

Microprocessors And Interfacing



JINEET HEMAL DESAI	2017A7PS0168G
VISARG SONEJI	2017A7PS0029G
PRASHIL PAREKH	2017AAPS0227G
ISHAN PATEL	2017A3PS0431G
URVIL JIVANI	2017A7PS0943G

PROBLEM STATEMENT

System Description: A humidistat is supposed to be reset according to the outside temperature - as the outside temperature falls, the humidity level inside the house should be set lower. The purpose of this project is to develop a humidistat which senses the outside temperature and adjusts the humidity accordingly. Two sensors are required: outside temperature and inside humidity. Output is provided via a simple relay with the humidifier (presumably on the furnace) being on or off. Also readings from the humidity and temperature sensors must be displayed on an LCD display.

Design Specifications:

- 1) Measurement of external Temperature in degree Celsius.
- 2) Measurement of internal Relative Humidity in %Rh.
- 3) Adjusting the humidity of the room based on the external temperature. This is done with the help of a humidifier.
- 4) The output to switch on/off the humidifier is given via a simple relay to indicate the state (on/off) of the humidifier.
- 5) Displaying the temperature (in degree Celsius) and Relative Humidity (in %) on the LCD.

Assumptions:

- 1) Range of temperatures : -30°C to 70°C
- 2) Range of humidity values: 0% Rh to 100% Rh
- 3) We measure the outside temperature with the help of temperature sensor. Then we measure the average humidity inside our room with the help of 4 humidity sensors.
- 4) Temperature sensor is located on the outer wall of the room. Humidity sensors are located inside on each of the 4 side walls of the room.
- 5) In normal environmental conditions 20°C corresponds to 50% Rh
- 6) We assume linear relationship between temperature ($^{\circ}\text{C}$) and relative humidity (%Rh).
- 7) When temperature is decreased by 1°C , humidity gets changed by 1%RH.

Hardware Requirements:

Microprocessor – 8086

Octal 8 bit buffer -74LS245 (x2)

Octal 8 bit latch - 74LS373(x3)

Octal buffer with 3 output - 74LS244(X1)

Temperature Sensors – WE710(x1)

Humidity Sensors – WE600 (x4)

Humidifier(x1)

LCD – LM020L(x1)

Programmable Peripheral Interface – 8255(x2)

3x8 Decoder 74LS138(x2)

Programmable Interval Timer – 8254(x1)

OR ICs – 7432 (x2) (8 or gates used in memory interfacing)

ROM chips (2K each) – 2716 (x4)

RAM chips(2K each) – 6116(x2)

A Simple Relay to control the humidifier(x1)

Clock Generator 8284(x1)

Switch(x1)

NOT IC - 7404(X1)

OR IC – 7408(X8)

AND IC-7411(3 INPUT)- (X2)

AND IC-7432(2 INPUT)- (X1)

Priority Interrupt Controller - 8259 (X1)

ADC 0808(x1)

Current to Voltage Convertor (X5) [MAX 951]

SENSOR REQUIREMENTS

Humidity Sensor WE600

Type: capacitance

Output: 4-20 mA

Range: 0 to 100% RH

Accuracy: $\pm 2\%$ RH

Resolution: 1% RH (50mV)

Operating Voltage: 10-36 VDC

Current Draw: 3mA plus sensor output

Warm Up Time: 3 seconds minimum

Operating Temp: -40° to $+55^{\circ}\text{C}$

Sensor Size: 1 1/2" diameter x 7"

Weight: 1/2 lb.



TEMPERATURE SENSOR WE710

Sensor Type: 100ohm Platinum Class A RTD

Output: 4-20 mA

Range: -58°F to $+185^{\circ}\text{F}$ (-50°C to $+85^{\circ}\text{C}$)

Accuracy: $\pm 0.5^{\circ}\text{F}$ ($\pm 0.25^{\circ}\text{C}$)

Operating Voltage: 10-36 VDC

Current Draw: Same as sensor output current

Warm-Up Time: 3 seconds minimum

Adhesive Type: 3M #4910 Acrylic

Storage Temp: -67°F to +195°F (-55°C to +90°C)

Sensing Surface: 0.75x1.5 inch (19x38 mm) Aluminum

Housing: 2.0x1.1x3.8 inch (5x2.8x9.7 cm)(WxHxL) ABS

Weight: 13oz (368g) with 25 ft of cable

LM020L HITACHI LCD MODULE

Display: 16 characters * 1 lines

Power supply for LCD drive: 0-6.5V

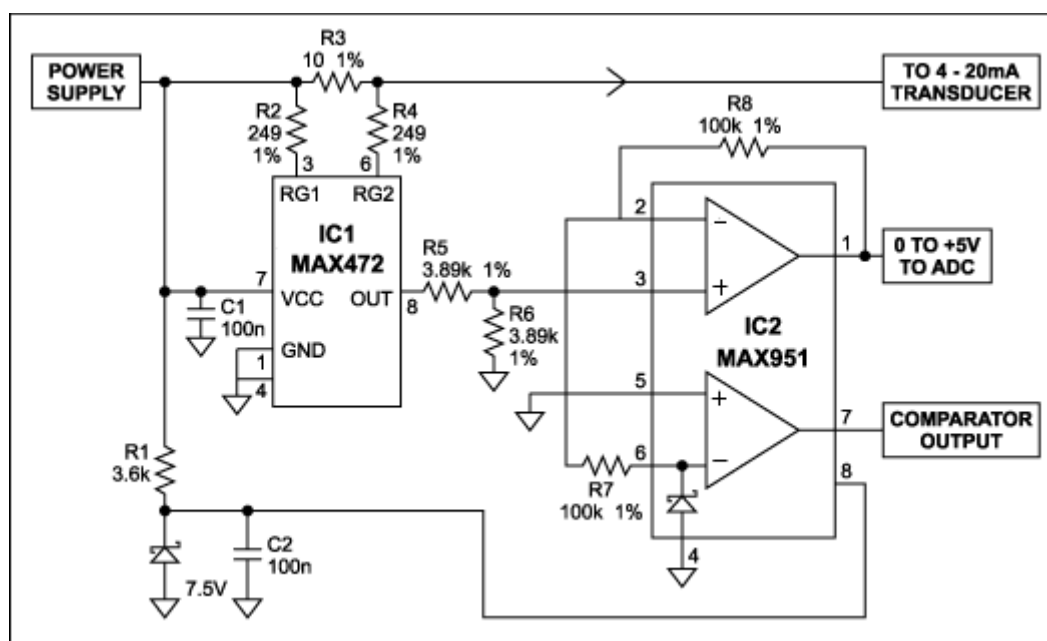
Operating temperature: 0-50 °C

Power supply current (Vdd = 5V) : 1 – 3 mA

Bi-directional 8 or 4 bit bus interface

Wide range of instruction functions including: - Display clear, Cursor positioning, Display or cursor shift on data entry, and Display ON/OFF

CURRENT TO VOLTAGE CONVERTOR



Output of WE sensors is 4-20mA. But the input to ADC is in terms of voltage. So a current to voltage convertor is required.

MEMORY INTERFACING

CHIP	START ADDRESS	END ADDRESS
ROM1	00000h	00FFFh
RAM1	01000h	01FFFh
ROM2	FF000h	FFFFFh

I/O INTERFACING 8255(1)

PORT	PORT ADDRESS
PortA	00h
PortB	02h
PortC	04h
Control Register	06h

I/O INTERFACING 8255(2)

PORT	PORT ADDRESS
PortA	10h
PortB	12h
PortC	14h
Control Register	16h

I/O INTERFACING 8259

PORT	PORT ADDRESS
Port1	60h
Port2	62h

I/O INTERFACING 8254

PORT	PORT ADDRESS
Cnt0	50h
Cnt1	52h
Cnt2	54h
Control Register	56h

RELAY USED FOR HUMIDIFIER

