

EE2361-Lecture 39

12/12/16

- The Watchdog Timer (WDT)

→ (PIC24F FRM Section 9) (DS39697B, 2010)

- Wed 12/14 course review & evals
- Discussion 13 today & tomorrow

Watchdog Timer (WDT)  
PIC 24F FRM section 9.

What is

\*pragm config FNDTEN = OFF ?

Doing ?

Turns off the WDT, which  
is on by default.

What is the WDT used for?

- to ~~reset~~ the microcontroller in the event of a software malfunction.
- also used to wake up the device from sleep or idle mode

This is the last line of defense, it can be thought of as a "dead man's switch".

Why do we need the WST?

- Bad Code

Most embedded systems ship with 95% of the bugs removed.

The remaining bugs risk crashing the system - or worse

## • Soft Errors due to Cosmic Rays

high-energy protons can affect both SRAM and logic

Example : 10 years ago a system with 1 GB of SRAM could expect a soft error every 2 weeks, this frequency increases by 10 in Denver

## What makes a great WDT?

- It should be independent of the CPU, so CPU problems (such as a clock fail) do not affect it.
- Short of hardware failure, it must be able to bring the system back  
⇒ hard reset
- Nice if it leaves a trail of "breadcrumbs"

The PIC24F WDT is a free-running timer which uses an internal low-power RC CHPRC oscillator

- peripheral block diagram for PIC24F RM section 9
- two instructions, CLRWD and PWRSAV, from Programmers Ref.

How is the WDT reset?

- On any device reset
- When ~~PA~~RSAR is executed
- When CLRWDT is executed
- When WDT is enabled in software
- On completion of a clock switch



Note: when the WDT is disabled in  
the configuration register (FWDTEN bit)

⇒ You can then turn it on and off  
with the SWDTEN bit in RECNK5.

software WDT enable

How long until it "times out"?

WDT settings in table 9-2 in section 9 FRM  
(see table)

# Software Considerations w/ WDT

Need to implement carefully

- Use only one CLRWD in your code
- Place the CLRWD instruction in the main body of code. Not in a subroutine or ISR
- Put ~~unconditional~~ unconditional branches ("GOTO") in unused areas of code space.  
⇒ verify the times involved.