ing latch control signal (LTCH1 to LTCHn). It is noted that a latch control signal (LTCH1 to LTCHn) can be activated according to detected transitions (i.e., activated on on-to-off transitions, as well as off-to-on transitions).

[0167] A counter input **2704** can receive a timer value TIME that indicates a time reference value in a digital music system. Time latch(es) **2710** can include a latch corresponding to each sound activation value (PAD1_ON/OFF to PADn_ON/OFF). Each such latch can latch timer value TIME in response to its corresponding sound activation value (PAD1_ON/OFF to PADn_ON/OFF). Thus, a time value can be latched in response to the activation and deactivation indication.

[0168] An encoder section **2708** can receive position values (POS1 to POSn) generated in response to capacitance values derived from sensors in a percussion instrument playing surface. In particular embodiments, position values can be generated according to the above described techniques. An encoder section **2708** can encode position values into digital note values (PERC_TYPE1 to PERC_TYPEn).

[0169] Note latch(es) **2708** can include a latch corresponding to each encoded digital note value. In a similar fashion to time latch(es) **2706**, each note latch can latch its corresponding digital note value in response to its corresponding sound activation value (PAD1_ON/OFF to PADn_ON/OFF). Thus, a note values can be latched in response to the activation and deactivation indication.

[0170] In some digital music formats, percussion instruments can be assigned a predetermined channel number. Thus, it may be desirable to provide a predetermined channel number, or have such a channel number default to a given value. For this reason, an encoding circuit **2700** can optionally include a channel value section **2712**.

[0171] Channel value section **2712** can include a channel latch **2714** and multiplexing type circuit **2716**. A channel latch **2714** can be loaded with a channel value (CHAN.) or a default channel value (CHAN_DEF) according to a mode signal RESET. A channel value CHAN. may be selectable by a user, while a default channel value CHAN_DEF can be a hardwired value, or value stored by some other nonvolatile means. A default channel value CHAN_DEF can have a value corresponding to percussion instruments in a defined digital music standard. For example, a default channel value CHAN_DEF can be "9" in a range staring at 0, or "10" in a range staring at 1, for encoding according to the Musical Instrument Digital Interface (MIDI).

[0172] In this way, sound activation values and capacitance sensor position values can be encoded into a digital format that includes percussion type values (e.g., note numbers), as well as the time at which such notes are turned on or off.

[0173] While an embodiment like that of FIG. **27** can encode sound values and sound activation values into a predetermined digital form, other embodiments can utilize such values for the generation of an analog sound signal. An example of one such approach is shown in FIG. **28**.

[0174] Referring now to FIG. **28**, a sound generation circuit according to one embodiment is shown in a block schematic diagram and designated by the general reference character **2800**. A sound generation circuit **2800** can be a polyphonic music synthesizer having multiple voices, each different voice being controlled, at least in part, according a sound activation value (STRIKE1 to STRIKEn). The particular example of FIG. **28** shows voice values that can also be controlled according to an amplitude value (AMPL1 to AMPLn). An amplitude value can be generated according to the various methods noted above. In many existing synthesizer designs, an amplitude value can be provided as a velocity input (VEL1 to VELn) for a given voice.

[0175] In some embodiments, an encoder section, like that shown as **2708** in FIG. **27**, can be included to encode position values into particular formats compatible with a given sound generation circuit. A sound generation circuit **2800** can receive other control input values CONTROL for determining the type of voice generated by activation/position combinations.

[0176] Referring now to FIG. **29**, a controller system according to an embodiment is shown in a block schematic diagram and designated by the general reference character **2900**. A controller system **2900** can include a number of capacitance sense inputs **2902**, a capacitance sense circuit **2904**, a position encoder **2906**, a central processing unit (CPU) **2908**, and a sound value output **2910**. Capacitance sense inputs **2902** can be configured to receive inputs from capacitance sensors formed on one or more playing surfaces of a percussion instrument, or similar device.

[0177] A capacitance sense circuit **2904** can receive capacitance sense input values, and in response thereto, generate sensor activation signals. A capacitance sense circuit **2904** can evaluate capacitance values utilizing including, but not limited to, relaxation oscillator methods and sigma delta modulation methods.

[0178] A position encoder **2906** can generate position values from sensor activation signals produced by a capacitance sense circuit **2904**. Such position information values can be provided to, or read from, a central processing unit (CPU) **2908**.

[0179] CPU **2908** can execute predetermined instructions stored within internal memory, or optionally, in an external memory **2912**. According to position values received from position encoder **2906**, CPU **2910** can generate output values at sound output **2910**, as well as provide control signals to the other portions of the controller system **2900**.

[0180] Preferably, a controller system **2900** can include a PSoC® mixed signal array made by Cypress Semiconductor Corporation of San Jose, Calif., configured to include at least the capacitance sense circuit **2908**.

[0181] In this way, the embodiments can include a system configured to generate sound values based on capacitance sense inputs of a percussion instrument, or similar device.

[0182] Various embodiments represented as systems will now be described.

[0183] Referring now to FIG. **30**, a system according to one embodiment is shown in a block schematic diagram and designated by the general reference character **3000**. A system **3000** can include a capacitance sensor array **3002** and a controller **3004**. A capacitance sensor array **3002** can include a number of capacitance sensors, preferably situated in a playing surface of a percussion instrument.

[0184] A controller **3004** can generate sound values based on sensed capacitance values of capacitance sensor array **3002**. In very particular embodiments, a controller **3004** can include any of the circuits and function described above in conjunction with FIGS. **12-15**, **17A-20**, and **22A-29**.

[0185] The particular system **3000** can be compatible with a sound synthesizer **3090** external to the system **3006**. A sound synthesizer **3090** can generate sound waveforms in response to sound values received from controller **3004**. In