

## **TI MSP430 Based LPG Gas Monitor**

**Project Number:** TI 004

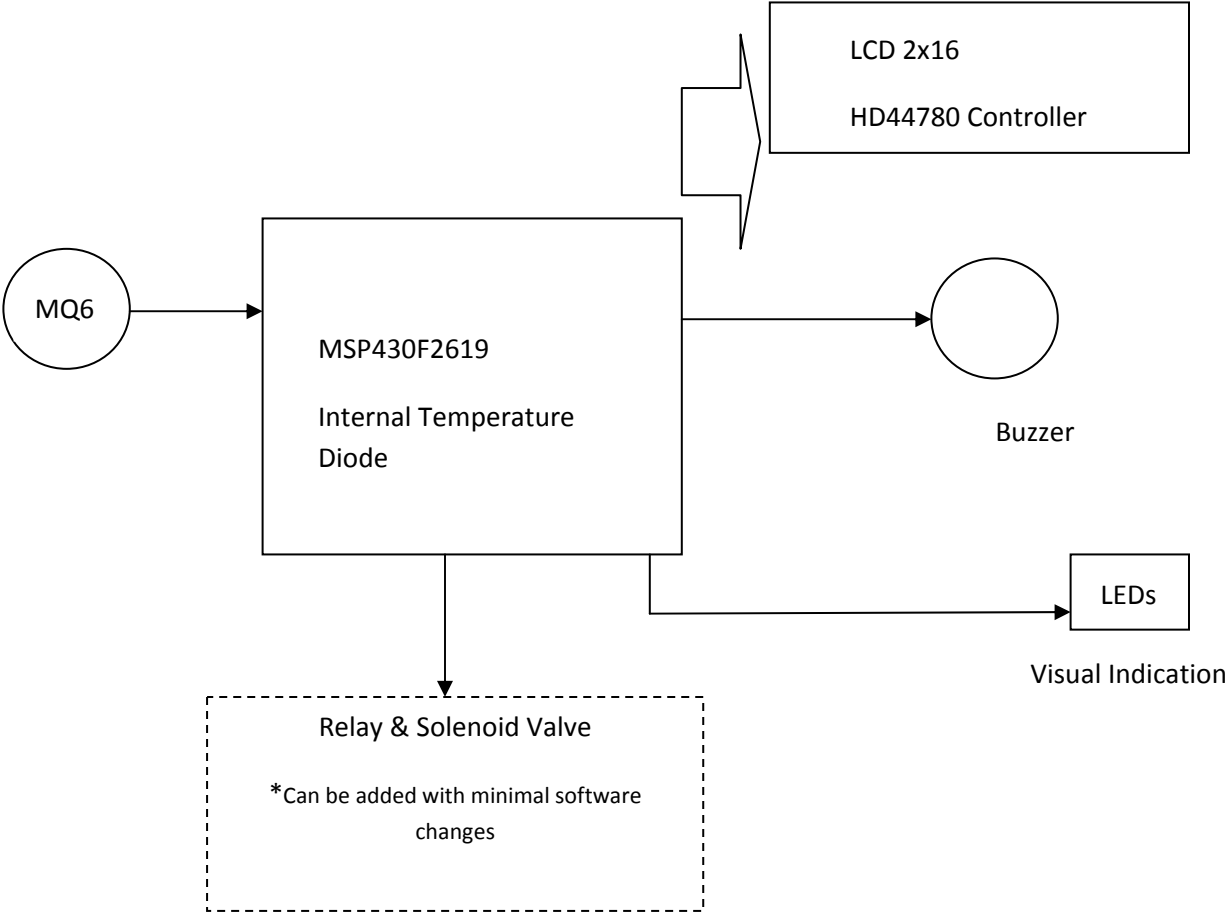
**Description:** Leakage in domestic gas cylinders has been a cause of a lot of casualty. A person in the vicinity of a leak may unknowingly operate a light switch. A spark is what LPG requires to ignite and create a massive fireball. The project monitors the temperature, and presence of LPG in the air, and raises a visual indication and a sound alarm. A latch relay can be further interfaced, to disable the electrical current. Similarly a solenoid valve can be used to cut off the gas supply. The provisions for both can be simply added in the software by enabling the particular output port.

The heart of the application is a TI MSP430F2619. It may sound overkill, for a simple application, but i had it in spare. It is my first application with MSP430 microcontrollers and i am really impressed with the flexibility in the selection of clock sources. A green led will blink, to confirm, the system is operational.

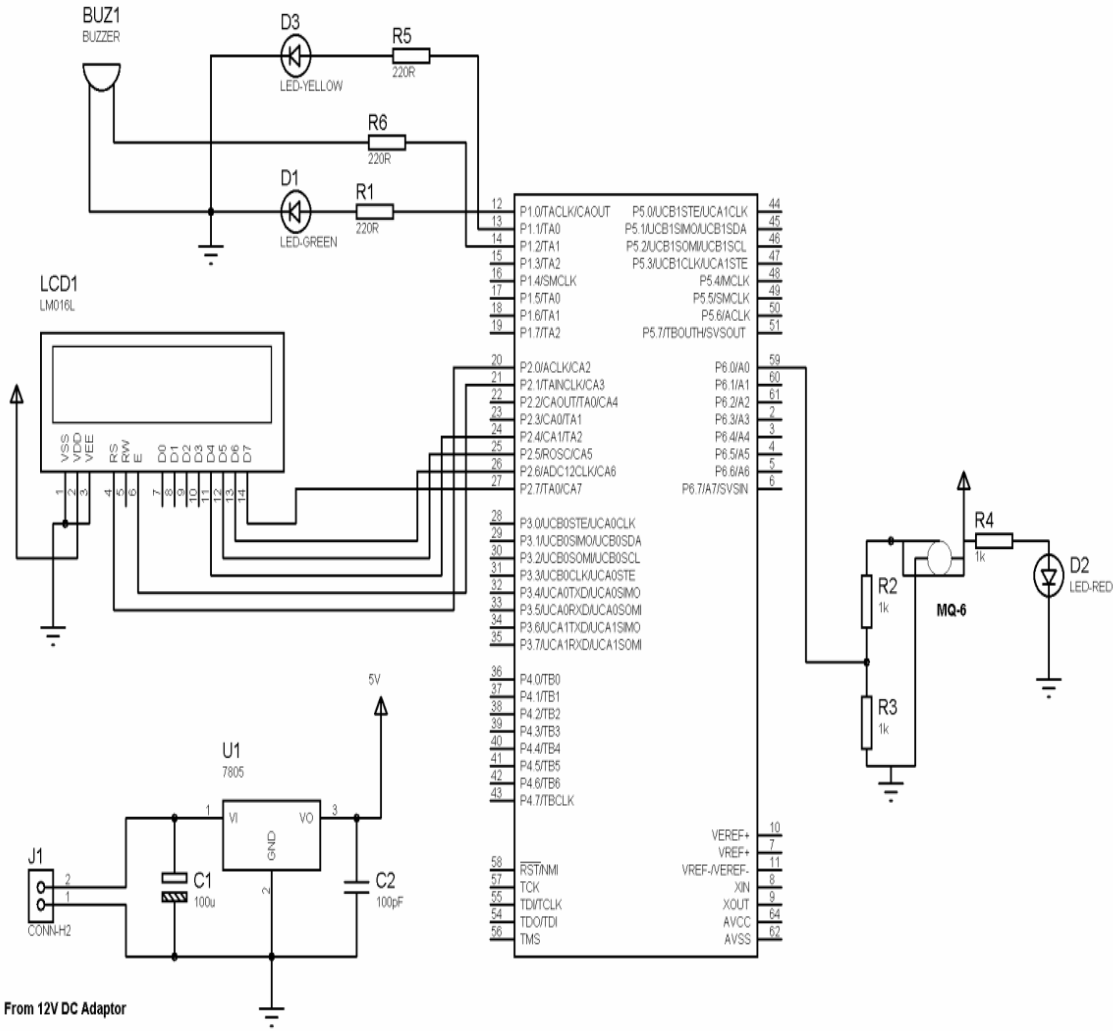
The sensor is connected to ADC pin of the microcontroller. The temperature is monitored using the internal temperature diode in the MSP430F2619. It is set at default channel no. 10. The analog output voltage of the LPG sensor is scaled down to half using a voltage divider network. The reference voltage required for ADC is used from an internal reference generator and it is set at 2.5V. The internal temperature sensor is fairly accurate for the current application. In the event of a gas leak, the buzzer will sound an alarm, and the yellow led will light up. The LPG sensor and LCD were assembled on a breadboard. The LCD is connected to PORT2, and it displays the current temperature reading.

The LPG Sensor MQ-6 is manufactured by **HANWEI Sensors**. The sensor is very sensitive and simple to use. The sensor has a heating coil that needs to be fed 5V and the voltage across the electrodes can be measured for sensor output. A TI MSP FET430 with USB interface was used to program the microcontroller. The LCD is 2x16 HYD 44780 type. It operates on 5 volt. A 5V,1A fixed positive voltage regulator 7805 is used to provide 5V to the LCD and LPG sensor and is further fed to the Schmartboard TI Development board. The LCD is configured for a 4bit interface.

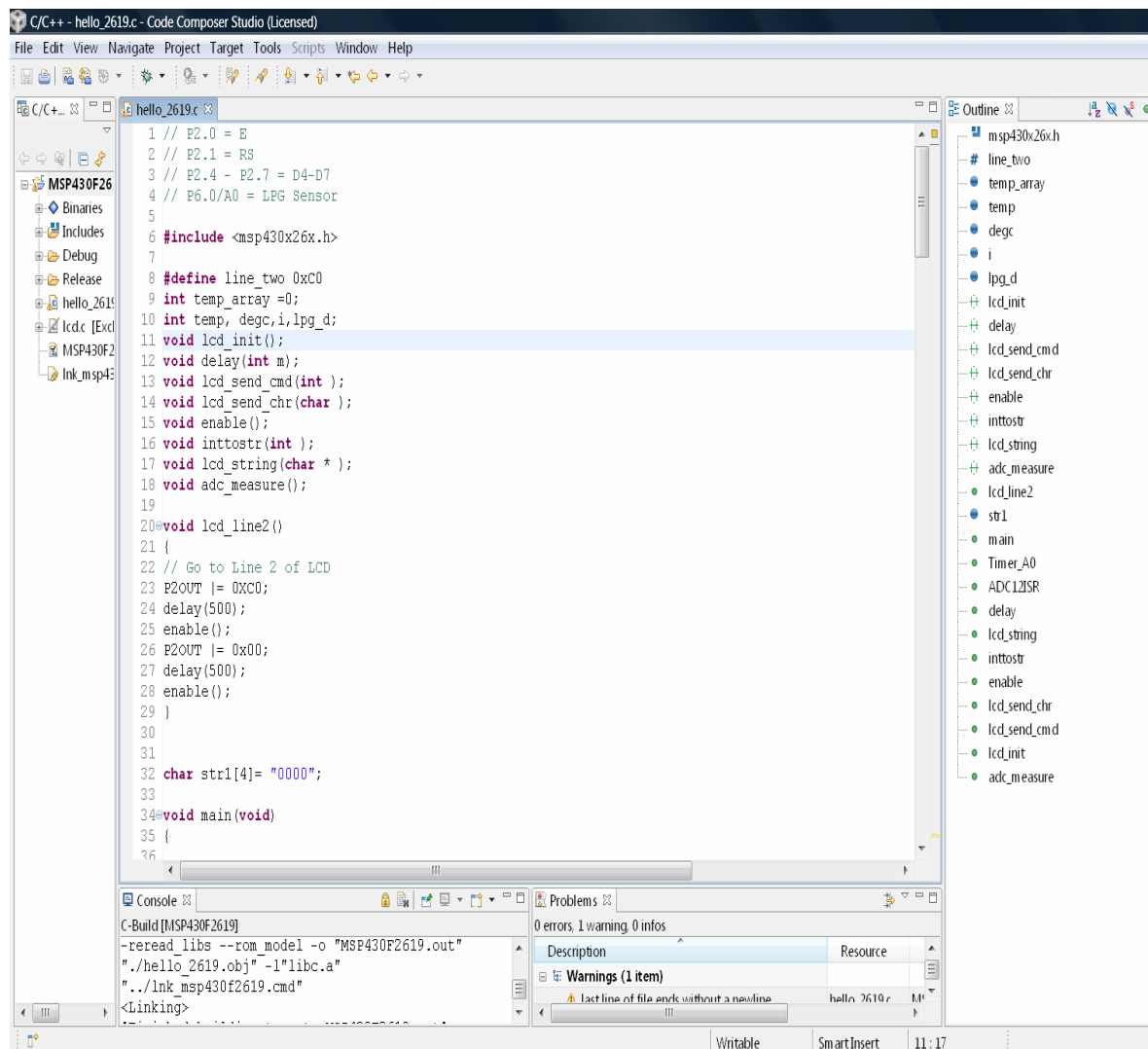
**Block Diagram**



# Schematic



**Software:** The software is written in C language using the CCS v 4.2 IDE. The MCLK and ACLK have been set to internal Very Low Power, Low Frequency Oscillator, which is typically set to 12 KHz.



Screenshot of the program

## Bill of Material:

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## 6 Resistors

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<u>Quantity:</u>	<u>References</u>	<u>Value</u>
3	R1, R5, R6	220R
3	R2-R4	1k

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## 2 Capacitors

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<u>Quantity:</u>	<u>References</u>	<u>Value</u>
1	C1	100u
1	C2	100pF

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## 1 Integrated Circuits

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<u>Quantity:</u>	<u>References</u>	<u>Value</u>
1	U1	7805

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## 3 Diodes

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<u>Quantity:</u>	<u>References</u>	<u>Value</u>
1	D1	LED-GREEN
1	D2	LED-RED
1	D3	LED-YELLOW

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## 3 Miscellaneous

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<u>Quantity:</u>	<u>References</u>	<u>Value</u>
1	BUZ1	BUZZER
1	J1	CONN-H2
1	J2	CONN-H2
1	J3	CONN-H2
1	J4	CONN-H4
1	LCD1	HD44780
1	MQ6	LPG Sensor