Digital Media Art Applying Physical Game Technology Using Gesture Recognition

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Abstract. In this study, we propose Digital media art to experience a virtual reality applying physical game using gesture recognition technology and describe its application based on the concept. Gesture and gesture recognition refer to HCI (Human Computer Interaction) is an important concept. Therefore, we produce the Digital media art calls 'Thrill Seekers'. 'Thrill Seekers' is for simulating Experimental game interfaces which offers an amusement while experiment the virtual environment. The using device Kinect is a motion sensing input device. Existing Kinect game is already popular in physical interaction; action-based games, with its sensing technology. However, we use Kinect with open library program 'Processing' to create virtual game interface for people who enjoy thrills the most.

Keywords: Virtual interface, physical game, gesture recognition, Interaction.

1   Introduction

Gesture recognition is the most demand technology in HCI (Human Computer Interaction) application. There are many applications in game instead of using keyboard or mouse. The applications are becoming more physical and tangible. Kinect is the most affordable motion sensing device for physical game interface with wireless input by Microsoft for Xbox 360 video game console and Window PCs. It can detect user's information and motion with Kinect's built in RGB (Red, Green, and Blue) camera and depth sensor technology. The device can be separated from gaming console and the sensor data can be used as input for gesture recognition. To use this device as an application for physical game is able to raise game user's immersion although existing applications; keyboard and mouse, has a disadvantage to reduce the game user's immersion and physical method.

Therefore, in this study we use Kinect for the 'Thrill Seekers' as a new user interface for Digital media art. The theme of this project focused on thrill seeking behavior and extreme sports type people as a way of relaxation and relief from fatigue of routine everyday activities.

Unlike many devices related to physical activity, our concept requires only subtle and constrained motion and the need to maintain balance while the user tilts the chest area forward and back or from side to side, which is monitored by the sensors.

2   Relate Works

2.1   Digital Media Art Implement Gesture Recognition Technology

Digital media art is a contemporary art due to the development of digital technology. Many artists implement the technology into their art works. The cutting edge technology and device is necessary for such an artist. For 'Thrill Seekers' we use Kinect as a cutting edge motion sensing device for the digital interactive media art. Gesture recognition can be seen as a way for computers to begin to understand human body language, this building a richer bridge between machines and humans than primitive text user interfaces or even GUIs (graphical user interfaces), which still limit the majority of input to keyboard and mouse.[1] We implemented gesture recognition system using Kinect, Processing code and Simple-OpenNI library.

3   Proposed Media Art

3.1   Concept

The first significant development in this work was the idea of moving human body which imposes specific physical requirements on their performance. This approach was based on the body movements and activities covered by our concept. We set out to find a suitable library example which could be extended and adapted to provide the desired user interface and visualization components. The used code is based on a Processing (www.processing.org) code by Ira and Danny Greenberg, providing the main visualization elements, which are combined with a number of functions incorporating the Kinect 3D control data. The mapping of the user's performance was developed in a bottom-up driven process, relying on practical experiments using the Kinect and observing the visualization.

3.2   The Process

3.2.1   The Interface
The physical interface that this project explores is based on movements of the upper torso aiming to stimulate user participation and ongoing interest by providing a visualization reflecting their performance. The Kinect enables the user to roam free from the computer, through a Bluetooth wireless connection and provides a very intuitive interface based on natural movements within a real world frame of reference. The main limitations in our project relate to the limited visual richness provided by the program.

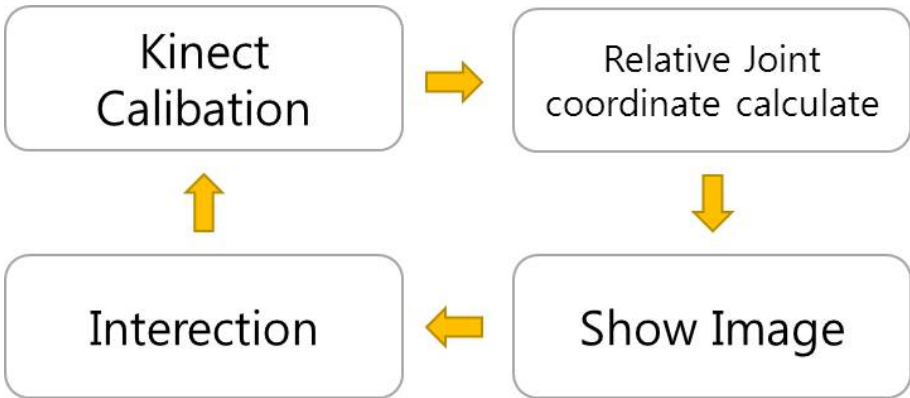[1] `http://en.wikipedia.org/wiki/Gesture_recognition`

Fig. 1. The Process

3.2.2 How It Works

The user moves their body in front of the Kinect device. The visualization comprises a large number of cubes randomly distributed within a space resembling a wheel (rotating) with the viewer placed at the top and looking along the tangent of the circle. The table 1 is 15 joints defined by Simple-OpenNI. We can have the user's skeleton, location of the joint and Depth information through Simple-OpenNI. In this study, using torso information within these joints and read the axis's value in a real time.

Table 1. 15 Joints defined by Simple-OpenNI

Sensor	Joints	Sensor	Joints
0	Head	8	Right Hand
1	Neck	9	Left Hip
2	Torso	10	Right Hip
3	Left Shoulder	11	Left Foot
4	Right Shoulder	12	Right Foot
5	Left Elbow	13	Left Knee
6	Right Elbow	14	Right Knee
7	Left Hand		

When standing in an upright position the body movements create subtle shifts of the cubes in front of the user to provide an impression of being surrounded by the 'space junk' environment. The graphical visual offers the world moves correspondingly to reinforce the spatial illusion.

Fig. 2. Simulated Image

4   Conclusion

This study proposed the new way of interaction in digital media art adapting the method of game. In this study, we implement game elements using Kinect and its sensor. The change visual images by user's body movements through Kinect motion sensor offer relief feelings and relaxation to users. Not only use the hands but also use user's body for the most interesting digital media art also as a physical game. For the further study we should survey from more users and how they feel while they experience the 'Thrill Seekers' interface.

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