Introduction of JSPE PRIZE 2007

Kazuo MATSUMOTO (Adviser of Denso Corporation)

Kazuo MATSUMOTO entered the current Denso Corporation in 1966 and has made significant contributions to the development of the car industry both around the world as well as in Japan. He accomplished this by making constant efforts to provide automotive parts of high quality and low cost by renovating the automotive part production technology and systems. In particular, he put a full automated production line for small type relay from forming processes to assembly and shipment (JSPE Technology Award in 1984) and a man-machine cooperative production system, which integrates humans, robots and facilities (JSPE Technology Award in 1995) into practical use for the first time in the world. In addition, he has contributed greatly in both industrial and academic aspects by implementing and instructing innovative production systems such as an adaptive production system and a protean production system, as well as by releasing numerous research papers.

Moreover, he won the 40th Okouchi Memorial Prize, Production Prize, which represents his great contributions on the development of such production technology as the development of a high-speed image processing equipment responding to human sensory evaluation (SICE Technology Award in 1996). He was also given a Science and Technology Agency (STA) Award from the Ministry of Education, Culture, Sports, Science and Technology (Development Category) in 2005 as a contribution to a development of high quality/efficient production method for the indicators equipped on automobiles. His achievements have been highly evaluated, and fellowships from both the Japan Society for Precision Engineering and the Japan Society of Mechanical Engineers have been conferred on him.

He has also been the head of the Tokai branch of the Japan Society for Precision Engineering and The Japan Society of Mechanical Engineers, FA Division Manager of the Japan Society of Mechanical Engineers, and the chairman of the Society of Plant Engineers Japan. His contributions to engineering development as a whole including not only those in the field of production system and technology but those in the field of measurement and control have been extremely high as well.

As observed above, his engineering and industrial achievements in the field of automotive part production technology have been quite significant. Therefore he deserves to win the JSPE Award.

Fig.1 JSPE PRIZE winner speech

Toshimichi MORIWAKI (Professor at Setsunan University, Professor Emeritus at Kobe University)

Toshimichi MORIWAKI is a world famous researcher in the field of production engineering and manufacturing systems. His research works have been wide-ranging, including the intelligent production systems, dynamic stiffness and thermal deformation analysis of machine tools and advancement of cutting process. Recently he has made great accomplishments in the advancement of ultra-precision machining and component development of ultra-precision machine tools.

Furthermore, he had held prominent positions such as the chairman of Integrated Manufacturing System Technical Committee, the head of Kansai branch, a Vice President, and a director and a committee chairman of the Japan Society for Precision Engineering, which had led to the revitalization of academic community activities. He has also been a leader of research worldwide, being the chairman of the STC-M (Scientific Technical Committee (Machines)) for the first time in Japan at CIRP (the International Academy for Production Engineering) which is very prestigious in the field of manufacturing processing, and the chairman of the organizing committee of the 2006 CIRP General Assembly held in Kobe.

He has also been a member of various committees for industrial development and manufacturing promotion, mainly in Hyogo Prefecture and Kobe City, and his

achievements have been highly recognized among the industrial world.
He is now in charge of the development of engineers as a professor at Setsunan University following his resignation from Kobe University in March 2007, and at the same time he works for the development of the local economy and industry as the chief director of the Kobe City Industrial Promotion Foundation.
As observed above, he has been highly praised from the standpoint of his research accomplishments, contributions to the Japan Society for Precision Engineering, and contributions to local communities and the industrial world, and his engineering and industrial achievements in the field of manufacturing and ultra-precision machining have been quite significant. Therefore, he deserves to win the JSPE Award.

Fig.2 Awarding of JSPE PRIZE

Introduction of Technical Committee

The main purpose of a technical committee is the investigation of research on and information exchange regarding specific fields on a continuous basis. The introduction of technical committees was mentioned in volume 28 number 1 and volume 29 number 2. Recently, some technical committees have been formed newly. The details on one of them are introduced as follows.

Technical Committee for Application of Animal Inspired Motion Control Mechanism

Chairman: Minayori Kumamoto, Ph.D., Professor Emeritus of Kyoto University

The Technical Committee for Application of Animal Inspired Motion Control Mechanism was established in October 2004 to organize our research group activities, which date back to 1999. The committee members include not only mechanical engineers but also medical doctors, physical therapists, biologists, and so on. Our research interests are mainly focused on the unique functional characteristics of bi-articular muscles, which drive two adjacent joints simultaneously. It should be noted that bi-articular muscles (actuators), which are very commonly seen in all quadruped and biped animals, not only in mammals, but also in birds, reptiles, and even amphibians, have never been introduced in mechanical engineering, robotics, or even humanoid robotics. Recently, we revealed that the existence of an antagonistic pair of bi-articular muscles demonstrated extremely stabilized postural control and perfect inter-muscular coordinating activities with two antagonistic pairs of mono-articular muscles and contributed to the performance of animal-like smooth, rapid and precise movements without position feedback signals from the endpoint (open loop control). A two-joint robot arm installed with one antagonistic pair of bi-articular actuators and two pairs of mono-articular actuators demonstrated perfect output force direction control with a single command signal informing output force direction. It also dissolved the contact task, which has never been dissolved in conventional, extremely sophisticated humanoid robot arms (BiCCOM: Bi-articular actuator provided Coordination Control Model).

Further, a review book entitled Humanoid Engineering–Evolution of Motion Control, Revolution in Humanoid Robotics was edited under the supervision of the Technical Committee and published by Tokyo Denki University Press in September 2006. Using mechanical engineering models (a Lancelet model and a BiCCOM robot arm), the authors showed that the neural network used to control antagonistic pair muscles may have originated during the early Paleozoic era (the Cambrian period). The muscles, which contribute to the successful control of the bi-articular muscles, are thought to have developed to supplement the work of mono-articular muscles in primitive amphibians when they were landing. The book also sheds light on other themes such as possibilities for BiCCOM real humanoid robots to replace conventional joint driving humanoid robots and a new motion analysis system based on driving muscles instead of the motion capture based conventional motion analysis system.