SwitchDoc Labs
*Raspberry Pi, Arduino tutorials, scripts
and projects*

Reliable Projects 1: WatchDog Timers for Raspberry Pi and Arduinos

Posted on November 19, 2014 by John Shovic

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Summary: In this series of postings I look at how to set up the Raspberry Pi and Arduino *internal* watchdog timers. I also explain why an *external* WatchDog Timer, such as the SwitchDoc Labs Dual WatchDog Timer is a better choice in many, *but not all*, systems.

- Part 2 – How to Set Up the Raspberry Pi Internal WatchDog Timer
- Part 3 – How to Set Up the Arduino Internal WatchDog Timer
- Part 4 -Internal Versus External WatchDog Timers / Issues with Internal Timers
- Part 5 -Adding an External WatchDog Timer to your Project

Introduction to WatchDog Timers

Computers sometimes lose their way. A power glitch, RFI (Radio Frequency Interference), hanging peripherals, or just plain bad programming can cause your small computer to hang causing your application to fail. It happens all the time. How often do you have to reboot your PC? Not very often, but once in while your Mac or PC will freeze making you have to power cycle the computer. Raspberry Pi's will sometimes freeze because of a task not freeing up sockets or consuming other system resources and from power supply fluctuations. Arduinos sometimes freeze because of brownouts on the power line or a short power interruption or because of running out of system resources such as RAM and/or stack space, which is a very limited resource in an Arduino.   Sometimes even programmers (gasp!) make mistakes.
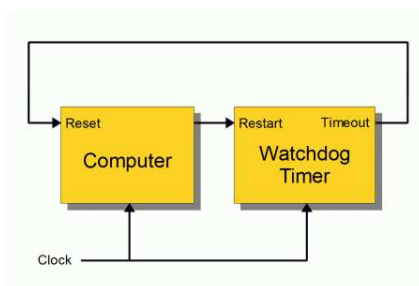
WatchDog Timer and Computer Block Diagram

In small computers, you give your device the chance to recover from faults by using what is called a WatchDog Timer (WDT). A WDT is an electronic timer that is used to detect and recover from computer malfunctions. If the computer fails to reset the timer (also called "patting the dog") on the WDT before the WDT timer expires, the WDT signal is used to initiate either corrective actions or simply to reboot the computer.

Will the use of a WatchDog Timer make your computer project more reliable? The answer is **yes**. The proper use of a WatchDog timer can make your computer reboot when it gets lost. A known problem with some Python libraries on the Raspberry Pi is that some of those libraries don't properly release sockets and after a long period of time (days generally – not weeks) the Raspberry Pi will hang or thrash because it is out of resources. A properly designed program could detect this and reboot the computer, but a WatchDog Timer can be used to cover a whole multitude of sins with

one fell swoop. In Project Curacao, I use a WatchDog Timer to reset the Battery Power Watchdog in case of a brownout or an RFI upset event.

In the next few posts, I will be discussing the following topics:

- Part 2 – How to Set Up the Raspberry Pi Internal WatchDog Timer
- Part 3 – How to Set Up the Arduino Internal WatchDog Timer
- Part 4 -Internal Versus External WatchDog Timers / Issues with Internal Timers
- Part 5 -Adding an External WatchDog Timer to your Project

The WatchDog Timer on the Left in Project Curacao

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About John Shovic
Dr. John C. Shovic is currently Managing Partner of SwitchDoc Labs, LLC and Chief Technical Officer of InstiComm, LLC, a company specializing in mobile medical software solutions for health practitioners. He has worked in industry for over thirty years and has founded multiple companies: Advance Hardware Architectures, TriGeo Network Security, Blue Water Technologies, InstiComm, LLC, and bankCDA. He has also served as a Professor of Computer Science at Eastern Washington University, Washington State University and the University of Idaho. Dr. Shovic has given over 55 invited talks and has published over 35 papers on a variety of topics on HIPAA, GLB, computer security, computer forensics, embedded systems and others.
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One Response to *Reliable Projects 1: WatchDog Timers for Raspberry Pi and Arduinos*

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