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Development and Evaluation of Virtual Basketball Game Using Motion Capture Technology

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Abstract : These days, along with the development of e-sports, video games as a competitive sport is attracting attention. But, in many cases, action in the screen does not match the real motion of operation. Inclusiveness of player motion is needed to increase reality and excitement for sports games. Therefore, in this study, the authors propose a method to recognize player motion by using the motion capture technology and develop a virtual basketball game. The virtual basketball game consists of a screen with nine targets, players, depth sensors, and no ball. The players pretend a two-handed basketball shot without a ball aiming at one of the nine targets on the screen. Time-series data of three-dimensional coordinates of player joints are captured by the depth sensor. 20 joints data are measured for each player to estimate the shooting motion in real-time. The trajectory of the thrown virtual ball is calculated based on the time-series data and hitting on the target is judged as success or failure. The virtual basketball game can be played by 2 to 4 players as a competitive game among the players. The developed game was exhibited to the public for evaluation on the authors' university open campus days. 339 visitors participated in the exhibition and enjoyed the virtual basketball game over the two days. A questionnaire survey on the developed game was conducted for the visitors who experienced the game. As a result of the survey, about 97.3% of the players found the game interesting regardless of whether they had experienced actual basketball before or not. In addition, it is found that women are easy to comfort for shooting motion. The virtual game with motion capture technology has the potential to become a universal entertainment between e-sports and actual sports.

Keywords : basketball, motion capture, questionnaire survey, video ga
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