# Circuit Cellar Contest Entry 253

## Blood Pressure Recorder

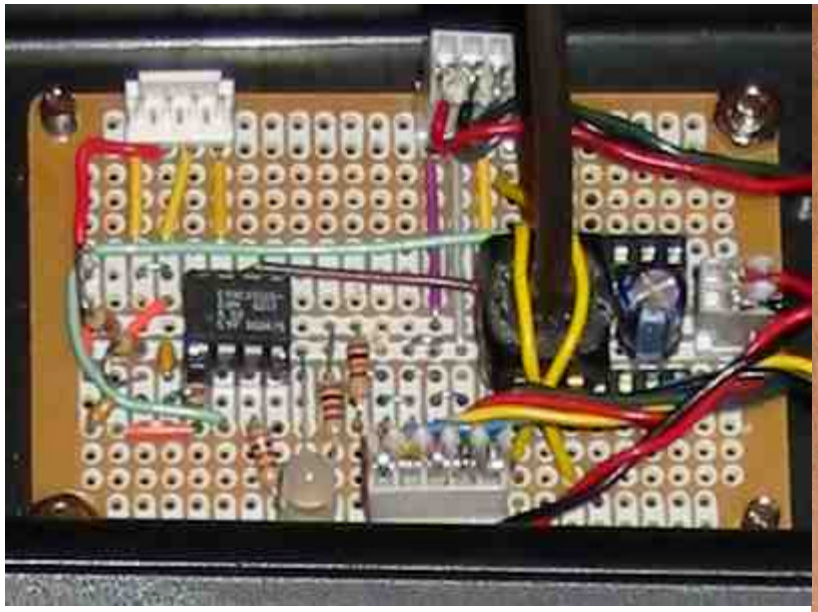
**I did this project to compare a design using the Cypress PSoC device to a project I did a number of years ago. The circuit uses a pressure sensor to read and display the pressure in a blood pressure cuff and record systolic and diastolic pressures. The original design used a microprocessor, EPROM memory, A to D converter, opamps for filters and amplifiers, and clue logic to tie it all together. The PsoC design uses one 8 pin dip to replace all of those items.**

**The first stage is a pressure bridge to a instrumentation amplifier followed by a low pass filter and an 11 bit A to D converter. The four control buttons are combined onto one analog line to save pins. The voltage at that pin is 2.5 volts with no buttons pressed. Each button pulls that pin to ground through a resistor selected to give a voltage in the range of 1 to 2 volts. This gives approximately a plus or minus 0.5 volt window for the audio signal. An A to D converter digitizes the switch voltage and the software determines which button is being pressed. The heart sounds from an external microphone are impressed on top of the buttons signal. The amplitude of the audio signal is kept below the plus or minus 0.5 volts which would confuse the switch sensing algorithm. The amplified heart sounds are output to external amplified speaker. A 4x20 serial LCD display interfaces with the user.**

**The program displays a heading screen for 5 seconds, auto zeros the pressure followed by displaying the main selection screen. The user may select to take a blood pressure reading or go to the setup utility.**

**The setup utility allows zeroing the pressure sensor or calibrating the span of the sensor. Zeroing is done at 0 mmhg and stores the two's complement of that reading as an offset which is added to all future readings. The calibration is done at 100 mmhg and an adjustment value is calculated and saved.**

**A blood pressure reading starts by the user placing a blood pressure cuff snuggly on his upper arm. Then a stethoscope with attached microphone is placed over the brachial artery just above the elbow. The screen asks the user to pump above their systolic pressure and then press the "Set" button upon reaching that pressure. The screen then displays the pressure in 4 times normal size characters and the audio channel gain is increased to hear the heart sounds. The gain is automatically lowered if a button is pressed and when the reading is complete. The user slowly drops pressure until heart sounds are heard. The "Up" button is pressed recording the systolic pressure. The user continues dropping pressure until heart sounds are no longer heard. The "Down" button is pressed and the diastolic pressure is saved and a screen is displayed showing the systolic and diastolic values. The user presses the "Menu" button to erase the blood pressure reading and display the main menu.**

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Blood Pressure PSoC
D. B. Goodrich
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Menu Up Down Set

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