

Messages from Modern Inventors to the Next Generation

Season 2

10. Robot Suit HAL: The World-Leading Human-Assistive Robot Contributing to a Long-Lived and Healthy Society

- Professor, Dr. Yoshiyuki Sankai, University of Tsukuba



Dr. Sankai invented Robot Suit HAL (Hybrid Assistive Limb), which is the world's first wearable cyborg-type robot. When people wear Robot Suit, it detects the signals (wearer's intention). Based on the signals obtained, the power unit is controlled to move the joint untidily with the wearer's muscle movement. Therefore HAL can help wearer's movements smoothly and let people who are wheelchair-bound and can't walk because of disabilities or illnesses fulfill their dreams of walking on their own feet again.

Robot Suit HAL has already been working in hospitals and nursing care facilities in various parts of Japan, taking active roles in the training and support of the physically challenged. In the future, HAL is expected to be used for more than just social-service work, for example, doing physically hard labor.

What inspired you to become an inventor/researcher?

Reading "I, Robot" written by science-fiction writer Isaac Asimov which I read at nine years old inspired me to think that I wanted to become a scientist or doctor of engineering who could make robots that help people. It was about that time that the animation program "Cyborg 009" first appeared on television, and I became interested in cyborgs. The scientists who appeared in science fiction novels and animation programs were like magicians; they always help people with their wonderful inventions.

Just as a child who likes sports would play soccer or baseball for fun, I who liked science would have fun playing with electronic gadgets, observing living things through a microscope, and doing all kinds of experiments such as rocket fire experiments using gunpowder.

When I encountered something that was mysterious and intriguing, I was so determined to learn about the principles behind it that I would read books and study or conduct experiments. Doing these things naturally made me think of becoming a scientist in the future.

What specific ideas and difficulties have you faced as an inventor/researcher?

Robot Suit HAL is one of the achievements in the field of research called “Cybernetics”, a research field that I created. Cybernetics integrates all kinds of research done on human beings, machines and information. After we started conducting research on the technology used for HAL, we took more than five years until we finally unveil Robot Suit HAL. The reason we took a long time from the start of our research until we announced our achievement was that we wanted to realize really useful system for the users/patients and so, people who saw it would put a smile on their face and say, “Wow!”, “Very useful!”, “I could walk!” and “Look at that. How amazing!”. Also we wanted to produce our research as a high-level achievement, it was necessary to give enough time to validate and evaluate the principles of our research as well as to go through formal processes.

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However, as a university professor, I couldn’t go on forever without releasing something and without producing results. In order for me to still do research on HAL, I conducted researches in different areas at the same time while publicizing findings. It was tough and I was very busy, but I overcame the hardship by telling myself “Wow! Spicy!”. I believe that “It may be hard, but I’m not in any pain.”

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What gives you joy as an inventor/researcher?
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My policy is “I will create things what is necessary but no exist.” based on the ideas of “I want people to be happy.” and “I want to be of use to others,” It is always difficult to create things from scratch so I was faced with many difficult issues as well as with some difficult times and hardships. Life is too short...

Even in such difficult times, I never sigh nor look down. My way of surviving was to take a rest by sleeping like a log. When sleeping is not enough, I would look up at the sky and actually take pleasure in sensing all of my hard work. The words left by the late calligrapher, Mr. Bakuzan Sakaki, go, “When flowers are in bloom, let you become intoxicated with flowers; and when the wind is blowing, let your become intoxicated with the wind.” I believe this way of thinking is very important.

Finally, the pleasure after overcoming various difficulties is truly exceptional. I was really delighted at the people’s responses and at their amazed expressions when we released HAL. This, of course, was in addition to the expressions and gestures of delight the physically challenged showed when they were able to walk using HAL. Then, all the hardships that I had experienced in the past instantly vanished. I gained new motivation to work even harder! I hope that you will also experience this wonderful delight after you overcome difficulties.



Showing how Robot Suit HAL is worn

Photo credit: Prof. Sankai University of Tsukuba/CYBERDYNE Inc.

What message would you like to give to future generations?

In the book “I, Robot” that first motivated my interest in robots, the year 2008 was a future more than 40 years away. When I read it, I thought the year 2008 was the distant future. So when it actually came, I was surprised to be in the middle of the “future”.

Future will surely come. And you will be there in that future. What you learn up to junior high

school is important, as it will form the basis for creating the future. It will definitely be valuable in due course, so please study hard with exciting minds and pleasure. High school and university give you knowledge and directions to build your future if you wish, so diligently study a wide variety of things. I look forward to your growing up into an adult who thinks about how you want to shape the future. I hope you play a central role in creating it.

If you have something you really like to do or have a dream for the future, you should think of them as valuable assets. When you to pursue something you like or make your dream for the future come true, there likely will be a number of difficulties that you will need to overcome first. Please continue to go forward and overcome them. On the other hand, there is no need to worry if you don't have anything you like to do at the moment, or if you don't have any dream for the future yet. Just stay with people close to you who do have dreams, and go forward together with them. That would be something both enjoyable and rewarding.