

# Rolling Display using LCD

Mohamed Abdelrahman Omer<sup>1</sup> and Dr. Eltahir Mohammed Hussein<sup>2</sup>

<sup>1</sup>Control Engineering, Graduate College, Al Neelain University, Khartoum, Sudan  
*mohamed\_fakhri84@hotmail.com*

<sup>2</sup>Engineering, Biomedical, Sudan university of Science and Technology, Khartoum, Sudan  
*altahir\_33@yahoo.com*

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## Abstract

The paper is mainly aimed to display a message or a text and roll it using liquid crystal display LCD, the rolling display can be used for advertising or for providing information to various places like schools, colleges, government offices, shops, hospitals, railway stations and etc. The rolling display is prepared using 20x2 LCD to display a certain message or a text. A 4x4 keypad is been used to help in some functions like changing the message rolling direction, or to select a certain message sending it from a PC through RS232 to be displayed, an AVR- 8535 Microcontroller belonging to the microchip microcontrollers family has been used for this purpose.

**Keywords:** *Microcontroller (AVR-8535), 20\*2 LCD, Keypad, PCB Board, RS232 Connecters.*

## 1. Introduction

A microcontroller Multi Control Unit (MCU) is a single chip computer that is specifically manufactured for embedded computer control applications. These devices are very low cost and can be used very easily in digital control applications. MCU typically consist of microprocessor (CPU) data memory (RAM), program memory (ROM) an input (I/O) output (O/P) port . Most MCs have the built in circuits necessary for computer control applications. For example a MCU may have Analogue to Digital (A/D) converters so that the external signals can be sampled. They also have parallel input output ports so that digital data output can be read or

output from the MC. Some devices have built in Digital to Analogue (D/A) converters and the output of the converter can be used to drive the plant through an actuator an amplifier. MCUs may also a built in timer and interrupt logic. Using the timer or the interrupt facilities, thus MCU can be program to implement the control algorithm accurately [1].

### 1.1 Atmega 8535

We selected the ATmega 8535 which is a low power CMOS 8 bit microcontroller based on the AVR enhanced RISC architecture. The ATmega8535 AVR is supported with a full suite of program and system development tools including C compilers, macro assembler's program debugger simulators in circuit emulators and evaluation kits.

#### 1.1.1 Atmega 8535 Features

- High performance Low power
- 130 Powerful Instructions Most Single Clock Cycle Execution
- Real Time Counter with Separate Oscillator
- 512 Bytes EEPROM
- 512 Bytes Internal SRAM
- 8 bit Microcontroller
- Advanced RISC Architecture
- 32 \* 8 General Purpose Working Registers.
- Nonvolatile Program and Data Memories.
- Programming Lock for Software Security.

### 1.1.2 Atmega 8535 Pin Descriptions

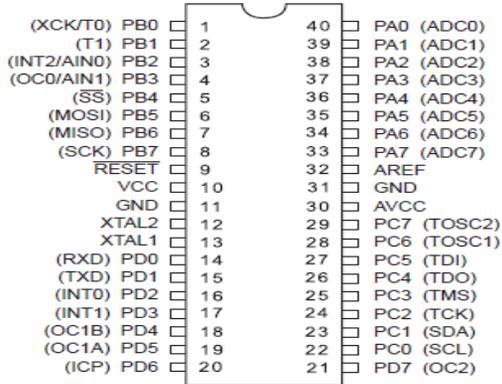


Figure 1: Atmega8535 Pin Descriptions

### 1.2 LCD (Liquid Crystal Display)

Screen is a electronic display module are preferred over seven segments and other multi segment LEDs.

#### 1.2.1 LCD Features

- Character Type 20 \* 2 characters Display format
- ST 7066 Built in controller
- 1/16 Duty cycle
- 5 \* 8 dots includes cursor
- + 5 V power supply
- LED can be driven by pin(1,2,15,16,A,K)

#### 1.2.2 LCD Pin Description

In the table blow we are description the LCD pin connection:

Table 1: LCD Pin Description

Pin No	Function	Name
1	Ground (0V)	Ground
2	Supply voltage; 5V (4.7V – 5.3V)	V <sub>CC</sub>
3	Contrast adjustment;	V <sub>EE</sub>

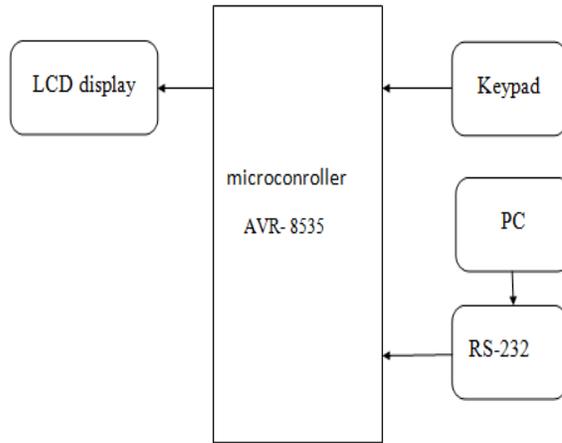
	through a variable resistor	
4	Selects command register when low; and data register when high	Register Select
5	Low to write to the register; High to read from the register	Read/write
6	Sends data to data pins when a high to low pulse is given	Enable
7-14	8-bit data pins	PB0 - PB7
15	Backlight V <sub>CC</sub> (5V)	Led+
16	Backlight Ground (0V)	Led-

### 1.3 RS 232

MAX 232 deriver provides RS 232 the level voltage output used for communication between various electronic devices. It has two drivers that converts TTL logic to RS-232 level voltage and two receivers that converts form RS 232 to TTL voltage levels during the communication for RX and TX requirements between the devices. The signals converted in each direction. It receives TTL level to covert then it changes TTL logic 1 to between -3 to -15V for converting from RS232 and change TTL logic 0 to between +3 and + 15V

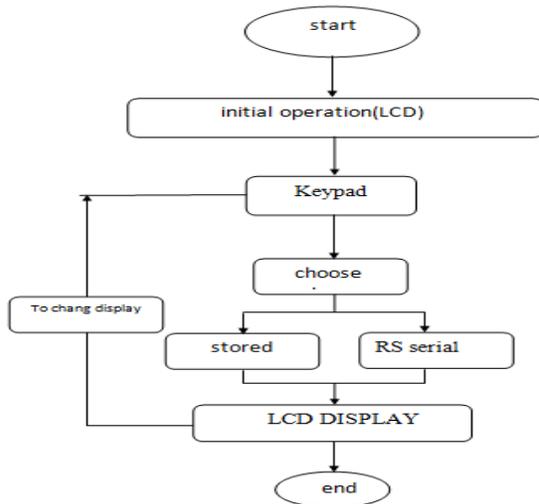
## 2. Methodology

In this project to display the information saved in the MC or sending it from the PC through RS232 we used the key bad to choose suitable information depending on what we need to display the information. the block diagram for the LCD Rolling Display with AVR 8535 microcontroller in figure 2:



**Figure 2: Block diagram is for the LCD Rolling Display with AVR - 8535 microcontroller**

### 2.1 Flow Chart of the LCD Rolling display



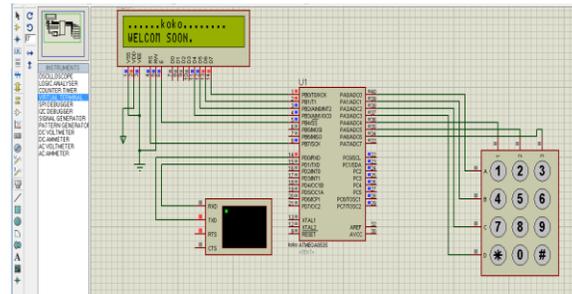
**Figure 3: Flow Chart of LCD Rolling Display**

Flow chart of rolling display message:  
 The user turn on the device , the initial operation (LCD) display a message name of offices, companies, etc depending on the product work place , press (#) to display input mode .then the user chooses from the keypad the message which he needs i.e. 1-open ,2-close ,3-wait, or

choose (9) to send a message from the PC to the device .if the user needs to change the message then he presses (\*) to display a new message.

### 2.2 Simulation Results

First, we design the project in the simulation program for the hardware, MC programs and the connection between the different components.



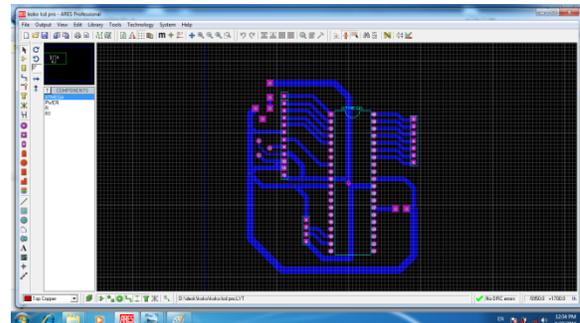
**Figure 4: Simulation Results**

### 2.3 Software Development

We use the based com AVR program to create the MC suitable program.

### 2.4 Hardware Circuit

After finishing the design for the project in the simulation program we design the Printed circuit boards (PCBs) layout model using the Proteus Design program.



**Figure 5: PCB Layout Model**



**Figure 6: Hardware Circuit**

The final product as in the figure blow is a cover design to easily and safely use the project.



**Figure 7: Final Product**

### 3. Applications

The Final product is a written information board which can be used in deferent locations such as:-

- Universities : the management offices, college reception, lectures and examination rooms
- Super markets
- Hospitals , etc

### 4. Conclusions

This project describes how a person can develop a LCD screen that can display rolling message with RS232hardware support. The displaying character on the LCD, RS232 communication and the scrolling speed can be controlled by a microcontroller. The project can easily be use in any location to help people to get the correct information which they need in the exact time

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