What is a Watchdog Timer?

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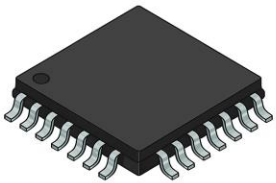

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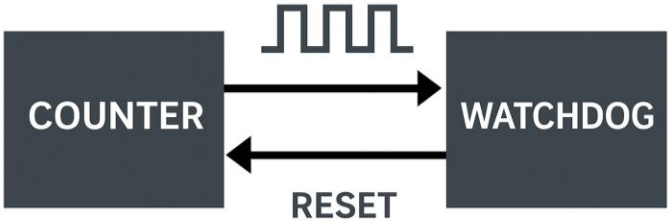
Watchdog Timer is a hardware timer inside the microcontroller.

It is used to **reset the system** if the microcontroller freezes or crashes.

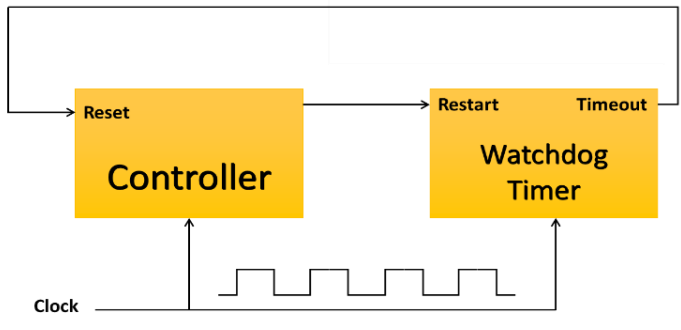


How Does a Watchdog Timer Work?

1. Monitoring: The watchdog timer continuously runs in the background, expecting regular refresh from the microcontroller.

2. Timeout Detection: If the microcontroller fails to send a refresh signal within the set time (e.g. due to a freeze), the watchdog timer continues counting until it reaches a timeout.

3. Reset: Upon timeout, the watchdog timer sends a reset signal to restart the microcontroller, restoring normal operation.



Example – Code Implementation

```
// Enable watchdog with 5 second timeout
enable_watchdog(5000);

while (1) {
    // Do main tasks
    task_1();
    task_2();

    // Refresh watchdog to prevent reset
    refresh_watchdog();
}
```

refresh_watchdog(): Must be called before timeout expires, otherwise system will reset.

Where to Use Watchdog Timers

Remote Systems Space probes, remote sensors – No manual reset possible.

Mission-Critical Devices Medical equipment – Must recover from failure instantly.

Real-Time Control Motor control, automation – Prevent system hangs or crashes.

Safety-Critical Systems Automotive, aerospace – Ensure reliable, safe restarts.

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