its respective sac **82**. To this end, a small fluid pump and/or source of vacuum may be in fluid communication with the valves **84**.

[0031] As illustrated in FIG. **8**, in response to, for instance, non-sliding, rolling motion of a finger on the touch surface **29**, the processor **22** moves the screen cursor and furthermore in coordination therewith selectively inflates the sacs **82** of the haptic membrane assembly **80** to propagate waves across the assembly that are transmitted to the touch surface **28** as a haptic model of a finger moving across a boundary of a simulated mechanical data input key **90**. That is, some sacs **92** are inflated and other sacs **94** are not as required to establish a raised periphery of the key **90**, in the case shown, an oval "enter" key, an image of which simultaneously would be presented on the display **26**/**34**. As pressure signals indicate that the cursor moves, the sacs **82** are inflated and deflated as necessary to cause the periphery of the key **90** to move across the touch surface **28** in a direction opposite to cursor motion to emulate what the user were to feel were he sliding his finger past a discrete key on a multi-key input device.

[0032] Once the user has by means of stationary finger motion stopped cursor motion to position the cursor over a desired key on the image **40**, he can exert greater pressure or tap the touch surface or input some other predefined tactile signal to indicate clicking the key. In response, the sacs **82** may be deflated accordingly to simulate a mechanical key moving downward when a user presses it.

[0033] Thus, by selecting an appropriate sac **82** granularity the surface of the touch surface **28** can be made to change to emulate the shape of a button, for instance, as if a finger were moving across the flat to over the button. The skilled artisan may now recognize, however, that the finger actually is stationary (apart from the minor rolling motion) and the "button shape" moves like a wave across the array **80** analogous to the location of the cursor as it moves across the display.

[0034] This allows users to essentially glide a digit across a button panel without actually moving the digit as the "panel is seemingly moving under the digit".

[0035] Now referring to FIG. **9**, commencing at block **100** signals representing finger pressure from a finger on the touch surface **28** are received from the pressure sensor array **70**. The finger pressure on the touch surface **28**, in other words, propagates through the haptic membrane assembly **80** to the pressure sensor array **70**. At block **102** these signals are converted to cursor motion as described above, and at block **104** the cursor and image **40** of notional keys are displayed on one or both of the remote display **26** and TV display **34**. Keyed to the visual feedback provided by the display at block **104** is the generation of haptic feedback at block **106** as described.

[0036] FIG. **10** shows another haptic membrane assembly **200** that uses an array of individually movable elements **202** that are electrostatically or magnetically movable relative to respective stationary elements **204**. In one implementation the movable elements **202** are diaphragms that are moved by electrostatic repulsion and attraction, in lieu of the inflatable sacs described above. Each diaphragm is disposed between the touch surface and a respective stationary element **204** that may be embodied as an electrostatic substrate. The diaphragms are individually biased toward and away from (i.e., attracted to and repulsed from) their respective substrates by selectively energizing and deenergizing electrodes **206** in a control matrix to electrostatically move the diaphragms. In one implementation, the diaphragms are permanently charged and the electrodes **206** selectively energize the substrates. In another implementation, the substrates are permanently charged and the electrodes **206** selectively energize the diaphragms.

[0037] The diaphragms and substrates may be square-shaped and formed complementarily to each other as shown, or they may assume other shapes and they need not be shaped complementarily to each other. In an alternate embodiment the substrates are not stationary and both the diaphragms and substrates may be individually charged to obtain a stronger repulsion field (and, hence, stronger haptic feedback) by charging each side with the same potential.

[0038] In another implementation, the movable elements **202** are addressable electromagnetic coils and the stationary elements **204** are permanent magnets in a film.

[0039] While the particular ONE BUTTON REMOTE CONTROL WITH HAPTIC FEEDBACK is herein shown and described in detail, it is to be understood that the subject matter which is encompassed by the present invention is limited only by the claims.

What is claimed is:

1. A TV remote control system, comprising:

a portable hand-held housing;

a wireless transmitter supported by the housing;

a processor supported by the housing and providing signals for wireless transmission by the transmitter;

a touch surface on the housing and exposed to a user's touch;

a pressure sensor array supported on the housing below the touch surface and providing input signals to the processor in response to pressure from a person's finger on the touch surface;

a haptic membrane assembly between the touch surface and pressure sensor array and being selectively moved by the processor at least partially in response to finger pressure on the pad; and

a display presenting an image of a remote control key array based on signals from the processor responsive to finger pressure on the pad.

2. The system of claim **1**, wherein the touch surface is the only input device on the housing.

3. The system of claim **1**, wherein the display is associated with a TV receiving signals from the transmitter.

4. The system of claim **1**, wherein the display is supported on the housing.

5. The system of claim **1**, wherein the membrane assembly includes an array of individually inflatable fluid sacs.

6. The system of claim **5**, wherein each sac is associated with a respective valve controlled by the processor to haptically model finger movement on a keyboard derived from finger pressure on the touch surface.

7. The system of claim **1**, wherein in response to at least one non-sliding motion of a finger on the pad, the processor selectively moves the haptic membrane assembly to propagate at least one wave across the pad as a haptic model of a finger moving across a boundary of a mechanical data input key.

8. The system of claim **7**, wherein the display presents indication of which key in the image of a remote control key array is modeled as the key currently associated with the touch surface, whereby the touch surface is associated with a sequence of at least two keys in the image of a remote control key array as a finger moves on the touch surface.