ATTACHMENT 1: Profile and Detailed Achievements of the Group A Recipient of the 2019 C&C Prize

Dr. Yasuhiko Yasuda

Current positions:
   Professor Emeritus, The University of Tokyo
   Professor Emeritus, Waseda University

Personal History (born in 1935):
1958   BS, in Electrical Engineering, The University of Tokyo
1963   PhD, in Electrical Engineering, The University of Tokyo
1963   Associate Professor, Institute of Industrial Science, The University of Tokyo
1964   Researcher, Institute of Space and Aeronautical Science, The University of Tokyo
1977   Professor, Institute of Industrial Science, The University of Tokyo
1985   Steering Committee Member, Supercomputing Center, The University of Tokyo
1985   Member, High Speed Computing Committee, The University of Tokyo
1985   Auditor (part-time), Japan Information Center of Science and Technology
1991   Technical Adviser, Space Development Committee, the Prime Minister's Office
1992   Retired from Institute of Industrial Science, The University of Tokyo
1992   Professor, Department of Electronics and Communication, Faculty of Science and Engineering, Waseda University
1993   Member, Management Council, Institute of Space and Astronautical Science, Ministry of Education
1993-2000 Member, Telecommunications Technology Council, Ministry of Posts and Telecommunications
1994   Visiting Professor, Academic Information Center, Ministry of Education
1994   Auditor, Japan Information Center of Science and Technology
1996   Professor Emeritus, The University of Tokyo
1996   Board Member, Japan Science and Technology Corporation
1998   Member, the Information and Communication Council, Ministry of Posts and Telecommunications
1998   First Chairman, Information and Communication Technology Subcommittee, Ministry of Internal Affairs and Communications
2000   Chair, IEEE Tokyo Section
2001   Visiting Professor, National Institute of Informatics

2004   Director, Information Technology Research Organization, Waseda University
2006   Retired from Waseda University

Major Awards and Recognition:
1963   Best Paper Award, The Institute of Electronics, Information and Communication Engineers (IEICE)
1987   Achievement Award, IEICE
1987   Kobayashi Memorial Achievement Award, IEICE
2001   Distinguished Achievement and Contributions Award, IEICE
2004   Takayanagi Memorial Award
2005   NHK Broadcasting Culture Award
2014   The Order of the Sacred Treasure, Gold Rays with Neck Ribbon

Prof. Mitsutoshi Hatori

Current positions:
      Professor Emeritus, The University of Tokyo
      Professor Emeritus, National Institute of Informatics

Personal History (born in 1938)
1963   BS, in Electrical Engineering, The University of Tokyo
1968   PhD, in Electrical Engineering, The University of Tokyo
1968   Lecturer, Faculty of Engineering, The University of Tokyo
1969   Associate Professor, Faculty of Engineering, The University of Tokyo
1986   Professor, Faculty of Engineering, The University of Tokyo
1999   Professor Emeritus, The University of Tokyo
1999   Professor, Academic Information Center, Ministry of Education
2000   Professor, National Institute of Informatics
2004   Professor Emeritus, National Institute of Informatics
2004   Professor, Faculty of Science and Engineering, Chuo University
2009   Retired from Chuo University

Major Awards and Recognition:
1969   Yonezawa Memorial Young Investigators Award, IEICE
1970   Best Paper Award, IEICE
1988   Niwa-Takayanagi Prize (Achievement), The Institute of Image Information and Television Engineers (ITE)
1995   Achievement Award, IEICE
1999   Niwa-Takayanagi Prize (Distinguished Achievement), ITE
1999   NHK Broadcasting Culture Award
2001   Distinguished Achievement and Contributions Award, IEICE
2017   The Order of the Sacred Treasure, Gold Rays with Neck Ribbon

Achievements

As the popularity of digital broadcasting has risen, the internet and social networking are pervasive in our social lives. With the practical realization of high-definition TV broadcasting such as 8K following the rollout of 4K, the launch of 5G high-speed wireless communication is expected to further drive social transformation and development. Efficient and user-friendly image coding technology has long played an integral role in the realization of this technology.

Since the 1960s, Dr. Yasuhiko Yasuda's research and proposals on topics such as delta sigma modulation, G2/G3 facsimile encoding, and hierarchical image encoding have led to a long list of pioneering achievements that have helped develop information and communication engineering as we know it today.

The delta sigma modulation algorithm eliminates the shortcomings of conventional delta modulation and is a groundbreaking A/D conversion algorithm that offers excellent performance and mounting flexibility. The technology is an essential component in the oversampling algorithm and high-precision A/D conversion algorithm employed in processing audio signals, and researchers around the world are still actively involved in the research and development of delta sigma modulation more than half a century since its discovery. In the area of facsimile encoding, Dr. Yasuda proposed the analog bandwidth compression algorithm and went on to lead research and development in image compression, halftone screen technology, and other elements from the early stages of digital facsimile development.

Furthermore, in 1980, he proposed a hierarchical image coding system as a method for encoding still images. In this method, the algorithm transforms image signals into a hierarchically ordered set of data before transmitting the data, making it possible to instantly provide an overview of the image to recipients. Besides enabling optimal transmission of image data to devices in various environments and resolutions, hierarchical image coding is positioned as an international standard for still image coding similar to ISO, IEC, and ITU-T and provides many other remarkable benefits. In 2017, the Institute of Electronics, Information and Communication Engineers selected Dr. Yasuda's delta sigma modulation algorithm and hierarchical image coding as IEICE milestones of significant impact on society, the industry, or the development of science and technology. He also received a special mention for his accomplishments in digital sigma modulation and hierarchical image coding. Furthermore, in 2012, the standardization of the G3 facsimile jointly applied by NTT and KDDI was selected as an IEEE milestone.

In addition to technological contributions such as those mentioned above, Dr. Yasuda has dedicated long years of service performing as a chairman of conferences and on various councils, and he has spearheaded the formulation of standards in digital broadcast systems. He has built a legacy of innovation in information and communication engineering from its development to practical application.

Under the guidance of the late Yasuo Taki, professor at the University of Tokyo, Prof. Mitsutoshi Hatori predicted the critical role high-efficiency coding was going to play in the future of TV signals, video phones, video conferencing, and other video images, and he conducted research from the early stages of development. He produced a number of research results and accomplishments that form the basis of today's high-efficiency video coding technology. Besides basic research on video signal processing, he was a leader in organizations responsible for facilitating practical use and standardization.

One of Prof. Hatori's groundbreaking research results is the technology he advocated in "Interframe coding that follows the motion," which he coauthored with Prof. Taki and others in 1974, and the foundation that he established with respect to its practical application. The blockmatching algorithm technology—classified within the category of interframe coding—is a temporal redundancy image compression technique that is an estimation method that divides images into blocks of pixels and predicts the interframes using the correlation between each moving block; it is regarded as a leading innovation in interframe coding. This research has been subsequently developed into the Moving Compensation Coding that is employed in the MUSE transmission algorithm and MPEG coding algorithm for HDTV, and it has greatly driven the field forward. Furthermore, the professor innovated the field of video signal processing by researching the medical application of image processing, ghost cancelers, multipath distortion cancelers, other channel interference cancelers, and other signal processing research projects.

In addition to the technological contributions mentioned above, Prof. Hatori has contributed to the social proliferation of fields associated with communications and broadcast engineering. The professor has played a significant role in the practical application and development of the field by gaining the required consent of telecommunications carriers, broadcasters, broadcasting equipment manufacturers, ministries, government offices, etc. Besides developing talent at universities, he has long served as chairman of related conferences, as head of the Telecommunication Technology Committee, and as a member or officer of various councils, making remarkable contributions to building communities and providing leadership

in the field of communications and broadcast engineering.

Given the enormous impact that they have had on the world through their visionary research in, and their development and promotion of, the image processing field and its social implementation, we believe that Dr. Yasuda and Prof. Hatori would be excellent recipients of the C&C Prize.