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Application Note FAN2201

How to Scroll Text on a Character Display

In this application note, we will discuss how to scroll text on a character display using the Arduino Uno (Rev 3). A simple demonstration featuring the C164AXBSYLY6WT 16x4 character display module is provided as an example.

1. Introduction

With the growing popularity of easy-to-use hardware such as the Arduino¹ or Raspberry Pi², it is easier to build systems. In this application note, a simple display project is shown wherein text is horizontally scrolled. It features the C164AXBSYLY6WT character display module ([datasheet](#)):

- 16 pins, 87.0 mm x 60.0 mm
- 16x4 display, STN
- [ST7066U](#) Driver IC
- Yellow background
- Yellow or green backlight
- Wide temperature (-20°C to +70°C)
- Positive transreflective
- Bottom viewing angle (6 'O Clock)
- ROHS-compliant

STN (Super-twisted Nematic) provides a sharper image and wider viewing angle than TN (Twisted Nematic). The cost for STN is approximately 5% higher than TN. STN is an ideal fluid for outdoor products that need to be read at various angles.

The **Transflective** polarizer is a mixture of Reflective and Transmissive. It provides the ability to read the LCD with or without the backlight on. It will work for all lighting conditions from dark with backlight to direct sunlight which makes it the most common choice. There is no cost difference between Transflective, Transmissive and Reflective polarization.

¹Arduino is an open-source development platform for easily building electronics projects that can electrically sense and control other objects. Arduino boards are primarily based on the Atmel AVR (8-bit) microcontroller (Example: Arduino UNO).



Figure 1: Arduino UNO

²The Raspberry Pi is a single-board computer. It features the Broadcom SOC (System-on-Chip) which includes a CPU and a GPU. Similar to the Arduino, it can be used for electronics projects (professional or hobbyist).



Figure 2: Raspberry Pi

2. What You Need

Qty	Description	Price (\$)	Store
1	Arduino UNO (Rev 3) with USB Cable	22.00	Arduino
1	C164AXBSYLY6WT Character Display Module	14.63	FocusLCDs
1	Solderless Breadboard	5.00	Adafruit
1	Male-to-Male Jumper Wires (Set)	1.95	Adafruit
1	10kΩ Potentiometer (Small)	0.95	Adafruit
1	Arduino IDE	0.00	Arduino

3. Instructions

- 3.a [Download](#) and install the Arduino IDE (Integrated Development Environment). Or you can use the cloud-based version: "Arduino Web Editor".
- 3.b Wire up the circuit as shown in the following schematic (Figure 3). It should look similar to Figure 4. Note that Arduino pins 4 to 9 are digital I/O pins. Arduino boards also have analog I/O pins. Connect the Arduino to a PC via the USB cable.

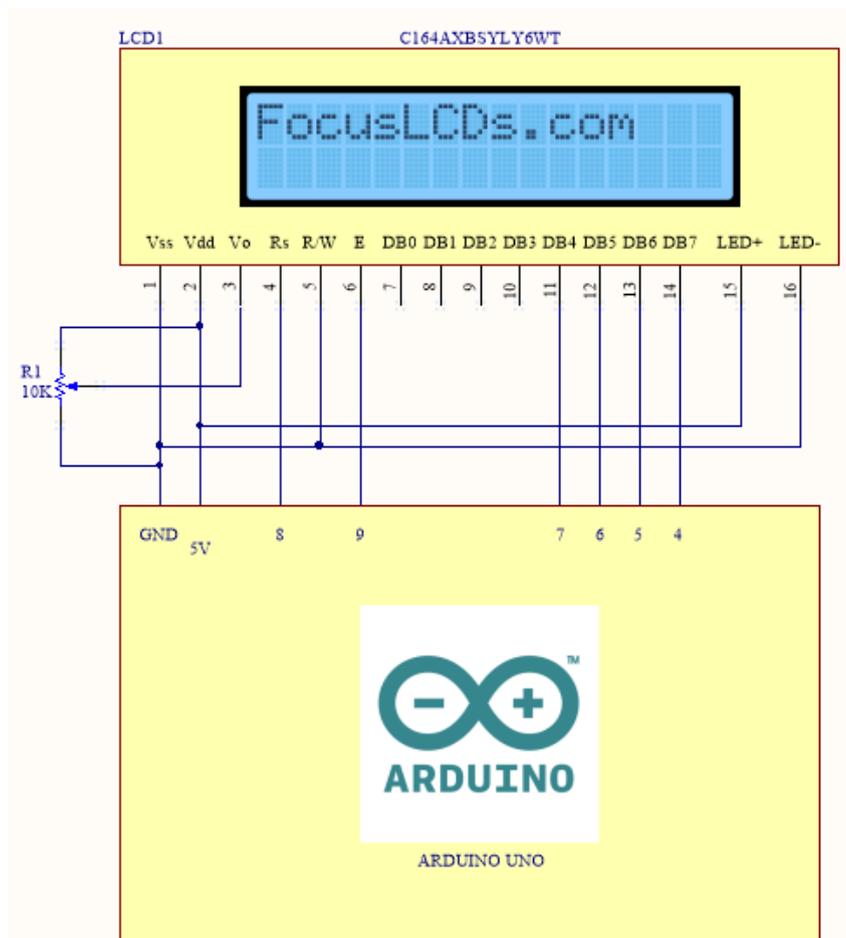


Figure 3: LCD and Arduino UNO Schematic

The LCD is powered from the Arduino (+5V) through its USB port. LCD contrast is varied via potentiometer R_1 through pin V_o . Reset (RS), Enable (E), DB_4 to DB_7 is controlled via the sketch. While R/W is grounded (logic LOW); this means that the program is writing to the LCD register. If it is a logic HIGH, then it is reading from the LCD register.

LED+ is connected to +5V for backlighting.

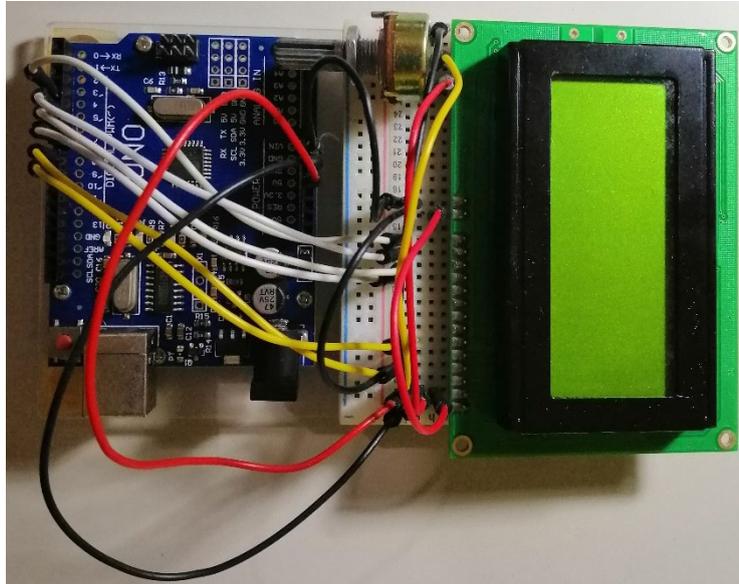


Figure 4: Wiring of Arduino to LCD.

3.c Open this Arduino program (AKA **Sketch**): *Scroll-Left-Right.ino*.

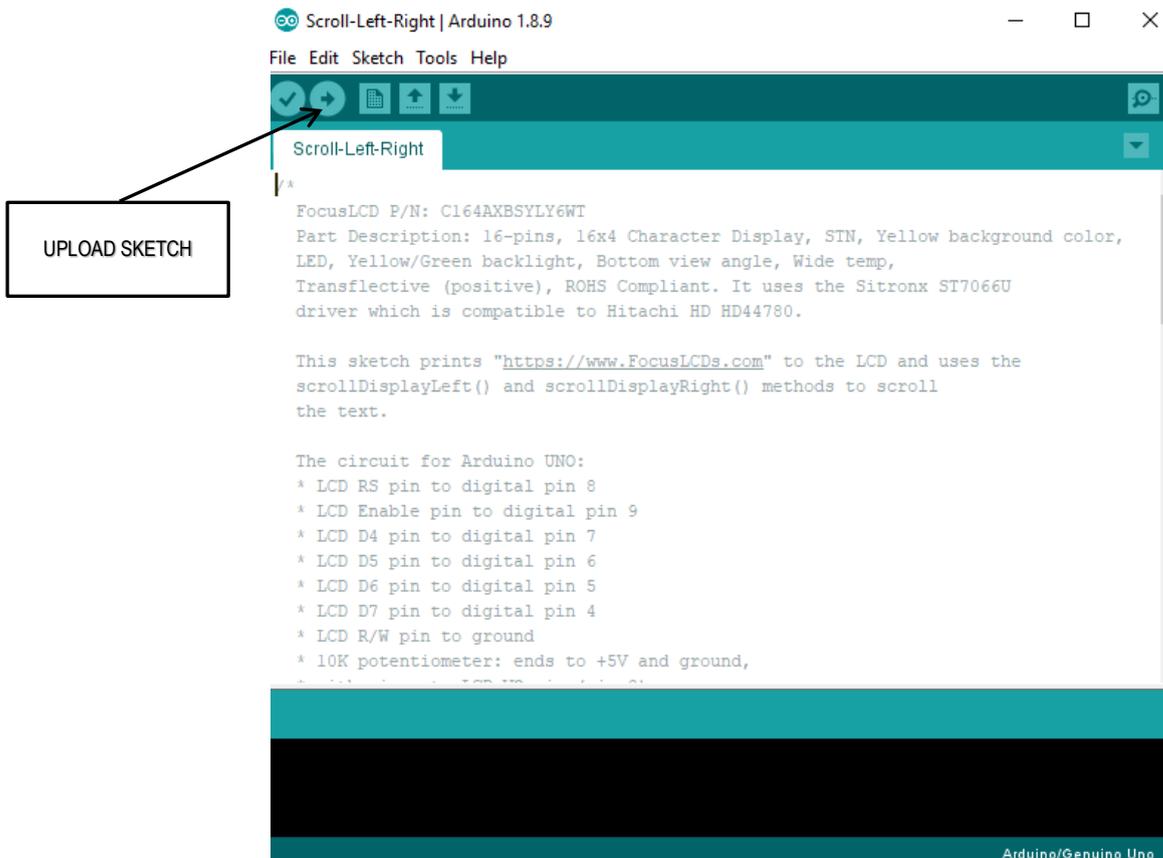


Figure 5: Arduino IDE and sketch.

The programming language used in the Arduino IDE is a derivative of C and C++ programming languages. At the heart of this sketch is LiquidCrystal library which is installed by default with the IDE. It is based on the HDD44780 LCD driver and is compatible with ST7066U.

In line 32 of the sketch, the library is initialized by associating the LCD pin to the Arduino pin it is connected to like so:

```
const int rs = 8, en = 9, d4 = 7, d5 = 6, d6 = 5, d7 = 4;  
LiquidCrystal lcd(rs, en, d4, d5, d6, d7);
```

Note that only 4 bits are needed to use the LCD (DB4 to DB7).

3.d Specify Arduino UNO is used and select the correct PC COM port. In the IDE top menu, select **Tools > "Board: Arduino / Genuino UNO"**. Then again, **Tools > Port**.

Upload and run the sketch. The LCD should have a display like in Figure 6.



Figure 6: Sketch running on the Arduino.

4. Summary

Scrolling text in the C164AXBSYLY6WT character display module is relatively easy with the use of an Arduino and the LiquidCrystal library. Other methods are available for manipulating text: These can be found in other Focus LCDs application notes.

- Blink()
- AutoScroll()
- setCursor()
- noDisplay()

Pay attention to the initialization of the LCD library, specifically the wiring of the Arduino pin with the corresponding LCD pin. Incorrect declaration of the pins may result in a malfunction. If RS is connected to 9 and EN is connected to pin 8 of the Arduino, the initialization is:

```
LiquidCrystal lcd(9, 8, 7, 6, 5, 4);
```

Note that no variables were used. Pin numbers were directly put in as arguments which eliminates 1 line of code.

Finally, select the correct Arduino board type and PC COM port (usually COM 3) for correct operation.

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