Newsletter

Issued on February 10, 2014 No.11

IEEE Tokyo Section
Life Members Affinity Group

This issue places the report of three events held last autumn, and coming meeting information, etc.

1. The Lecture by Dr. Sadaoki Furui titled "My thoughts now and my 40 years of the study and education on speech and multimedia processing"

LMAG Tokyo held the above lecture meeting in co-sponsorship with IEEE Tokyo Section at the meeting room B2-1, Kikai-Shinko Kaikan, from 15:30 to 17:00 on October 18, 2013. The meeting was chaired by Dr. Gene Cheung, TPC Vice-Chair of IEEE Tokyo Section, and had approximately 50 participants. The summary of the lecture is shown below.

Lecture by Dr. S. Furui

Lecture Meeting Room

Dr. Furui received ME degree from the University of Tokyo in 1970, and started as a researcher of speech processing at the 4th Research Section, Basic Research Lab., Electrical Communications Labs., NTT. The department head, Dr. Shuzo Saito, who was making global achievements then, always required the world top-level quality of study to his group members, including the research leader, Dr. Fumitada Itakura.

Following Dr. Saito's motto: "Submit the papers that should not be rejected by journals or conferences", Dr. Furui always tried to achieve the high quality study. As he was endowed an opportunity as visiting researcher at Bell Labs. (Murray Hill) for one year since December 1978, his life was greatly evolved, where he could engage himself in a study of speech recognition.

The NTT laboratory was a splendid place, and research funds were sky limit. For two years, he did the administrative work apart from the study on the way, but learned the organizational research management. He was able to push forward an advanced study in the field of speech recognition for 27 years at NTT, though for the last six years, he served as Director of Furui Research Laboratory.

He became a professor at Tokyo Institute of Technology in April, 1997 and was engaged in big research projects such as "The spontaneous speech engineering project", "The systematization and application of large-scale knowledge resources", and "The development of the speech recognition generic technology". The spontaneous speech engineering project developed the technology for recognition, understanding and summarizing of spontaneous speech in five years since1999. It brought significant results to have built up a Japanese spontaneous speech corpus by various researchers from the NINJAL, Communications Research Laboratory, Kyoto Univ., and NTT Laboratories in addition to Tokyo Institute of Technology. He experienced that big power was generated when members who had different skills cooperated together.

The speech recognition goes to the interface technology between a computer and a human being, and becomes more and more important technology for various kinds of guidance, reservation, search, car navigation systems and future robots as natural interfaces. On the other hand, a speech documentation technology is used already for the production of meeting minutes, the automatic subtitles for TV broadcasting, the medical record, and other business applications. It is necessary to aim at realization of the process of human thinking, namely artificial intelligence itself, so that these systems may get closer to the human ability. Even though it is not easy, he believes there should exist a right course by all means. To this end, a big switch of the idea is essential, and liberation from spellbinding of the written language is necessary. He reached a retirement age of Tokyo Institute of Technology in March 2011, but continued working at Academy for Global Leadership as Master of "Furui-dojo", where is given the integrated doctoral education program for global-leadership.

In April 2013, he was appointed as president of TTIC (Toyota Technological Institute at Chicago) which is located on the campus of the University of Chicago in the USA. This university was established in October 2001, collaborating with the Univ. of Chicago, as a sister university of Toyota Technological Institute based on the endowment of the Toyota Motor Corporation. TTIC conducts education and research on the basics of computer science and information technology (mainly machine learning now), and it has 25 full-time

professors, seven office workers, 25 doctoral course students, and 17 interns now. The Univ. of Chicago has produced 89 Nobel Prize winners, but is not yet strong in the field of computer science. The Univ. of Chicago is therefore collaborating with TTIC to enrich the graduate school education of this field. TTIC accepts the graduate students locally, but it also accepts the students of Toyota Institute of Technology in Japan as a foreign student every year for a short term from September to December. The student evaluation committee is held twice a year in TTIC, and all the professors examine every graduate student's progress and check other professors' guidance and advice for every student. This is the popular system in the US, and should also be adopted at Japanese universities.

From his experience, he states that the followings are necessary for future university education in Japan.

- Even though it is necessary to teach basic knowledge, the ability to manage knowledge and creativity (ability to find and solve a problem) is more important, because knowledge itself comes to be available easily. The base of this ability is to think. This is to be emphasized from now on.
- The undergraduate students should be given basic education thoroughly, and their graduate course should be decided freely based on interests and ability, irrespective of their undergraduate courses.
- The key whether the university is recognized globally or not depends on whether it can educate students with the leadership to play active parts globally.
- It is necessary for university professors to work on education more seriously.
- It may be appropriate for undergraduate courses to be given in Japanese, but it is necessary to provide graduate education in English.

2. The Commemorative Lecture of Dr. Shinichi Takagi's Andrew S.Grove Award Winning

LMAG Tokyo held the above lecture meeting in co-sponsorship with IEEE Tokyo Section at the meeting room of B2-1, the Kikai Shinko Kaikan, from 15:30 to 17:00 on November 29, 2013.

IEEE Andrew S. Grove Award is one of the awards in IEEE Electron Devices Society, succeeded in 2000, IEEE Jack A. Morton Award starting in 1976. This award is presented to an individual who provides outstanding contributions to solid-state devices and technology. The 2013 Andrew S. Grove Award has been given to Prof. Shinichi Takagi, Dept. of Electrical Engineering and Information Systems, Graduate School of Engineering, the University of Tokyo, for contributions to the understanding of transport properties in inversion layers of high-performance MOSFETs.

At the lecture meeting with 33 participants, following the greeting of Dr. Hiroki Shoki, TPC Chair of IEEE Tokyo Section, Dr. Takagi presented the lecture entitled as "A path of the understanding of carrier transport properties in CMOS and enhancing the performance". He has conducted the researches on the understanding of factors determining the performance of MOS transistors and methods/device structures to enhance

Lecture by Dr. S. Takagi

the MOSFET performance in both an industry and the university over 30 years in step with the evolution of Si technology and the development of the Si industry. In this lecture, he introduced the essences of the research achievements with the times, including the episodes of the developments. The contents are briefly summarized in the following.

Semiconductor ultra-large scale integrated circuits (ULSI) have been realized with improvement of the performance and functionality over time longer than 50 years through the device miniaturization. Such a progress of the technology is based on the increase of the current drive of Si MOS transistors, of which integrated circuits are composed. Here, one of the most important physical parameters to determine the current drive of MOS transistors is the mobility of carriers in Si inversion layers. Thus, in order to increase the drive current of MOSFET, it is necessary to realize items: (1) clarify the physical mechanism determining the channel mobility, (2) establish the quantitative physical model to predict the drive current of MOSFETs, and (3) propose and establish engineering to enhance the channel mobility in Si MOSFETs

Under such recognition of the importance of the channel mobility in MOSFETs, Dr. Takagi experimentally examined the channel mobilities in Si n-channel and p-channel MOSFETs with changing the vertical electric field, substrate impurity concentration, temperature, surface orientation and so on. As a result, it was found, as shown below in Fig., the channel mobility can be represented by a physical quantity called the effective field, the averaged vertical field in the inversion layers. Based on this result, the physical origins of the inversion-layer mobility have been quantitatively clarified for both mobility components which do and do

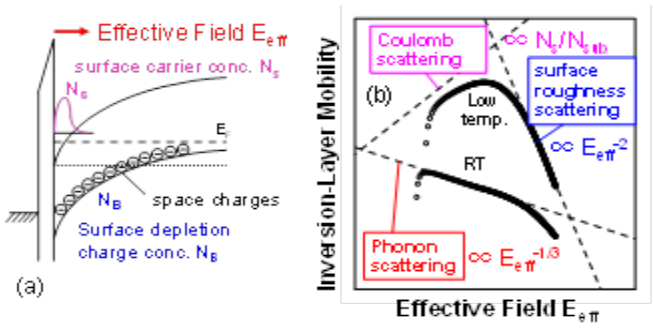

Fig. (a) Schematic band diagram of Si MOS interface and (b) Schematic diagram of effective field dependence of inversion-layer mobility and scattering mechanism of the mobility

not obey to the universality against the effective field. The present mobility model, which has been called “universal mobility model”, has been adopted into numerous commercial device simulators in terms of the accuracy of the inversion-layer mobility in Si MOSFETs. In addition, this result has been widely utilized to evaluate the performance of MOSFETs as the standard values of the mobility in Si MOSFETs.

In addition, based on the characteristics of carriers in Si MOS inversion layers shown above, Dr. Takagi has proposed and demonstrated the subband modulation engineering to enhance the inversion-layer mobility in Si MOSFETs by using tensile-strained or ultra-thin Si layers.

Moreover, Dr. Takagi is still continuing to conduct the development of MOS transistor technologies using Ge and III-V semiconductor channels with light effective mass of carriers for realizing future high performance MOS transistors on a basis of the understanding of the MOS inversion-layer mobility.

3. Lectures Celebrating the IEEE Milestone to Toshiba Laptop PC.

The presentation ceremony of the IEEE Milestone plaque to Toshiba laptop PC was held in Hotel Okura Oak Room on Tuesday, October 29. The Milestone plaque was given to Mr. Atsutoshi Nishida, Chairperson, Toshiba, from Dr. Peter Staecker, President, IEEE. To celebrate, the lecture meeting of following contents was held from 14:00 to 16:00 in the same room, under the co-sponsorship with IEEE Tokyo Section.

1. IEEE Milestone Overview: Dr. Isao Shirakawa, Chair, History Committee, IEEE Japan Council
2. Japan and IEEE: Dr. Peter Staecker, President, IEEE
3. Laptop PC T1100: Mr. Atsutoshi Nishida, Chairperson, Toshiba Corporation

Toshiba Laptop PC "T1100" released in Europe in 1985 was the product compatible with the IBM desktop PC’s functions, and was developed as a laptop type ahead of the world. This became the beginning, and led to the development of today’s notebook PC. The citation of the Milestone shown below is written down to its plaque: “The Toshiba T1100, an IBM PC compatible laptop computer that shipped in 1985, made an invaluable contribution to the development of the laptop PC and portable personal computers. With the T1100, Toshiba demonstrated and promoted the emergence and importance of true portability for PCs running packaged software, with the result that T1100 won acceptance not only among PC experts but by the business community”.

The IEEE Milestone has been selected about 140 cases throughout the world so far. In Japan, Yagi-Uda Antenna was the first one in 1995, and this time becomes the 18th case.

4. Election of the 2014 Officers

Call for the additional nomination of the officer candidates was announced, but there was no proposal by the time limit. At LMAG officers meeting of Nov. 29, the original candidates shown below were appointed as

Presenting IEEE Milestone Plaque
to Mr. A. Nishida from Dr. P. Staecker

Laptop PC “T1100”

LMAG officers for 2014.
Chair: Kunio Tada, Prof. Emeritus, Univ. of Tokyo
Vice-chair: Yukou Mochida, Bayern State Representative to Japan
Secretary: Tetsuya Miki, Univ. of Electro-Commun.

5. Event Information

5.1 2014 General Assembly of LMAG Tokyo
This will be held on the afternoon of Friday, March 14. Details will be announced shortly.

5.2 Interchange Meeting among four groups
LMAG Tokyo, Student Branch, Young Professionals (former GOLD) Affinity Group, all under IEEE Tokyo Section, and WIE (Women in Engineering) Affinity Group under IEEE Japan Council will hold an interchange meeting bridging generations as follows:
Date and Time: 15:00-19:00, March 15 (Sat), 2014
Location: Katsushika-Campus, Science Univ. of Tokyo
Events:1. Address
2. Lecture by Dr. Kunio Tada, entitled “The dawn of R&D on Semiconductor Integrated Circuits – Contributions from Japan made a Half-Century ago –”
3. Information Exchange and Discussion
4. Get-together party
Details will be announced shortly.

6. Call for Contribution

Your contribution is always welcome. Please contact to the secretariat <tokyosec@ieee-jp.org>.

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