PSoC 4 Pioneer Kit Community Project#16 - Proximity Theremin

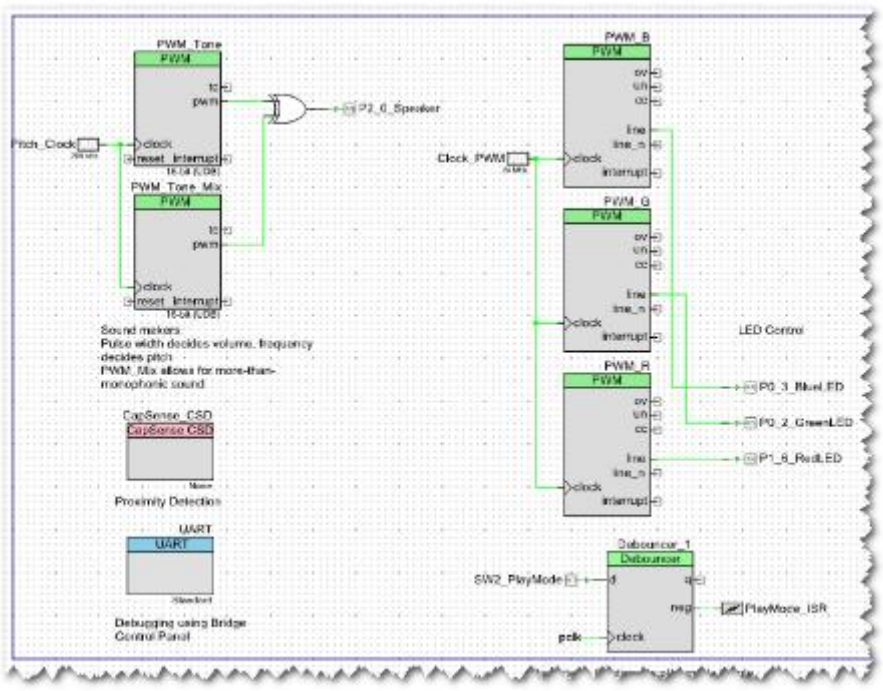
Today's project is a personal favorite of mine because it got the amateur/wannabe musician inside me very excited. Building on yesterday's example of how to do proximity sensing with the *CapSense* Component, today we're going to use that concept in an application. This example project implements a Theremin, a 1920s electronic musical instrument played without physical contact.

The project uses two proximity sensors - one for *Pitch* and another for *Volume*. The proximity sensing itself is done using wires that act as antennas, input to the PSoC 4 using the *CapSense* block.

The theremin has 2 modes - discrete and continuous notes, toggled by using the pushbutton (SW2) on the board. *Pitch* information is indicated by the color of the LED, while *Volume* information is indicated by the brightness of the same LED.

The Cortex-M0 CPU takes the analog input from the CapSense proximity sensors and send a parameter indicating distance to the hardware PWMs, that in-turn modulate the LED. The CPU also sends data to the 2 other PWMs that are used to drive the a Buzzer that creates the musical notes.

The project also includes a UART Component so you can read the CapSense proximity sensor data over hyperterminal.



What's cool about this project?

- It uses 5 (five!) hardware 16-bit PWMs - 3 of which are implemented on the TCPWM block (modulating the RGB LEDs), wheres 2 more implemented using UDBs (to drive the buzzer).

- It implements distance sensing using CapSense proximity

- It lets you make music in the air! Check out the demo video above.

Hardware Connections:

Alias	Name	Port
Cmod	\CapSense_CSD:Cmod\	P4[2] SCB0:SPI:SCLK
ProximitySensor0_0__PROX	\CapSense_CSD:Sns[0]\	P1[0] TCPWM2:P
ProximitySensor1_0__PROX	\CapSense_CSD:Sns[1]\	P0[4] SCB1:I2C:SCL, SCB1:SPI:MOSI, SCB1:UART:RX
	\UART:rx\	P4[0] SCB0:I2C:SCL, SCB0:SPI:MOSI, SCB0:UART:RX
	\UART:tx\	P4[1] SCB0:I2C:SDA, SCB0:SPI:MISO, SCB0:UART:TX
	P0_2_GreenLED	P0[2] SCB0:SPI:SS3
	P0_3_BlueLED	P0[3]
	P1_6_RedLED	P1[6]
	P2_0_Speaker	P2[0]
	SW2_PlayMode	P0[7] SCB1:SPI:SS0

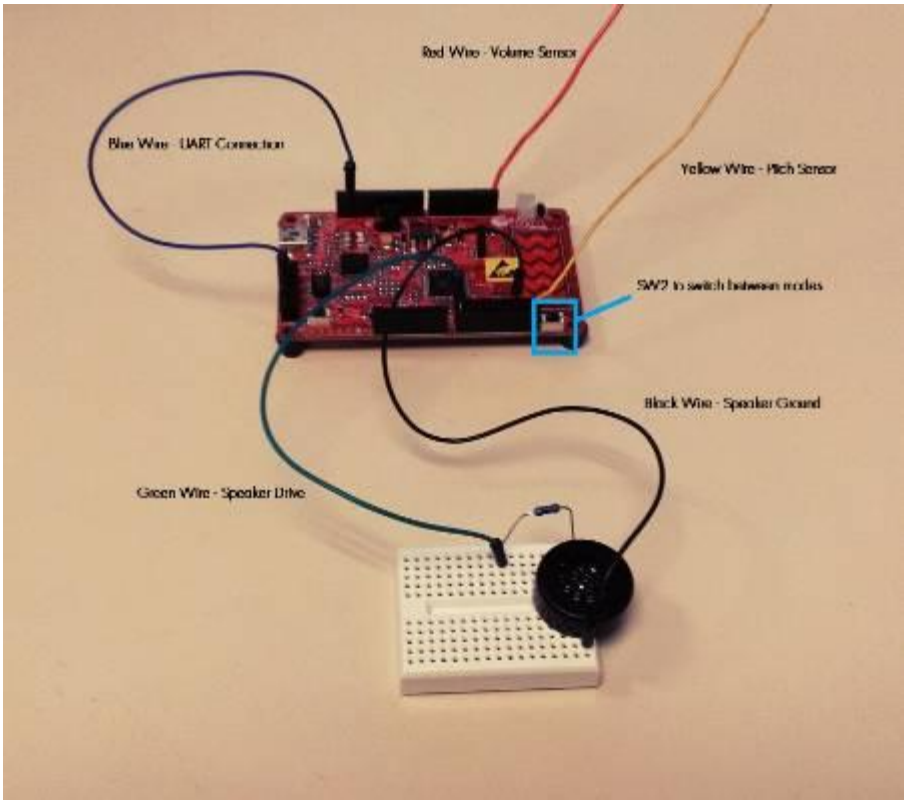
The RGB LED and the pushbutton switch are on the board. In addition to the PSoC 4 Pioneer Kit, you're going to need -

- an 18 ohm Speaker/Buzzer (P2[0])

- 2 resistors, 2 capacitors

- handful of jumper wires

http://www.element14.com/community/message/77464



The project is attached below, its all ready to go. Just build and program on to your PSoC 4 Pioneer Kit, and wire up a small buzzer.

Have fun making music!