LCD Interfacing: Introduction

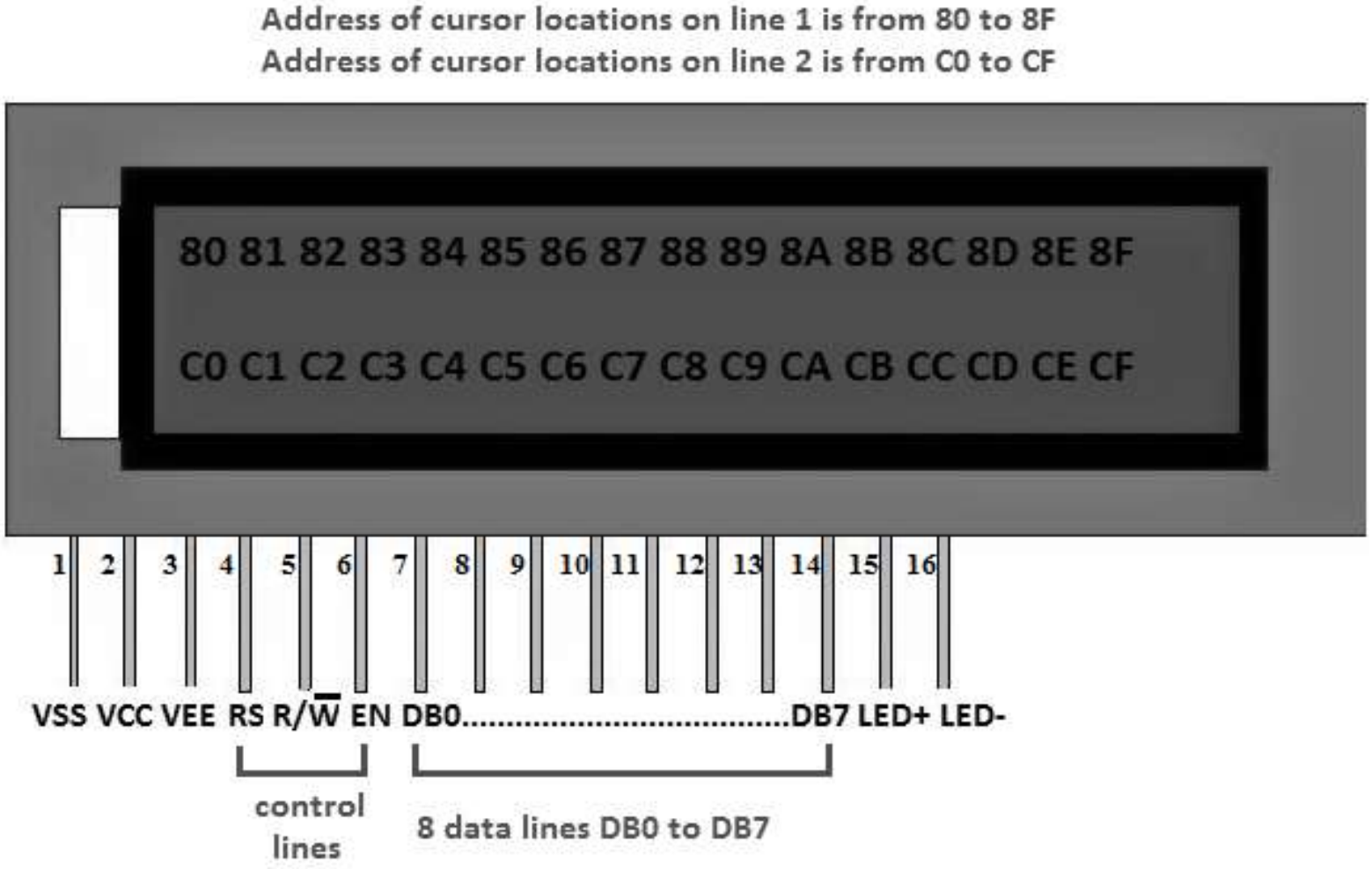
Liquid Crystal Display: An Overview

Liquid Crystal Display (LCD) is a very important component in embedded applications as it can display some vital information about the system that can be read by the users. It can also facilitate the user interaction with the embedded system, for example vending machines make use of these displays for completing the transaction so that buyer can get the right product from the machine.

- Low Cost
- Information displayed can be changing by changing few lines of code in the program.
- It can display information in English and can also display special characters.
- You can program the LCD to display information in any language.
- It consumes extremely low power and has long life.

LCDs are available in different configurations like 16x1, 16x2, 20x4 etc. It follows m x n configuration where m indicates the maximum number of characters that can be displayed in a row and n indicates the number of rows.

LCD Pin Diagram



LCD Pin Description

VSS	GROUND
VCC	+5V Power Supply
VEE	Contrast control power supply (10 K ohm Potentiometer output is connected to this pin)
RS	Register Select (RS = 0 to select command register, RS=1 to select Command register)
R/W	Read/Write, R/W = 1 for read and R/W = 0 for write operation
EN	Enable, H to L transition on this pin will latch the data in to LCD
DB0-DB7	Data bit 0 to 7
LED+	Back Light LED anode connection (Connect to +5V of Arduino Uno)
LED-	Back Light LED cathode connection (Connect to GND pin of Arduino Uno)

Arduino Functions for LCD Programming

lcd.begin ( )

This function is used to initialize the LCD interface. We define the LCD configuration using this command. For 16x2 LCD, this can be done using the following:
lcd.begin(16,2);
This is for initializing interface of LCD so that it has 2 lines and 16 characters can be displayed in one line.
The general syntax is:
lcd.begin(cols,rows);
So, you need to specify number of rows and columns as per the LCD specifications.

lcd.print ( )

This function is used to print text message on LCD screen. The general syntax is:
lcd.print (data);
Here, data is the text message that we want to display on LCD. For example:
lcd.print(“welcome”);
This will print welcome on LCD display.

lcd.print (data, Base)

Here, Base can be HEX, BIN, DEC, OCT depending on the number system in which the number specified in the function needs to be displayed on LCD.

lcd.setCursor ( )

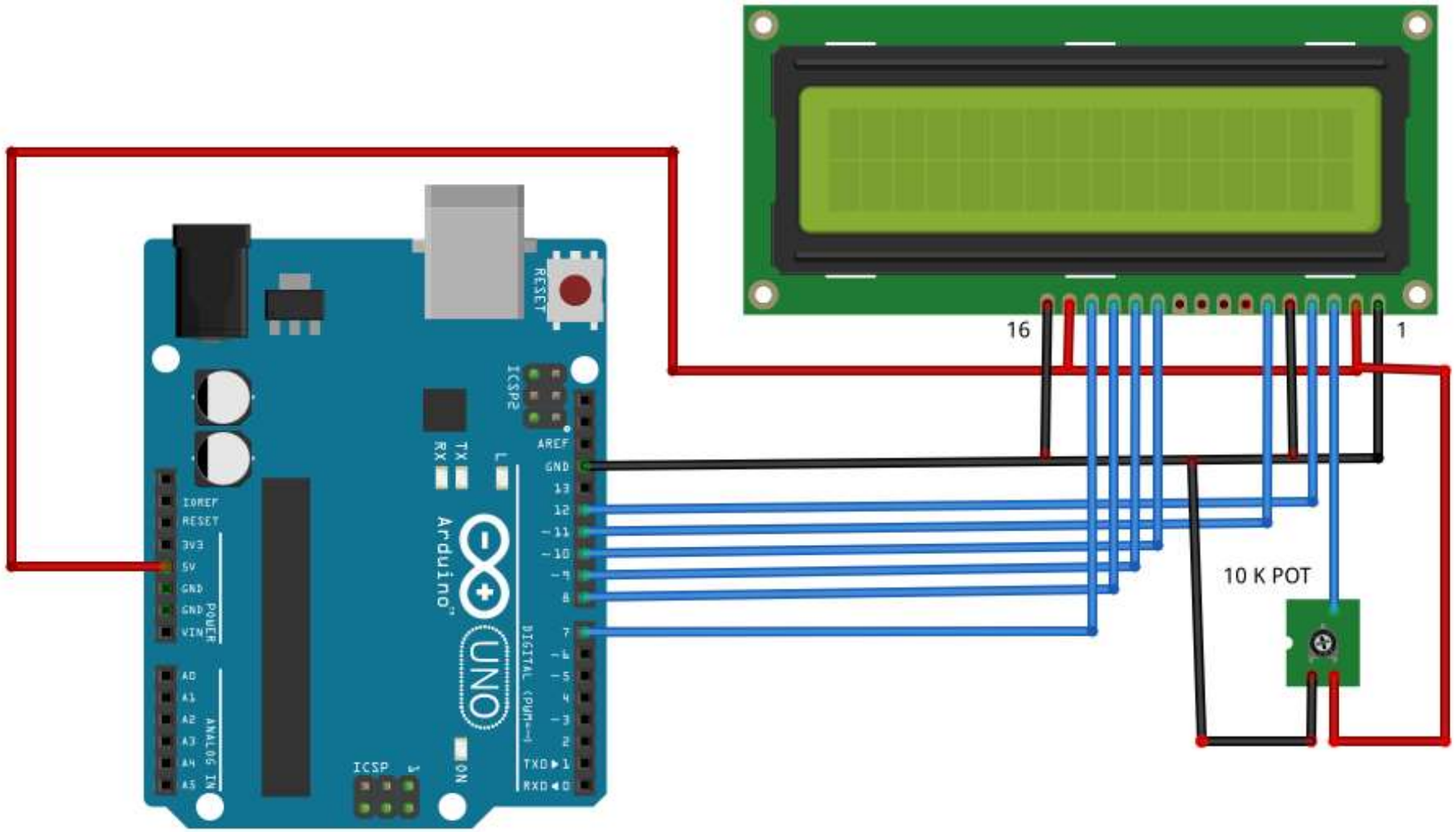
This function is used to position cursor at a specified position on the LCD display. The general syntax is as follows:

lcd.setCursor (col,row)
col and row specify the column and row number where the cursor needs to be positioned. For line 1 row value is 0 and for line 2 row value is 1. The col value can range from 0 to 15 for a 16x2 LCD display.

lcd.clear ( )

This function is used to clear the LCD display and it also positions the cursor to initial position, i.e. the upper left corner point of LCD screen.

LCD Interfacing Circuit Diagram



LCD Interfacing Arduino Code

```
#include <LiquidCrystal.h>
// library for using LCD
LiquidCrystal lcd(12,11,10,9,8,7);
//create variable lcd of type LiquidCrystal
// rs-12,en-11, D4 - D7 connected to pins 10-7
void setup()
{
// put your setup code here, to run once:
lcd.begin(16,2); // initialize 16x2 LCD
lcd.print("Welcome"); // print welcome on LCD
}
void loop()
{
// put your main code here, to run repeatedly:
}
```