

Digital Human Modeling (Prof. J. OTA and Dr. N. MIYATA@AIST)

Keywords: Human, Modeling, Computer Manikin, Optimization, Motion Generation

Recently, modeling of human motion has been getting more and more important. The most well-known application software in the field of ergonomics is what we call a "computer manikin." It is a CAD like software that is expected to reduce the cost to evaluate, for example, the interference between human and the products before making a pile of expensive mock-up. So far, however, it has been mainly utilized from the viewpoint of the static shape of the human body because of its limitation in generating arbitrary motion according to the designed product. Though simple motion such as walking and reaching can be generated, the captured motion data is directly used in most of the case to make a manikin's whole body move. For further evolution of this area, it is expected to utilize captured motion data and to generate complex whole body "human" motion with individuality which comes from the constitution, age, gender, etc. In addition, instead of the fact that most of the products are operated directly by human hand, current commercial software is mainly developed for whole body and doesn't have adequately precise hand model. Therefore, we are collaborating with Digital Human Research Center of AIST on developing the technologies (1)to generate whole body complex motion, and (2)to model and measure human hand posture. As for (1), we have developed the method to regenerate captured lift-up motion by identifying performance index to optimize. As for (2), we are developing the method to derive accurate link mechanism of the hand and its posture using MRI images and the 3D reflective marker position data attached on the surface of the hand. Difficulties of accurate measurement lies in its high degrees of freedom linkage concentrated in the small area and in its relatively large skin movement artifact.

References

- 1) Natsuki Miyata, Kenichiro Oguri, Jun Ota, and Tamio Arai: "Human Lift-up Motion Generation based on Identification of Time-variant Performance Index," Proceedings of the 2002 IEEE/RSJ Int. Conf. on Intelligent Robots and Systems, pp. pp.2503-2508 (CD-ROM), 2002.
- 2) Natsuki MIYATA, Kenichiro OGURI, Jun OTA, and Tamio ARAI: "Individual Whole Body Motion -- Expression and Generation using Time-variant Performance Index --", Proceedings of the IEEE Int. Conf. on Systems, Man and Cybernetics (CD-ROM), 2002.

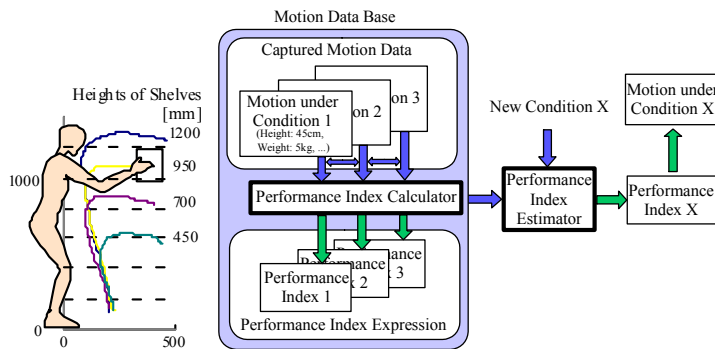


Fig. 1 Schematic View of the Whole body complex motion generation

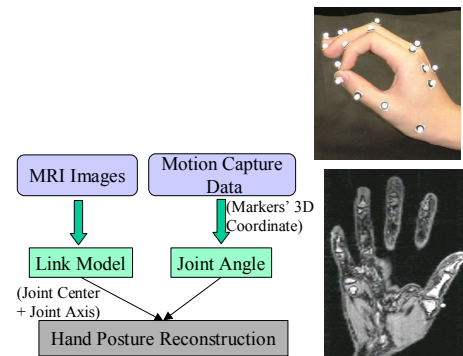


Fig. 2 Hand Posture Measurement