display **350** comprises six pixels: **351**, **352**, **353**, **354**, **355**, and **356**. Each pixel is associated with a color and an intensity for that color ranging from 1-10. For example, pixel **355** is associated with the color green, and the color intensity 3 out of 10. Thus, the display **350** will output the color green at an intensity of 3 at the location of pixel **355**.

[0065] In the embodiment shown in FIG. **3***b*, the processor will determine the haptic effect based at least in part on the display signal and an interface signal received from a touch-sensitive interface mounted overtop of display **350** (not shown in FIG. **3***b*). For example, in the embodiment shown in FIG. **3***b*, the processor uses the display signal to associate, or "map," a haptic effect with each pixel. For example, in the embodiment shown in FIG. **3***b*, the processor may determine a different frequency haptic effect for each color. The processor may further associate the intensity of the haptic effect at each pixel with the intensity of the color at each pixel. For example, the processor may determine that a pixel with a color intensity of 8 will also have a haptic intensity of 8. When the processor receives an interface signal associated with user interaction overtop of the pixels on the display, the processor will output a haptic signal associated with the pixels the user is interacting with. This haptic effect is configured to cause the user to feel a texture on the surface of the display.

[0066] For example, in the embodiment shown in FIG. **3***b*, the processor may determine blue pixels are associated with a knocking haptic effect, red pixels are associated with a pulsing vibration, and green pixels are associated with a clicking haptic effect. In such an embodiment, when the touch-sensitive interface detects that the user's finger has passed over pixel **351**, the processor will determine a knocking with an intensity of 1. Then as the user's finger moves over pixel **352**, the processor will determine a pulsing vibration with an intensity of 5. And as the user's finger continues to move across display **350** to pixel **353**, the processor may determine a clicking effect with an intensity of 3.

[0067] These haptic effects are configured to cause the user to feel a texture on the surface of display **350** as the user moves his/her finger over its surface. In some embodiments, the messaging device may comprise multiple actuators. In such an embodiment, the processor may be configured to determine which actuator to output the haptic signal to. For example, in one embodiment a messaging device may comprise two actuators configured to output different intensity haptic effects. In such an embodiment, the processor may determine that all haptic effects with an intensity of less than 3 should be output by the first actuator, and all haptic effects with an intensity of greater than or equal to 3 should be output by a second actuator. In other embodiments, each color may be mapped to a specific actuator. For example, in such an embodiment all haptic effects associated with the color blue may be output by a first actuator, all haptic effects associated with the color red may be output by a second actuator, and all haptic effects associated with the color green may be output by a third actuator. In other embodiments, the messaging device may implement different combinations of colors, intensities, haptic effects, and actuators to simulate various textures on the surface of the display.

Method for Using Textures in Graphical User Interface Widgets

[0068] FIG. **4** is a flow chart of a method for using textures in graphical user interface widgets according to one embodiment of the present invention, which is discussed with respect to the device shown in FIG. **1**. As shown in FIG. **4**, the method **400** begins when processor **110** receives a display signal comprising a plurality of pixels defining a display area **402**. The display signal may comprise a vga, hdmi, svga, video, s-video, or other type of display signal known in the art. The display signal may comprise a graphical user interface, or other image that the messaging device will display to the user via display **116**. In some embodiments, the display area may comprise a standard display size known in the art, for example 480 pixels by 320 pixels. In other embodiments, the display area may be larger or smaller.

[0069] Then, touch-sensitive interface **114** transmits an interface signal to processor **110**, which receives the interface signal **404**. In some embodiments, touch-sensitive interface **114** may comprise a touch-screen or a touch-pad. For example, in some embodiments, touch-sensitive interface **114** may comprise a touch-screen mounted overtop of a display configured to receive a display signal and output an image to the user. In other embodiments, touch-sensitive interface **114** may comprise a button, switch, mouse, scroll wheel, roller ball, or some other type of physical device interface known in the art. In some embodiments, processor **110** is in communication with a single touch-sensitive interface **114**. In other embodiments, processor **110** is in communication with a plurality of touch-sensitive interfaces **114**, for example, a touch-screen and a roller ball. Touch-sensitive interface **114** is configured to detect user interaction, and based on the user interaction, transmit signals to processor **110**. In some embodiments, touch-sensitive interface **114** may be configured to detect multiple aspects of the user interaction. For example, touch-sensitive interface **114** may detect the speed and pressure of a user interaction and incorporate this information into the interface signal. In some embodiments, touch-sensitive interface **114** is capable of detecting multi-touch.

[0070] Next, processor **110** determines a first texture associated with a first group of pixels defining a first section of the display area **406**. The section of the display area defined by the first group of pixels may define an object in a graphical user interface, for example text, figures, or an icon. In some embodiments, the processor **110** will determine a texture associated with the characteristics of the object. For example, if the object comprises text, processor **110** may determine a course texture for tall letters such as "l" and a softer texture for shorter letters such as "o." In another embodiment, processor **110** may determine a texture based on the contents of a file associated with the icon. For example, processor **110** may determine a course texture for a file that contains more than a user defined amount of data, and a softer texture for a file that contains less than that amount. The first texture may comprise one of many textures known in the art, for example, the texture of steel, ice, fur, skin, leather, sand, sandpaper, rocks, snow, water, or oil. Or, in some embodiments, processor **110** may determine that the first texture comprises no texture.

[0071] Then, processor **110** determines a second texture associated with a second group of pixels defining a second section of the display area **408**. In some embodiments, the second section of the display area may comprise all of the display area not occupied by the first section of the display area. In other embodiments, the second section of the display area may comprise a specific object in the graphical user interface, for example, text, figures, or an icon. In yet other embodiments, the second section may comprise some subset of the area not occupied by the first section. In some embodi-