



IOT LAB PORT PROGRAMMING

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Q-1

WRITE ALP TO GENERATE A SQUARE WAVEFORM ON PIN P3.3

Code:

```

REPEAT:
    SETB P3.3
    LCALL DELAY
CLR P3.3
    LCALL DELAY
SJMP REPEAT
DELAY:
    MOV R3, #05H
    HERE: DJNZ R3, HERE
    RET

```

Output:

The screenshot displays the EdSim51DI software interface, showing the execution of the provided assembly code. The main window is divided into several sections:

- System Clock (MHz):** Set to 12.0.
- Registers:** R0-R7, ACC, PSW, IP, IE, PCON, DPH, DPL, SP, and PC are visible. The PC register is highlighted at 0x000E.
- Assembly Code:** The code is loaded and executed. The instruction pointer (IP) is at 0x000E, corresponding to the instruction `HERE: DJNZ R3, HERE`.
- Hardware Simulation:** The bottom section shows a virtual hardware environment with various components:
 - Keypad:** A 4x4 keypad is shown with labels like 'Display-select Decoder CS|DAC WR'.
 - ADC:** An 8-bit ADC is shown with a value of 1111111.
 - Motor:** A motor is shown with a status 'Motor Enabled'.
 - Display:** A 7-segment display shows the value '8888'.
 - Other Components:** Includes a DAC, a scope, and various control buttons like 'Rx Reset', 'Tx Send', and 'Scope'.

Q-2

WRITE ALP TO GENERATE A RECTANGULAR WAVEFORM ON PIN P3.3

Code:

```

REPEAT:
SETB P3.3
LCALL DELAY1
CLR P3.3
LCALL DELAY2
SJMP REPEAT

```

```

DELAY1:
MOV R3, #05H
HERE1:
NOP
DJNZ R3, HERE1
RET

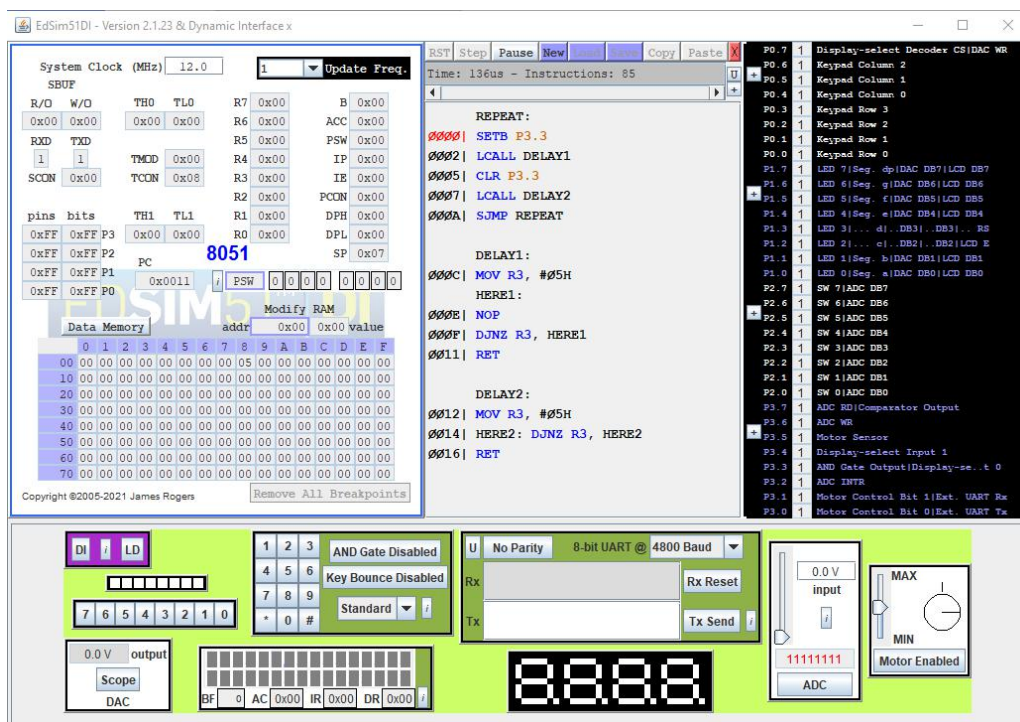
```

```

DELAY2:
MOV R3, #05H
HERE2: DJNZ R3, HERE2
RET

```

Output:



WRITE ALP TO GENERATE A SQUARE WAVEFORM ON PORT P1 USING DAC

Code:

```
CLR P0.7
REPEAT:
MOV P1, #0FFH;5v
LCALL DELAY
MOV P1, #33H;1V
LCALL DELAY
SJMP REPEAT
```

```
DELAY:
MOV R3, #10H
HERE1:
DJNZ R3, HERE1
RET
```

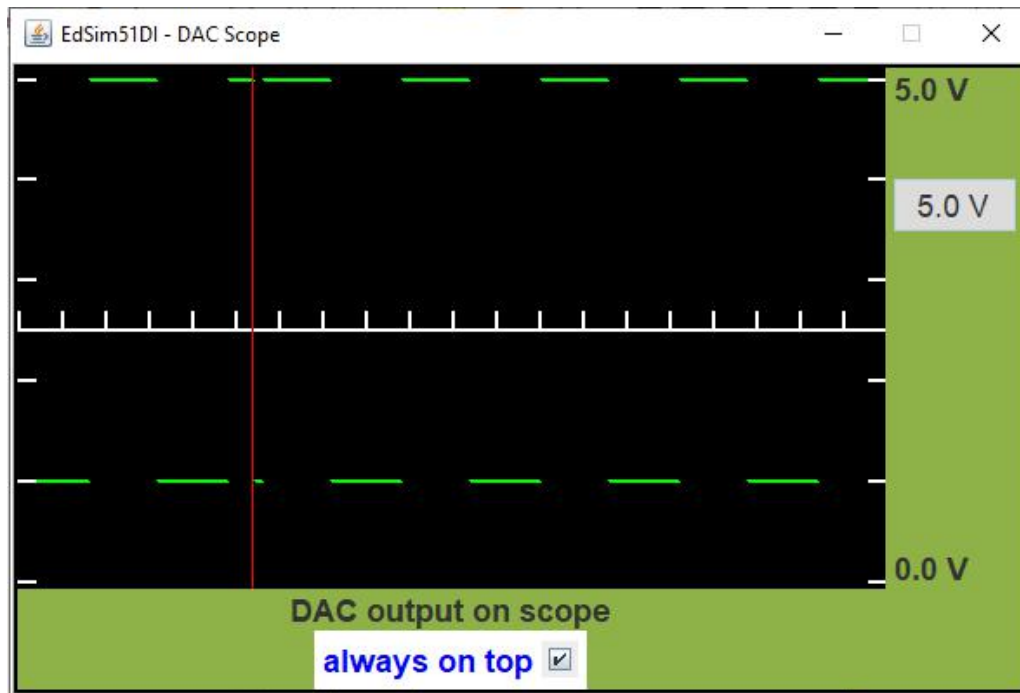
Output:

The screenshot displays the EdSim51DI software interface, showing the execution of the provided ALP code. The main window is divided into several sections:

- System Clock (MHz):** Set to 12.0.
- Register Window:** Shows the status of various registers. The PC (Program Counter) is highlighted at 0x0012, and the PSW (Program Status Word) is 8051.
- Code Editor:** Displays the assembly code being executed:


```
0000| CLR P0.7
      REPEAT:
0002| MOV P1, #0FFH;5v
0005| LCALL DELAY
0008| MOV P1, #33H;1V
000B| LCALL DELAY
000E| SJMP REPEAT

      DELAY:
0010| MOV R3, #10H
      HERE1:
0012| DJNZ R3, HERE1
0014| RET
```
- Data Memory:** A table showing memory addresses from 0 to 70 and their corresponding values (all 00).
- Hardware Simulation Panel:** Located at the bottom, it includes:
 - DI/LD:** A switch labeled 'LD' is turned on.
 - AND Gate Disabled:** A checkbox that is unchecked.
 - Key Bounce Disabled:** A checkbox that is unchecked.
 - Standard:** A dropdown menu set to 'Standard'.
 - UART:** A section for 8-bit UART @ 4800 Baud, with 'No Parity' selected. It includes 'Rx Reset' and 'Tx Send' buttons.
 - ADC:** A section showing '0.0 V' input and '11111111' output. A 'MAX' button is also present.
 - Motor Enabled:** A checkbox that is checked.
 - Scope:** A section for the DAC output, showing '1.0 V'.
 - Error Message:** A red text box stating: 'Error! Function set incorrect. DL=1 N=0 F=0. Function set must be DL=X N=1 F=0.'
 - Display:** A 7-segment display showing '8.8.8.8'.



Q-4

WRITE ALP TO GENERATE A RECTANGULAR WAVEFORM ON PORT P1 USING DAC

Code:

```
CLR P0.7
```

```
REPEAT: MOV P1, #66H;5v
```

```
LCALL DELAY
```

```
MOV P1, #33H;1V
```

```
LCALL DELAY1
```

```
SJMP REPEAT
```

```
DELAY: MOV R3, #10H
```

```
HERE1:
```

```
NOP
```

```
DJNZ R3, HERE1
```

```
RET
```

```
DELAY1: MOV R3, #10H
```

```
HERE:
```

```
DJNZ R3, HERE
```

```
RET
```


Output:

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

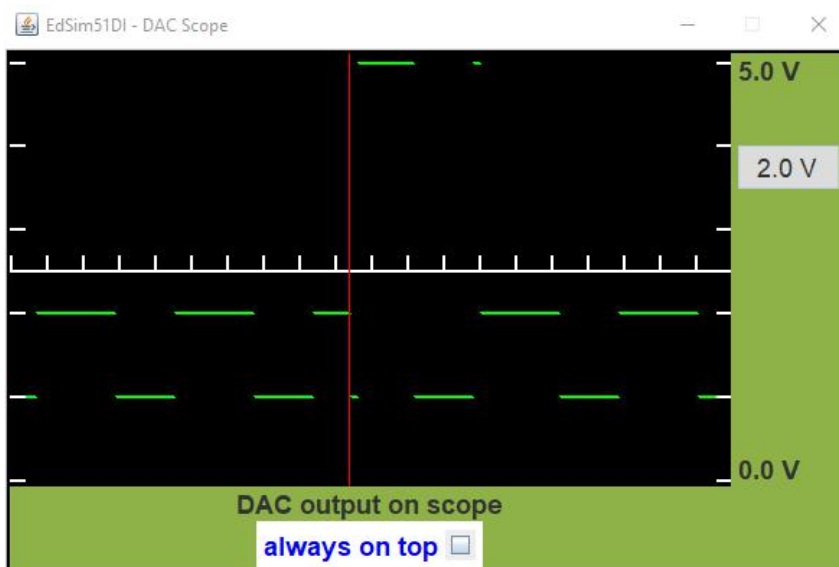
- System Clock (MHz):** Set to 12.0.
- Registers and Memory:** A table showing the state of various registers (R0-R7, ACC, PSW, IP, IE, PCON, DPH, DPL, SP) and memory locations (TH0, TL0, TMOD, TCON, TH1, TL1, PC). The PC register is highlighted at address 0x0008 with the value 8051.
- Assembly Code Editor:** Displays the following code:


```

      0000 CLR P0.7
      0002 REPEAT: MOV P1, #66H;5v
      0005 LCALL DELAY
      0008 MOV P1, #33H;1V
      000B LCALL DELAY1
      000E SJMP REPEAT

      0010 DELAY: MOV R3, #10H
      HERE1:
      0012 NOP
      0013 DJNZ R3, HERE1
      0015 RET

      0016 DELAY1: MOV R3, #10H
      HERE:
      0018 DJNZ R3, HERE
      001A RET
      
```
- Hardware Simulation Panel:** Located at the bottom, it includes:
 - DI/LD:** Buttons for digital input/output.
 - AND Gate Disabled:** A status indicator.
 - Key Bounce Disabled:** A status indicator.
 - Standard:** A dropdown menu.
 - UART:** Configuration for 8-bit UART at 4800 Baud.
 - Rx/Tx:** Serial communication input/output fields.
 - ADC:** A digital-to-analog converter output showing 0.0 V.
 - Motor:** A motor control output showing 11111111.
 - Scope:** A digital display showing 8888.



Q-5

Code:

```
CLR P0.7
```

```
REPEAT:
MOV P1, #0FFH
LCALL DELAY1
MOV P1, #33H
LCALL DELAY2
SJMP REPEAT
```

```
;700
DELAY1:
MOV R3, #0FFH ;1
HERE1: DJNZ R3, HERE1 ;2 =255*2=510
MOV R3, #5DH;1
HERE2: DJNZ R3, HERE2 ;186
RET ;2ms
```

```
;300
DELAY2: MOV R3, #94H;1
NOP;1
HERE3: DJNZ R3, HERE3;2
RET;2
```

Output:

The screenshot displays the EdSim51DI software interface, which simulates an 8051 microcontroller and its associated hardware. The main window is divided into several sections:

- System Configuration:** Shows the System Clock (MHz) set to 12.0 and the Update Freq. button.
- Register and Variable View:** Displays the status of various registers and variables. The PC (Program Counter) is highlighted in blue, showing the address 0x0000. The PSW (Program Status Word) is 0x0000. The R3 register is highlighted in green, showing the value 0x0000.
- Data Memory:** A table showing memory addresses from 0 to 70 and their corresponding values. The value at address 0x0000 is 0x0000.
- Assembly Code Editor:** Contains the assembly code being executed. The code is as follows:


```
REPEAT:
MOV P1, #0FFH
LCALL DELAY1
MOV P1, #33H
LCALL DELAY2
SJMP REPEAT

;700
DELAY1:
MOV R3, #0FFH ;1
HERE1: DJNZ R3, HERE1 ;2 =255*2=510
MOV R3, #5DH;1
HERE2: DJNZ R3, HERE2 ;186
RET ;2ms

;300
DELAY2: MOV R3, #94H;1
NOP;1
HERE3: DJNZ R3, HERE3;2
RET;2
```
- Hardware Simulation:** A visual representation of the hardware components, including:
 - 8051 Microcontroller:** Labeled with '8051'.
 - Memory:** A grid of memory cells.
 - UART:** An 8-bit UART @ 4800 Baud interface with Rx and Tx lines.
 - ADC:** An ADC module with a 0.0V input and a MAX/MIN scale.
 - Motor:** A motor control module with a 'Motor Enabled' indicator.
 - Display:** A 4-digit 7-segment display showing '8888'.



Q-6

Write ALP to generate a step waveform, each step is of 1v and the step delay is common for all steps

Code:

```
CLR P0.7
```

```
AGAIN:
```

```
MOV P1, #33H;1v
```

```
MOV A, #33H
```

```
REPEAT:
```

```
LCALL DELAY
```

```
ADD A, #33H
```

```
MOV P1, A
```

```
CJNE A, #0FFH, REPEAT
```

```
REPEAT2:
```

```
LCALL DELAY
```

```
SUBB A, #33H
```

```
MOV P1, A
```

```
CJNE A, #33H, REPEAT2
```

```
SJMP AGAIN
```

```
DELAY:
```

```
MOV R1, #0AH
```

```
HERE:
```

```
DJNZ R1, HERE
```

```
RET
```


Output:

EdSim51DI - Version 2.1.23 & Dynamic Interface x

System Clock (MHz) 12.0 Update Freq. 1

SBUP

R/O	W/O	TH0	TL0	R7	0x00	B	0x00
0x00	0x00	0x00	0x00	R6	0x00	ACC	0x66
R/D	TXD	TMCD	0x00	R5	0x00	PSW	0x04
1	1	0x00	0x00	R4	0x00	IP	0x00
SOCON	0x00	TCON	0x00	R3	0x3C	IE	0x00
				R2	0x00	PCON	0x00
pins	bits	TH1	TL1	R1	0x0A	DPH	0x00
0xFF	0xFF	0x00	0x00	R0	0x00	DPL	0x00
0xFF	0xFF	P2				SP	0x09
0x66	0x66	P1					
0x7F	0x7F	P0					

PC 8051

Data Memory

addr	0x00	0x00	value
0	0	0	0
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0
7	0	0	0
8	0	0	0
9	0	0	0
A	0	0	0
B	0	0	0
C	0	0	0
D	0	0	0
E	0	0	0
F	0	0	0

Modify RAM

Remove All Breakpoints

Assembly Code:

```

0000 CLR P0.7
AGAIN:
0002 MOV P1, #33H;1v
0005 MOV A, #33H
REPEAT:
0007 LCALL DELAY
000A ADD A, #33H
000C MOV P1, A
000E CJNE A, #0FFH, REPEAT
REPEAT2:
0011 LCALL DELAY
0014 SUBB A, #33H
0016 MOV P1, A
0018 CJNE A, #33H, REPEAT2
001B SUMP AGAIN
DELAY:
001D MOV R1, #0AH
  
```

Hardware Status:

- DI: 1, LD: 0
- AND Gate Disabled
- Key Bounce Disabled
- Standard
- 8-bit UART @ 4800 Baud
- No Parity
- Rx Reset
- Tx Send
- 0.0 V input
- 11111111
- ADC
- MAX
- MIN
- Motor Enabled

8.8.8.8

Error Function set incorrect.
DL=1 N=0 F=0
Function set must be
DL=X N=1 F=0.



Q-7

Write an ALP to generate triangular wave

Code:

CLR P0.7

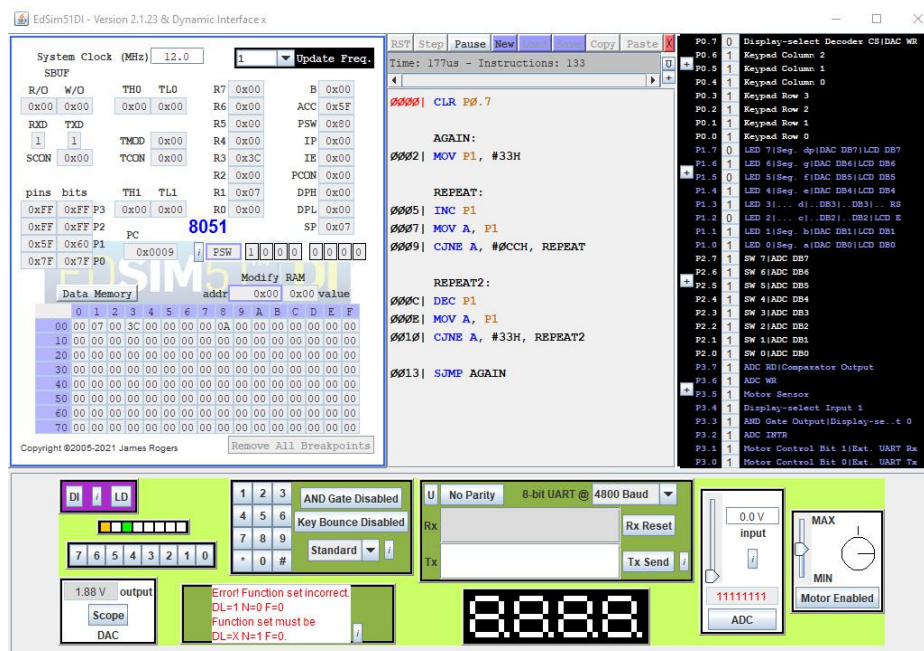
AGAIN:
MOV P1, #33H

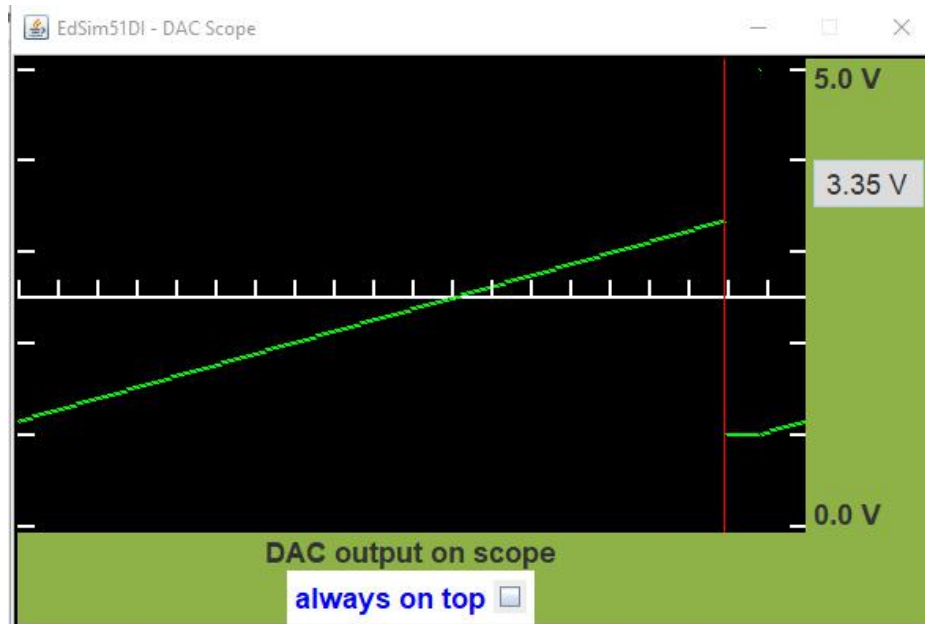
REPEAT:
INC P1
MOV A, P1
CJNE A, #0CCH, REPEAT

REPEAT2:
DEC P1
MOV A, P1
CJNE A, #33H, REPEAT2

SJMP AGAIN

Output:





THANK YOU!!