

## Citation

For pioneering research on mobile communications and networking, and outstanding contributions to education and nurture of many human resources in the fields of information and telecommunications



## Dr. Susumu Yoshida

**Position and Organization :**  
Specially Appointed Professor,  
Professor Emeritus, Kyoto University

**Doctorate :** Ph.D. (Kyoto Univ., 1978)

**Date of Birth :** November 26, 1948

### Brief Biography :

- 1971 B.S. in Electronic Engineering, Kyoto Univ.
- 1973 M.S. in Electrical Engineering, Kyoto Univ.
- 1973 Research Associate, Faculty of Engineering, Kyoto Univ.
- 1978 Ph.D. in Electrical and Electronic Engineering, Kyoto Univ.
- 1979 Associate Prof., Faculty of Engineering, Kyoto Univ.
- 1990 Visiting Scholar, Rutgers Univ. (WINLAB) and Carleton Univ.
- 1992 Prof., Faculty of Engineering, Kyoto Univ.
- 1996 Prof., Graduate School of Engineering, Kyoto Univ.
- 1998 Prof., Graduate School of Informatics, Kyoto Univ.
- 2006 Member, Education and Research Council, Kyoto Univ.
- 2012 President, Institute of Electronics, Information and Communication Engineers (IEICE)
- 2012 Council Member, Science Council of Japan
- 2013 Retirement, Prof. Emeritus and Specially Appointed Prof., Kyoto Univ.

### Main Awards and Honors :

- 1978 IEICE Young Researcher's Award
- 1988 TELECOM System Technology Award, Telecommunications Advancement Foundation
- 1993 IEICE Achievement Award
- 2004 IEICE Fellow
- 2006 TELECOM System Technology Award, Telecommunications Advancement Foundation
- 2006 Info-Communications Promotion Month Commendations by the Director of the Kinki Bureau of Telecommunications, the Ministry of Internal Affairs and Communications
- 2007 Ericsson Telecommunications Award
- 2011 IEICE Best Paper Award
- 2011 Radio Day Ministerial Commendations, the Ministry of Internal Affairs and Communications
- 2012 Honorable Mention of TELECOM System Technology Award, Telecommunications Advancement Foundation
- 2013 IEICE Best Paper Award

### Main Achievements :

During his 40 years at Kyoto University, Dr. Susumu Yoshida has been involved with education and research in the field of information and communication technology. Over this time, he has produced many leading-edge research outcomes and provided quality instruction to lots of talented local and international students, greatly contributing to the development of human resources driving Japan's information and communication technology sector forward.

After obtaining his doctorate in engineering by studying transmission line codes and recording channel codes with spectral nulls at specific frequencies targeting high density magnetic recording, together with a pioneering research project to connect computers by an optical fiber, Dr. Yoshida began the research on mobile communications in 1976 at the research laboratory of Professor Emeritus Dr. Fumio Ikegami in Kyoto University at a time when the potential for this technology was completely unknown. He would go on to conduct progressive research on the characteristics of radio wave propagation in urban areas.

Later, at the beginning of the 1980s, Dr. Yoshida focused on the future potential of digital mobile communications, becoming the first in the world to clarify the causes of burst error generation mechanism unique to mobile communication during frequency selective fading, which posed a major challenge to high-speed transmission. This research also led him and his student to invent the anti-multipath modulation technique. Since this technique had the surprising effect, at that time, of improving the bit error rate characteristics in multipath environments, known as the

path-diversity effect today, Dr. Yoshida obtained a testing frequency license (400MHz band) for field testing in downtown Kyoto where he confirmed this outstanding property of the proposed scheme. He also proposed a distributed antenna for his anti-multipath modulation technique, which demonstrated excellent results in improving the error rate, prior to proposals for CDMA.

Dr. Yoshida found that high reliability mobile communication requires mitigating the effects caused not only by multipath signals, but also by co-channel interference signals, and in the early 1990s he proposed a pioneering receiving technique that combined spatial signal processing using a sector antenna with temporal signal processing with an adaptive equalizer. This would become the forerunner to receivers that feature a combination of array antenna and adaptive equalizers. This led Dr. Yoshida to the research of a trellis coded co-channel interference cancellation equalizer, which demonstrated the potential of a space division multiplexing transmission system.

Dr. Yoshida was also among the first to notice the future need of autonomous distributed control systems for wireless networks, and he studied the basic technologies behind these systems. For example, Dr. Yoshida was involved in the theoretical analysis of frequency utilization efficiency for multihop wireless networks using the game theory, and also conducted research and validation testing on a multiuser MIMO assuming a pre-coding.

In the realm of international exchange, Dr. Yoshida has not only welcomed international students with open arms, but has also proactively participated in academic exchange with universities and research institutions outside Japan. For example, he has been enthusiastically involved with JICA and JSPS exchange programs with universities in Singapore since Kyoto University was a hub institution, and he has hosted many faculty members from Universities in Singapore. He has also been an active participant in academic exchanges between Kyoto University and a consortium of universities from the Province of Quebec in Canada, in the field of information and communication technology, including joint workshops and student exchange. Over the last seven years Dr. Yoshida has also devoted great efforts to Japan-China academic exchange programs as a representative from Japanese academia side, including an annual Japan-China workshop in the field of mobile communications and joint collaborative research projects.

Additionally, Dr. Yoshida has made many great contributions to academic societies in the field of information and communication technology both in Japan and abroad. For example, he has served as the Chairman of the Technical Committee on Radio Communication Systems, Director for Journals and Transactions, President of the Communications Society, and Vice President of the Institute of Electronics, Information and Communication Engineers, and in 2012 Dr. Yoshida was elected as President of this organization. He also worked as the guest editor for IEEE JSAC in IEEE ComSoc and later was involved with the editing of articles in wireless communications series of the same publication. Recently, he served as the General Co-chair of the IEEE VTC 2012-Spring International Conference. All of these positions and more illustrate his prominent contributions to academic societies in the wireless communications field in particular.

In Science Council of Japan and also in Information and Communication Council of Ministry of Internal Affairs and Communication, he has been actively working to contribute to the further development of information and communication technology in Japan as a council member.

For the above reasons, Dr. Susumu Yoshida is hereby awarded the Okawa Prize, in recognition of his many years of progressive research and education involving validation activities in the field of information and communication technology and in particular mobile (wireless) communication systems, his support in developing many talented human resources, and the important roles he has played in academic societies and government affiliated institutions. All of these contributions to society have been extremely meaningful and made a difference.