
Concluding Remarks

SAWAI Hidefumi

This special issue discusses various approaches to research that produce useful ideas “inspired by life,” with the goal of designing and constructing future information communication systems.

Part 1, “Trends in research on information and communications technologies (ICT) inspired by life,” discusses our knowledge of brain functions and the evolution of life, mining this knowledge for insights into the superb functions of life forms and their possible application to the design of information processing systems and information communication systems capable of solving real-world problems. Part 2, “Trends in research on molecular communication technologies,” argues for the possibility of information communication systems based on molecules, harnessing the inherent functions of life forms at the molecular level.

Here’s a prediction of how research on information and communications technologies inspired by life will proceed over the next several decades. According to *The Singularity is Near: When Humans Transcend Biology*^[1] by Ray Kurzweil, paradigm shifts (technological innovations) have emerged at accelerating rates in recent years, while information technology capabilities (cost performance, speed, capacity, bandwidth) grow at exponential rates, even faster than that forecast by Moore’s Law. One of the ultimate goals of brain science is to create an artificial brain. Forecasts call for the “reverse engineering of the brain” to result in human intelligence software by

2045 or so. Integrated with concurrent GNR (G: genetics, N: nanotechnology, R: robotics) breakthroughs taking place, these cutting-edge technologies will lead in several decades to revolutionary technologies well beyond our imagination. In this future, humans will become qualitatively different entities, embarking on a new stage of human evolution. It requires a vivid imagination to envision the actual technologies that will be available, but in view of the scale and nature of the effects of scientific and technological revolutions on human civilization, these technologies will doubtlessly have both bright and dark aspects. We must consider not just scientific and technological progress, but the social impact of such progress, including ethical issues, as we pursue our research and development.

Acknowledgements

In addition to introducing the results of research carried out primarily at the Kobe Advanced ICT Research Center (KARC) at the Kobe Research Laboratories of the National Institute of Information and Communications Technologies (NICT), this special issue also discusses the results of joint research undertaken by organizations other than NICT, including universities and research institutions. I wish to express my deep gratitude to all those who have provided support and cooperation at various stages of this research.



SAWAI Hidefumi *Dr. Eng.*

*Director, Project Promotion Office,
Kobe Advanced ICT Research Center,
Kobe Research Laboratories*

Information Science, Computer Science