Development of standard procedures for preserving mind-body techniques using Motion capture

Eun Kyung Bae[1], Bokyung Yim[2], Sujeong Mun[1], Jeong Hwan Park[1], Sungha Kim[1,3], Sanghun Lee[1]

1 Medical Research Division, Korean Institute of Oriental Medicine, Korea

2 Korea Centers for Disease Control and Prevention

3University of Science & Technology-Korea Institute of Oriental Medicine, Korea

1. Introduction

Mind body techniques can have influence on physical health mentally and emotionally. These kinds of techniques have problems in preserving original motions because techniques are handed down among people by training. In an effort to preserve intangible cultural properties, human cultural assets are selected and 2D captures are applied, but 2D capture couldn't explain motions overall because captured images are fixed on one view. Recently, 3D motion capture technique, which is the process of recording movement of people, is used on film industry and biomechanical research area for motion analysis[1]. In this study, we developed the standard procedures for preserving mind-body techniques using Motion capture.

2. Materials and methods

The procedures consist of 5 steps (Fig.1). Firstly, subjects of mind body techniques are selected under 3 criteria. Its historical backgrounds, activities and transmission. Second, ethical / legal problems are considered prior to investigation. In preliminary investigation, collecting historical records and books related subject and understanding subject is needed to form a rapport. Contact subject and pre-interview is conducted. In main investigation, in- depth research target, selecting appropriate place where could be free from metallic obstructor for increasing good signal to noise ratio, and designing continuity for motion recording and required documents are included.We used Xsens MVN motion capture techniques which used acceleration and gyro sensors[2].After investigation, captured 3D data are separated by each unit of motion. Data and documents are arranged as database of mind body techniquesfor organizing systematically.
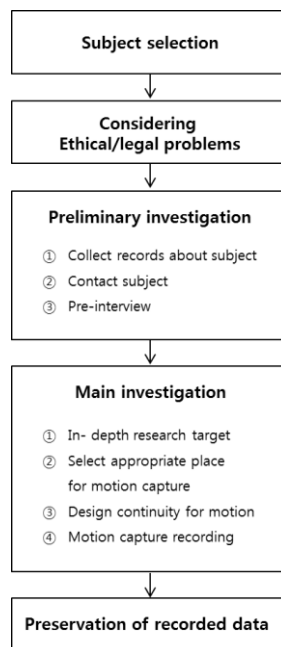

Figure1. Procedures for preserving mind-body techniques using Motion capture

3. Results

We developed proceduresfor preserving mind-body techniquesusing Motion capture (Fig.1). Following procedure, we captured 6 traditional mind body techniques, Kuksundo, Wuqinxi, Qigong, SeokMun Breath, Taekkyun and Taegyeok. Compared to 2D and 3D captured data (Fig.2), 3D motion data have more precise information about postures and provide 3D angular transformation of body and its speed and acceleration for biomechanical analysis.
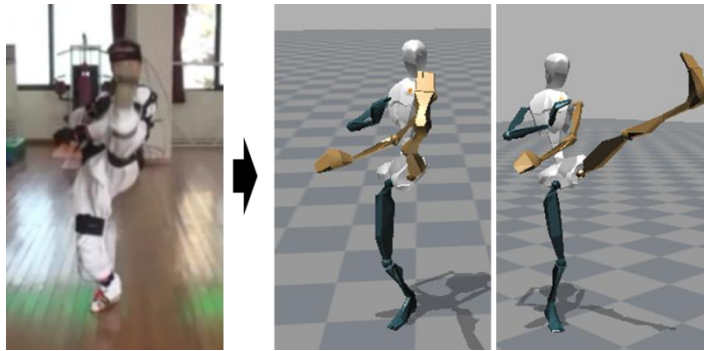

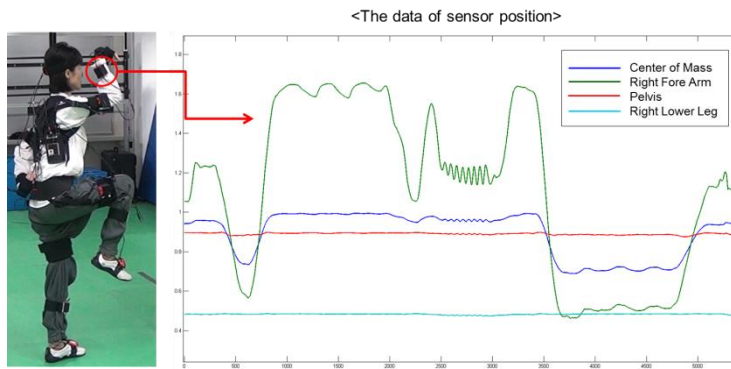Figure 2. Example of 2D and 3D captured Naejireugimotion in Taekkyun

Figure 3. Biomechanical analysis of Wuqinxi

4. Discussion

3D motion capture of mind-body techniquescould be digitally preserved motion.Especially 3D angular transformation of joint, muscle could be analyzed for biomechanicalresearch.3D view of each motion provides more valuable and quantitative features of motions than previous 2D captured data. As following standard procedures, traditional mind-body techniques could be effectively preserved each motion and clearly visualized as 3D characters.

5. References

[1] Cutti AG, Giovanardi A, Rocchi L, Davalli A, Sacchetti R. 2008. Ambulatory measurement of shoulder and elbow kinematics through inertial and magnetic sensors.Med BiolEngComput.46(2), 169-178.
[2] Roetenberg D, Luinge H, Slycke P,2013. The Xsens MVN motion capture suit is an easy-touse, cost efficient system for full-body human motion capture, Xsens Motion Technologies.

288