We present an exploration into realistic locomotion interfaces in video games using spatially convenient input hardware. In particular, we use Nintendo Wii Remotes to create natural mappings between user actions and their representation in a video game.

Targeting American Football video games, we used the role of the quarterback as an exemplar since the game player needs to maneuver effectively in a small area, run down the field, and perform evasive gestures such as spinning, jumping, or the "juke". In our study, we developed three locomotion techniques. The first technique used a single Wii Remote, placed anywhere on the user's body, using only the acceleration data. The second technique just used the Wii Remote's infrared sensor and had to be placed on the user's head. The third technique used combined a Wii Remote's acceleration and infrared data using a Kalman filter. The Wii Motion Plus was also integrated to add the orientation of the user into the video game.

To evaluate the different techniques, we compared them with a "gold standard", employing a 6 degree of freedom optical tracker with two Wii Remotes placed on the user's feet. Experiments were performed comparing each to the gold standard. Finally, a user study was performed to determine if a preference existed among these techniques.

The results showed that the second and third technique had the same location accuracy as the gold standard, but the first was too inaccurate for video game players. Furthermore, the range of the Wii remote infrared and Motion Plus exceeded the optical tracker of the gold standard. Finally, the user study showed that video game players preferred the third method over the second, but were split on the use of the Motion Plus when the tasks did not require it.

Major: Computer Science

Educational Career:
Bachelor's of Computer Science, BS, 2005, University of Central Florida

Committee in Charge:
Dr. Joseph J. LaViola , Chair, Computer Science
Dr. Charles E. Hughes, Computer Science
Dr. Hassan Foroosh, Computer Science

Approved for distribution by Dr. Joseph J. LaViola , Committee Chair, on October 21, 2009.

The public is welcome to attend.