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1 ;\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

2 ;

3 ; Author : ADI - Apps www.analog.com/MicroConverter

4 ;

5 ; Date : October 2003

6 ;

7 ; File : TIC.asm

8 ;

9 ; Hardware : ADuC841

10 ;

11 ; Description : Demonstrates a use of a timer interval counter for

12 ; counting longer intervals than the standard 8052

13 ; timers are capable of.

14 ;

15 ; The LED will, on power up, flash at 6.4Hz. By pressing

16 ; the external interrupt button INT0 the counter will

17 ; count how long the button is pressed correct to

18 ; 1/128th of a second. When released the program will

19 ; flash the light at the measured time correct only to

20 ; the nearest unit (1/128s, seconds, minutes or hours)

21 ; rounded DOWN.

22 ; eg) If the button was pressed for 0.91000s the light

23 ; would complement every 0.90625s (less than 1 second

24 ; therefore it measures in 1/128s and the nearest unit

25 ; less than 0.91000s is 0.90625s). However if the light

26 ; was on for 1.6s it complements every 1s as the nearest

27 ; unit is now the second.

28 ; Pressing the INT0 button again will record a new

29 ; time interval which will flash the light in the same

30 ; way.

31

32 ;\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

33

34 $MOD841 ; Use 8052&ADuC841 predefined symbols

35

00B4 36 LED EQU P3.4 ; P3.4 drives red LED on eval board

00B2 37 BUTTON EQU P3.2 ; P3.2 drives the INT0 button on the

38 ; eval board

39

40 ;\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

41 ; BEGINNING OF CODE

---- 42 CSEG

43

0000 44 ORG 0000h

45

0000 020060 46 JMP MAIN ; jump to main program

47

48 ;\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

49 ; EXTERNAL INTERRUPT VECTOR SPACE

0003 50 ORG 0003h ; (INT0 ISR)

51

0003 C2B4 52 CLR LED ; Turn ON the LED while the INT0

53 ; is pressed

54

55 ; reset all counters and then start counting

0005 53A1FE 56 ANL TIMECON, #0FEh ; Clear the TCEN bits to clear the

57 ; registers;

58 ; -Hthsec

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59 ; -sec

60 ; -min

61 ; -hour.

62 ; and to clears the internal counter

63

0008 43A101 64 ORL TIMECON, #01h ; Set the TCEN bit to restart counting

65

000B 30B2FD 66 JNB BUTTON, $ ; Wait here while button is pressed

67

000E 53A1FD 68 ANL TIMECON, #0FDh ; Clear the TIEN bit to stop the

69 ; counter

70

71 ; after button is released we can store the value in intval

72

0011 D2B4 73 LOOP: SETB LED ; Turn off LED to indicate that the

74 ; button is released.

0013 E5A5 75 MOV A, HOUR

0015 B40028 76 CJNE A, #00H, HOURS ; Check if any hrs have been counted

77 ; If so jump to HOURS

0018 E5A4 78 MOV A, MIN

001A B40019 79 CJNE A, #00H, MINS ; Check if any mins have been counted

80 ; If so jump to MINS

001D E5A3 81 MOV A, SEC

001F B4000A 82 CJNE A, #00H, SECS ; Check if any secs have been counted

83 ; If so jump to SECS

84

0022 85A2A6 85 HUNTHS: MOV INTVAL, HTHSEC ;load the value of HTHSEC into INTVAL

0025 75A100 86 MOV TIMECON, #00h ; clear TCEN to reset the registers

0028 75A103 87 MOV TIMECON, #03H ; change TIMECON to measure in 1/128s

88 ; reset TIEN

002B 32 89 RETI

90

002C 85A3A6 91 SECS: MOV INTVAL, SEC ; load the value of SEC into INTVAL

002F 75A100 92 MOV TIMECON, #00h ; clear TCEN to reset the registers

0032 75A113 93 MOV TIMECON, #13H ; change TIMECON to measure in secs

0035 32 94 RETI

95

0036 85A4A6 96 MINS: MOV INTVAL, MIN ; load the value of MIN into INTVAL

0039 75A100 97 MOV TIMECON, #00h ; clear TCEN to reset the registers

003C 75A123 98 MOV TIMECON, #23H ; change TIMECON to measure in mins

003F 32 99 RETI

100

0040 85A5A6 101 HOURS: MOV INTVAL, HOUR ; load the value of HOUR onto INTVAL

0043 75A100 102 MOV TIMECON, #00h ; clear TCEN to reset the registers

0046 75A133 103 MOV TIMECON, #33H ; change TIMECON to measure in hours

0049 32 104 RETI

105 ;\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

106 ; TII INTERRUPT VECTOR SPACE

0053 107 ORG 0053h

108

0053 B2B4 109 CPL LED ; Complement the LED every time the

110 ; measured time runs up.

0055 32 111 RETI

112 ;\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

113

0060 114 ORG 0060h

115

0060 116 MAIN:

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117

118 ; Configure Time Interval Counter

0060 75D707 119 MOV PLLCON,#07H ; Allow sufficient time for instructions to execute

0063 75A103 120 MOV TIMECON, #03h ; initialise timecon to count in 1/128s

121 ; -set TCEN to enable the time clock

122 ; -set TIEN to enable the TIC

123 ; -clear STI to allow automatic relaod

124 ; of interval timeout

125 ; -clear TFH to disable 24 hr counting

126

0066 75A60A 127 MOV INTVAL, #0Ah ; initialise to blink LED every 10 units

128 ; the units are 1/128s

129

130 ; Configure External Interrupt

0069 D288 131 SETB IT0 ; INT0 edge triggered

006B D2A8 132 SETB EX0 ; enable INT0 (button on eval board)

006D 75A904 133 MOV IEIP2,#04H ; enable time interval interrupt

134

0070 D2AF 135 SETB EA ; enable global interrupts

136

137

0072 80FE 138 JMP $ ; wait here for interrupts

139 ; main program can be inserted here

140

141 ;\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

142

143 END

VERSION 1.2h ASSEMBLY COMPLETE, 0 ERRORS FOUND

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BUTTON . . . . . . . . . . . . . NUMB 00B2H

EA . . . . . . . . . . . . . . . B ADDR 00AFH PREDEFINED

EX0. . . . . . . . . . . . . . . B ADDR 00A8H PREDEFINED

HOUR . . . . . . . . . . . . . . D ADDR 00A5H PREDEFINED

HOURS. . . . . . . . . . . . . . C ADDR 0040H

HTHSEC . . . . . . . . . . . . . D ADDR 00A2H PREDEFINED

HUNTHS . . . . . . . . . . . . . C ADDR 0022H NOT USED

IEIP2. . . . . . . . . . . . . . D ADDR 00A9H PREDEFINED

INTVAL . . . . . . . . . . . . . D ADDR 00A6H PREDEFINED

IT0. . . . . . . . . . . . . . . B ADDR 0088H PREDEFINED

LED. . . . . . . . . . . . . . . NUMB 00B4H

LOOP . . . . . . . . . . . . . . C ADDR 0011H NOT USED

MAIN . . . . . . . . . . . . . . C ADDR 0060H

MIN. . . . . . . . . . . . . . . D ADDR 00A4H PREDEFINED

MINS . . . . . . . . . . . . . . C ADDR 0036H

P3 . . . . . . . . . . . . . . . D ADDR 00B0H PREDEFINED

PLLCON . . . . . . . . . . . . . D ADDR 00D7H PREDEFINED

SEC. . . . . . . . . . . . . . . D ADDR 00A3H PREDEFINED

SECS . . . . . . . . . . . . . . C ADDR 002CH

TIMECON. . . . . . . . . . . . . D ADDR 00A1H PREDEFINED