

Experiment No : 1

Aim : To Study the various features of EDSIM51 simulator for 8051 micro controller.

Theory :

- EdSim51 is a software product that simulates the 8051 microcontroller.
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- Peripherals can be ignored in EDSim51 unlike other stimulators. Various sections of EDSim consists of:
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- The Microcontroller Panel. The Bitfield. Data and Code Memory.
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- The Assembly Code Panel.
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- The Peripherals. The Logic Diagram. The LED Bank, DAC and the 7-segment Displays. The LCD Module. The Switch Bank and the ADC. The Comparator and the DAC. The Motor. The UART. The Keypad.

Various peripherals provided by EDSim are as follows:

- Analogue-to-Digital Converter(ADC)
- Comparator
- UART
- 4Multiplexed7-segment Displays
- 4X3Keypad
- 8 LEDs
- DC Motor
- 8 Switches
- Digital-to-Analogue Converter (DAC)- displayed on oscilloscope.

Write assembly language programs to do the following:

1. Store a hexadecimal number in register A.

The screenshot shows the EdSim51DI - Version 2.1.23 interface. The assembly window displays the instruction `0000| MOV A, #25H;`. The hardware simulation interface at the bottom shows the following components:

- System Clock (MHz):** 12.0
- SBUF:** R/W, TH0, TL0, RXD, TXD, SCON, TH1, TL1, PC, PSW, DPH, DPL, SP.
- Data Memory:** A table of memory addresses (0-70) and their values (00-FF).
- Hardware Simulation:** Includes a keyboard, a display showing '8.8.8.8', an ADC input/output, and a motor control section.

2. Store a binary number in register A.

The screenshot shows the EdSim51DI - Version 2.1.23 interface. The assembly window displays the instruction `0000| MOV A, #0100B;`. The hardware simulation interface at the bottom shows the following components:

- System Clock (MHz):** 12.0
- SBUF:** R/W, TH0, TL0, RXD, TXD, SCON, TH1, TL1, PC, PSW, DPH, DPL, SP.
- Data Memory:** A table of memory addresses (0-70) and their values (00-FF).
- Hardware Simulation:** Includes a keyboard, a display showing '8.8.8.8', an ADC input/output, and a motor control section.

3. Store a decimal number in register A.

The screenshot shows the EdSim51DI v2.1.23 interface. The assembly window displays the instruction `MOV A, #17;` at address 0000. The register window shows the PC at 8051 and the PSW at 0000. The data memory window shows the value 00 at address 00. The hardware simulation interface at the bottom shows the 8-bit UART at 4800 Baud, the ADC input at 0.0 V, and the motor enabled. The display shows the value 0000.

4. Store a hexadecimal number which starts with a letter in register A.

The screenshot shows the EdSim51DI v2.1.23 interface. The assembly window displays the instruction `MOV A, #0CH;` at address 0000. The register window shows the PC at 8051 and the PSW at 0000. The data memory window shows the value 00 at address 00. The hardware simulation interface at the bottom shows the 8-bit UART at 4800 Baud, the ADC input at 0.0 V, and the motor enabled. The display shows the value 0000.

5. Add two unsigned numbers.

EdSim51DI - Version 2.1.23

System Clock (MHz): 12.0 | Update Freq. 1

Time: 35us - Instructions: 35

```

0000| MOV A, #3H;
0002| ADD A, #3H;
      END
  
```

PC: 8051

Modify RAM: addr 0x00, value 0x00

Data Memory (0x00-0x7F): All zeros.

Hardware Interface:

- DI, LD, AND Gate Disabled, Key Bounce Disabled
- U: No Parity, 8-bit UART @ 4800 Baud
- Rx, Tx, Rx Reset, Tx Send
- 0.0 V output, Scope, DAC
- BF, AC, IR, DR registers
- Display: 8888
- ADC: 11111111
- Motor Enabled

6. What is the largest value you can move into a register? Give an example program

EdSim51DI - Version 2.1.23

System Clock (MHz): 12.0 | Update Freq. 1

Time: 20us - Instructions: 20

```

0000| MOV A, #255;
  
```

PC: 8051

Modify RAM: addr 0x00, value 0x00

Data Memory (0x00-0x7F): All zeros.

Hardware Interface:

- DI, LD, AND Gate Disabled, Key Bounce Disabled
- U: No Parity, 8-bit UART @ 4800 Baud
- Rx, Tx, Rx Reset, Tx Send
- 0.0 V output, Scope, DAC
- BF, AC, IR, DR registers
- Display: 8888
- ADC: 11111111
- Motor Enabled

The screenshot displays the EdSim51DI - Version 5.1.23 software interface, which is used for simulating an 8051 microcontroller. The interface is divided into several main sections:

- Top Panel (Registers and Memory):**
 - System Clock (MHz):** Set to 12.0.
 - SBUF:** Register for serial data buffer.
 - R0-R7:** General-purpose registers.
 - ACC:** Accumulator register.
 - PSW:** Program Status Word.
 - IP:** Interrupt Priority Register.
 - IE:** Interrupt Enable Register.
 - DPH, DPL:** Data Pointer High/Low bytes.
 - PC:** Program Counter, currently at 0x0016.
 - PSW:** Program Status Word, currently at 0x0000.
 - RAM:** Random Access Memory, currently at 0x0000.
 - 8051:** The central microcontroller unit.
- Bottom Panel (I/O Devices):**
 - DI / LD:** Input/Output devices.
 - AND Gate Disabled:** A control for the AND gate.
 - Key Bounce Disabled:** A control for key bounce.
 - Standard:** A dropdown menu for standard settings.
 - 0.0 V output:** The output voltage of the motor control circuit.
 - Scope:** A scope for monitoring signals.
 - 4-digit display:** A 4-digit display showing the value 1111.
 - Motor Control:** A panel for controlling the motor, showing the motor is enabled and the output is 0.0 V.

Conclusion : The Experiment to study the various features of EDSIM51 simulator for 8051 microcontroller was completed successfully.

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