

# USER'S MANUAL FOR

## 8051 DEVELOPEMENT BOARD

*Manufactured By*

**Regd. Office & Works:**

4A, Shree Sadgurunivas Soc.,16/5/1 Hingane  
Khurd, Sinhgad Road, Pune-411051.  
Ph.-020 24356456 / +91 99211 59583

**Email:** - support@logsun.com

**Web:** www.logsun.com | www.logsunonline.com

## INDEX

SR NO.	TOPIC	PAGE NO.
1	INTRODUCTION	3
2	SPECIFICATION	3
3	SETTING FOR 8051 DEVELOPMENT BOARD (DVK) :	4
4	HOW TO CREATE PROJECT	5
5	PROGRAMMING USING PROG ISP SOFTWARE	9
6	EXPERIMENT LIST	
	• Interfacing of LED logic	14
	• Interfacing of LCD (8-bit mode)	15
	• Interfacing of LCD + keyboard (8-bit mode)	16
	• Interfacing of 7-segment	17
	• Interfacing of 7-segment+keyboard	18
	• Interfacing of DAC 0808	19
	• Interfacing of ADC 0804	20
	• Interfacing of DC motor	22
	• Interfacing of stepper motor	23
	• Interfacing of relay & buzzer	25
	• Interfacing of EEPROM	26
	• Interfacing of RTC	27
	• Serial Rx_Tx	28
7	FRC CONNECTOR DETAILS	31

## **1. INTRODUCTION**

Logsun's open 8051 board has ATMEL 8-bit AT89S52. This board is used extensively to test and validate Programs. At the heart of the development board is AT89S52; this provides advance features like ISP, I2C and IAP. The microcontroller has 8K Bytes of flash memory and 256k Bytes of RAM. The development board comes with USB interface to allow user to program the microcontroller directly from PC. It provides a complete development platform with different modules interface that accelerates the task of designers to run application software on target Controller hardware, thus providing a platform to benchmark their system, save time & expense of building their own application test board and enabling them to get their designs to market quickly.

## **2. SPECIFICATION**

1. 89S52 Central Processing Unit
2. On-chip Flash Program Memory with In-System Programming (ISP) and In-application Programming (IAP) capability
3. Flash EPROM for downloading hex files via UART
4. All ports pins brought on 10 PIN FRC (User selection is possible)
5. Supplied with companion CD includes working sample programs, ISP programming
6. Software, Assembler, disassembles, +12 V supply, USB cable and quick start manual.

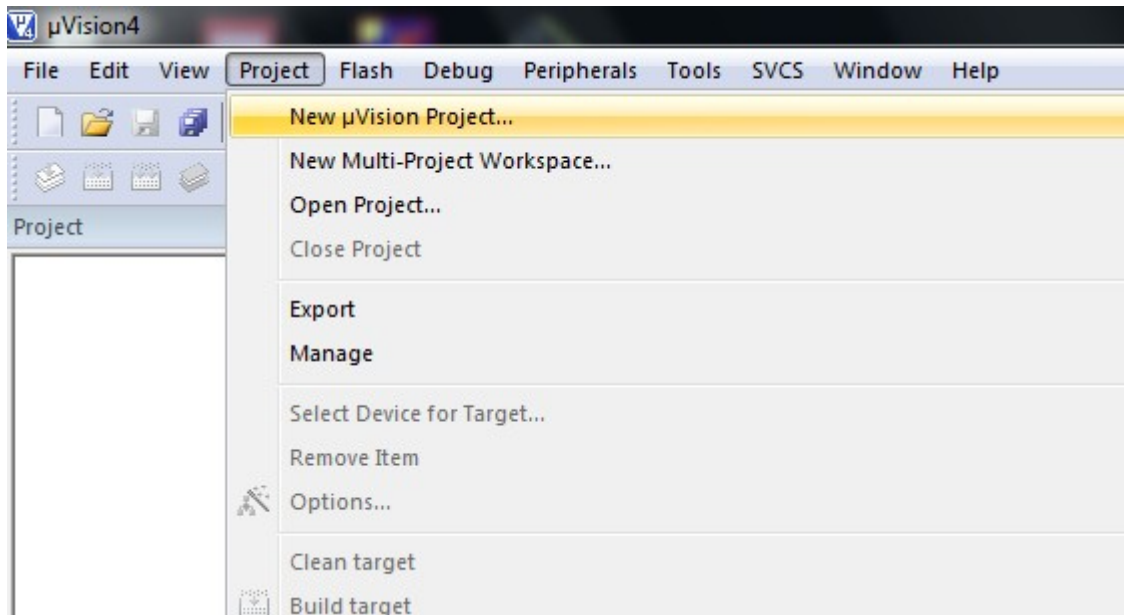
### 3. SETTING FOR 8051 DEVELOPMENT BOARD (DVK) :

1. Connect the 12V power supply to the Kit.
2. Switch on the board.
3. Connect **USB A-B cable** to the board and PC.
4. Keep switch S3 in down position to upload program.
5. Open **PROG ISP** software on PC. Check the com port shows **USBasp** connected
6. Select the IC (AT89S52).
7. This shows PROG ISP in green color as detected com port.
8. To select program hex File -> click on Load Flash.
9. Select the HEX file.
10. Click on Auto Button. This uploads HEX file into microcontroller shown by green bar.
11. Connect 10 pin FRC.
12. Press RESET observes output.
13. Jumpers Settings on board.

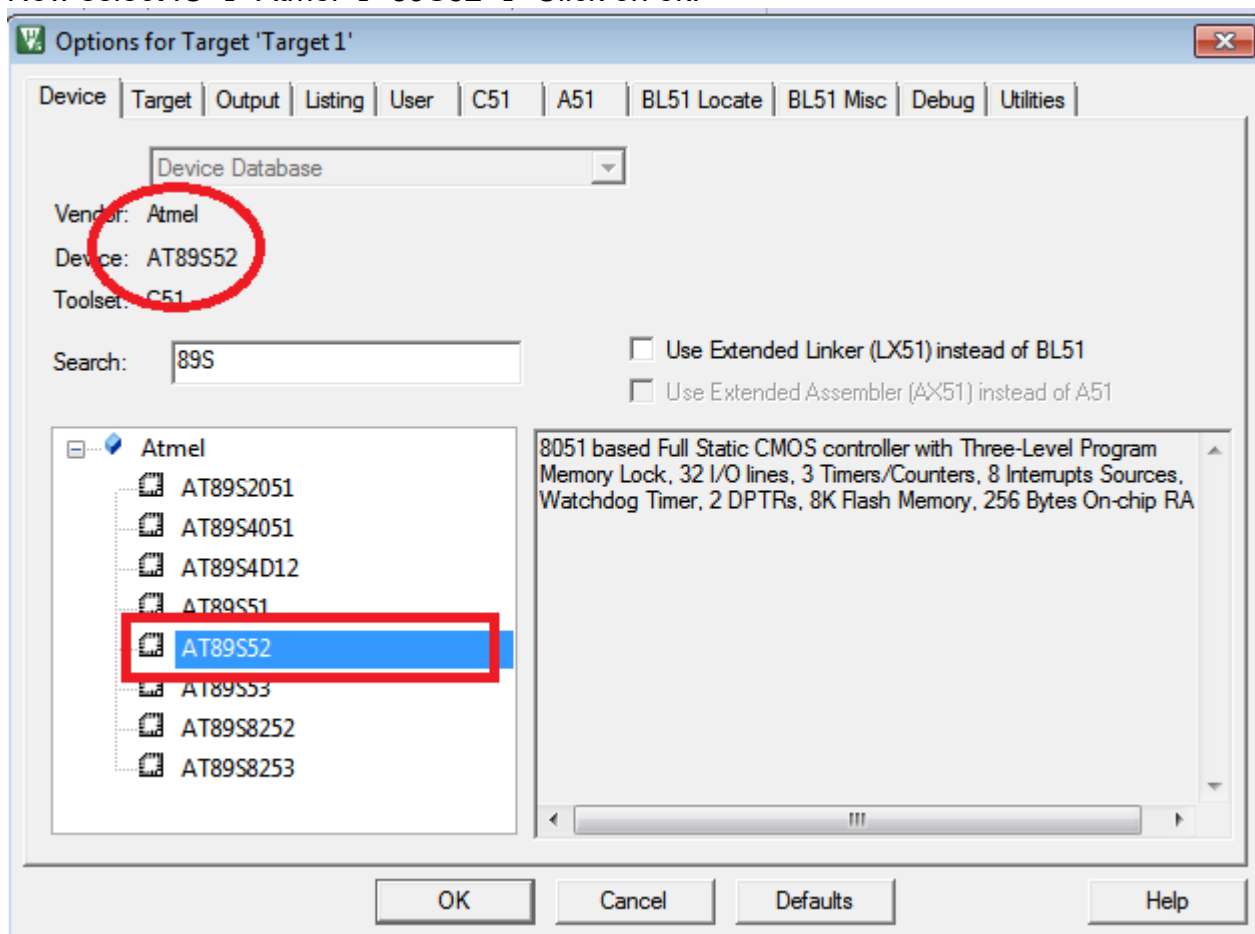
JP4	SHORT/CONNECT JUMPER
P0 PULLUP	1,2 SHORT
P1 PULL UP	1,2 SHORT
JP9	1,2 SHORT
JP10	1,2 SHORT
JP1	VCC,EA BAR SHORT

#### 4. HOW TO CREATE PROJECT: SOFTWARE USED: KEIL

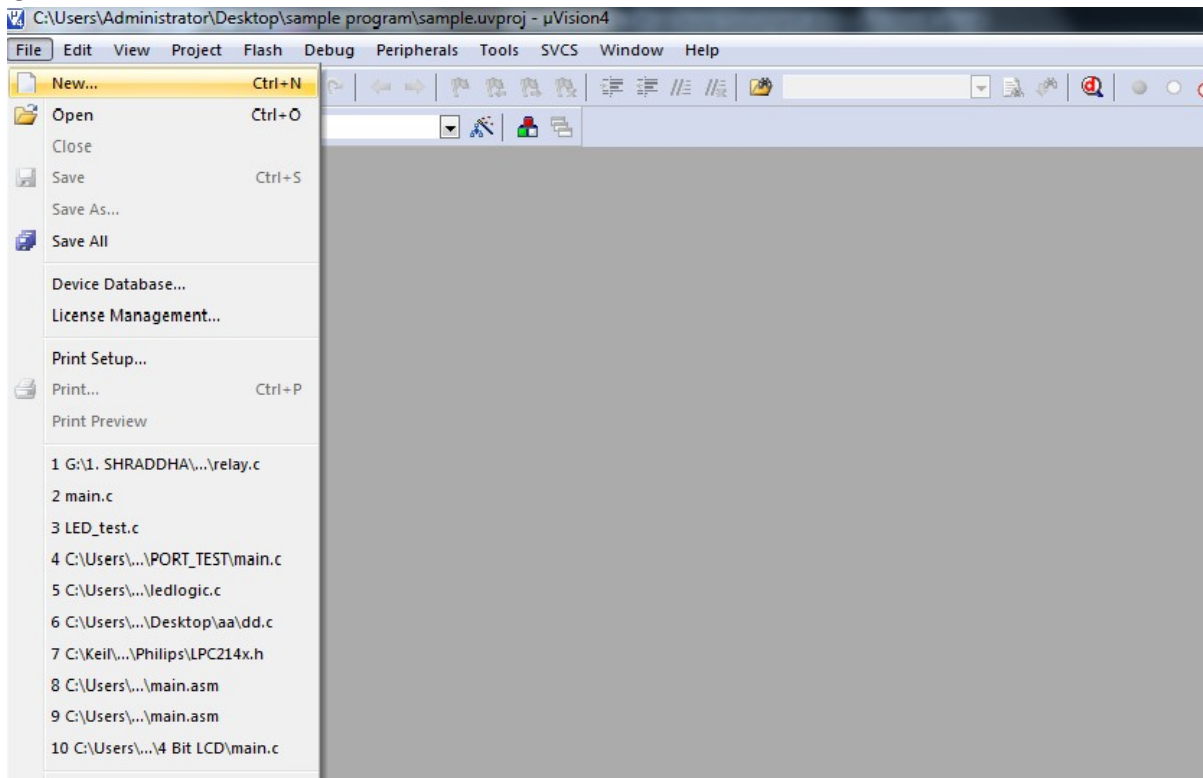
Open Keil software → go to project menu → click on new microVision project → create new folder in that you enter project name and click on ok.



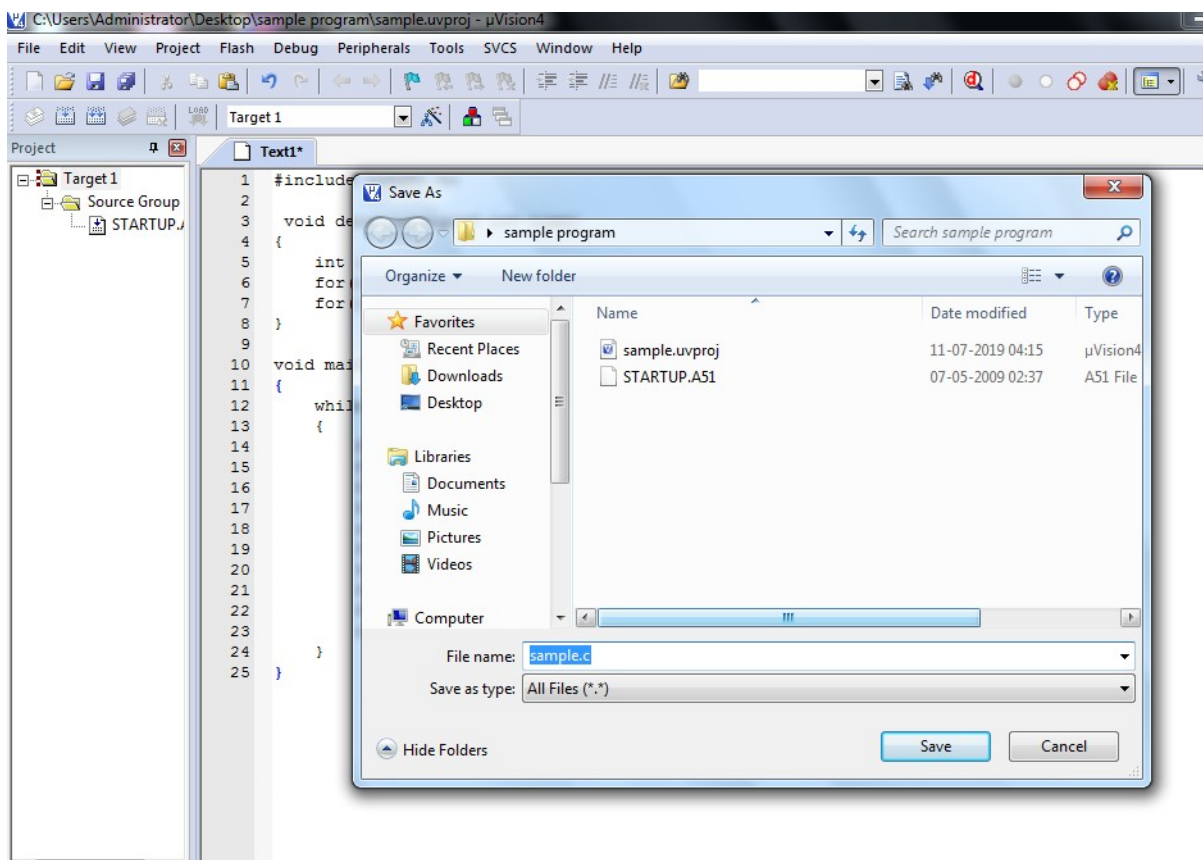
Now select IC → Atmel → 89S52 → Click on ok.



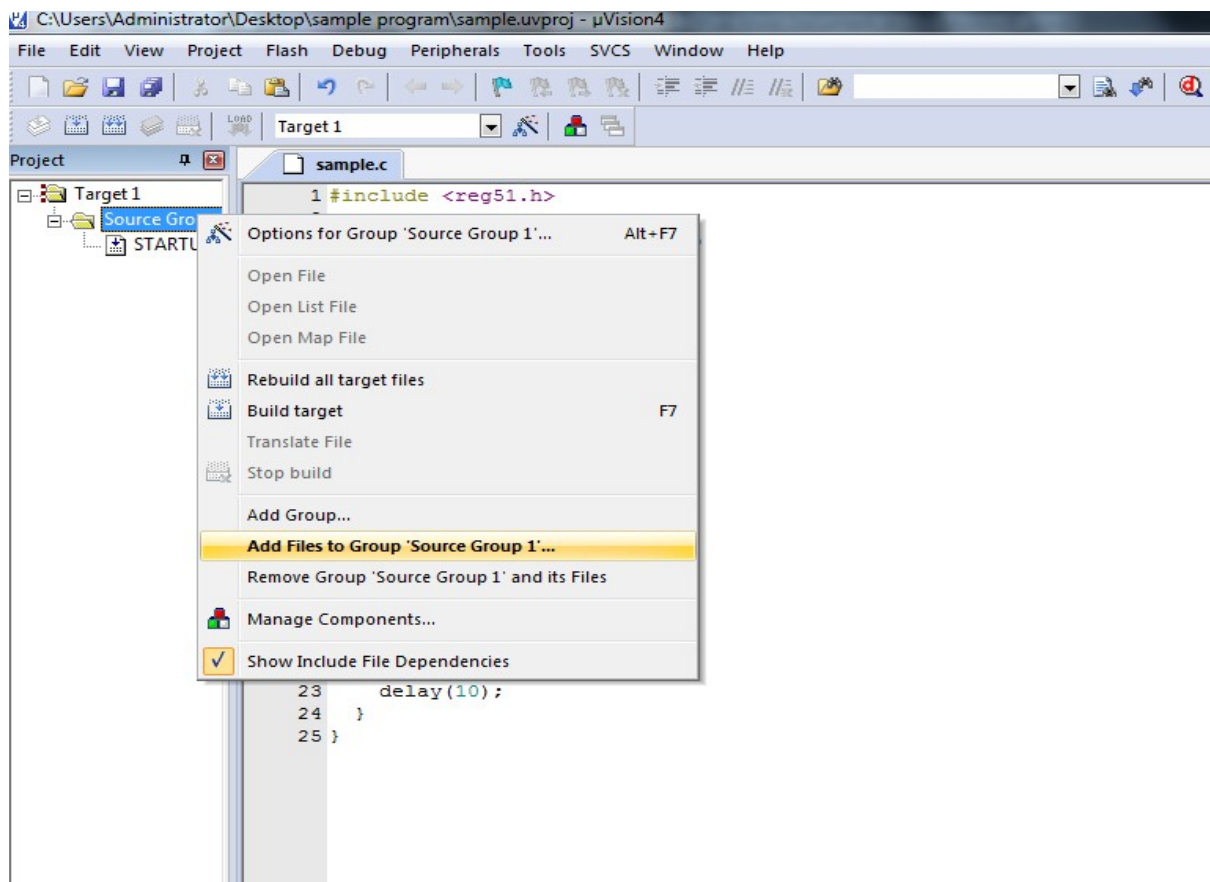
Click on File menu → click on New



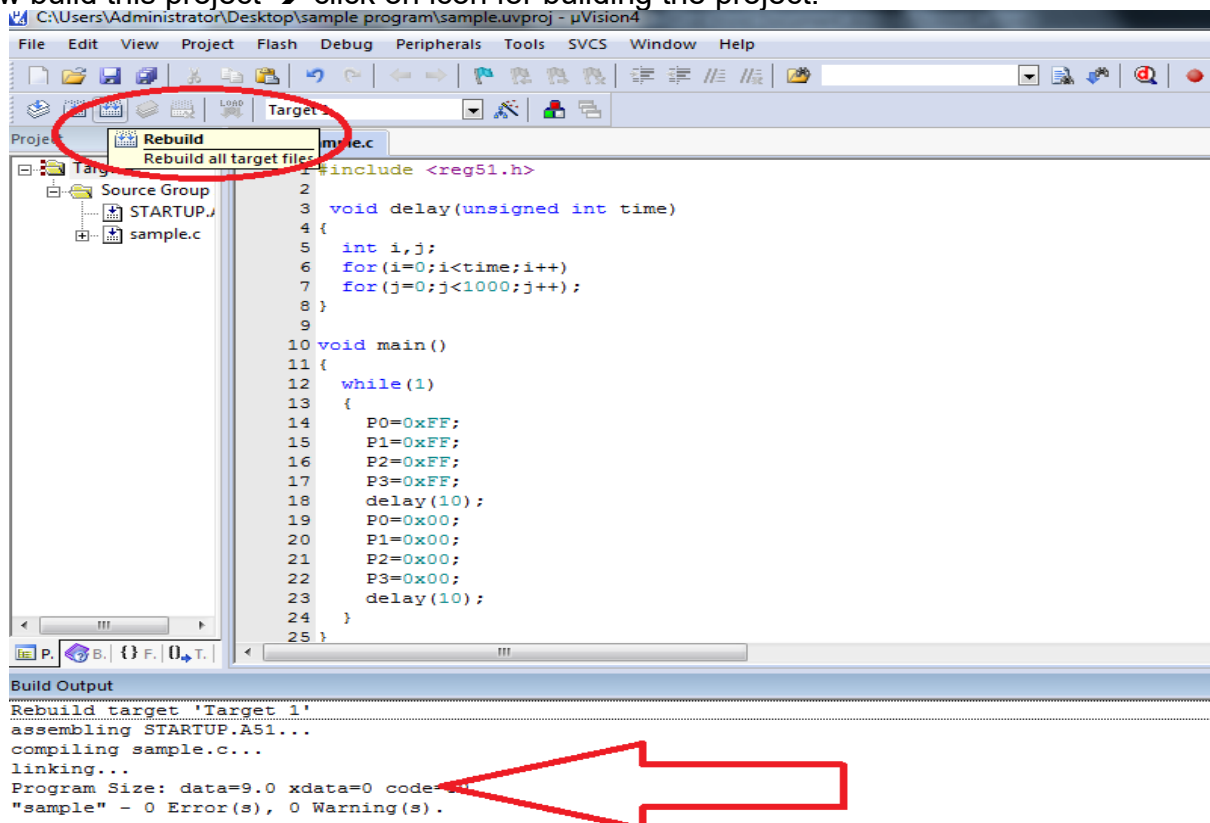
Now write your code → and save your code .c extension.



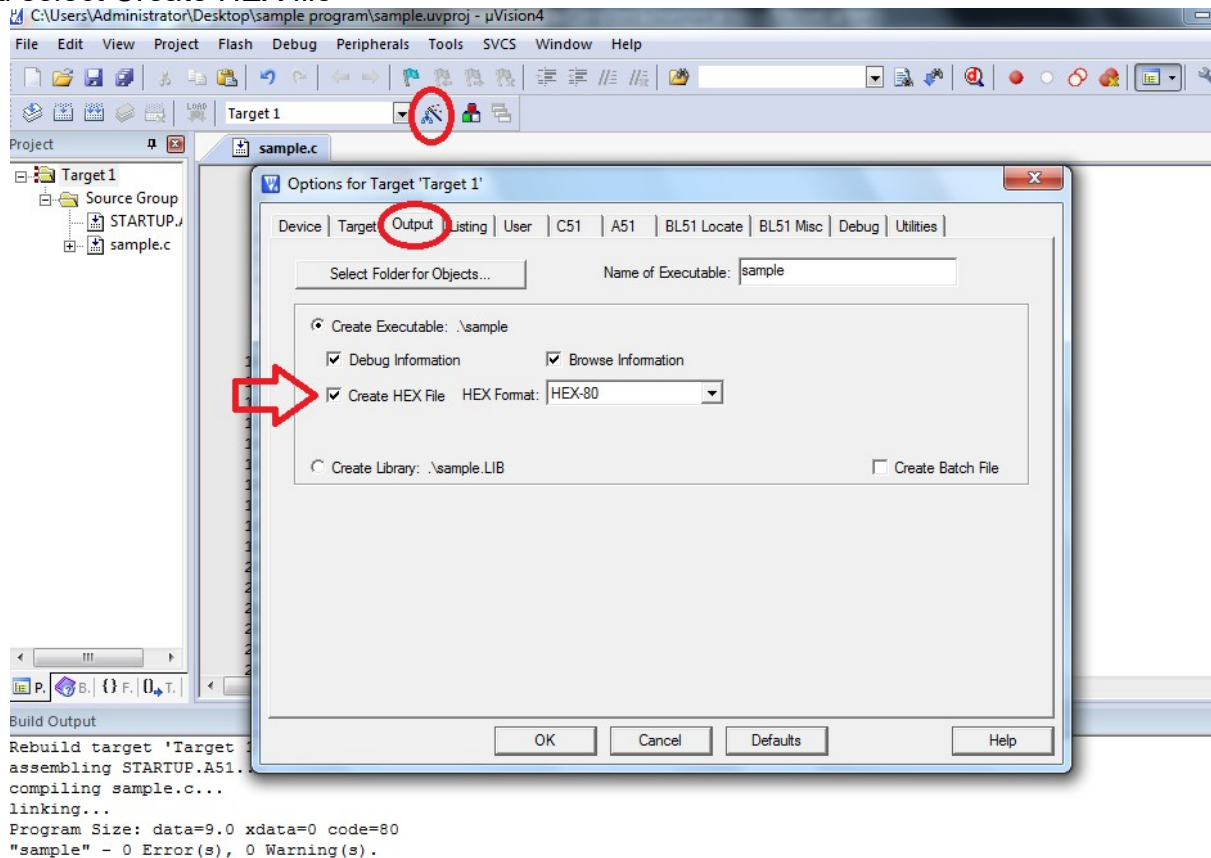
Now add this file on source code → right click on Source code → and click on Add Files to Group 'source Group 1' and select sample and add and close this window.



Now build this project → click on icon for building the project.



For creating hex file → click on Target option → new window will open → click on Output and select Create HEX file



## 5. ISP PROGRAMMING USING ProgISP Flashing Software using USB ISP Programmer and ProgISP Flashing Software.










1. Connect 12V power adaptor to board.
2. Keep switch **sw3** down position for USB communication to **upload program .hex file**.

**Step1: Connect USB A-B cable between PC/Laptop USB port .**







Install USB ISP Programmer driver.

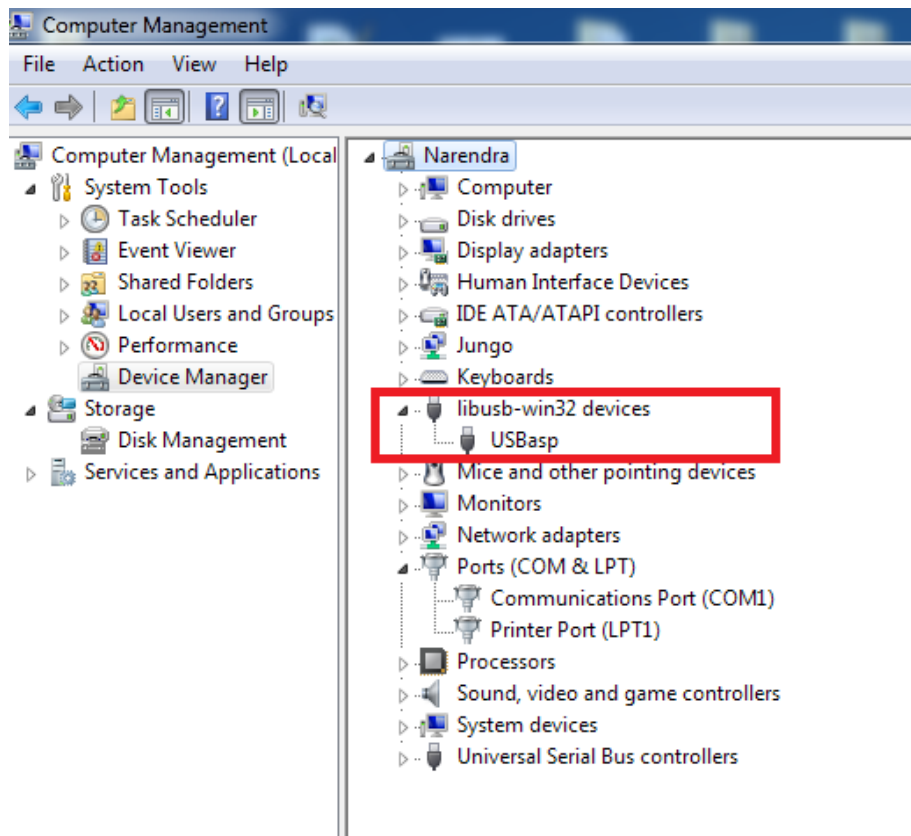
Make sure that **S3** is down pressed.



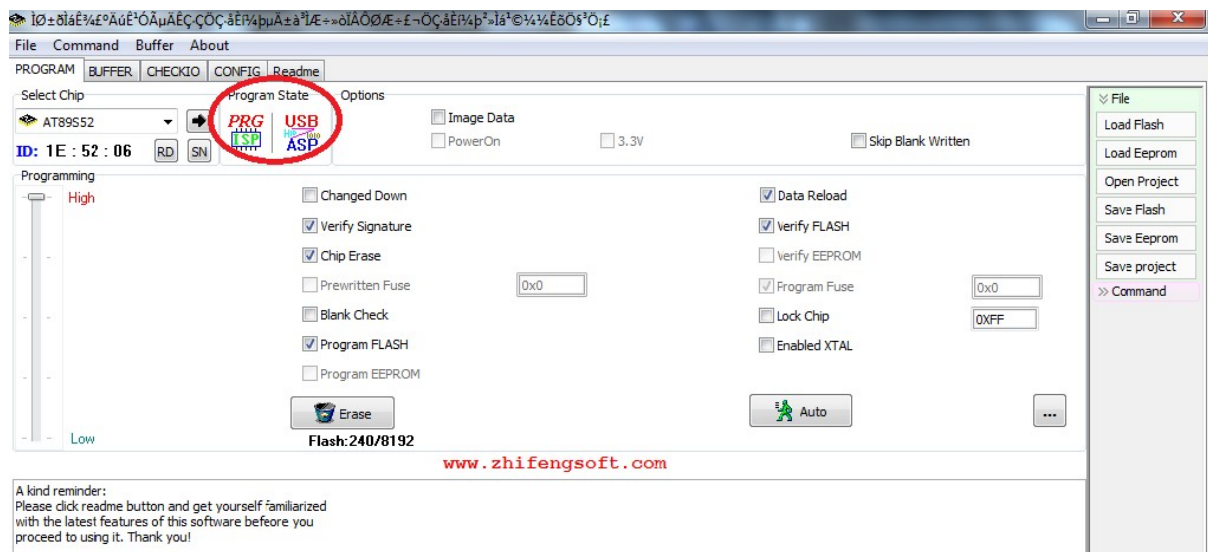
New Volume (E:) ▶ programmer for atmel ▶ usbasp.2011-05-28 ▶ bin ▶ win-driver ▶ libusb_1.2.4.0 ▶				
New folder				
Name	Date modified	Type	Size	
 amd64	16-06-2021 10:58	File folder		
 ia64	16-06-2021 10:58	File folder		
 license	16-06-2021 10:58	File folder		
 x86	16-06-2021 10:58	File folder		
 installer_x64.exe	28-05-2011 13:55	Application	22 KB	
 <b>installer_x86.exe</b>	28-05-2011 13:55	Application	21 KB	
 libusb-win32-bin-README.txt	28-05-2011 13:55	Text Document	1 KB	
 usbasp.cat	28-05-2011 13:55	Security Catalog	1 KB	
 usbasp.inf	28-05-2011 13:55	Setup Information	8 KB	

## Step 2: RUN software ProgISP.exe

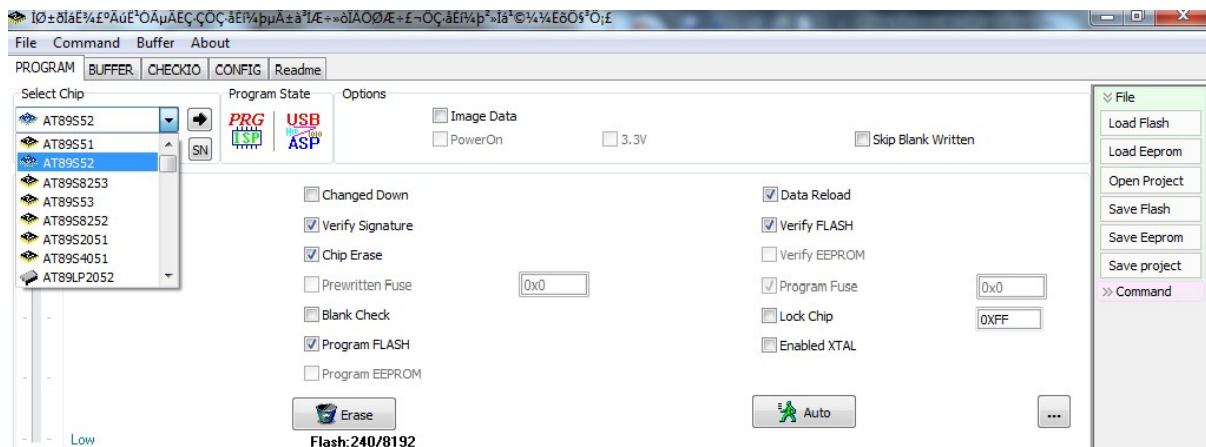
New Volume (E:) ▶ programmer for atmel ▶ 1-progisp172 ▶				
ry ▼ Share with ▼ New folder				
Name	Date modified	Type	Size	
 chn	13-01-2011 13:53	File folder		
 eng	02-06-2018 19:44	File folder		
 config.xml	19-09-2010 16:27	Microsoft Office I...	87 KB	
 GIVEIO.SYS	16-07-2004 10:52	System file	3 KB	
 progisp.exe	10-06-2010 13:48	Application	578 KB	
 progisp.ini	08-07-2021 10:47	Configuration sett...	2 KB	



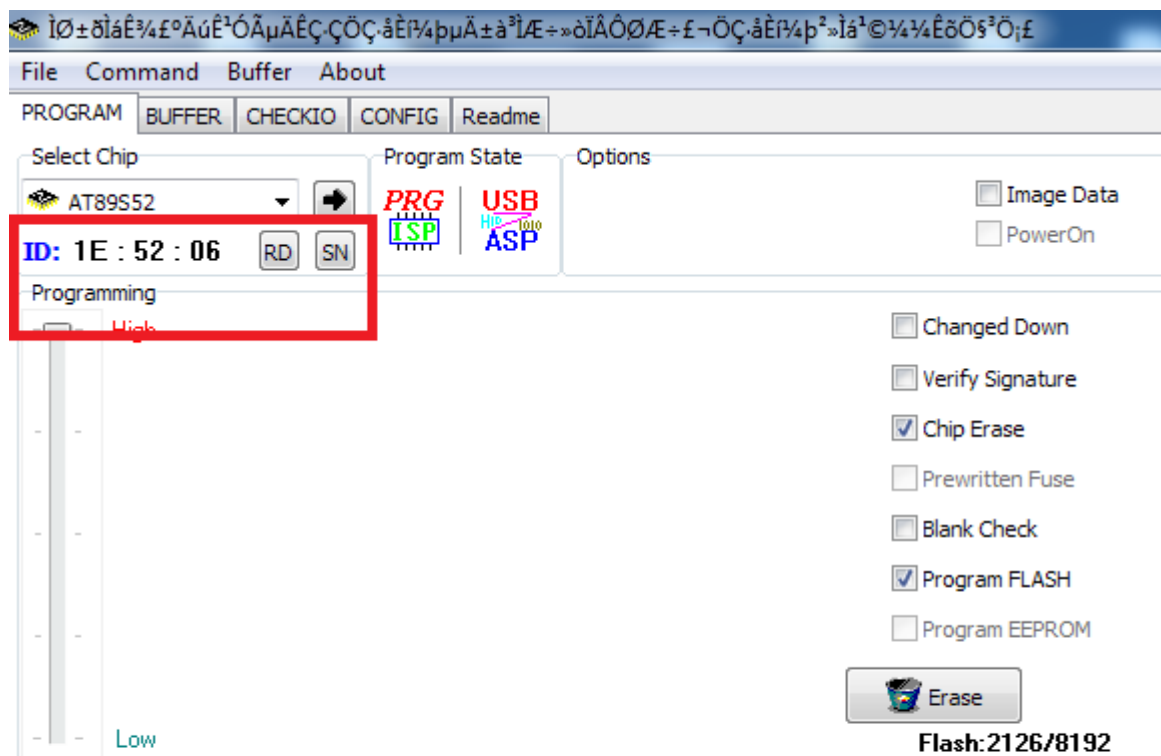
This detects USB programmer.



**From Select Chip Menu Select your MCU e.g. AT89S52.**

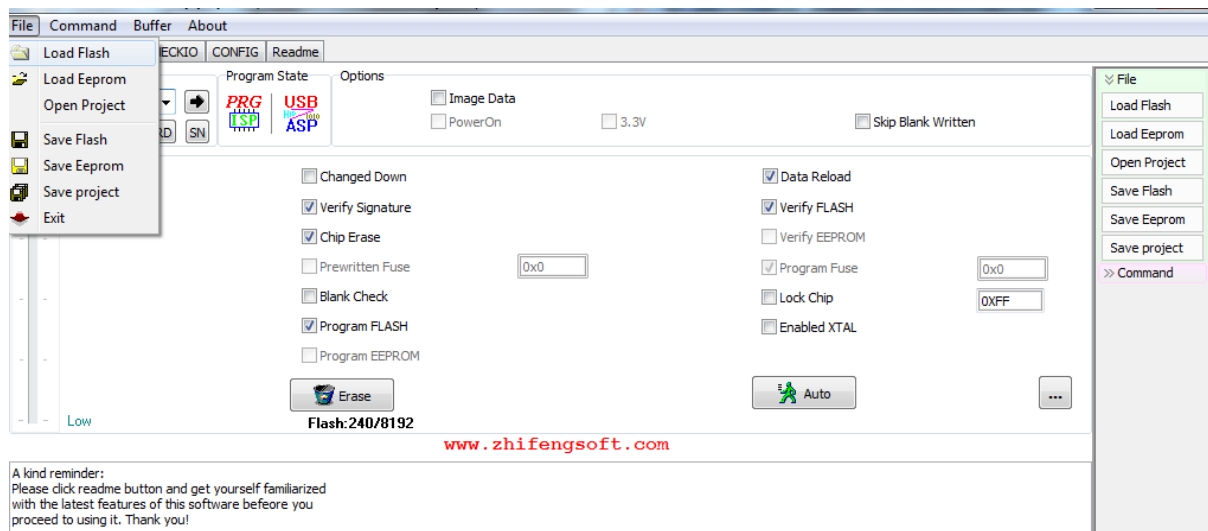


## IT READS DEVICE ID

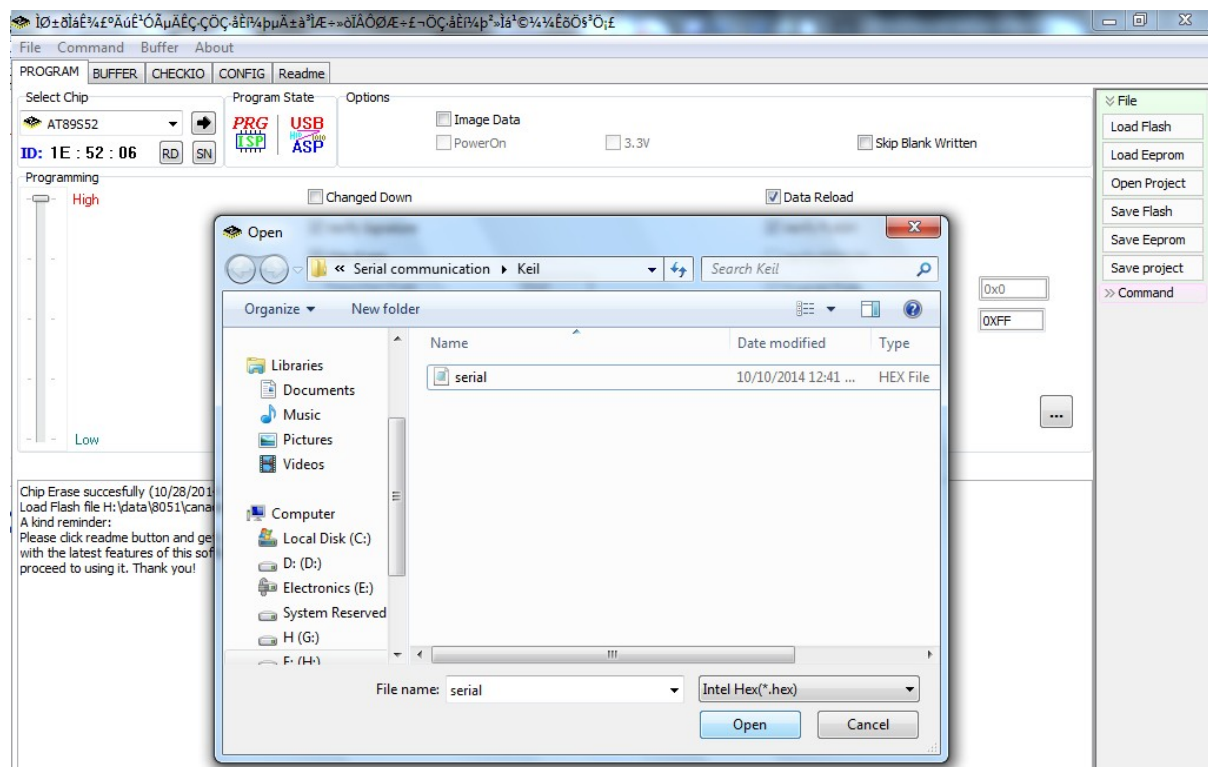


Read ID Successfully (10-07-2021 AM 10:19:59)  
 Read ID Successfully (10-07-2021 AM 10:19:52)  
 1: Erase, Write Flash, Verify Flash, Successfully done (10-07-2021 AM 10:19:36)  
 Load Flash file D:\1. Development board\1. 8051 (LGSA17\_260\_V1.1)\1.Deliverable\SAMPLE PEOGRAMS\C Programme\  
 A kind reminder:  
 Please click readme button and get yourself familiarized  
 with the latest features of this software before you  
 proceed to using it. Thank you!

**Select File -> click on Load Flash.  
 Select the HEX file.**

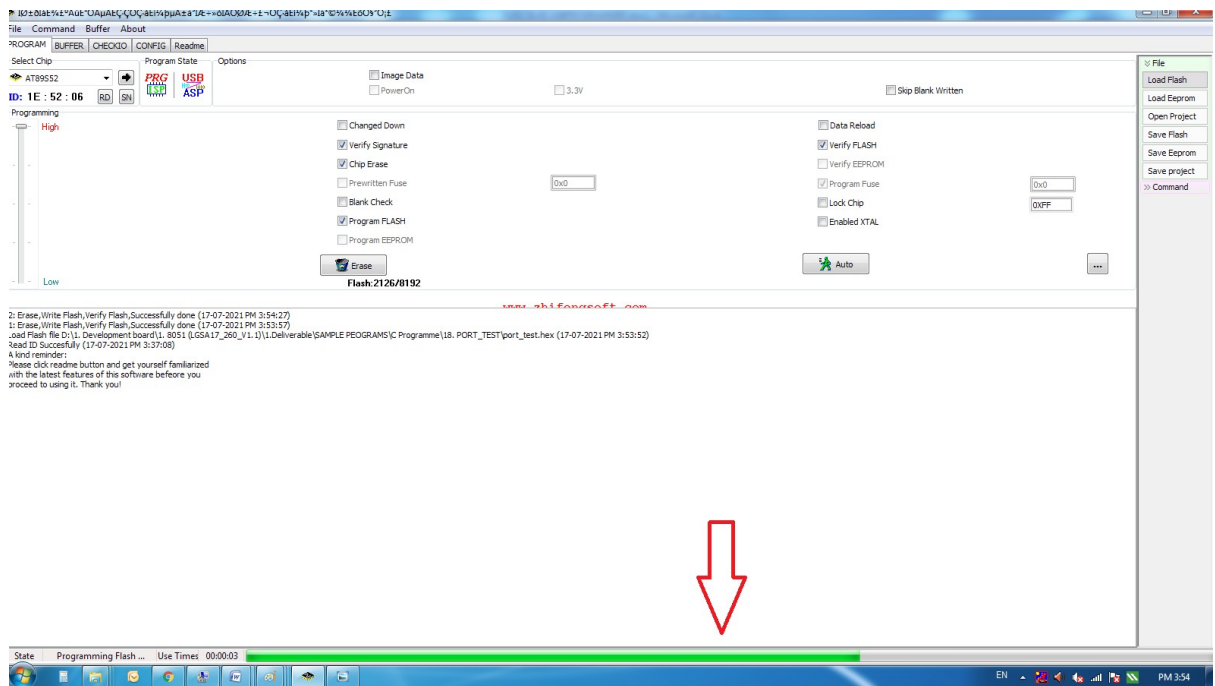


## Select HEX File.



Click on Auto Button.

This uploads HEX file into microcontroller shown by green bar.



**Connect 10 PIN FRC cables to ports and press RESET button.**

# EXPERIMENT No 1

## LED Logic

**AIM:** To study the interfacing of LED Logic.

**REQUIREMENTS:** 89S52 DEVELOPMENT BOARD, 10 pin FRC cable, USB cable, 12V power supply.

### PROCEDURE:

- 1) Connect +12V supply to board.
- 2) Connect the USB Cable to the micro controller Kit and select COM port of the PC.
- 3) Switch ON the power supply.
- 4) Open ProgISP Flashing Software on PC. Select the IC (AT89S52).
- 5) Select given ledsw hex File -> click on Load Flash. Select the HEX file. Click on Auto Button. This uploads HEX file into microcontroller shown by green bar.
- 6) Connect 10 pin FRC Cables. Press RESET and observe output.

PORT 0(J1)	J21 (Digital I/O)
PORT 1(J2)	J22(Digital I/O)

**You will observe that LED on as switch press.**

**Note:** FRC port connection must be proper to run the program.

## EXPERIMENT No 2.

### LCD DISPLAY

**AIM:** To study the interfacing of LCD with 89E516RD2 DEVELOPMENT BOARD.

**REQUIREMENTS:** DVK BOARD on AT89S52, 10 pin FRC cable, USB cable, 12V power supply.

#### PROCEDURE:

- 1) Connect +12V supply to board.
- 2) Connect the USB to the micro controller Kit and select COM port of the PC.
- 3) Switch ON the power supply.
- 4) Open ProgISP Flashing Software on PC. Select the IC (AT89S52).
- 5) Select given .hex File -> click on Load Flash. Select the HEX file. Click on Auto Button. This uploads HEX file into microcontroller shown by green bar.
- 6) Now if downloading of the program is completed, connect 10 pin FRC cables to the LCD section of the DVK kit
- 7) You will observe **LOGSUN SYSTEMS**.

#### THEORY:

##### Liquid crystal display:

LCD can be connected to the Microcontroller through the port 0. LCD is connected in the 4-bit mode or 8-bit mode. And the standard subroutine is given with the development board. So that the application can be easily demonstrated and also for further implementation the subroutine can be easily embedded for which one has to do very few changes. Wide range of instruction functions: Clear displays, cursor home, display ON/OFF, cursor ON/OFF, cursor shift, display shift.

##### 4-bit mode

RS, RW, EN are 1&2 are short.

##### 8-bit mode

RS, RW, EN are 2&3 are short

## EXPERIMENT No 3.

### LCD WITH KEYPAD INTERFACING

**AIM:** To study the interfacing of LCD and Keypad with 89E516RD2 DEVELOPMENT BOARD.

**REQUIREMENTS:** BOARD on AT89S52, 10 pin FRC cable, USB cable, 12V power supply.

#### PROCEDURE:

- 1) Connect +12V supply to board.
- 2) Connect the USB to the micro controller Kit and select COM port of the PC.
- 3) Switch ON the power supply.
- 4) Open ProgISP Flashing Software on PC. Select the IC (AT89S52).
- 5) Select given .hex File -> click on Load Flash. Select the HEX file. Click on Auto Button. This uploads HEX file into microcontroller shown by green bar.
- 6) Now if downloading of the program is completed, connect 10 pin FRC cables to the LCD section of the DVK kit
- 7) **You will observe LOGSUN SYSTEMS KEY PRESSED.**

#### THEORY:

##### Liquid crystal display:

LCD can be connected to the Microcontroller through the port 0. LCD is connected in the 4-bit mode or 8-bit mode. And the standard subroutine is given with the development board. So that the application can be easily demonstrated and also for further implementation the subroutine can be easily embedded for which one has to do very few changes. Wide range of instruction functions: Clear displays, cursor home, display ON/OFF, cursor ON/OFF, cursor shift, display shift.

##### 4-bit mode

RS, RW, EN are 1&2 are short.

##### 8-bit mode

RS, RW, EN are 2&3 are short



## EXPERIMENT NO 4.

### SEVEN SEGMENT DISPLAY

**AIM:** To study the interfacing of SEVEN SEGMENT.

**REQUIREMENTS:** BOARD on AT89S52, 10 pin FRC cable, USB cable, 12V power supply.

#### PROCEDURE:

1. Connect +12V supply to board.
2. Connect the USB Cable to the micro controller Kit and select COM port of the PC.
3. Switch ON the power supply.
4. Open ProgISP Flashing Software on PC. Select the IC (AT89S52).
5. Select given .hex File -> click on Load Flash. Select the HEX file. Click on Auto Button. This uploads HEX file into microcontroller shown by green bar.
6. Now if downloading of the program is completed, connect 10 pin FRC cables to the SEVEN SEGMENT section of the DVK kit
7. You will observe that **Seven segment will Display (0000 To FFFF).**

## EXPERIMENT NO 5.

### SEVEN SEGMENT + KEYBOARD DISPLAY

**AIM:** To study the interfacing of SEVEN SEGMENT + KEYBOARD with 89S52 DEVELOPMENT BOARD.

**REQUIREMENTS:** BOARD on AT89S52, 10 pin FRC cable, Serial or USB cable, 12V power supply.

#### PROCEDURE:

1. Connect +12V supply to board.
2. Connect the USB to the micro controller Kit and select COM port of the PC.
3. Switch ON the power supply.
4. Open ProgISP Flashing Software on PC. Select the IC (AT89S52).
5. Select given SEVEN SEGMENT + KEYBOARD.hex File -> click on Load Flash. Select the HEX file. Click on Auto Button. This uploads HEX file into microcontroller shown by green bar.
6. Now if downloading of the program is completed, connect 10 pin FRC cables to the SEVEN SEGMENT section of the DVK kit and observe key pressed.

## EXPERIMENT NO 6.

## 8 BIT DAC

**AIM:** To study the interfacing of DAC with Embedded Trainer board.

**REQUIREMENTS:** BOARD on AT89S52, 10 pin FRC cable, USB cable, 12V power supply.

### THEORY:

D/A converters: Digital to analog converters are broadly classified in three categories: Current output, voltage output and multiplying type.

The current output DAC, as the name suggests, provides current as the output DAC is slower than the current output DAC because of the delay in converting the current signal into the voltage signal. However, in many applications, it is necessary to convert current into voltage by using an external operational amplifier. The multiplying DAC is similar to the other two types except its output represent the product of the input signal and the reference source, and the product is linear over a broad range. Conceptually, there is not much difference between these three types; any DAC can be viewed as a multiplying DAC.

D/A converters are available as integrated circuits. Some are specially designed to be compatible with the micro controller. Typical applications include digital voltmeters, peak detectors, panel meters, and programmable gain and attenuation, and stepping motor drive.

### PROCEDURE:

1. Connect +12V supply to board.
2. Connect the USB to the micro controller Kit and select COM port of the PC.
3. Switch ON the power supply.
4. Open ProgISP Flashing Software on PC. Select the IC (AT89S52).
5. Select given .hex File -> click on Load Flash. Select the HEX file. Click on Auto Button. This uploads HEX file into microcontroller shown by green bar.
6. Connect 10 pin FRC Cables. Press RESET and observe output. Connect CRO/DSO probe on DAC O/P and GND turret.
7. Observe the output on **CRO/DSO**.

## EXPERIMENT NO 7.

## 8 BIT ADC 0804

**AIM:** To study & observe the theoretical knowledge of ADC IC-0804.

**REQUIREMENTS:** BOARD on AT89S52, 10 pin FRC cable, USB cable, 12V power supply.

### **THEORY:**

In the ADC section the IC- 0804 is used to convert the input signal in digital. Here we have discussed about the process of A/D and D/A conversion techniques used by these ICs.

A/D conversion: The A/D conversion is quantizing process whereby an analog signal is represented by equivalent binary states; this is opposite to the D/A conversion process. Analog to Digital converters can be classified into two general group based on the conversion technique. One technique involves comparing the given analog signal with internally generated equivalent signal. This group involves successive –approximation, counters, and flash type converters. The second technique involves changing an analog signal into time or frequency and comparing these new parameters to known values. This group involves integrator converters and voltage to frequency converters. ‘The tradeoff between the two techniques is based on accuracy vs. speed. The successive – approximation and flash type are faster but generally less accurate than the integrator and the voltage to frequency converters. Furthermore, the flash type is expensive and difficult to design for high accuracy.

The successive – approximation A/D converter are used in applications, such as data loggers and instrumentation, where conversion speed is important. On the other hand, integrating – type converters are used in applications such as digital meters, panel meters and monitoring systems, where the conversion accuracy is critical. The most commonly used A/D converters- successive approximation is discussed in this section with several interfacing examples.

### **PROCEDURE:**

1. Connect +12V supply to board.
2. Connect the USB Cable to the micro controller Kit and select COM port of the PC.
3. Switch ON the power supply.
4. Open ProgISP Flashing Software on PC. Select the IC (AT89S52).
5. Select given .hex File -> click on Load Flash. Select the HEX file. Click on Auto Button. This uploads HEX file into microcontroller shown by green bar.
6. Connect 10 pin FRC Cables to the 8 Bit ADC section of the DVK kit. Press RESET and observe output.
7. Observe the output of LEDs (00 to FF) through the POT (0 to 5 V).

**Note:** Keep link at SL4 between 1 &2, SL5 between 2,3 short

## EXPERIMENT NO 8.

### DC MOTOR

**AIM:** To study DC motor speed control using PWM

**REQUIREMENTS** BOARD on AT89S52, 10 pin FRC cable, USB cable, 12V power supply DC motor card.

**APPLICATION:** In Industries DC motors are using. In some application speed control is required. Here we have assembly of small DC motor with speed control.

#### PROCEDURE:

1. Connect +12V supply to board.
  2. Connect the USB Cable to the micro controller Kit and select COM port of the PC.
  3. Switch ON the power supply.
  4. Open ProgISP Flashing Software on PC. Select the IC (AT89S52).
  5. Select given .hex File -> click on Load Flash. Select the HEX file. Click on Auto Button. This uploads HEX file into microcontroller shown by green bar.
  6. Connect 10 pin FRC Cables to the DC motor section of the DVK kit.
  7. Press start switch then increment. You can change the direction of motor by pressing REV switch for keyboard. You can start or stop the motor by pressing the START or STOP keys.
  8. Connect Motor card at RL3 on DVK BOARD.
- Jumpers Settings For DC motor :  
JP6, JP7 – 1& 2 short.

## EXPERIMENT NO 9.

### STEPPER MOTOR

**AIM:** To study Stepper motor.

**REQUIREMENTS:** BOARD on AT89S52, 10 pin FRC cable, USB cable, 12V power supply, Stepper motor card.

#### INTRODUCTION:

Basically the stepper motor is an electromagnetic device, which converts digital pulses in to discrete mechanical rotational movements.

In rotary step motor, the output shaft of the motor rotates in equal increments, in response to a train of input pulses.

#### CONSTRUCTION:

The stepping motor is basically a motor with two phases, eight silent poles, toothed iron rotor and a permanent magnet. This rotor is known as hybrid rotor. The rotor is suspended in the stator by means of sealed ball bearings.

#### WORKING OF STEPPING MOTOR:

Sequential switching of supply to the two phases of motor causes the stepping action. The stepping motor can be run in two modes,

**a) Full Step Mode:** In this mode out of the four coils, two coils are energized at each time when we apply the pulses. The step angle in this case is  $7.5^\circ \pm 0.1^\circ$ . The speed of the motor can vary by varying the time duration between the two pulses.

Applying the pulses sequence in the reverse can change the direction of the motor Direction, that is from BOTTOM to TOP.

**b) Half step Mode:** In this mode, we get the step angle of  $3.75^\circ$ , hence better resolution.

## **PROCEDURE FOR STEPPER MOTOR:**

1. Connect +12V supply to board.
2. Connect the USB to the micro controller Kit and select COM port of the PC.
3. Switch ON the power supply.
4. Open ProgISP Flashing Software on PC. Select the IC (AT89S52).
5. Select given .hex File -> click on Load Flash. Select the HEX file. Click on Auto Button. This uploads HEX file into microcontroller shown by green bar.
6. Connect 10 pin FRC Cables to the stepper motor section of the DVK kit.
7. Press start switch then increment. You can change the direction of motor by pressing REV switch for keyboard. You can start or stop the motor by pressing the START or STOP keys.

Connect Motor card at RL4 on DVK BOARD.

- Jumpers Settings For stepper motor :  
JP6, JP7 – 2 & 3 short.



## EXPERIMENT NO 10.

### RELAY AND BUZZER INTERFACE

**AIM:** Relay & Buzzer Interface to embedded development board

**REQUIREMENTS:** BOARD on AT89S52, 10 pin FRC cable, USB cable, 12V power supply.

#### PROCEDURE:

1. Connect +12V supply to board.
2. Connect the USB Cable to the micro controller Kit and select COM port of the PC.
3. Switch ON the power supply.
4. Open ProgISP Flashing Software on PC. Select the IC (AT89S52).
5. Select given .hex File -> click on Load Flash. Select the HEX file. Click on Auto Button. This uploads HEX file into microcontroller shown by green bar.
6. Now if downloading of the program is completed, connect 10 pin FRC cables to the Relay section of the DVK kit.
7. Press the Relay button to turn on the Relay and turn OFF the buzzer.
8. Press the Buzzer button to turn ON the buzzer and turn off the relay.

## EXPERIMENT NO 11.

### EEPROM INTERFACE

**AIM:** EEPROM Interface to embedded development board

**REQUIREMENTS:** BOARD on AT89S52, 10 pin FRC cable, USB cable, 12V power supply.

#### PROCEDURE:

1. Connect +12V supply to board.
2. Connect the USB to the micro controller Kit and select COM port of the PC.
3. Switch ON the power supply.
4. Open ProgISP Flashing Software on PC. Select the IC (AT89S52).
5. Select given .hex File -> click on Load Flash. Select the HEX file. Click on Auto Button. This uploads HEX file into microcontroller shown by green bar.
6. Now if downloading of the program is completed, connect 10 pin FRC cables to the EEPROM section of the DVK kit.
7. Observe the output of EEPROM on LCD display. As below

**ADDRESS: 0X70**

**DATA: BB**

## EXPERIMENT NO 12.

## RTC INTERFACE

**AIM:** RTC Interface to embedded development board

**REQUIREMENTS:** BOARD on AT89S52, 10 pin FRC cable, USB cable, 12V power supply.

### PROCEDURE:

1. Connect +12V supply to board.
2. Connect the USB Cable to the micro controller Kit and select COM port of the PC.
3. Switch ON the power supply.
4. Open ProgISP Flashing Software on PC. Select the IC (AT89S52).
5. Select given .hex File -> click on Load Flash. Select the HEX file. Click on Auto Button. This uploads HEX file into microcontroller shown by green bar.
6. Now if downloading of the program is completed, connect 10 pin FRC cables to the RTC section of the DVK kit.  
Observe the output of RTC on LCD display.

## EXPERIMENT NO 12.

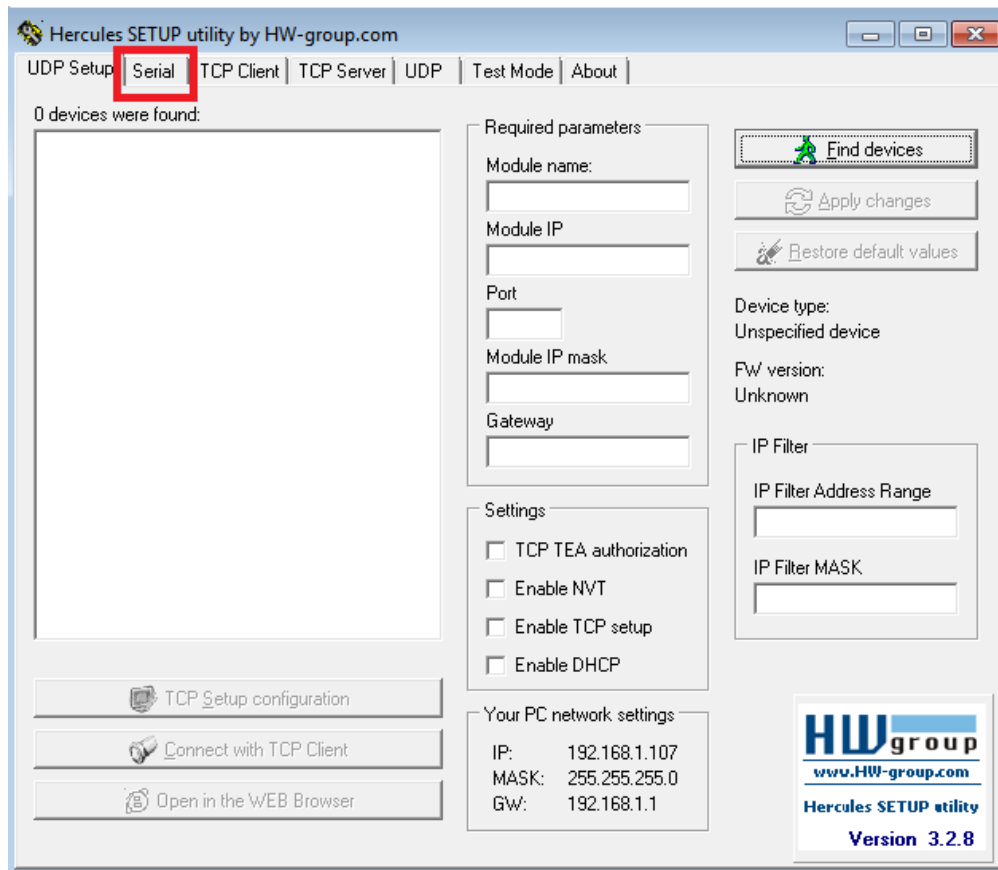
### Serial Rx\_Tx

**AIM:** To check serial communication on embedded development board

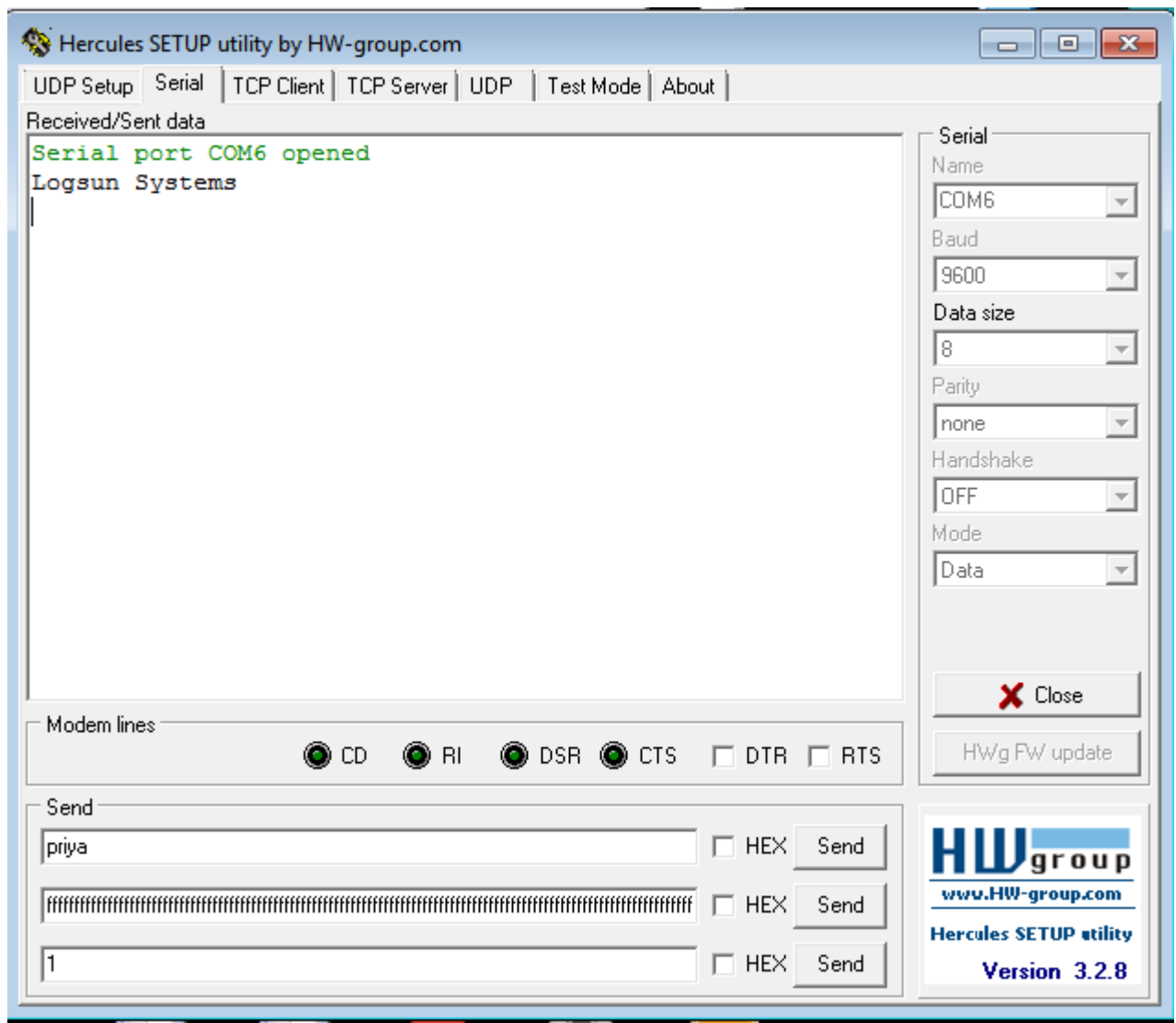
**REQUIREMENTS:** BOARD on AT89S52, 10 pin FRC cable, USB cable, 12V power supply.

#### PROCEDURE:

1. Connect +12V supply to board.
2. Connect the USB to the micro controller Kit and select COM port of the PC.
3. Switch ON the power supply.
4. Open ProgISP Flashing Software on PC. Select the IC (AT89S52).
5. Select given .hex File -> click on Load Flash. Select the HEX file. Click on Auto Button. This uploads HEX file into microcontroller shown by green bar.
6. Now if downloading of the program is completed, open Hercules software->
7. **Open Hercules CLICK ON SERIAL**



SELECT BAUD RATE **9600**, SELECT RESPECTIVE **PORT** OF YOUR PC/LAPTOP WHICH IS CONNECTED TO DVK  
KEEP SW3 UP AND CLICK ON **OPEN** YOU CAN SEE FOLLOWING WINDOW AS OUTUT.



## FRC CONNECTION DETAILS:

Sr. No.	Experiments	8051 DVK Port No.	Port No.
1	8 Bit ADC	PORT 2	J17 (8-Bit ADC)
2	8 Bit ADC + 8 Bit LCD	PORT 0 PORT 1 PORT 2 PORT 3	J9 (LCD) J10 (LCD) J16 (8-Bit ADC) J17 (8-Bit ADC)
3	8 Bit DAC	PORT 1	J18(8-bit DAC)
4	LCD(4 bit)	PORT 0	J9 (LCD)
5	LCD(8 bit)	PORT 0 PORT 1	J9 (LCD) J10 (LCD)
6	EEPROM	PORT 0 PORT 1 UEXT	J9 (LCD) J10(LCD) J20 (EEPROM)
7	RTC	PORT 0 PORT 1 UEXT	J9 (LCD) J10 (LCD) J20 (RTC)
8	LCD + Keypad	PORT 0 PORT 1 PORT 2	J9 (LCD) J10 (LCD) J13 (Keypad)
9	7 Segment	PORT 0 PORT 1	J11 (7 segment) J12 (7 segment)
10	7 Segment + Keypad	PORT 0 PORT 1 PORT 2	J11 (7 segment) J12 (7 segment) J13 (Keypad)
11	LED LOGIC	PORT 0 PORT 1	J21 (Digital I/O) J22(Digital I/O)
12	Relay buzzer	PORT 2	J7 (Relay buzzer)
13	DC motor	PORT 1 PORT 2	J14 (DC Motor) J15
14	Stepper motor	PORT 1 PORT2	J14 (Stepper Motor) J15
15	Serial Rx-Tx	Connect A-B USB Cable Between DVK and PC/Laptop. upload the program and open Hercules software, go to serial select COM port and set baud rate at 9600,make SW UP and click on open COM. You can see output <b>LOGSUN SYSYSTEM</b> .	