Water level indicator using microcontroller 8051 pdf

Engineering project-Water Level Controller using 8051 Microcontroller -tested and assembled .... Water Level Controller using 8051 Circuit Principle: This system mainly works on a principle that “water conducts electricity”. The four wires which are dipped into the tank will indicate the different water levels. Based on the outputs of these wires, microcontroller displays water level on LCD as well as controls the motor. Circuit Components: At89c51 controller At89c51 programming board. 16*2 LCD 5V Relay Bc547 (NPN) transistors – 5 Resistors (1K) – 4 Resistor – 330 ohm AC Motor Pot – 10k Programming cable Connecting wires Water Level Controller using 8051 Circuit Design: The main heart of this project is AT89C51 microcontroller. The water level probes are connected to the P3.0, P3.1, P3.2, and P3.3 through the transistors. Port P2 connected to the data pins of LCD and control pins RS, RW and EN of LCD are connected to the P1.0, P1.1, and P1.2 respectively. Initially when tank is empty, LCD will display the message EMPTY and motor runs automatically. When water level reaches to quarter level, now LCD displays QUARTER and still motor runs. For further levels, LCD displays the messages HALF and ¾ FULL. When tank is full, LCD displays FULL and motor automatically stops. Again motor runs when tank is empty. Algorithm for Water Level Controller Circuit: First configure the controller pins P3.0, P3.1, P3.2 and P3.3 as inputs and P3.4 as output. Now initialize the LCD. Continuously check the water level input pins P3.0, P3.1, P3.2, and P3.3 If all the pins are low then display tank is empty on LCD and make P3.4 pin high to run the motor automatically. High pulse on the pin P3.0 indicates quarter level, display the same thing on LCD. If P3.1 is high then water level is half. High pulse on P3.2 indicates 3/4th full of the tank. If P3.3 is high then tank is full, now make P3.4 pin is low to turn off the motor automatically. Here is a simple, versatile project which indicates the level of water and automatically controls it by using PIC Microcontroller. The Water Level Sensing Section senses the level of water in the tank and sends it (wireless) to the Receiver Section. Receiver Section is connected to the Controlling Section, which process the received information and produces visual, sound indications and controls the operation of the motor whenever required. The project is divide into 4 sections. 1. Power Supply Section Power Supply section provides required supply for Receiver and Controlling modules. Receiver module requires +5V power supply. Controller module requires +5v and +12v supply. Circuit Diagram: 2.Water Level Sensing Section ASK RF Transmitter Level Sensor module is made of with HT12E encoder and ASK (Amplitude Shift Keying) RF transmitter. This circuit can be drive using 9V battery. For more details about this transmitter, please read the article Wireless RF Transmitter and Receiver using ASK RF Module. This circuit is placed near the Water Tank and connected to the tank as show in the figure below. Water Tank Connections ASK RF Receiver Receiver Module is made of with HT12D decoder and ASK RF receiver. The data transmitted by the Sensor module is received by this module and is given to the Controlling Module. For more details about this receiver, please read the article Wireless RF Transmitter and Receiver using ASK RF Module. 4. Controlling Section Water Level Indicator Controller using PIC Microcontroller The soul of the Controlling Section is PIC16F877A. It process the data given by the Receiver Section. LCD Display, LED Indications and Motor status are updated according to the data. You can download the hex file and mikroC Source Code at the bottom of this article. MikroC Code // LCD module connections sbit LCD_RS at RB2_bit; sbit LCD_EN at RB3_bit; sbit LCD_D4 at RB4_bit; sbit LCD_D5 at RB5_bit; sbit LCD_D6 at RB6_bit; sbit LCD_D7 at RB7_bit; sbit LCD_RS_Direction at TRISB2_bit; sbit LCD_EN_Direction at TRISB3_bit; sbit LCD_D4_Direction at TRISB4_bit; sbit LCD_D5_Direction at TRISB5_bit; sbit LCD_D6_Direction at TRISB6_bit; sbit LCD_D7_Direction at TRISB7_bit; // End LCD module connections char txt1[] = "Water"; char txt2[] = "Level"; char txt3[] = "Indicator"; char txt4[] = "And Controller"; char mtr1[] = "Motor "; char mtr2[] = "OFF"; char mtr3[] = "ON"; char wtr1[] = "Level: "; char wtr2[] = "Very Low"; char wtr3[] = "Low"; char wtr4[] = "Medium"; char wtr5[] = "High"; char wtr6[] = "Full"; void main() { int i = 0; int c = 16; int b = 0; CMCON = 0x07; ADCON1 = 0x06; TRISA = 0x0F; // set direction to be input PORTA = 0x00; PORTD = 0x00; PORTC = 0x00; TRISB = 0x00; // set direction to be output TRISC = 0x00; // set direction to be output TRISD = 0x80; // set direction to be output PORTD.F2 = 1; PORTD.F7 = 1; Lcd_Init(); // Initialize LCD Lcd_Cmd(_LCD_CLEAR); // Clear display Lcd_Cmd(_LCD_CURSOR_OFF); // Cursor off Lcd_Out(1,1,txt1); // Write text in first row Lcd_Out(2,1,txt2); // Write text in second row Delay_ms(500); Lcd_Cmd(_LCD_CLEAR); // Clear display Lcd_Out(1,1,txt3); // Write text in first row Lcd_Out(2,1,txt4); // Write text in second row Delay_ms(500); // Moving text for(i=0; i0) { PORTD.F2 = 1 //LCD Backlight ON c--; } else PORTD.F2 = 0; //LCD Backlight OFF if(b>0) { PORTD.F0 = 1; //Buzzer ON Delay_ms(125); PORTD.F0 = 0; //Buzzer OFF b--; } if(PORTD.F7 == 0) //Manual Backlight ON c = 16; if(PORTA == 0x0F) { PORTD.F1 = 1; Lcd_Out(1,8,wtr2); Lcd_Out(2,7,mtr3); PORTC = 1; if(i == 0) { c = 16; //Backlight b=3; //Buzzer } i=1; } else if(PORTA == 0x0E) { Lcd_Out(1,8,wtr3); if(i == 1) Lcd_Out(2,7,mtr3); else Lcd_Out(2,7,mtr2); PORTC = 3; //LED Bar } else if(PORTA == 0x0C) { Lcd_Out(1,8,wtr4); if(i == 1) Lcd_Out(2,7,mtr3); else Lcd_Out(2,7,mtr2); PORTC = 7; //LED Bar } else if(PORTA == 0x08) { Lcd_Out(1,8,wtr5); if(i == 1) Lcd_Out(2,7,mtr3); else Lcd_Out(2,7,mtr2); PORTC = 15; //LED Bar } else if(PORTA == 0x00) { Lcd_Out(1,8,wtr6); Lcd_Out(2,7,mtr2); PORTD.F1 = 0; // Motor OFF if(i == 1) { c = 16; //Backlight b = 3; //Buzzer } i=0; //Motor Status Updated PORTC = 31; //LED Bar } else PORTA = 0x0F; Delay_ms(125); }while(1); // Endless loop } Working For the transmission and reception of data we have used Holtek encoder-decoder pair of HT12E and HT12D. Both of them are CMOS ICs working voltage ranges from 2.4 to 12v. The oscillator resistances are chosen according to the datasheet. When water level raises, the data pins of the encoder will be grounded corresponding to the level of water, which will be transmitted to the Receiver via ASK RF module. The received data is decoded by the decoder HT12D. LED on the receiver indicates that it is receiving data. Then the data is given to the PIC for processing. D0 D1 D2 D3 Status 0 0 0 0 All data pins are grounded, indicates tank is Full. 0 0 0 1 Water level is below D3 and above D2, indicates High level. 0 0 1 1 Water level is below D2 and above D1, indicates Medium level. 0 1 1 1 Water level is below D1 and above D0, indicates Low level. 1 1 1 1 Water level is below D0, indicates Very Low level. When the water level becomes Very Low, the motor will turned ON, buzzer sounds and the LCD backlight will automatically turned ON for 5 seconds. After this, when the water level reaches Full level, the motor will automatically turned OFF, buzzer sounds and the LCD backlight will automatically turned ON for 5 seconds. During normal operation you can manually turn on LCD backlight by pressing the Push button switch. The LCD indicates the Level of water (‘Very Low’, ‘Low’, ‘Medium’, ‘High’,’Full’) and the status of the motor (‘ON’ or ‘OFF’). The LED bar will also indicate the level of water. Download Here You can download the hex file, mikroC source code, PCB Design, Layout, Proteus and Orcad files here. Water Level Indicator Controller using PIC

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