

CODE:

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// Program to operate a Vacuum Fluorescent Display
// using an Arduino Uno, Atmega328P microcontroller.
// code: [modified eg 12.5.4-Mazidi, 8 pin 2 ports DON]

#define F_CPU 16000000UL
#include <avr/io.h>
#include <util/delay.h>

#define LCD_DPRT PORTD          // configuring PortD for data
#define LCD_DDDR DDRD
#define LCD_DPIN PIND
#define LCD_CPRT PORTB          // utilizing PortB pins for the control.
#define LCD_CDDR DDRB
#define LCD_CPIN PINB
#define LCD_RS 0                 // control pin assignments.
#define LCD_RW 1
#define LCD_EN 2
//*****
void delay_us(unsigned int d)
{
    _delay_us(d);
}
//*****
void lcdCommand( unsigned char cmnd )
{
LCD_DPRT = cmnd;           // ready data lines
LCD_CPRT &= ~ (1<<LCD_RS); // RS low to select the command register
LCD_CPRT &= ~ (1<<LCD_RW); // RW low to write commands.
LCD_CPRT |= (1<<LCD_EN);   // Enable pin set to latch data on the falling edge.
delay_us(.02);              // Enable high for 20 ns for LCD module to run a command.
LCD_CPRT &= ~ (1<<LCD_EN); // LCD_EN pin of PortB is cleared after sending a command.
delay_us(.23);              // Delay 230 ns between commands sent.
}
//*****
void lcdData( unsigned char data )
{
LCD_DPRT = data;
LCD_CPRT |= (1<<LCD_RS);   // RS pin set to select the Data register.
LCD_CPRT &= ~ (1<<LCD_RW); // RW low to write commands.
LCD_CPRT |= (1<<LCD_EN);   // Enable pin set to latch data on the falling edge.
delay_us(.666);             // delay .666us between data sets.
LCD_CPRT &= ~ (1<<LCD_EN); // LCD_EN pin of PortB is cleared after sending data byte.
delay_us(.666);             // delay .666us
}
//*****
void lcd_init()             // Equivalent to void InitializeComputerBoard (void).
{
    // ...exception: the delay btwn clear display and entry mode.
LCD_DDDR = 0xFF;            // Port D is configured as output.
LCD_CDDR = 0xFF;            // Port B is configured as output.

LCD_CPRT &= ~ (1<<LCD_EN); // LCD_EN pin of PortB is cleared in preparation for sending
delay_us(2000);              // delay of 2ms before sending commands.
lcdCommand(0x38);            // Function set command for interface data length, display lines and character font.
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LcdCommand(0x0E);           // Display on with blinking cursor.
LcdCommand(0x01);           // Display cleared.
delay_us(2000);
LcdCommand(0x06);           // Entry mode set
}

//*****
void lcd_gotoxy(unsigned char x, unsigned char y)
{
unsigned char firstCharAdr[]={0x80,0xC0,0x94,0xD4}; //table 12-5 of text.
LcdCommand(firstCharAdr[y-1] + x - 1); // calculating the address location to the first and subsequent characters.
delay_us(100);                // delay of 100us btwn each character being displayed
}
//*****
void lcd_print( char * str )
{
unsigned char i = 0 ;
while(str[i]!=0)
{
LcdData(str[i]);           // string array of characters to be displayed
i++;                      // each member of array called up incrementally.
}
}
//*****
int main(void)
{
Lcd_init();                 // init routine.
lcd_gotoxy(1,1);
lcd_print("The world is but");
lcd_gotoxy(1,2);
lcd_print("one country");
while(1);                  // do forever.
return 0;
}
//



/CODE

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