Although positive effects are achieved by continuously performing preventive care and other health activities, performing the same activities daily can be a also result in mental strain. Therefore, research has been conducted on maintaining ways to persistently motivate users and encourage them to use exercise systems by incorporating games in which the users can perform voluntary activities. On the other hand, the Kinect system developed by Microsoft is able to recognize people’s postures and the three-dimensional coordinates of their joints, and work has been done to develop systems that use a Kinect to measure hand and foot movements for rehabilitation purposes. Since the Kinect can detect real-world human postures, it can also be used to recognize antagonistic exercises.

Recently, several Kinect-based commercial rehabilitation systems have been developed. Formerly, we designed and developed a prototype lower-limb chair exercise support system using a depth image sensor, and evaluated its performance and usability. The system recognizes and evaluates exercises based on 3D position data and joint angles for skeletal and RGB red-green-blue data obtained from the Kinect sensor. In this study, using a depth sensor, we designed, implemented, and evaluated a system that supports antagonistic exercise. The system recognizes exercises by using skeletal data about the user’s joints acquired from a depth sensor, and evaluates the user’s exercises to provide real-time feedback. This system uses an audiovisual display to explain the exercise procedures to the user, and displays user’s real-time video to encourage the user to perform the exercises. The system also has a rhythm game function whereby the user can exercise in time with music. This system provides four types of exercise: upper/lower-limb...
antagonistic movement, upper–limb left/right antagonistic movement, rock/paper/scissors using both arms and both legs, and duple-/triple-time exercises.