

Inputs for Brainstorm

Some references that might be of interest for the definition of this course module:

Cause of such course need are at least

1. Windows crash causes Mexico gulf disaster in 2010
<http://www.computerworlduk.com/news/security/21299/blue-screen-of-death-hit-rig-before-gulf-oil-spill-says-tech-worker/>
2. Another Microsoft Windows caused disaster in 2010: Stuxnet: Ahmadinejad admits cyberweapon hit Iran nuclear program
<http://www.csmonitor.com/USA/2010/1130/Stuxnet-Ahmadinejad-admits-cyberweapon-hit-Iran-nuclear-program>
3. Another attacks to Windows based critical control systems are anticipated since 2006

Main cause of Windows use in control systems is that there is not enough Linux control system specialists at the Earth planet.

Course Description

This course deals of industrial control systems based on Free Libre and Open Source Software as defined by European Commission. It shows several realtime executives for GNU/Linux operating system. We mainly use RTAI and RT - preempt patch executives. Therefore we will make programs using userspace as well as kernel modules. We also will use our own CAN bus driver for NXP(formerly Philips Semiconductor) SJA1000 based Adlink PCI 7841 adapter and IgH EtherCAT Master for Linux to teach networked control using open source. Kernel port of CAN Festival project will also to be used.

Syllabus

1. Basics of control theory
2. Types of used controllers
3. Linux kernel patching, configuration, compilation and installation
4. Basics of kernel modules programming
5. RTAI(RealTime Application Interface) and its technologies using kernel modules.
6. RT Preempt patch
7. Our own CAN bus controller driver using hardware and its modification using

- virtual software driver.
8. IgH EtherCAT Master for Linux
 9. Subsystems needed to effectively program control system modules
 10. Communication subsystem in networked control
 11. Controller implementation
 12. Implementation of designed control

Learning Outcomes

Student will be able to design and implement realtime control software using GNU/Linux for industrial networked control systems.

Prerequisites

Basics of System programming using Linux at utility level. Basic knowledge of kernel modules is helpful but not required. Command line usage of Unix/Linux systems is a must.

Needed Steps

The steps needed to incorporate this module in the FTA Study Programme are the following (note the [FTA Educational Methodology](#)):

define course book outline

define competences, learning outcomes and links to classifications

estimate needed efforts and funding to develop the complete course to the FTA

define commitments of people and partners to author, review and certify the course

develop initial course book, Continuous Assessment Activities, study guide etc

run an open review, feedback and improvement loop

run test course(s) based on initial material (go back to previous step)

work on recognition in the FTA-QA team

At least three years of teaching is needed for course to be perfect.

Tasks/Names/Dates

Who is interested in this?

Every programmer of the control systems.

Who works on this?

Ing. Peter Fodrek, PhD, j.r. with possible team

What planning? Pencil in your names, interests and plans!

In two years deadline to write textbooks for such status and to start teaching course