

HAPTIC MESSAGING IN HANDHELD COMMUNICATION DEVICES

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to U.S. Provisional Patent Application No. 60/431,662, filed on Dec. 8, 2002, the entire disclosure of which is incorporated herein by reference.

FIELD OF THE INVENTION

[0002] This invention relates generally to haptic-feedback systems. More specifically, embodiments of the present invention relate to using customized haptic effects in a variety of applications to convey information to users of handheld communication devices.

BACKGROUND

[0003] As handheld communication devices become part of everyday life, device manufacturers and service providers strive to enhance the versatility and performance of such devices.

[0004] Handheld communication devices in the art (e.g., mobile phones, pagers, personal digital assistants (PDAs), etc.) typically use auditory and visual cues to alert a user when incoming messages, such as voice calls and emails, are received. Such auditory and visual alerts, however, have the disadvantages of being distracting in some situations (e.g., during driving), or annoying in others (e.g., during a meeting or a concert). Although vibratory alerts are made available in some communication devices such as cellular phones, such vibratory effects cannot be customized or personalized according to applications, thus conveying little information to the user. A need, therefore, exists in the art for a new sensory modality that delivers information to users of handheld communication devices in a personalized fashion.

SUMMARY

[0005] Embodiments of the invention relate to methods and systems for providing customized "haptic messaging" to users of handheld communication devices in a variety of applications.

[0006] In one embodiment, a method of haptic messaging includes: receiving an input signal associated with an actuation of a user-interface member; determining a haptic code associated with the actuation; and including the haptic code in an output signal to be sent to a remote handheld communication device.

[0007] In another embodiment, a method of haptic messaging includes: receiving an input signal; outputting a request relating to a contact with a user-interface member coupled to a handheld communication device; and providing a control signal associated with the contact to an actuator coupled to the handheld communication device, the control signal being configured to cause the actuator to output a haptic effect associated with the input signal.

[0008] Further details and advantages of embodiments of the invention are set forth below.

BRIEF DESCRIPTION OF THE FIGURES

[0009] These and other features, aspects, and advantages of the present invention are better understood when the

following Detailed Description is read with reference to the accompanying drawings, wherein:

[0010] **FIG. 1** depicts a block diagram of a haptic handheld communication device according to an embodiment of the present invention;

[0011] **FIG. 2** shows a flowchart depicting a method of using customized haptic effects to convey information to users of handheld communication devices, according to an embodiment of the invention;

[0012] **FIG. 3** shows a flowchart depicting a method of using haptic logos to relate information to users of handheld communication devices, according to an embodiment of the invention;

[0013] **FIG. 4** shows a flowchart depicting a method of haptically encoding communication signals, according to an embodiment of the invention;

[0014] **FIG. 5** shows a flowchart depicting a method of providing haptic messaging to users of handheld communication devices, according to a further embodiment of the invention;

[0015] **FIG. 6** shows a flowchart illustrating a method of providing an interactive virtual touch in one embodiment of the present invention;

[0016] **FIG. 7** depicts a flowchart illustrating a method of carrying out a chat session using handheld communication devices, according to an embodiment of the invention;

[0017] **FIG. 8** shows a flowchart depicting a method of using haptic effects to relate navigation information, according to an embodiment of the invention; and

[0018] **FIG. 9** shows a flowchart illustrating a method for providing haptic effects to a remote control in one embodiment of the present invention.

DETAILED DESCRIPTION

[0019] Embodiments described in the following description are provided by way of example to illustrate some general principles of the invention, and should not be construed as limiting the scope of the invention in any manner. One skilled in the art would also recognize that various changes and modifications can be made herein, without departing from the principles and scope of the invention.

[0020] **FIG. 1** depicts a block diagram of a handheld communication device **100** according to an embodiment of the invention. It will be appreciated that various elements are shown in schematic form for illustrative purposes and are not drawn to scale. It will also be appreciated that many alternative ways of practicing the present invention exist. Accordingly, various changes and modifications may be made herein, without departing from the principles and scope of the invention.

[0021] Device **100** includes a device body including a housing **110** and a user-interface **112**; a processor **120**; at least one actuator **130** in communication with processor **120**; and a memory **140** in communication with processor **120**. Device **100** also includes an antenna **150** and a transceiver **160**, in communication with processor **120**. Device **100** additionally includes a display module **170** and an audio