Special Visiting Scholar Presentation
Department of Electrical and Computer Engineering
University of Alabama in Huntsville
10:00 AM – 11:00 AM, Monday October 15, 2012
Room 258 Engineering Building

RTEMS Executive and XML Based GUI in Medical Instrument Firmware

Pavel Píša

This presentation describes the design of a real-time safety critical instrument that is used to administer intensive medical care. This instrument, the TECHNIC I syringe pump for high-precision pharmaceutical dispensing, received the HospiMedica 2006 Golden Award for its advances in the area of infusion systems. It has now been in production for over five years. Instruments, such as this, have to conform to high safety standards, yet still provide an easy to use interface that allows for fast parameters setup and control in life critical situations. To achieve the necessary level of safety, our design utilizes two independent processors that employ separate architecture libraries and compiler tool chains. RTEMS (Real-Time Executive for Multiprocessor Systems) was chosen as the base operating environment because of its real-time performance, robust design and its documented successful use in critical control applications. The user interface library (SuiTk) has been designed to allow user-friendly instrument operation. It is driven by an original nested state automata concept. The automata, styles, data connections and all visual elements are built from description provided in XML files.

Presenter's background: Pavel Píša is senior firmware and electronics concepts designer for a series of HPLC and other instruments. He received his PhD degree from the Czech Technical University in Prague in 2010 for a thesis on high resolution ADC design, data acquisition and processing of HPLC detector signals. He current holds a Research Assistant Position at the Department of Control Engineering, Faculty of Electrical Engineering, CTU. He works with and teaches Linux, RTEMS, VxWorks based systems, MCU and CPU architectures. He contributes to Linux CAN subsystem development as well as to other open-source projects.