



**YILDIZ TECHNICAL UNIVERSITY  
MECHATRONICS ENGINEERING  
MICROPROCESSORS AND PROGRAMMING  
LAB EXPERIMENT#3**

**G21**

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## 1. Purpose of the Experiment

The purpose of this experiment is to learn the hardware-based timer modules and interrupt handling capabilities of the PIC16F887 microcontroller. The primary goal is to replace inefficient software-based delay subroutines with a precise timing mechanism using the Timer0 (TMR0) module.

In addition, the experiment aims to apply fundamental microcontroller programming principles such as:

1. Configuring the microcontroller's configuration bits and external crystal oscillator.
2. Configuring the OPTION\_REG to set the TMR0 clock source and prescaler.
3. Configuring the INTCON register to enable global and peripheral interrupts (GIE and TMR0IE).
4. Writing an Interrupt Service Routine (ISR) to perform a background task (toggling an LED) without interfering with the main program loop.
5. Demonstrating the efficiency of an interrupt-driven design over the polling (continuous monitoring) method.

## 2. Code Part

```
LIST P=16F887
INCLUDE "P16F887.INC"

__config _CONFIG1, b'1110000011100001'
__config _CONFIG2, b'1111100011111111'

CBLOCK 0x20
COUNTER
ENDC

ORG 0x00
GOTO MAIN

ORG 0x04
GOTO TMR0_INT

MAIN
BANKSEL ANSEL

CLRF ANSEL
CLRF ANSELH

BANKSEL OPTION_REG
MOVLW B'11010111'
MOVWF OPTION_REG

BANKSEL TRISB
CLRF TRISB

BANKSEL PORTB
CLRF PORTB

MOVLW D'15'
```

```

MOVWF    COUNTER

BANKSEL  INTCON
MOVLW    B'10100000'

MOVWF    INTCON

LOOP
    GOTO  LOOP

TMR0_INT

    BCF    INTCON, TMR0IF
    DECFSZ COUNTER, F
    GOTO   CIKIS

    MOVLW   D'15'
    MOVWF   COUNTER

    MOVLW   H'01'
    XORWF   PORTB, F

CIKIS
    RETFIE

END

```

### 3. Images of Simulation (Proteus)

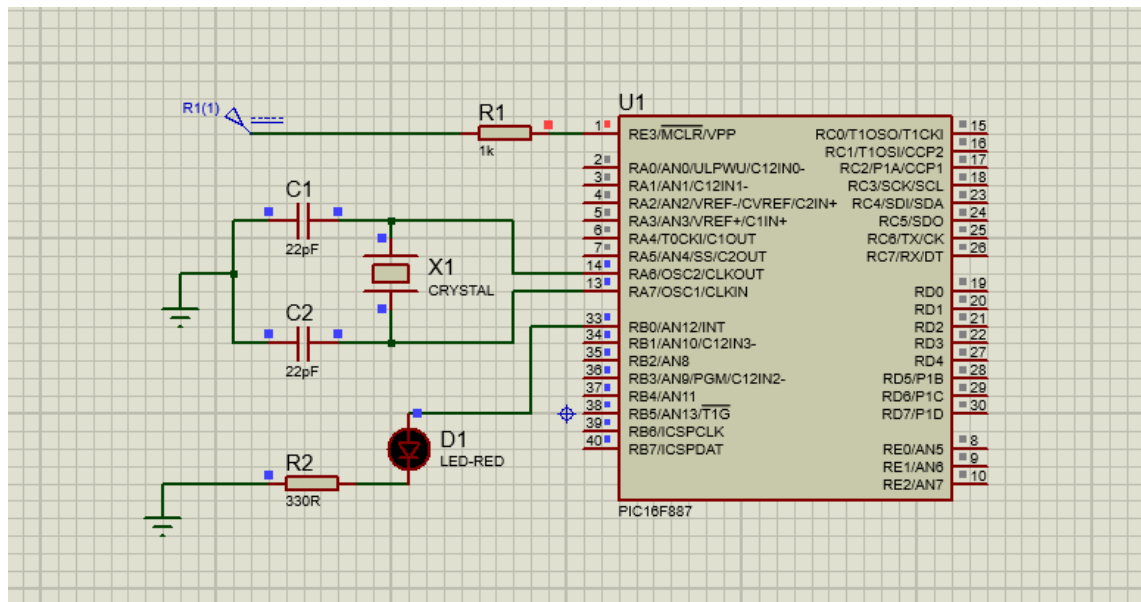


Figure 1: Circuit Diagram for Timer0 Interrupt Experiment

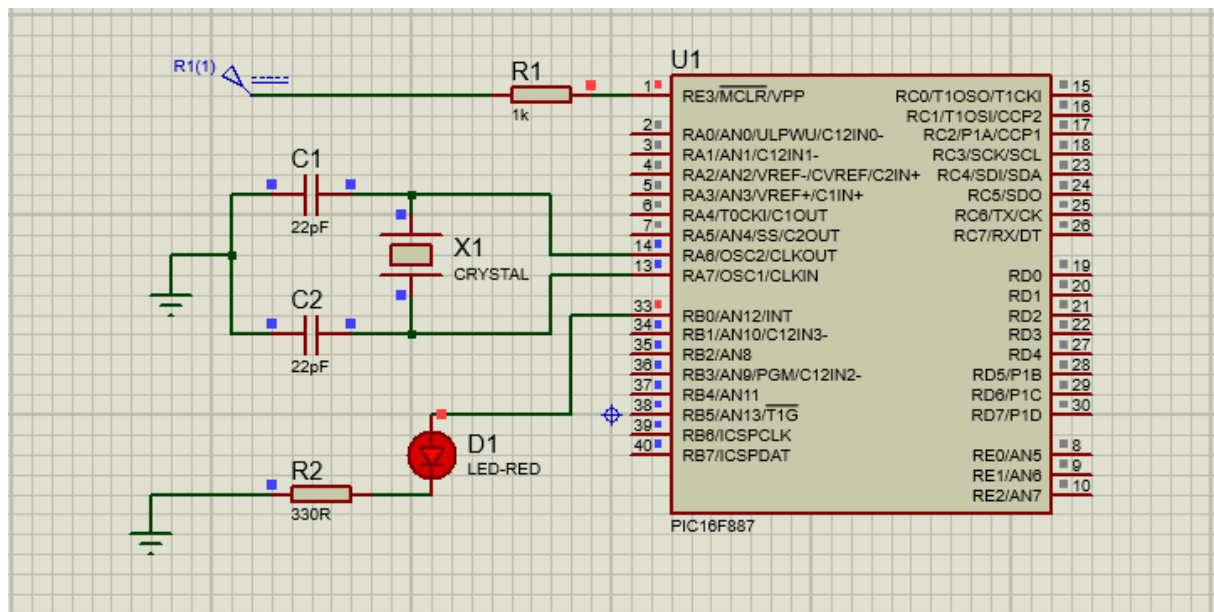


Figure 2: 'On' State of the LED during the 1Hz Blink Cycle