ROBIO 2008 Plenary Talk

Human Adaptive Mechatronics and Analysis of Human Emotional Level

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Abstract:

Human Adaptive Mechatronics is the coined word expressing the Mechatronics with adapting function to the operator skill and assisting to improve operator's skill level, which was created in the COE project of MEXT, Japan in 2003. In the lecture, the TDU COE project of Human Adaptive Mechatronics shall be introduced including the development of Capsubot(Capsule Robot). Then the assisting control system and the analysis of the emotional level studied with Prof. Shinichi Yoshino, Nippon Medical School.

In the first, the assisting control strategy for the human stabilizing a pendulum shall be explained, which has the similar structure with the voluntary motion proposed by Kawato-Suzuki. The proposed control system works satisfactorily for assisting the stabilization of the pendulum by a beginner and a well trained people.

The emotional level of the people is difficult to be analyzed the measurement of the oxy-Hemoglobin by the near infrared spectroscopy. The lecture proposes Yohsino-Furuta method to analyze the level when the subjects are watching sad video story. The dynamic sadness and the static sadness are defined and the level is defined by their combination.

The sadness test done shows the possibility to distinguish the dementia subjects from the normal ones

Short Bio:

Katsuhisa Furuta was educated at Tokyo Institute of Technology in Tokyo, Japan (MS 1964, Ph. D 1967). After graduation he was with Tokyo Institute of Technology until 2000, where he held the position of Professor of Control & Systems Engineering, Graduate School of Information Science & Engineering, and School of Engineering. In 2000 he received Professor Emeritus there. As a short term position he served as Russell Severance Springer Visiting Professor, University of California at Berkeley (1997). Since 2000 he has been with Tokyo Denki University as professor, and he also served as Director of the 21st Century COE (Center of Excellence) Project on HAM (Human Adaptive Mechatronics) from 2003 to March 2008. Now he is President of Tokyo Denki University (2008-)

K. Furuta's research interests lie in the broad areas of System Control, Robotics, Mechatronics, and Computer Vision. He is a pioneer researcher in control of pendulum, so called Furuta Pendulum which has been used for control study and education in many countries. He has delivered plenary lectures at the academic conferences including IFAC Congress (2002-Barcelona), IEEE Conference on Decision and Control (CDC 2003-Maui), and also IEE Tustin/ UKACC Lecture (2003). He is going to deliver a talk as plenary speaker on UKACC Control Conference this September.

K. Furuta held numerous positions in academic societies including the Vice President, Technical Activities, of IEEE Control Systems Society (1996-1997), Associate Editor of IEEE Transaction on Automatic Control (1991-1993), President of SICE (1999-2000), IFAC Technical Board Member (1993-1996), IFAC Council Member (1994-1999), Automatica Paper Prize (1999-2002), and the editor of Automatica in Applications (1996-1999). He served as Member of Science Council of Japan (1997-2003) as one of national activities. He has also served for many national level committees as a member or as an expert as well as a role of Supervisor, the MEXT/JST Project of Humanitarian Anti-personnel Mine Detection and Removal Activities (2002- March 2008).

He received many awards including of Honorary Doctorate-Helsinki University of Technology (1998), IEEE CSS Distinguished Member (1998), and IEEE Third Millennium Medal (2000). He is Fellow of SICE (1992), IEEE (1996), IET (2003), IFAC (2006), and Honorary Member of SICE (2006).