

Sistemas de Tiempo Real 2011/2012

ETS de Ingeniería Informática

Notes about the contents of PoliformaT resources at “Trabajos - Projects”

List of proposed projects

This document contains a list of proposed projects. For each project, a minimum description of the goals is given. For more detailed info please contact the lab professor Jorge Real.

Pendulum

This folder contains a document explaining how the oscillating display works and a simulator for the first phase of the project.

PWM

This folder contains a document explaining the basics of Pulse Width Modulation and a program that implements PWM that may be adapted for use with the robots or the DC motor. You can also find here a document titled “PID without a PhD”, a simple guide for programming PID controllers – intended for those choosing the motor speed control project.

Input-Output

This folder contains different versions of input/output libraries:

Pendulum_IO (Box)

Contains the packages needed for input/output with the pendulum, when used from the lab machines box01...box09 and with Partikle/Xtratum.

Port_IO Digital_IO

Contains the packages needed to drive the lab's robots from the embedded PCs box01...box09 with Partikle/Xtratum.

Port_IO_Linux

Contains an implementation of the Port_IO library that may be used from Linux as root. The difference between Port_IO_Linux and Port_IO is that the former makes a call to iopl to get read/write access permission to the IO ports. First you need to compile the program get_iopl_3.c by issuing:

```
gcc -c get_iopl_3.c
```

which will produce an object file get_iopl_3.o and this will be linked to our application. It is not necessary to specify any linker options for this purpose since Port_IO.Linux.adb contains the necessary Ada pragmas for that purpose. Remember you need to execute your program as superuser.

Pendulum_IO_Linux_Parallel_Port

This version allows us to operate a pendulum connected to the parallel port, instead of the digital IO card MPC-7632, which in turn is available only in the PC104 computers. So by using this interface package we can work with the pendulum from any computer in the lab. There are two pendulums with parallel port connection in the lab. When the rest are busy, you can use this library and work with the one of them.

Partikle-Xtratum

This folder contains information about the hardware platform, the Partikle OS and the Xtratum hypervisor.

Additional notes about the projects

The programs will be executed under the PC104 computers available in the laboratory. These computers have a digital I/O card (MPC-7632 or MPC-7664). By using a power adaptor circuit, the digital I/O cards MPC-76xx allow us to access the robots or the pendulums.

The PC104 computers have a minimal Linux installed, including an ssh deamon for remote access from other computers in the lab by issuing:

```
ssh user@boxXX.disca.upv.es
```

where “user” is your user name and the name of the computer “boxXX” is written on the machine itself. Bear in mind that the PC104 computers do not have write access to your home directory. Hence you need to copy your source/executable files to a local folder.

A useful alternative is to access the boxes from a file browser (Dolphin) in the host by means of fish://boxXX.disca.upv.es/a_local_folder.

You can compile your program from any PC in the lab and then copy the Linux executable to the PC104. However, to achieve maximum performance, you must use the Ada Partikle compiler (pgnatmake) and insert the resulting module by means of “xmctl load”. More information is given in the Partikle/Xtratum manual in PoliformaT.

Programs compiled with Partikle have the limitation that they cannot use the keyboard. So this is not adequate for the learning/repeating project, where you must constantly scan the keyboard to detect keystrokes. For that case, compile and execute your program as a regular Linux program (gnatmake).