

Leading edge of Cybernics: Robotics that suit you

Yoshiyuki Sankai



Cybernics is a new domain of interdisciplinary academic field of human-assistive technology to enhance, strengthen, and support human's cognitive and physical functions, which challenges to integrate and harmonize humans and robots (RT: robotics technology) with the basis of information technology (IT) in a functional, organic, and social manner. We aim to develop the frontier science Cybernics, which is centered on cybernetics, mechatronics, and informatics, and it challenges to integrate neuroscience, robotics, systems engineering, information technology, "kansei" engineering, ergonomics, physiology, social science, law, ethics, management. The goal of the Program represents a

Grand Challenge that makes breakthroughs in the innovative creation and fusion of forefront researches based on information science. A pioneering achievement of Cybernics is Robot Suit HAL (Hybrid Assistive Limbs) developed by Yoshiyuki Sankai. HAL is the world's first cyborg type robot that enhances and strengthens the limb motion of human bodies by detecting the weak bioelectrical signal through the body from the brain which generates the nerve signal to control the musculoskeletal system. In this talk, I will deliver the outline Cybernics approach based on our experienced and introduce the work performed in Cybernics. And, I may present what we have done related in this fields.

Yoshiyuki Sankai received a PhD in engineering from University of Tsukuba in Japan in 1987. He was Assistant Professor, Associate Professor, Professor at the Institute of Systems & Engineering at the University of Tsukuba, and a Visiting Professor of Baylor College of Medicine in Houston, Texas in the United States. Currently, he is professor of the Graduate School of Systems & Information Engineering at the University of Tsukuba, and president and CEO of CYBERDYNE Inc. He was/is a member of Japan Society of Embolus Detection & Treatment and International Journal of the Robotics Society of Japan (RSJ) and executive board member of RSJ. He is the inventor, creator and driving force behind the advanced robotics, Robot Suit HAL® (Hybrid Assistive Limb ®) and various Cybernics, medical, care and welfare technologies. In 2006 and 2009, he was invited to provide direction to Japan's future science & technology policies by the Council for Science and Technology Policy advising the prime minister, other Japanese ministers and senior government officials.

Among the awards he won are: World Technology Award (2005), Good Design Gold Award (2006), Japan Innovator Award (2006), Best Paper Award (International Journal of Advanced Robotics) (2006), Award from American Society for Artificial Organs, Award from International Society for Artificial Organs, Award from the Minister of Economy, Trade and Industry of Japan (2007), Award from National Institute of Science and Technology Policy (2007), NIKKEI Top – Quality / Service Award (2008) , Award from IEEE / IR, Invention & Entrepreneurship Award (2009), the 21st century Invention Award from Japan Institute of Invention and Innovation (2009) , NIKKEI change makers of the year 2010 (2010) and so on.

In 2007, he was appointed as leader of Global COE (Centre of Excellence) program for Cybernics by the Japanese Ministry of Education, Culture, Sports, Science and Technology of Japan, he obtained the significant grants from NEDO (New Energy and Industrial Technology Development Organization), and health science grants from the Japanese Ministry of Health, Labor and Welfare, and a grant-in-aid for scientific research from the Japanese Ministry of Education, Culture, Sports, Science & Technology. And now, September in 2009, he was also selected as leader of Center for Cybernics Advanced Research of Funding Program for World – Leading Innovative R & D on Science and Technology, set up by Cabinet Office of Japan. He continues to promote the application of the HAL® technology for the benefit of senior citizens, physically challenged people and patient groups with specific diseases.