Motion sensor games development using Xbox Kinect, Android TV & mobile phones  (WA2b-13)

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Project overview

This industrial final year project is development of an Android mobile game, which can take inputs from a Kinect. This project is in collaboration with Tangotoons, Ltd., a company at the HK Science Park. Inspired by the industrial partner, we combine a story with an endless runner game, named “UST Survival”. The player will have a game play with a story about HKUST. Objects and settings in the game are drawn from student’s life at HKUST – term-papers, sun-dial, etc. - so that players will experience HKUST again in a virtual game environment.

We enhance the user experience on Kinect motion control over the Kinect Windows Application provided by Microsoft. We create a 3D game with the Unity game engine, which most popular mobile games like Temple Run and Angry Birds were developed in. Unity provides powerful libraries on physics and animators for lively real-time animation. Thus, users can interact with 3D game objects with real-time body motion.

Methodology

The development was divided into two phases: Kinect Windows Application, and Unity Game. The first phase is to explore the Kinect Software Development Kit (SDK) on Windows. The next phase is to implement some of the Kinect Application functionalities on Unity Integrated Development Platform (IDE) and then create a game for Android system.

Kinect Windows Application

Kinect SDK has a powerful skeleton tracking program to track 20 skeleton points fairly precisely. Moreover, other functions like tilting control, hand cursor control and streaming of color image and depth image are useful. They provide more options to interact with the application and display feedbacks.

Unity Game

We created a runner game with a story about life in HKUST. We first created a Temple Run clone which is a runner game with obstacles to stop the player. Next, we imported the Kinect Wrapper Package from Microsoft into the game environment (figure 3). Thus, we have a skeleton model for interpreting user’s motion into command. Finally, user can use motions to control a hand cursor or interact with the game player to avoid hurt by the obstacles.

Results

A Temple Run clone game based on the Kinect sensor is successfully created using the Unity IDE. Some game objects related to HKUST like “Wisdom Stone” and sun-dial are placed on the runner track to interact with the game player. Animations like running and dying are integrated into the game. Apart from the game play, a Kinect hand cursor can press the buttons virtually to start the game and adjust option setting. Users can experience a virtual environment of HKUST with an interesting HKUST students’ story.

We have not completed the porting of the game to Android as originally planned. The main problem is that there does not exist a compatible library for Kinect on other OS. We stopped the porting because implementing an Android library is beyond our project’s objective, which is implementing a game. A possible solution is to use OpenNI and other 3D sensors to replace the role of Kinect.

Hardware/Software requirements

Hardware:
- Kinect sensor for Windows or Kinect sensor for XBOX360
- Windows 7 or above computer with dual-core 2.66 GHz or faster processor
- Raspberry Pi Model B

Software:
- Microsoft Visual Studio 2010 or above
- Unity IDE
- Kinect for Windows SDK

Figure 1. System Diagram

Figure 2. A demonstration on interpreting user’s motion (right) into the model motion in the Unity game environment (left).

Figure 3. A gameplay screenshot of “UST Survival”