



IEEE Tokyo Section Life Member Affinity Group

In this issue, the award report of LMAG-Tokyo, an LMAG-Tokyo lecture (Tokyo Section TPC co-sponsored), TPC sponsored lectures (LMAG-Tokyo co-sponsored) and future events are reported.

1. LMAG-Tokyo won the Award

LMAG-Tokyo received the 2021 IEEE Life Members Affinity Group Achievement Award. This award is given to the Group that performed the best activity in 2020 among the more than 100 LMAGs of the entire IEEE. The award ceremony will be held on December 10th at the Kikai Shinko Kaikan in a hybrid format.

2. Lecture Meeting "Research and Developments of Communication Antennas Over Fifty Years"

A lecture meeting sponsored by IEEE Tokyo Section TPC and co-sponsored by LMAG-Tokyo was held on Zoom Webinar at 15:00 - 16:30 on June 9th. Dr. Ken-ichi Kagoshima, Emeritus Professor of Ibaraki University, who was awarded an IEEE Fellow in 2017, gave a talk on his R&D efforts on antennas for satellite communications and for mobile wireless systems. The participants were 146 in number including 80 IEEE members.

Dr. Kagoshima first introduced a background of the satellite communication system development in the era from 1970s to 80s when a demand for domestic satellite communication was increased. In the period, 30/20GHz satellite systems were mainly used to avoid conflicts with the terrestrial wireless channels and 6/4GHz systems were used for remote island communication. In addition to size and efficiency improvement, cost reduction was one of the top requirements to antennas. To reduce the cost of the earth station antennas, he developed an elliptic beam antenna with one-dimensional tracking mechanism instead of two-dimensional one. Further cost reduction was achieved by developing a simple driving system for satellite tracking with a secondary reflector. An efficient snow melting system for the earth station was developed to maintain the antenna

performance in winter.

He developed a large multi-beam antenna for

satellite loading which enabled a repeated use of the frequency for communication channels between Tokyo and Osaka to reduce the cost. As the core to achieve a very low side-lobe characteristics of the antenna, a cluster power supply technology was developed.

Dr. Kagoshima introduced his research on multi-band antenna analysis including shared antennas for car and mobile phones (800MHz/1.5GHz). He also explained a variety of research topics on antennas for high-speed Wireless LAN applications such as multibeam antennas, relay antennas built in fluorescent lights, and sector antennas for terminals.

Finally in a Q&A session, there were several interesting questions on the broad range of communication antenna research, and the lecture was ended successfully.



Fig.1 Dr. Ken-ichi Kagoshima

3. Lecture Meeting "Future Society Opened by Power Electronics"

A lecture meeting sponsored by IEEE Tokyo Section TPC and co-sponsored by LMAG-Tokyo

was held on July 8th from 15:00 to 16:30 at Zoom Webinar. The lecturer was Noriko Kawakami of Toshiba Mitsubishi Electric Industrial Systems Co., Ltd., who gave a lecture entitled "Future Society Opened by Power Electronics-The Road to the First IEEE Fellow for Japanese Women in the Heavy Electric Field".

Power electronics is a technology that freely converts voltage, current, and frequency according to the purpose using power semiconductors. Currently, with the progress of electrification, power generation and transmission of renewable energy, transportation of automobiles, trains, aircraft, etc. There are a wide range of application fields, including power saving such as motor drive in the industrial field and home appliances such as inverter air conditioners. The status, transition, and prospects of the power electronics technology were explained in an easy-to-understand manner.

She also introduced the path to becoming the first Japanese woman to become an IEEE Fellow in the heavy electrical field along with the product that she has been developed. The participants were 83 in number including 49 IEEE members.



Fig. 2 Screenshot of Dr. Kawakami (Captured from Zoom)

4. Lecture Meeting “Challenges and Future Vision of the Electric Power System toward Carbon Neutral and Resilience”

Lecture Meeting was held on August 6th from 15:00 cosponsored by both LMAG-Tokyo and TPC of Tokyo section, and supported by IEICE and IEE Japan. The lecturer was Dr. Hiroshi Okamoto, Member of the Board and Executive Vice President of TEPCO Power Grid, Inc.

He talked on the topics about the facing subjects of current power companies, especially on the Carbon Neutral and the electric power systems. This meeting proceeded via Webinar. The number of attendants was 163, including 83 IEEE members.



Fig. 3 Dr. Okamoto giving a lecture

He began talking about 5 D's which introduced the evolution for the electric power companies. The first D is Deregulation, that is Democratization. The electric power companies so far, covered generation, transmission, and distribution of electric power as a vertical integration. Now these structures were changed due to Democratization. Then, the electric power network was unbundled to derive the Decentralization, Digital Transformation, Decarbonation, and Depopulation. In these situations, electric companies are trying to cooperate and merge with others.

The new subject toward Carbon Neutral was to transform the demand-supply structure. The goal was to decrease the usage of fossil fuel to be below 20 %. It arose a problem how to get the non-fossil fuel.

Issues for the electric system transformation were explained. A big issue was the large distance between the places of the renewable energy generations and the consumers. The fluctuation of the renewable energy generation due to the weather condition, etc. was also important. The time duration of the blackout in Japan was the shortest all over the world. By considering such situation, it should be realized what was shown in the Society 5.0 designs.

Lastly the trials in TEPCO were introduced, such as the promotion and the foundation of the Distributed Energy Resources. Especially the EV would be spread hereafter and it is important how to store the electric energy, therefore the life cycle of electric cells should be a great issue. In the recycle management, legacy subjects such as the process of the used nuclear fuel and the collect and reuse of the generated CO₂ gas were explained.

The overseas electric companies have positively developed carbon neutral and renewable energies and are spreading their business globally. TEPCO established Smart Resilience Network for contribution to the social environment. The future

topics are mixing various energies, provisioning and efficient use of the Grid, the management of electric power transmission and distribution, and their regulations.

After the talk, we had many questions, for examples, the capacity of the transmission power lines, the use of Ammonia gas instead of Hydrogen gas (they have to be imported), the geothermal power generation (although development is possible in hot spring areas, the cost is high), the biomass power generation (not sure whether it is carbon neutral or not?), the nuclear power generation (possibility of nuclear fusion and smart nuclear power generation) and so on. The lecturer politely and minutely answered every question. We were sorry that the time limitation to close the meeting came. We have enjoyed the fruitful discussions.

5. Invitation to Promotion to Life Senior

LMAG-Tokyo has sent a letter to encourage promotion to Life Senior, to all Life Members (excluding Life Senior and Life Fellow) of Tokyo Section in the name of Hajime Imai, LMAG Chair, and Tomoyuki Yokota, MDC Chair. If you have any questions about promotion to Life Senior, please feel free to contact the secretariat of Tokyo Section.

6. Future Events

The following events are planned carefully considering the prevention of Covid-19 infection. Information will be sent out via e-mails or updated on the Web site as soon as fixed.

Lecture Meeting (Co-sponsored by LMAG-Sendai and LMAG-Tokyo)

- Date & Time: Sept. 25 (Sat), 13:00-16:30
- Lecture Format: Online by Zoom
- Lecture Theme

“Artificial intelligence, big data processing and its applications”

1. Neural circuit model and neocognitron
Lecturer: Kunihiko Fukushima
2. Fujitsu's Artificial Intelligence Research Initiatives to Bring Trust to Society
Lecturer: Akira Nakagawa
3. Possibilities and challenges for artificial intelligence application to medical big data

Lecturer: Kengo Kinoshita

Please register at the following site by Sept 15: (in Japanese)

https://us02web.zoom.us/webinar/register/WN_tdV6feR1SSyPPVOWBzd3Vw

Technical Tour associated with IEEE Milestone (Sponsored by LMAG and TPC of IEEE Tokyo Section)

- Date & Time: To Be Determined
- Venue: Shinkansen Museum and Railway Technical Research Institute

Technical Tour (Sponsored by LMAG and TPC of IEEE Tokyo Section)

- Date & Time: To Be Determined
- Venue: ANA Airplane Maintenance Facility (Haneda Airport)

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