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INTERFACING 8751 MICROCONTROLLER WITH HDSP - 2112 ALPHA NUMERICAL DISPLAY

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ABSTRACT: “interfacing of 8751 microcontroller with HDSP-2112 alphanumeric displays”, the micro controller will provide the pre-loaded information. This information has to be displayed on the HDSP displays provided in a continuous running mode and has to be updated as and when required.

I. INTRODUCTION

MICRO CONTROLLER IS A COMPUTER-ON-CHIP, CONTAINING A PROCESSOR, MEMORY, AND INPUT AND OUTPUT FUNCTIONS. IT IS A MICROPROCESSOR EMPHASIZING HIGH INTEGRATION, IN CONTRAST TO GENERAL PURPOSE MICROPROCESSOR. IN ADDITION TO THE USUAL ARITHMETIC AND LOGIC ELEMENTS OF A GENERAL PURPOSE MICROPROCESSOR, THE MICROCONTROLLER INTEGRATES ADDITIONAL ELEMENTS SUCH AS READ/WRITE MEMORY FOR DATA STORAGE, READ ONLY MEMORY FOR PROGRAM STORAGE, EPROM FOR PERMANENT STORAGE, PERIPHERAL DEVICES, AND INPUT/OUTPUT INTERFACES. THEY CONSUME RELATIVELY LITTLE POWER AND WILL GENERALLY HAVE THE ABILITY TO SLEEP WHILE WAITING FOR AN INTERESTING PERIPHERAL EVENT SUCH AS A BUTTON PRESS TO WAKE THEM UP AGAIN TO DO SOMETHING. POWER CONSUMPTION WHILE SLEEPING MAY BE JUST NANOWATTS, MAKING THEM IDEAL FOR LOW POWER AND LONG LASTING BATTERY APPLICATIONS.

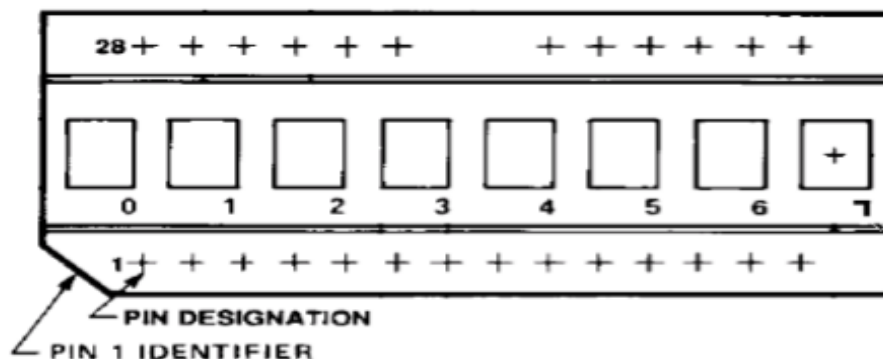
INTRODUCTION TO 87C51:

THE 87C51 IS A PIN COMPATIBLE EEPROM VERSION OF 8051AH. INTEL'S ADVANCED +5VOLTS, DEPLETION LOAD, N-CHANNEL, HMOS TECHNOLOGY ALLOWS IT TO REMAIN FULLY COMPATIBLE WITH ITS 8751/8751-8 PREDECESSOR. THIS ALLOWS THE 8751H TO BE A FULL SPEED MCSR-51 PROTOTYPING TOOLS AND PROVIDES FOR AN EFFECTIVE SINGLE COMPONENT SOLUTION FOR HIGHLY SENSITIVE CONTROLLER APPLICATIONS REQUIRING CODE MODIFICATION FLEXIBLE.

II REQUIREMENTS

HDSP-2112 DISPLAY This display is an Eight Character 5 mm and 7 mm Smart

PIN CONFIGURATION:





International Journal of Advanced Research in Science, Engineering and Technology

Vol. 1, Issue 3, October 2014

The Above **Figure** Display consists of an 8 byte Character RAM, an 8 bit Flash RAM, a 128 character ASCII decoder, a 16 character UDC RAM, a UDC Address Register, a Control Word Register, and refresh circuitry necessary to synchronize the decoding and driving of eight 5 x 7 dot matrix characters. The major user-accessible portions of the display are listed below.

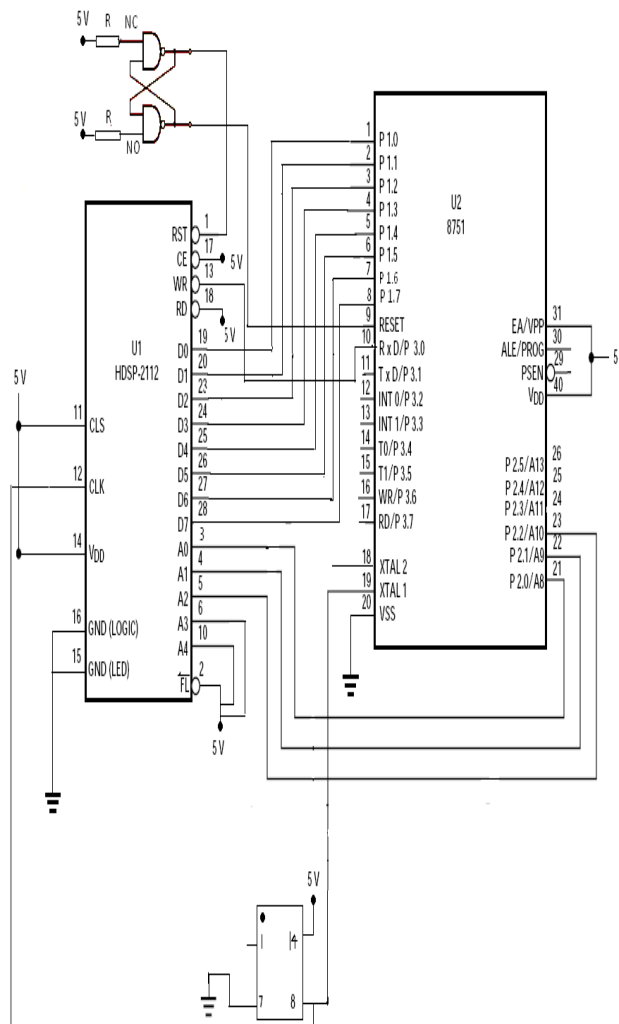
In Interfacing, we use User Defined Characters(U.D.C)

UDC RAM and UDC Address Register:

Figure shows the logic levels needed to access the UDC RAM and the UDC Address Register. The UDC Address Register is eight bits wide. The lower four bits

(D0-D3) are used to select one of the 16 UDC locations. The upper four bits (D4-D7) are not used. Once the UDC address has been stored in the UDC Address Register, the UDC RAM can be accessed. To completely specify a 5 x 7 character, eight write cycles are required. One cycle is used to store the UDC RAM address in the UDC Address Register and seven cycles are used to store dot data in the UDC RAM. Data is entered by rows and one cycle is needed to access each row. Figure 4 shows the organization of a UDC character assuming the symbol to be stored is an "F." A0-A2 are used to select the row to be accessed and D0-D4 are used to transmit the row dot data. The upper three bits (D5-D7) are ignored. D0 (least significant bit) corresponds to the right most column of the 5 x 7 matrix and D4 (most significant bit) corresponds to the left most column of the 5 x 7 matrix.

HARDWARE IMPLEMENTATION





International Journal of Advanced Research in Science, Engineering and Technology

Vol. 1, Issue 3, October 2014

The **Figure** shown above is the hardware implementation of interfacing 8751 microcontroller with HDSP-2112 Display. The output of the program can be seen in the memory locations specified in the code. Programs that send data into memory locations using data pointer can be executed using the kit. Writing programs on the kit, we can see patterns in the memory locations. Also, programs can be written for performing arithmetic and logical operations and result can be stored in the memory. Alphanumeric Displays. The HDSP-21XX/-25XX series of products is ideal for applications where displaying eight or more characters of dot matrix information is required. These devices are 8-digit, 5 x 7 dot matrix, and alphanumeric displays. The on-board CMOS IC has the ability to decode 128 ASCII characters (HDSP-211X/25XX) or 128 Katakana characters (HDSP-212X), which are permanently stored in ROM. Up to 16 user defined symbols may be stored in on-board ROM, allowing flexibility for displaying additional symbols and icons. Seven brightness levels provide versatility in adjusting the display intensity and power consumption. These products are designed for standard microprocessor interface techniques. The display and special features are accessed through a bidirectional 8-bit data bus.

III. DESCRIPTION

The HDSP-210X/-211X/-250X series of products is ideal for applications where displaying eight or more characters of dot matrix information in an aesthetically pleasing manner is required. These devices are 8-digit, 5 x 7 dot matrix, alphanumeric displays and are all packaged in a standard 15.24 mm (0.6 inch) 28 pin DIP. The onboard CMOS IC has the ability to decode 128 ASCII characters which are permanently stored in ROM. In addition, 16 programmable symbols may be stored in on-board ROM, allowing.

IV. METHODOLOGY

consider-HDSP-210X Series HDSP-211X Series HDSP- 250X Series able flexibility for displaying additional symbols and icons. Seven brightness levels provide versatility in adjusting the display intensity and power consumption. The HDSP-210X/-211X/-250X products are designed for standard microprocessor interface techniques. The display and special features are accessed through a bidirectional 8-bit data bus. The Above **below** shows how a programmer can use **U.D.C** to choose the segment of the **H.D.S.P** Display. The display has address and data fields. Programs are written in Assembly language using the instruction set for 8751 micro controllers and the corresponding hex code for the program is generated (by a software) which is entered into the kit in the data field corresponding to each address. When reset is given, UP 51 comes on the display system. The code is then entered into successive address locations. The starting address location is generally 2000h. When the code is completely entered, it is executed by going to starting address location of the code and then pressing EXE key.



**International Journal of Advanced Research in Science,
Engineering and Technology**

Vol. 1, Issue 3, October 2014

\overline{RST}	\overline{CE}	\overline{WR}	\overline{RD}	
1	0	0	0	UNDEFINED
		0	1	WRITE TO DISPLAY
		1	0	READ FROM DISPLAY
		1	1	UNDEFINED

CONTROL SIGNALS

\overline{FL}	A_4	A_3	A_2	A_1	A_0
1	0	0	X	X	X

UDC ADDRESS REGISTER ADDRESS

D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0
X	X	X	X	UDC CODE			

UDC ADDRESS REGISTER DATA FORMAT

\overline{RST}	\overline{CE}	\overline{WR}	\overline{RD}	
1	0	0	0	UNDEFINED
		0	1	WRITE TO DISPLAY
		1	0	READ FROM DISPLAY
		1	1	UNDEFINED

CONTROL SIGNALS

\overline{FL}	A_4	A_3	A_2	A_1	A_0	
1	0	1	ROW SELECT			000 - ROW 1 110 - ROW 7

UDC RAM ADDRESS

D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0
X	X	X	DOT DATA				

UDC RAM DATA FORMAT

C
O
L
1

C
O
L
5

0 - LOGIC 0; 1 - LOGIC 1; X - DO NOT CARE



International Journal of Advanced Research in Science, Engineering and Technology

Vol. 1, Issue 3, October 2014

V.CONCLUSION

In this project the 8751 Micro Controller was programmed to get desired displays like set of characters being displayed, scrolling of characters and Displaying Set of Characters using of 2 HDSP'S were performed and executed with the help of assembly level programming .Both the pre defined and user defined characters were displayed as HDSP Display has a future of decoding 128 ASCII Characters. This is an overview of project which is based on the application of a Micro Controller in our daily life

Here the interfacing of 8751 Micro Controller with HDSP 2112 display was done. Interfacing can also be done to LCD displays UART etc., this project output was taken from the ports of 8751 Micro Controller .we can also use the ports for giving serial inputs. Generally pot 0 is used for input purposes, but it requires additional pull up resistors. hence in order to avoid more of hardware, we have used port 1 as input port for data.

VI APPLICATIONS

- i. Satellite Communications
- ii. Avionics
- iii. Computer Peripherals
- iv. Industrial Instrumentation
- v. Medical Equipment
- vi. Portable Data Entry Devices
- vii. Telecommunication Equipment
- viii. Test Equipment

VII. REFERENCES

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- ii. Muhammad ali Mazidi, "8051 Micro Controller"
- iii. AVAGO Intel 8051 manual