Abstract

This paper elaborates the implementation of a PCI based device driver for a Data Acquisition System (DAS) Card using the RTDM (Real-Time Driver Model) skin over Xenomai kernel, which is integrated with the Linux kernel. A C language kernel module was written for the PCI bus based driver to provide hard real-time capabilities and determinism to any application accessing the DAS card. The PCI DAS card used consisted of 12-bit ADC, 12-bit DAC, Programmable Digital I/O lines (TTL compatible) and Timers/Counters. In order to test all the features of the DAS and the performance of the driver, a test system, consisting of a 3-axis analog accelerometer connected to the ADC of the DAS via a junction box and powered by its DAC, was been constructed. Additionally, a 3-axis digital accelerometer communicated with an AVR development board via I2C in order to generate conditioned input for the programmable digital
I/O lines of the DAS card. A graphical tilt measurement application involving real time acquisition of the accelerometers data was implemented using OpenGL. Finally, the driver was thoroughly tested with this arrangement, and the interrupt latencies were noted to be around 4µsec.

References

- Daniel P. Bovet, Marco Cesati, "Understanding the Linux Kernel"; O&apos;Reilly, 2006.
- AN3182 Application Note "Tilt measurement using a low-g 3-axis accelerometer"; ST Microelectronics, 2010.

Index Terms

Computer Science Data Processings

Keywords

Real-Time PCI Device Driver Xenomai RTDM Data Acquisition Systems