Newsletter

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IEEE Life members

IEEE Tokyo Section Life Member Affinity Group

This issue includes reports on the 10 and 11th Tokyo Section hosted lecture 2024, the 2025 LMAG annual general assembly and a report on the Tokyo Section 1st Lecture Meeting 2025.

1. The 10th Lecture Meetings hosted by Tokyo Section (co-hosted by LMAG)

The "Development and Popularization of Pulse Oximeters" was recognized as an IEEE Milestone, and a dedication ceremony, along with a commemorative lecture, was held on November 14, 2024. The commemorative lecture was conducted in a hybrid format, hosted by the IEEE Tokyo Section TPC and co-hosted by LMAG, with a total of 100 participants—70 attending in person and 30 joining online.

Fig. 1 IEEE Milestone Dedication Ceremony

The event began with a lecture titled *"Overview of IEEE Milestones"* by Prof. Isao Shirakawa, Chair of the IEEE Japan Council History Committee (JCHC). He explained that the IEEE Milestone program, established in 1983, honors historic technological achievements in the fields of electrical, electronic, information, and communication engineering that are over 25 years old and have significantly contributed to the advancement of society and industry. He also discussed recent trends in milestone recognition and their broader significance.

Following this, Dr. Naoki Kobayashi from the Ogino Memorial Research Institute at Nihon Kohden Corporation delivered a lecture titled *"The Invention of the Pulse Oximeter and Its Contribution to Medical Care."* He explained that a pulse oximeter is a device that non-invasively and continuously measures oxygen saturation (SpO_2) in arterial blood without the need for blood sampling. The principle behind the device was invented in 1972 by Dr. Takuo Aoyagi and his colleagues, with a domestic patent filed in 1974. The world's first ear oximeter was then commercialized and released in 1975.

Today, pulse oximeters are widely used in various medical settings, such as operating rooms, emergency care, intensive care units, and home healthcare, and have become essential tools in modern medicine. He also noted that the global COVID-19 pandemic reaffirmed the vital role of pulse oximeters in healthcare worldwide.

Fig. 2 Naoki Kobayashi giving the Commemorative Lecture

2. The 11th Lecture Meetings hosted by Tokyo Section (co-hosted by LMAG)

A lecture hosted by the Tokyo Section TPC and co-hosted by LMAG was held in a hybrid format, both on-site and online, from 15:00 to 16:30 on Thursday, December 26, 2024. The lecture title was "Trends in SF6 gas regulations aimed at achieving a carbon neutral society, and the development of SF6-free switchgear in its early stages, as well as its latest development trends." The lecturer was Toshiaki Rokuto (Hitachi, Ltd. / IEEE Fellow). A total of 153 people attended the lecture, including 56 IEEE members.

To achieve a carbon-neutral society by 2050, it is essential to expand the adoption of renewable energy sources and reduce greenhouse gas emissions from power grid equipment. In particular, SF6-free

technology, which eliminates the use of sulfur hexafluoride (SF6)—a gas commonly used as an insulating material in power equipment—plays a crucial role. The lecture covered the history and benefits of the world's first practical application of SF6-free high-voltage switchgear, the feasibility of using air insulation as an alternative to SF6, and the latest trends in SF6 regulations, which have been tightened in recent years, particularly in Europe and the United States. The speaker also compared different circuit breaker solutions and explained the use of dry air in electrical systems, as well as the insulating properties of air versus SF6.

After the talk, a lively Q&A session took place, with discussions on topics such as dry air vs. SF6 insulation.

Fig.3 Toshiaki Rokuto giving his talk

3. LMAG-Tokyo Annual General Assembly

The 2025 LMAG-Tokyo General Assembly was held on March 27th (Friday) from 14:10 to 14:40 in an face to on-site conference format. The assembly was presided by Dr.Chiba, Secretary. After reporting that 34 participants and other 791 LMAG-Tokyo members entrusted to the executive, this year's officers (Dr.Hayashi, Chair, Dr.sugie, Vice Chair, Dr.Chiba, Secretary) introduced themselves. Following that, Dr.Hayashi, Chair, gave a speech and proceeded with the proceedings of the general meeting as chair person. All agendas were deliberated and approved, and the LMAG-Tokyo General Assembly ended successfully. Below is an outline of the proposal.

Fig.4 LMAG-Tokyo Annual General Assembly

Agenda 1 : Appointment of officers in 2025

Dr. Hayashi, Chair, reported on the election of officers as follows.
Chair: Hideki Hayashi (Yokohama National University, former Sumitomo Electric)
Vice Chair: Toshihiko Sugie (Hokkaido University*, former NTT) *Tokyo Section resident member
Secretary: Isamu Chiba(Japan Manned Space Systems Corporation, former Mitsubishi Electric)

Agenda 2 : Report on the 2024 LMAG-Tokyo Activities

Dr. Hayashi, Chair, made the following activity report.
-The 2024 LMAG Annual General Assembly was held online on March 14th.
- 12 board meetings were held on-site and online.
- LMAG sponsored or co-sponsored ten lectures mainly online, with a total of 858 participants.
-Milestone-related tours were held (NTT Musashino Research and Development Center (IOWN), Technology Historical Museum (Musashino, Tokyo)) and technology site tours (Sagamiko Berry Garden, Abio Farm (Sagamihara City, Kanagawa Prefecture)).
-Other events we have co-hosted or cooperated with: Participation in the JC LMAG Conference (February 1st), R10 Life Member Committee Meeting (February 18th, June 9th, September 14th, November 30th), MGA Geographic Unit Elections Training (June 3rd), Participation in the R10 SYWL Congress (August 29th - September 1st), Participation in IEEE IEW2024 in Tokyo (August 31st), Participation in the JC LMAG Chair Conference (August 31st), 15th Career Development Workshop (November 16th)
- The LMAG-Tokyo Newsletter, which reports on our activities, was published three times a year and posted on our website.
- Articles about the activities of LMAG-Tokyo were posted on IEEE LMAG e-Newsletter and R10 Newsletter (Connect).
- We have improved the LMAG-Tokyo Home Page with the cooperation of the Tokyo Section Publication Committee.
- Election of next term (2025-2026) officers
In accordance with the new MGA Geographic Unit Election Process that came into force in February 2024 as much as possible, an election committee was established, candidates were solicited from the public, and the next term of officers was elected. The election results are as per Agenda 1.

Agenda 3 : Activity Plan for 2025

Dr. Chiba, Secretary, explained the following activity plan for 2025.
-The 2025 LMAG Annual General Assembly is held online (March 27).
- Officers: The activities of LMAG-Tokyo in 2025 will be carried out by the new organization, Chair: Dr. Hideki Hayashi, Vice Chair: Dr. Toshihiko Sugie and Secretary: Dr. Isamu Chiba.
- Lecture Meetings and Technical Tours:

Lectures (sponsored or co-sponsored) are planned more than four times. In addition, LMAG plans to hold tours of companies and other organizations, as well as tours related to the milestones.
-Promote participation and exchange with other sections and other Affinity Group events.
Strengthen cooperation with the Tokyo branch and SYWL to promote GMI-related events.
-Participate in R10 and LMAG related activities (LMAG Meet, R10 Conference LMAG Track, etc.).
Respond proactively to events such as HTC2025, the flagship conference for R10.
- LMAG-Tokyo Newsletter will be published at least three times a year and will be distributed to LMAG members by e-mail attachment and posted on the website.
-At the beginning of the year, the federation of Tokyo Section Chair and LMAG-Tokyo Chair will send a congratulatory message to new life members by e-mail.
-Work with the Publication Committee of IEEE Tokyo Section to improve the LMAG-Tokyo Home Page.

All the agenda items were deliberated, and after a Q&A session, all were approved, and the LMAG-Tokyo annual general assembly was successfully completed.

Fig.5 LMAG-Tokyo Officers
(Center: Dr. Hayashi, Chair, Right: Dr. Sugie, Vice Chair, and Left: Dr. Chiba, Secretary)

4. Lecture hosted by Tokyo Section (co-sponsored by LMAG-Tokyo)

The IEEE Tokyo Section TPC hosted a lecture, co-sponsored by LMAG Tokyo, on Thursday, March 27, 2025. The event took place at the Kikai Shinko Kaikan (in person) and online. The speaker, Dr. Akira Matsuzawa (CEO of Tech Idea Co., Ltd. / Professor Emeritus of Tokyo University of Science), and the title of the lecture was "The History and Development of A/D Converters." A total of 58 attendees participated, including 36 in person and 22 online, with 51 of them being IEEE members.

Over the past 50 years, electronic devices have evolved from analog to digital. However, since signals remain analog, an analog-to-digital converter (ADC) is required to convert analog signals into digital signals. While ADCs are essential for digital devices, they must be based on analog technology and achieve high precision. Particularly, the need to integrate ADCs into digital LSIs necessitates their implementation in CMOS. However, CMOS has lower precision than the bipolar technology initially used, and its precision has further deteriorated as chip sizes have shrunk. Additionally, power consumption has been a major challenge. Low-power operation has become increasingly crucial, especially for mobile devices and digital recording and communication applications that require ultra-high-speed conversion. As a result, ADC technology has evolved in a distinct manner, separate from conventional analog and digital circuit technologies.

In this lecture, based on experiences in developing ADCs for digital imaging equipment such as HDTVs, digital handy cams, and DVDs, the speaker provided an overview of the evolution of these electronic devices and the history and development of ADC technology as device technologies transitioned from bipolar to Bi-CMOS and CMOS. The lecture illustrated how ADC technology shifted from continuous-time analog circuits to discrete-time analog circuits and further to dynamic analog circuits that operate with ultra-low energy and without steady-state current flow.

Fig.6 Dr. Matsuzawa giving his talk

Furthermore, the speaker discussed topics such as the relationship between device area and precision, chopper and interpolation techniques for precision enhancement, the development of calibration technology, and the low-power, high-speed ADC technology that enabled the complete one-chip analog-digital integrated system LSI for DVDs. Additionally, the lecture introduced an example of a 100 Gb/s interleaved successive approximation ADC, which enabled ultra-high-speed digital optical communication. The discussion highlighted how ADC technology, similar to CMOS logic circuits, operates without steady-state current, adheres to scaling laws, and benefits from miniaturization to achieve higher speeds and lower power consumption. Finally, the importance of ADC technology for cutting-edge analog computing applications, such as AI and quantum computers, was emphasized.

It was an extremely fascinating lecture, followed by an active and engaging Q&A session.

5. Future Events

LMAG-Tokyo is planning to hold the following events while paying attention to corona countermeasures. Details will be announced at a later date.

・August 5 (Tuesday): LMAG lecture (sponsored by LMAG, co-sponsored by TPC), with hybrid method.

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