more vibration units to provide single or multiple degrees of freedom of motion as may be required to meet the needs of a particular implementation.

**[0065]** Thus, the sensory feedback logic component **1120** is arranged to receive a call for a specific sensory effect from the host application, such as the feeling of fur being smoothed in the example shown above in FIG. **10** along with the corresponding visual animation and sound effect. The sensory feedback logic component **1120** then formulates the appropriate commands for the hardware-specific controllers to thereby implement the desired sensory effect on the device. For example, to implement the multi-sensory effect of turning a page as described in the text accompanying FIG. **10**, the sensory feedback logic component **1120** invokes the rendering of page animation on the touch screen and the playing of the sound of the page turning. In addition, a drive signal, or set of drive signals are generated to control the motion actuators such as vibration units. The drive signals will typically vary in amplitude, frequency, pulse shape, duration, etc., and be directed to a single vibration unit (or various combinations of vibration units in the implementations where multiple vibration units are utilized) to produce the desired tactile feedback.

**[0066]** While tactile feedback has been presented in which motion of the touch screen is utilized to provide distinctive sensory cues to the user, it is emphasized that other methods may also be employed in some scenarios. For example, an electro-static generator may be usable to provide a low-current electrical stimulation to the user's fingers to provide tactile feedback to replace or supplement the tactile sensation provided by the moving touch screen. Alternatively, an electro-magnet may be used which is selectively energized in response to user interaction to create a magnetic field about the touch screen. In this embodiment, a stylus having a permanent magnet, electro-magnet or ferromagnetic material in its tip is typically utilized to transfer the repulsive force generated through the operation of the magnetic field back to the user in order to provide the tactile feedback. Alternatively, such magnets may be incorporated into user-wearable items such as a prosthetic or glove to facilitate direct interaction with the touch screen without the use of a stylus.

**[0067]** Although the subject matter has been described in language specific to structural features and/or methodological acts, it is to be understood that the subject matter defined in the appended claims is not necessarily limited to the specific features or acts described above. Rather, the specific features and acts described above are disclosed as example forms of implementing the claims.

What is claimed is:

**1**. A method for providing a multi-sensory experience to a user of a device, the device including a touch screen, the method comprising the steps of:

imparting motion to the touch screen, the motion being arranged for i) confirming a user action performed on the touch screen through tactile feedback to the user, ii) simulating interaction with an object as though the object has three dimensions, and iii) being imparted responsively to the user's touch to a representation of the object on the touch screen;

playing an audio sample that is associated with the interaction with the object, the audio sample confirming the user action through auditory feedback to the user; and

rendering a visual effect to the representation that is responsive to the interaction with the object, the visual effect confirming the user interaction through visual feedback to the user.

**2**. The method of claim **1** in which the motion comprises multiple degrees of freedom.

**3**. The method of claim **2** in which the visual effect comprises displaying the object on the touch screen so that the object appears to have a depth dimension.

**4**. The method of claim **3** in which the displaying comprises providing the object with a drop shadow, or rendering the object with perspective, or applying one or more colors to the object.

**5**. The method of claim **3** in which the visual effect further comprises an application of animation to the object.

**6**. The method of claim **1** including a further step of varying the motion imparted to the touch screen in response to a level of pressure that the user applies to the touch screen.

**7**. The method of claim **6** including a further step of varying the playing or varying the rendering in response to the level of pressure that the user applies to the touch screen.

**8**. A device for simulating 3-D interaction with an object displayed on a touch screen by providing a sensory feedback experience, comprising:

a touch screen arranged for receiving input indicative of a user action via touch and for displaying visual effects responsively to the user action;

one or more motion actuators arranged for imparting motion to the touch screen, the motion being arranged for i) confirming a user action performed on the touch screen through tactile feedback to the user, ii) simulating interaction with the object as though the object has three dimensions, and iii) being imparted responsively to the user's touch to a representation of the object on the touch screen;

a sound rendering device for playing an audio sample that is associated with the interaction with the object, the sound confirming the user action through auditory feedback to the user;

a memory for storing sensory feedback logic instructions; and

at least one processor coupled to the memory for executing the sensory feedback logic instructions, the sensory feedback logic instructions, when executed, implementing the sensory feedback experience for the user responsively to the user action, the sensory feedback experience including the tactile feedback, the auditory feedback, and the visual effects.

**9**. The device of claim **8** further including one or more structures for implementing functionality attendant to one of a mobile phone, personal digital assistant, smart phone, portable game device, ultra-mobile PC, personal media player, POS terminal, self-service kiosk, vehicle entertainment system, vehicle navigation system, vehicle subsystem controller, vehicle HVAC controller, medical instrument controller, industrial equipment controller, or ATM.

**10**. The device of claim **8** in which the one or more motion actuators are arranged to move the touch screen with multiple degrees of freedom of motion so that a distinctive motion which is associated with a specific 3-D simulation may be imparted to the touch screen.

**11**. The device of claim **10** in which the 3-D simulation is selected from one of geometry or texture.