

Interview mit Jun-Ho Oh



Prof. Jun-Ho Oh received the B.S. and M.S. degrees in mechanical engineering from Yonsei University, Seoul, in 1977 and 1979, respectively and the Ph.D. degree in mechanical engineering from the University of California, Berkeley, in 1985. Since then, he has been with the Korea Advanced Institute of Science and Technology (KAIST), where he directs the humanoid robots lab. In this lab, Albert Hubo, one of the most advanced humanoid robots, has been developed. Research interests of Prof. Oh include control of mechanical systems, mechatronics, microprocessor applications, robotics, stabilization of servo systems, precision motion sensing and control, and computer vision.

KI: What sparked your interest in humanoid robots?

I majored in robotics and humanoid robots are the dream of every researcher in robotics. When I first saw the Honda Asimo, I really wanted to create my own humanoid robot. This is a very personal motivation to start humanoid robotic research. Secondly, humanoid robots are the ultimate form of service robots. While today most robots drive on wheels, eventually, two-legged locomotion is the best option for human living environments, because there are many steps, ditches, and thresholds and humanoid robots should go over such obstacles. The third reason is the general interest of the people in humanoid robots. Many people know these robots from the movies and want to interact with such robots. Also, a humanoid robot is the ideal platform to test robotics technology, such as advanced computer vision algorithms.

Humanoid robots are not yet practical

KI: You mentioned service tasks and argued with mobility, but there are simpler service robots, like vacuum cleaners. Which applications really require a human-like body?

Today, there are no real applications for humanoid robots, because humanoid robots are not ready. It will take a long time to use humanoid robots in real situations. At this moment, the purpose of developing humanoid robots is to demonstrate the best robotics tech-

nology. This technology will be used for more practical applications, such as cleaning robots. Humanoid robots are used today for entertainment, demonstration, exhibitions, and research, but they are not yet practical.

KI: You developed Albert Hubo, an android-type humanoid. Other androids are even copies of living persons. Is it a good idea to develop humanoids that are indistinguishable from humans?

It is neither a good nor a bad idea. It only shows the possibilities of giving robots a human-like appearance. I don't think that androids are very practical or desirable, but it is a great challenge to animate the human face.

KI: Humanoid robots are complex machines. What are the main technological challenges in their development?

The first challenge is actuation. Currently, electric motors and reduction gears are used to move the joints, but they are very different from human muscles. We would need artificial muscles, but, unfortunately, they are not available. The second challenge is biped walking. We do not understand human walking. We would need more knowledge about how humans stabilize themselves in order to improve the robot gaits. This is similar to artificial intelligence research. Everybody wants to have artificial intelligence, but we do not know enough about how the brain works. AI researchers have their own model of intelligence and want to realize this, but the results so far are not very satisfactory.

KI: What about other aspects, such as perception and manipulation?

Hubo and Asimo are humanoid robot platforms. Humanoid robots need intelligence for autonomous motion, but recognition and navigation are not yet good enough to be used in real situations. For manipulation, the size constraints are challenging. Many components must be integrated in a small and lightweight system. For safety reasons and to limit energy consumption, we must reduce the weight of humanoid robots. Currently, batteries run out quickly. The batteries of Hubo last for only 1 ½ hours.

Humanoid robots are an open-ended endeavor

KI: You mentioned artificial muscles and understanding human walking. Is it a good idea to learn from biology when designing humanoid robots?

In principle, this is a good idea. However, the understanding of neural information processing is very limited and artificial muscles are not available.

KI: What are the long-term goals of your research?

Humanoid robot technology has a very long way to go. If I grade the performance of current humanoid robots, I would give them five to seven points, out of hundred. Until I retire, I would like to reach ten to fifteen points, maybe even 30 points, but it is an open-ended endeavor.