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School on TANGO Controls system

Hands on: Device Server development

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<http://www.tango-controls.org>

Before writing a tango server the software requirements have to be specified (by the owner of the device):

- **Features** of the physical device that should be exported in the control systems
- **State machine**
 - Define On / Off / Fault states
 - Plan state transitions according to the hardware
- **Hardware “safety”**
 - Reset procedure
 - Hardware initialization
 - Parameter limits
- **Time constrains**
 - Responsiveness (minimum reading refresh time, reaction to command)
 - realtime

The tango device server developer has to read carefully the device manual.

The most important part of the manual is the one regarding the communication interface and the communication protocol:

- Communication interface configuration: serial / ethernet / gpib / usb / pci
- Communication protocol: ASCII, binary (serial communication), interrupt handler + registers

In the last years the hardware manufactures provide:

- A proprietary software which allows to control the device
- A software library which takes care of the data transport and protocol and map the device features into software API (functions)

Definition of Tango Device Server interface

Define DS skeleton (pogo):

- Properties (hardware ip address....)
- Attributes (AxisPosition)
- Commands (On, Off, Reset, Standby)
- States (ON, OFF, FAULT, UNKNOWN....)

•Define DS configuration:

- State machine
- Attribute configuration
 - min/max limits
 - alarm limits (warning/alarm)
 - data format (%f, %d, %e)
 - data unit (m, mm, A, sec)
- Polled variables

Demo setup

- Two stepper motors steer horizontally and vertically a mirror
- The motors are controlled by a motion controller
- The controller provides an ethernet interface which support tcp based communication
- The communication protocol is based on ASCII strings

Demo setup

- A laser beam is reflected by a mirror on a target
- The image of the laser beam on the target is acquired by a camera
- The camera is controlled by a tango device server which exports as attributes the image of the target and horizontal and vertical size of the image itself.

Demo setup

- A laser beam is reflected by the mirror on a target
- The image of the laser beam on the target is acquired by a camera
- The camera is controlled by a tango device server which exports as attributes the image of the target and horizontal and vertical size of the image itself.

Demo setup

- Develop two tango servers
 - Tango server of the motor controller
 - Tango server which process the image of the camera and returns the position of the laser spot on the target

/home/tango-cs/dservers/tangoschool/exercises

- **motor_spec.txt**
- **imageprocessing_spec.txt**