASA ITO

The role of engineering and its impact on society

Junichi Sato
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Junichi Sato

The fifth World Engineering Conference and Convention (WECC2015) is now being held at the Kyoto International Conference Center from Nov. 29th through Dec. 2nd. About 2,000 people are attending this conference to discuss a variety of engineering issues relating to society.

How does engineering compare to science and technology? Engineering is the act of using science and technology to meet the needs of society and humanity through ingenuity, with consideration for the requirements and boundaries presented by society. Accordingly, scientific discovery and technological advancement lead to new innovation in engineering and enable engineering to propose to society how change and advancement should be realized.

Furthermore, engineering is often called upon in order to realize new innovations to solve the problems of society and humanity and build a better society. As new innovations implemented for society have a direct effect on humanity, those involved in engineering must consider numerous conditions and engage in the open exchange of opinions with society in order to achieve mutual understanding and trust.

The world is faced with numerous problems today. These include problems of population, poverty, energy and the environment. Global warming is closely related to these problems and steadily having more effect on the planet. The emission of greenhouse gasses such as carbon dioxide is accelerating global warming.

Climate change causes effects such as drought, heavy rains, as well as extreme temperatures throughout the world. This affects the survival of plants and animals and has a major impact on food production. Engineering must intensely apply its proficiency to reduce carbon dioxide emissions in numerous fields, including in the development of diversified energy sources, as well as power generation, energy usage and energy conservation technologies.

We must make proactive efforts to address these issues through innovations in engineering. This is a must if we wish to ensure that all people can enjoy safe and comfortable lives. The primary theme of WECC2015 is "Engineering: Innovation and Society." This includes discussions on "Innovation for Sustainable Growth and Socioeconomic Development," "Engineering Research and Development for Innovation" and "Engineering for Society and Engineering in Society." The conference features seven Conference Plenary Lectures, technical programs covering every engineering domain and summary lectures for each of the technical programs.

The Conference Plenary Lecture series consists of seven lectures. These include a lecture on engineering and society by professor Shahbaz Khan of UNESCO, a lecture on the global water problem by U.N. Secretary-General Special Envoy professor Han Seung-soo, and a lecture on global energy issues by professor Nobuo Tanaka, former executive director of the International Energy Agency. There is also a lecture on automotive technologies and environmental issues by Takeshi Uchiyamada, chairman of the board of Toyota Motor Corp., a lecture by the Minister of Land, Infrastructure, Transport and Tourism Keiichi Ishii on national resilience technology and its global impact and a lecture by the Minister of Economy, Trade and Industry Motoo Hayashi on engineering innovation and its global contributions. Finally, there is a lecture on LED lighting and environmental issues by professor Hiroshi Amano of Nagoya University, recipient of the 2014 Nobel Prize in Physics.

In the technical programs, major topics of discussion are devoted to: "Resilient Infrastructure for Society," "Energy for a Sustainable Society, Natural Resources for a Sustainable Society," "Urban Development and Infrastructure, Mobility and Communication Technology," "Industry for Society," "Life Innovation, Engineering for Society and Engineering in Society," and "Engineering Education and Women in Engineering."

These topics were chosen by examining the current state of different fields of engineering in light of the problems faced by the Earth and humanity. Consideration was also given to future, coming innovations and their relationship with society. Each topic was then divided into six sessions covering different fields of engineering.

Approximately 200 leading experts in each of the fields of engineering playing an important role in the sustained development of society will give in-depth presentations on the current state of their respective fields and their directions for the next ten years and beyond, while participating in panel discussions to promote communication with attendees.

To further promote these discussions, about 400 posters submitted by the public will also be presented. The discussions will foster a deeper understanding of the present and future conditions of each field, and this understanding will enable discussions on the unification of those fields and on engineering, science and technological directions.

On the afternoon of Dec. 2nd, the final day of WECC2015, a concluding lecture and discussion will be given regarding the technical programs. The results of the discussions will be compiled to produce the Kyoto Declaration, a final outcome document that will set forth a vision for the ideal future of engineering.

A key factor for progress in engineering is the culture that fosters it. In WECC2015 in Kyoto, we are planning to hold not only technical programs, but also cultural programs to enhance participants' understanding of industries in Kyoto that have roots in the community and culture.

There are many creative companies in Kyoto and their advancement is profoundly affected by the culture of the city. It is my sincere hope that all of the engineers will, through the WECC2015 conference, gain a fresh and more profound appreciation of the relationship between engineering, industry, culture and society.

Studying problems facing engineers today

About 2,000 engineers and others involved in engineering are expected to participate in the World Engineering Conference and Convention 2015 (WECC2015), which is to be held in Kyoto from Nov. 29 to Dec. 2.

WECC2015, under the theme of "Engineering: Innovation and Society," covers a range of topics with more than 50 conferences and seven plenary lectures on engineering taking place at the Kyoto International Conference Center. Additionally, participating companies will showcase their engineering technologies at the same venue.

"Fruitful discussions should be carried out over issues such as the current level of engineering or problems facing modern engineering," said Junichi Sato, the president of e Japan Federation of Engineering Society and the chair of WECC2015 Organizing Committee, during a roundtable discussion with engineers and academics in June. "I'd like people to think about and discuss those issues in addition to broader issues such as how engineering develops in the future, or what engineering should look like."

e plenary lecturers include Shahbaz Khan, deputy director and senior science program specialist of UNESCO, whose background is in water and the environment; Han Seung-soo, the U.N. secretary-general's special envoy on disaster risk reduction and water; and Hiroshi Amano, who won a Novel Prize for his research on blue LEDs.

Khan plans to discuss the 2030 Agenda for Sustainable Development, a plan of action for people, the planet and prosperity, promoted by the U.N., and the role of engineering in it. e agenda is to address major issues such as poverty eradication, peace and security, safe and su cient food, sustainable energy, pollution prevention and control, water and environmental resource management, disease control, mobility, natural and man-induced disasters, population growth, urbanization and sustainable cities.

Amano's presentation is titled, "Wide-bandgap Semiconductors as Tools for Realizing a Sustainable Society." e development of wide-bandgap semiconductors (WBGs) is essential for realizing a sustainable society as they enable manufacturing low-loss, high-power and high-frequency devices. GaN (gallium nitride) and related alloys are among the most important materials used in building WBGs.

e conferences cover many issues such as engineering education, the role of women in engineering, patents, robotics, energy management, next generation broadcasting systems, smart communities, railway technology and many other subjects.

e exhibitions cover construction and infrastructure for society, energy, the environment, machinery, medicine and life sciences, chemistry, electronics and other areas.

e conference is just the second to be held in Asia and the rst to be hosted by Japan. Additionally, this year's event is the rst to be called WECC, as the previous ones were known as World Engineering Conventions (WEC). e di erence stems from a preference of the organizing committee of the WECC2015, according to the committee.

e rst WEC, held under the theme "Humankind, Nature and Development," in Hannover, Germany, in June 2000, drew 3,500 participants. e second WEC theme was "Engineers Shape the Sustainable Future," and was attended by 3,000 people in Shanghai in November 2004.

e third WEC was in Brasilia, Brazil, in December 2008, under the theme "Engineering: Innovation with Social Responsibility," and around 5,000 people participated. e fourth WEC, held under the theme "Engineers Power the World — Facing the Global Energy Challenge" in Geneva, Switzerland, in September 2011, drew about 2,000 people. e sixth will be in Melbourne in 2019.

e fact that the WECC2015 is held in Japan is signi cant to the world because Japan is advanced in many aspects of engineering. Japan has focused on how engineering contributes to society, especially in terms of disaster risk reduction, as the country has experienced so many disasters, such as earthquakes, tsunami, typhoons, oods and more. Because of this, Japan has managed to build infrastructure resistant to those disasters, and other countries can learn from this experience.

WECC2015 participants are very diverse because the event is co-organized by the World Federation of Engineering Organizations, which brings together national engineering organizations from over 90 nations and represents some 20 million engineers. us, the participants represent diverse social needs that require di erent types of engineering, depending on the stage of the countries' development.

In the early stages of development, social needs are life-related infrastructure, such as water supply systems, schools and hospitals. In later stages, they can be more diverse. For example,

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Kenichi Suganuma, then ambassador of the Permanent Mission of Japan to the International Organizations in Geneva delivers a speech at the closing ceremony of the World Engineers' Convention 2011 in Geneva in September 2011. KAZUMASA ITO