

Algorithm To Create Multi line Display From Two Line LCD display

Pranav Agarwal

Indian Institute of Information Technology, B.Tech ECE Second Year, Guwahati, Assam, India

pranav2109@hotmail.com

Abstract: The proposed algorithm is made to run 16x2 alphanumeric LCD more efficiently. This LCD can display 32 characters at once; due to this limited size it is quite difficult to use the 16x2 LCD to display text. The proposed system is also aimed to send small text messages in short distances by using UART communication protocol. The proposed algorithm added scrolling feature in LCD. This can also be useful in calculators to know the previous results.

Keywords—Atmega8, Bluetooth, hex files, LCD(Liquid Crystal Display), UART(Universal Asynchronous Receiver Transmitter).

I. INTRODUCTION

Proposed system has great importance in our day to day projects which make use of LCD for displaying short messages in multiple lines and to scroll the LCD to see the previous results on a particular line. The proposed system uses an AVR Microcontroller, a 16x2 alphanumeric LCD and a Bluetooth device to receive messages from user. A 16x2 alphanumeric LCD is connected to the microcontroller to display message send by the user by his Bluetooth device (it can be any Bluetooth enabled device like mobile phone, laptops etc.) [4].

The main working of this project revolves around the LCD. The message send by the user through UART is not limited just to 16x2 characters but can be extended to as many as we want according to the size of message just like we get in our mobiles messaging system.

II. DESCRIPTION OF HARDWARE

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications [7]. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuitries. These modules are preferred over seven segments and other multi segment LEDs [7]. The reasons being LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines therefore total 32 characters can be displayed at once. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position,

controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD [4].

The low-power Atmel 8-bit AVR RISC-based microcontroller combines 8KB of programmable flash memory, 1KB of SRAM, 512B EEPROM, and a 6 or 8 channel 10-bit A/D converter. The device supports throughput of 16 MIPS at 16 MHz and operates between 2.7-5.5 volts [8].

A UART is usually an individual (or part of an) integrated circuit (IC) used for serial communications over a computer or peripheral device serial port. UARTs are now commonly included in microcontrollers. A dual UART, or *DUART*, combines two UARTs into a single chip. An octal UART or *OCTART* combines eight UARTs into one package, such as the Exar XR16L788 or the NXP SCC2698. A related device, Universal Synchronous Asynchronous Receiver Transmitter (USART) also supports synchronous operation [1].

III. DESCRIPTION OF SOFTWARE

CVAVR is an embedded C compiler based software which is used to create hex file of the Embedded C code [7]. The code is first run on a simulation software particularly Proteus to check if there is any problem before burning the hex file on the MCU [7]. After simulation and correcting the software related problems, this hex file is burned on the MCU using software called khazama avr programmer.

IV. ADVANTAGES

It makes working of 16x2 LCD becomes more efficient. The information displayed on LCD is not limited to 16x2=32 characters. If we want to see the text printed on previous line we can do so by scrolling up and down in the LCD. No interruption in case of large messages.

V. Simulation Result

Figure 1-4 shows the simulation performed on proteus simulation software. It shows how the scrolling can be performed through 16x2 LCD with line number printed on each line.

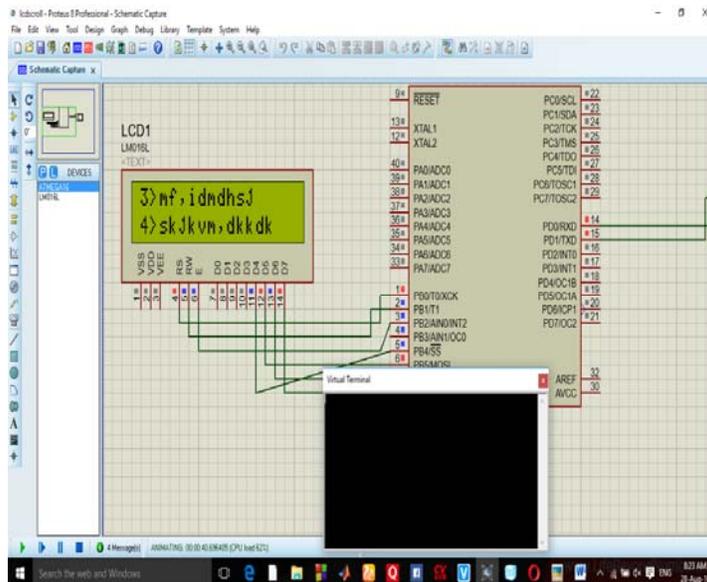


Figure 3: LCD screen on scrolling further and modifying line.

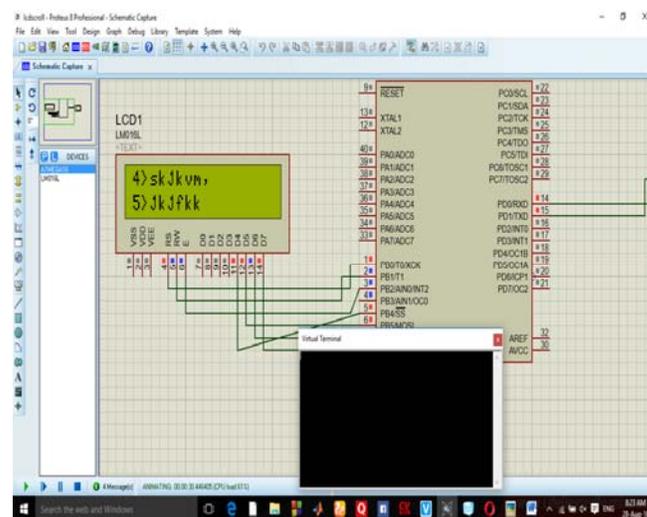


Figure 4: LCD screen on Scrolling down and modifying line as needed.

screen on the next line. In order to scroll back to the first line or any other line above, character “(” is required to send which results in scrolling one line up. Similarly by sending character “)”, screen will scroll one line down as shown in the figure 5.

Figure 1-4 clearly explains 16x2 LCD is being used for multiple lines.

VI. WORKING

As the user sends data using Bluetooth enabled device by UART communication protocol, the MCU receives and displays it on the LCD character by character. Now if the length of the message exceeds the size of the LCD there is no problem as the message will continue to be printed on the

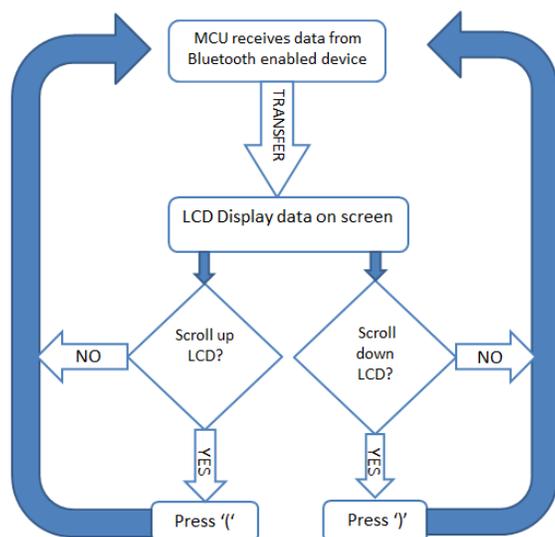


Figure 5: Working of the proposed system.

VII. CONCLUSION

The proposed system is used to display large messages on the 16x2 LCD without any difficulty and hence we are not limited to 16x2=32 characters. Thus this improvement in the working of LCD will make the working of various projects more innovative and interesting.

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