

DonkiWeb: a KISS web SCADA

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Abstract

Contemporary web applications are exceptionally efficient and often use a complex structure of frameworks and libraries for front-end development. This escalation in technical complexity requires a team with diverse, specialized skills, inevitably increasing the cost of web development. DonkiWeb is a simple, control system oriented, web SCADA that follows the KISS (Keep It Simple, Stupid) design principle. It integrates a REST interface to Tango, a user authentication layer, a websocket communication protocol and a Javascript API for easy GUI development. Writing a web GUI aims to be as simple as writing a few lines script. This work presents and describes the architecture of DonkiWeb, a fully working web SCADA prototype that is currently used by Elettra Synchrotron beamlines.

The goal: web GUIs with short scripts

```
function populateArea( mainarea )
{
  var myPanel = new LiteGUI.Panel("first_panel", {title:page_title, close:true,scroll:true,height:"auto"});
  mainarea.add( myPanel );
  // Read positions and status
  row_idx = 1;
  donkiAddLabel(aInsp,"Horizontal Gap", {width: 120, align:"center", row: row_idx, col: 1});
  donkiAddHeader(aInsp,null,TG_HOST+"fe04/tools/slits.gap/D50a0m", {width: 100, align:"center", row: row_idx, col: 2});
  donkiAddHeader(aInsp,"Vertical Gap", {width: 120, align:"center", row: row_idx, col: 1});
  donkiAddHeader(aInsp,null,TG_HOST+"fe04/tools/slits.gap/D50a0m", {width: 100, align:"center", row: row_idx, col: 2});
  row_idx += 1;
  donkiAddLabel(aInsp,"Horizontal Center", {width: 120, align:"center", row: row_idx, col: 1});
  donkiAddHeader(aInsp,null,TG_HOST+"fe04/tools/slits.gap/D50a0m", {width: 100, align:"center", row: row_idx, col: 2});
  row_idx += 1;
  donkiAddLabel(aInsp,"Vertical Center", {width: 120, align:"center", row: row_idx, col: 1});
  donkiAddHeader(aInsp,null,TG_HOST+"fe04/tools/slits.gap/D50a0m", {width: 100, align:"center", row: row_idx, col: 2});
  // @todo: fine tune
  // 4 Double Slits
  var scndPanel = new LiteGUI.Panel("scnd", {title:page_title, close:true,scroll:true});
  mainarea.add( scndPanel );
  var aInsp = donkiAddInspector(scndPanel, {});
  row_idx = 1;
  donkiAddPositionManager(aInsp,"UP",TG_HOST+"fe04/tools/slits.gap/AxisPositionV1", {step: 0.1, row:row_idx, col:1, postfix:"mm"});
  row_idx += 1;
  row_idx += 1;
}
```

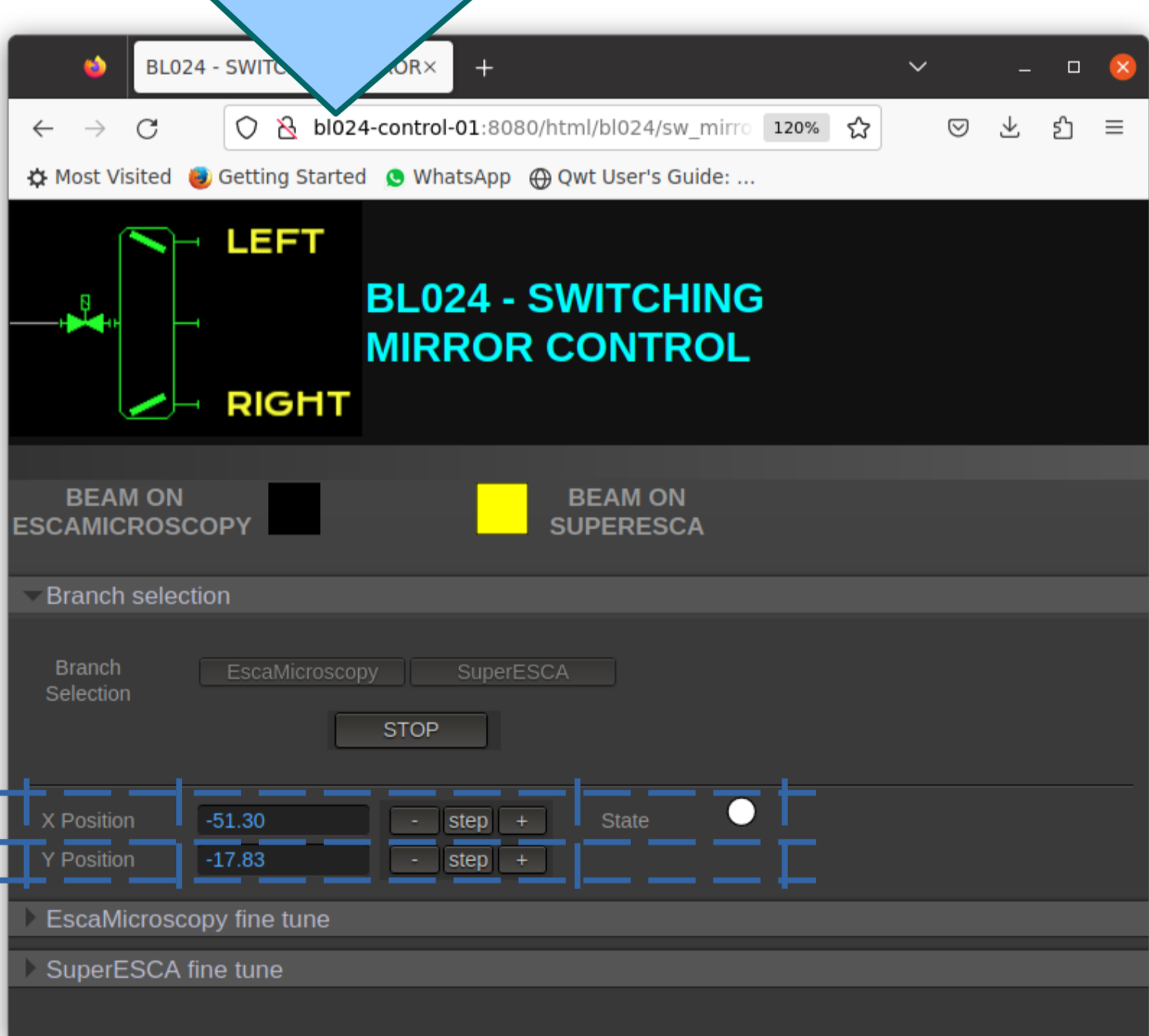
DonkiWeb JS API
An intuitive API allows to create Web interfaces with few lines of code. Little Javascript knowledge required, expanded developer base.

Behind the scenes

- **Bottle** Web Framework (Python backend)
- **Litegui.js** widget library (Javascript frontend)
- Custom **Tango REST** server
- Custom **GUI API JS** library
- **WebSocket** server for data update
- **SVG** widgets for colorful elements

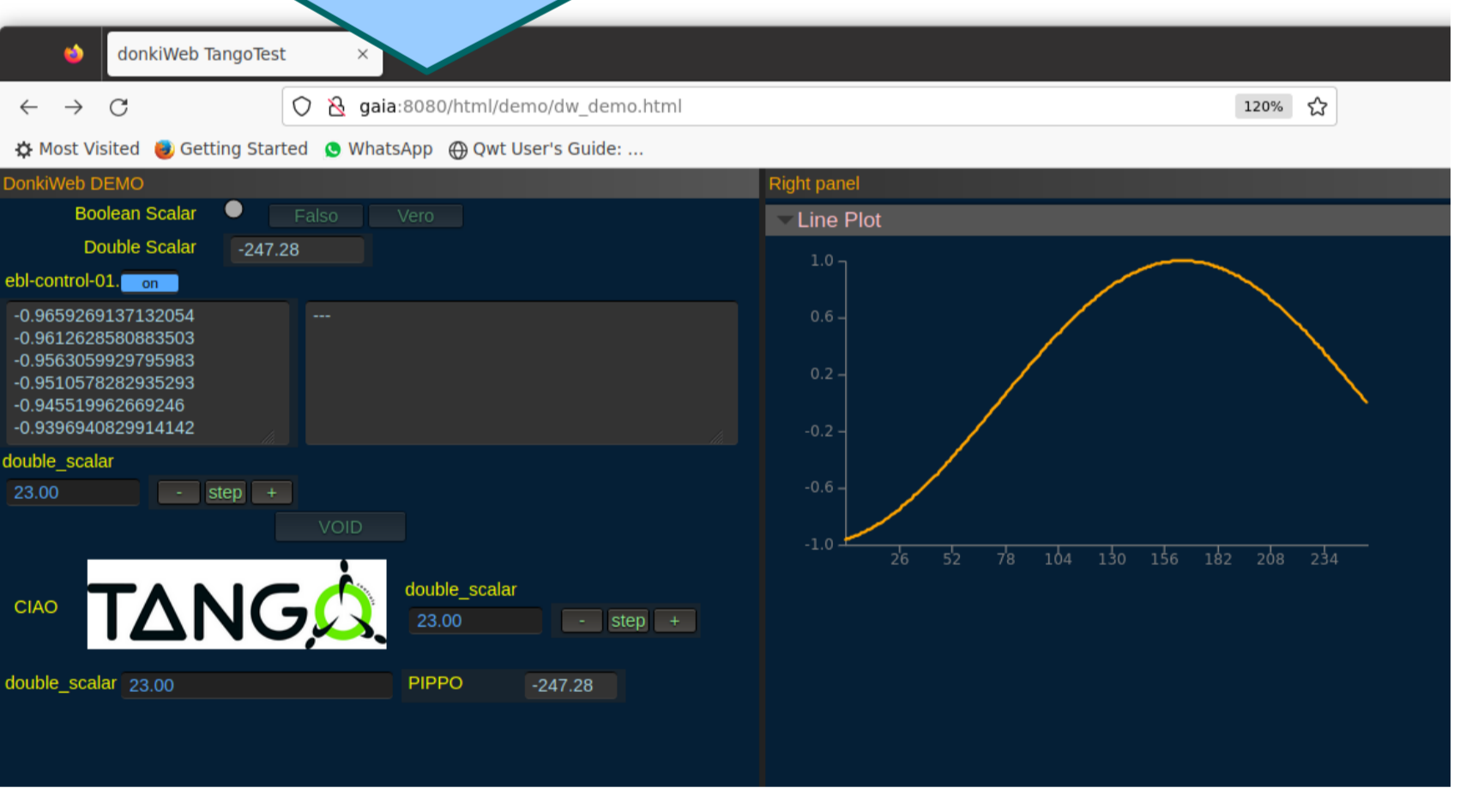
Applications @ Elettra Beamlines

Short info
Visual widgets are organized in grids inside containers (simple or tabs). The panel can be divided into "foldable" sections. Each web page hosts a single or multiple panels.



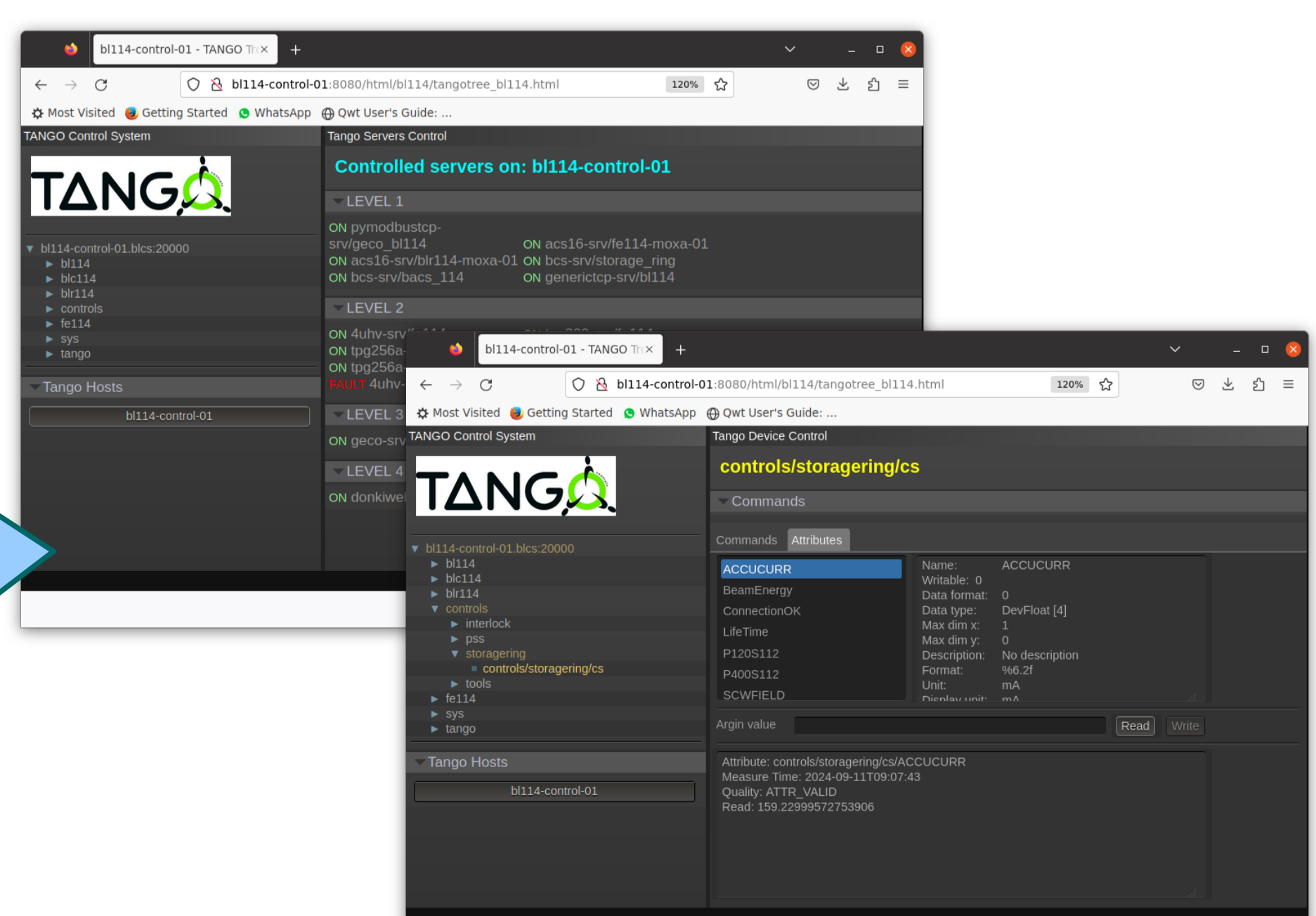
DonkiWeb synoptic
Synoptic widgets are aligned in rows. Their core element is a SVG image containing a specific object tag for color changes. Widget options: lookup color table, title label (shown over), readout values (shown below), alarm attribute (shown below).

Work in progress
Default "look & feel" in a CSS file. Widgets can be automatically disabled on the base of the value of another Tango attribute. A "Chart widget" is under investigation.



Control System

Tango Interface
DonkiWeb includes a Tango REST web interface (JSON based protocol). An alternative "Astor/Jive" web application allows an easy interaction with any Tango device.



User authentication

- The DonkiWeb web server allows to restrict:
- web pages access;
 - write operations and commands on the control system.
- Authentication rules, contained in a configuration file, can be defined as:
- list of static "username/password" tuples;
 - list of trusted IP addresses;
 - list of VUO users (Elettra authentication service).