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; Date : October 2003

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; File : TIC.asm

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; Hardware : ADuC841

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

; counting longer intervals than the standard 8052

; timers are capable of.

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

; the external interrupt button INT0 the counter will

; count how long the button is pressed correct to

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

; flash the light at the measured time correct only to

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

; rounded DOWN.

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

; would complement every 0.90625s (less than 1 second

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

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

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

; unit is now the second.

; Pressing the INT0 button again will record a new

; time interval which will flash the light in the same

; way.

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$MOD841 ; Use 8052&ADuC841 predefined symbols

LED EQU P3.4 ; P3.4 drives red LED on eval board

BUTTON EQU P3.2 ; P3.2 drives the INT0 button on the

; eval board

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; BEGINNING OF CODE

CSEG

ORG 0000h

JMP MAIN ; jump to main program

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; EXTERNAL INTERRUPT VECTOR SPACE

ORG 0003h ; (INT0 ISR)

CLR LED ; Turn ON the LED while the INT0

; is pressed

; reset all counters and then start counting

ANL TIMECON, #0FEh ; Clear the TCEN bits to clear the

; registers;

; -Hthsec

; -sec

; -min

; -hour.

; and to clears the internal counter

ORL TIMECON, #01h ; Set the TCEN bit to restart counting

JNB BUTTON, $ ; Wait here while button is pressed

ANL TIMECON, #0FDh ; Clear the TIEN bit to stop the

; counter

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

LOOP: SETB LED ; Turn off LED to indicate that the

; button is released.

MOV A, HOUR

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

; If so jump to HOURS

MOV A, MIN

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

; If so jump to MINS

MOV A, SEC

CJNE A, #00H, SECS ; Check if any secs have been counted

; If so jump to SECS

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

MOV TIMECON, #00h ; clear TCEN to reset the registers

MOV TIMECON, #03H ; change TIMECON to measure in 1/128s

; reset TIEN

RETI

SECS: MOV INTVAL, SEC ; load the value of SEC into INTVAL

MOV TIMECON, #00h ; clear TCEN to reset the registers

MOV TIMECON, #13H ; change TIMECON to measure in secs

RETI

MINS: MOV INTVAL, MIN ; load the value of MIN into INTVAL

MOV TIMECON, #00h ; clear TCEN to reset the registers

MOV TIMECON, #23H ; change TIMECON to measure in mins

RETI

HOURS: MOV INTVAL, HOUR ; load the value of HOUR onto INTVAL

MOV TIMECON, #00h ; clear TCEN to reset the registers

MOV TIMECON, #33H ; change TIMECON to measure in hours

RETI

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; TII INTERRUPT VECTOR SPACE

ORG 0053h

CPL LED ; Complement the LED every time the

; measured time runs up.

RETI

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ORG 0060h

MAIN:

; Configure Time Interval Counter

MOV PLLCON,#07H ; Allow sufficient time for instructions to execute

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

; -set TCEN to enable the time clock

; -set TIEN to enable the TIC

; -clear STI to allow automatic relaod

; of interval timeout

; -clear TFH to disable 24 hr counting

MOV INTVAL, #0Ah ; initialise to blink LED every 10 units

; the units are 1/128s

; Configure External Interrupt

SETB IT0 ; INT0 edge triggered

SETB EX0 ; enable INT0 (button on eval board)

MOV IEIP2,#04H ; enable time interval interrupt

SETB EA ; enable global interrupts

JMP $ ; wait here for interrupts

; main program can be inserted here

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END