

Naohito Shiroma, Director of Kawada Robotics

# Robots Will Create New Aspects of Collaboration

By *Japan SPOTLIGHT* Editorial Section

## From Construction Company to Robot Creator

**Q:** Robotics is considered a new industry and a new source of economic growth, as defined in the Japanese government's recently published growth strategy. We would like to tell our readers about the potential of robots in this interview.

First of all, I would like to ask a personal question. How have you been involved in the development of robots, and when did your company begin?

**Shiroma:** Our company, Kawada Robotics Corp., was founded in April last year as a subsidiary of Kawada Industries, Inc. Until then, we had been working on robots in Kawada Industries, which is a bridge construction and steel structure fabrication company.

In 1987, Kawada started a new business unit developing personal-use helicopters. The staff assigned to this new line of business eventually became the core members of our robotics business. During the long and continuing recession since the collapse of the bubble economy in Japan in the 1990s, we realized we could not turn our personal-use helicopters into a business, and we had to come up with a different strategy. What made us think about robots as a new business was the Ministry of Economy, Trade and Industry's (METI) Humanoid Robotics Project (HRP). Our project in this HRP was started as a concept in which seven robots and four people would work together in outdoor operations. We were impressed by this concept of cooperation between human beings and robots. In addition, the helicopters that we were working on were close to biped robots in the sense that both had to be light and compact, and required high-tech equipment. We succeeded in developing a robot called HRP-2 PROMET in 2002.

Three or four years after this, having assumed that it would still take time to commercialize a biped robot that can function well in



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real life environments, we decided to develop robots with only an upper torso that can support human activities. In 2009, we presented our new robot called "NEXTAGE" at an international exposition and finally started selling it in 2011.

**Q:** That's an amazing story about creating a new business from within a construction company. Could you tell us a little more about this move from construction to robotics?

**Shiroma:** During the 1980s, Kawada industries started to think of diversifying its business. One option was helicopters, since we thought that in some cases such forms of transportation would save more time than using highways. Thus we started developing a new type of helicopter — a personal-use type — in 1987. But we didn't succeed in developing a personal-use type helicopter, and due to

strict aviation regulations it was difficult for us as latecomers to get a license to produce personal-use helicopters. Meanwhile the Japanese economy was falling into recession, so we gave up on the idea of commercializing our helicopter.

In such a business environment, we began to engage in helping manufacturing companies and universities develop new products based on their R&D plans. By word of mouth, Dr. Hirochika Inoue, a professor at Tokyo University and world authority on humanoid robots, learned about Kawada's technical competence, and he came to us and asked us if we could build a humanoid robot for his lab. That is how we started to develop the new walking biped robots, such as the HRP series.

## Robots for Enhancing Productivity

**Q:** How many sorts of robot have you made and for what purposes?

**Shiroma:** We made 10 kinds of robot over 10 years, including walking biped robots as well as NEXTAGE. NEXTAGE is now in the fifth generation. We want to make robots that help people in operations and not ones that are merely entertaining to watch. This is a key concept for us. The walking ones are, however, still difficult to be adopted for operation in a factory and so far only 20 of them are used in research institutes. But NEXTAGE is now being used in factories throughout Japan.

**Q: Do humanoid robots still need technological elaboration for practical use?**

**Shiroma:** To fully develop humanoid robots we need collaboration among different entities, such as Kawada Industries for the hardware and the National Institute of Advanced Industrial Science and Technology for the software. It is difficult to complete them within only one company.

Our developmental focus has been on robots that can work together with humans in factories. These are very different from recent developments in more personal-service robots that can respond to human emotions. We are not pursuing such communication-oriented robots. However, we continue to work with university and national laboratory researchers who are studying the concept of robots that can help with manual labor operations.

**Q: What industries will use your robots?**

**Shiroma:** Because we hope our robots will work in close proximity with people, we need to be conscious of safety. In the case of factories, however, infants and the elderly will not be present at a production site, so perhaps we do not have to be overly sensitive compared to robots that work in other places. This is part of the reason why we chose factories as places for the initial use of our robots. A wide range of industries use our robots at their manufacturing sites. A key concept, as I have said, is to help human operations there and not to take away human jobs. We are helping people in factories to enhance their productivity.

Some Japanese manufacturing companies are finding it difficult to get part-time workers in the current economic situation. Due to this problem, some factory owners may be forced to move their factories abroad. If they use our robots to supplement their part-time worker needs, then they can keep their production in Japan.



Robots for industrial use are originally supposed to replace human operations, such as carrying heavy materials or moving many things at extremely high speed, or work that is done with the help of microscopes such as making chips. Our robots are not fit for such work. In that sense, ours are different from the traditional category of industrial robots. We call them “next generation industrial robots”.

Since ours have two arms, they are also sometimes called dual-armed robots. They supplement human work and thus try to raise human productivity, thus contributing to solutions to the labor shortage that the economy is currently facing.

**Japanese Robots More Advanced?**

**Q: Japanese robot technology is said to be the best in the world. What do you think about the level of the Japanese robot technology in international comparisons?**



NEXTAGE (2013)

**Shiroma:** When we started producing humanoid robots, such as the HRP-2 in 2002, it was certainly true that Japanese humanoid robots had a very strong competitive advantage over those of other countries. However, since a couple of years ago, the US and other countries' humanoid robots have been catching up. As for robots for industrial use, Japanese makers certainly have an overwhelming competitive advantage over those in other countries.

**Q: Whether humanoid robots or robots for industrial use, will there be any joint projects with overseas makers to develop new robots?**

**Shiroma:** Our HRP-2 robot was introduced to the French national institute *Centre national de la recherche scientifique* through France-Japan R&D cooperation. With NEXTAGE, we have a plan to encourage joint collaboration. We currently sell a robot meant for research called "NEXTAGE OPEN" which uses open source software. Users of "NEXTAGE OPEN" can get feedback from other users through the open source community. We at Kawada have confidence in our hardware, but since overseas companies like those in Silicon Valley have a competitive edge in software, we would be happy to see more international collaboration by providing our robots to them.

## Impact of Robots on Overall Economy

**Q: Airplanes have a great impact upon other industries and it is said that our national economy's growth potential can be enhanced by the production of only one airplane. How about robotics? Can we expect the same from the production of robots?**

**Shiroma:** Yes. Our robots can help human beings in many industrial sectors, including the service sector which is allegedly suffering from a labor shortage. At this moment we are concerned about safety, because these are very unstructured environments. The safety standards for robots in this area are still under consideration. Once set, our technology should meet all such safety requirements in accordance with standards. Then we will be able to see much more expansionary use of robots.

**Q: Many countries are now keen on space development. What do you think about the potential of robots for space development?**

**Shiroma:** We have never thought about application of our robots to space. The durability of robots would probably be a crucial element in using them for space development.

## Possibility of Open Innovation in Robots

**Q: What do you think will be the most difficult barriers to be overcome to achieve the open innovation that you mentioned in the development of robot technology?**

**Shiroma:** We would like to promote open innovation through our research robot "NEXTAGE OPEN", which I mentioned earlier.

On the other hand, with our industrial version "NEXTAGE" our customers are using the robot for specific purposes. We cannot share these applications with the public because our clients prefer to keep them confidential. In using our products our clients continue to study how NEXTAGE can help them achieve the best outcome for their own work. Manufacturing techniques are the core competence of these companies and this knowledge will not be made public.

This is a difficult point for companies like us in realizing open innovation. We cannot make such information open to the public by

ourselves but would need our clients' agreement. We cannot even show the products made by such collaboration to third parties without our clients' permission.

If we are able to team up with companies and organizations that agree to make our joint research results public, we would be more than happy to contribute to open innovation to expand the use of collaborative robots.

## Future Challenges & Opportunities

**Q: Could you tell us about your plans for new products or technologies?**

**Shiroma:** It is not possible to tell you about specific products as many involve confidential information. However, I can tell you what we think is important in general in promoting our technological development. We will try to make robots that can be used by everybody and not just by skillful engineers with some knowledge of robotics. People use mobile phones every day but most of us have no professional knowledge about such equipment. So we would like to make our robots more universally used like such items.

In order to achieve this, how to teach robots easily will perhaps be the key question. Human beings can learn about work intuitively from their colleagues, but in the case of robots how well you can communicate with them will be crucial in achieving their universal use. Anybody should be able to tell robots exactly what they expect them to do in the simplest manner. That is our challenge in the future.

**Q: Your company was founded only last year. Do you have any management strategy for the future?**

**Shiroma:** Japanese industries are now pursuing high-value added products that are well suited to being produced in small quantities across a variety of production lines. Traditional robots for industrial use are, I believe, well suited for the sort of mass production that was mainstream in the past. So I believe we should follow the current direction of production systems and pursue technologies for more high-value added products in Japanese industries.

**Q: Looking at the Japanese economy today, our growth potential is very low. No matter how much our monetary or fiscal policies try to stimulate the economy, our economic growth would be no more**

**than 1%. Some economists say that creation of attractive products through innovation would be more effective in raising growth than macropolicies. In this regard, robots would contribute greatly to growth as a product of entrepreneurship.**

**Shiroma:** Japan is now an aging society with a shrinking population. We are producing robots that will enhance human capacities to respond to the reduction in the working population.

One great thing we have learned from producing robots is that our clients are very creative and could improve the functions of our robots and increase their efficiency by trying to discover how best to use them in their own specific production process. Each client's best application of the robots is unique and they cannot imitate each other. We are very impressed by such creativity and it should be considered a Japanese growth potential.

Although our clients are reluctant to make their unique application open to the public, we have received much feedback from our clients to make our robots better. We hope to continue listening to our customers so that we can improve our products. Our robots will continue to evolve and we hope that eventually they will help the Japanese economy, but moreover, they will help each and every customer — an increasing number of customers. **JS**

