sustools.py,
a Python module for SUS

August 13, 2013
SUS Testing Meeting

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Motivation

- Guardian is now to be written in Python (replacing Perl)
  - » Much adjustment of settings will be done with BURT, but some will be done directly in scripts.
  - » Would be good to have a module with common operations specifically for SUS.

- Many existing Matlab scripts call ezcaswitch etc via system().
  - » Slow - would be good to have something quicker

- Python is a great scripting language, will probably write other SUS-related scripts.

Result: sustools.py

- Defines a class Sus that wraps Ezca from guardian.ezca and adds SUS-specific methods.

- Each instance of Sus represents a particular suspension.

- Built around a dictionary object susData with all the info from G1100968-v2 and T1000618-v3.

- Can be used as a command line tool as well as a Python module.

- Currently supports writing switches and settings of all the main types of filter blocks (OSEMINF, COILOUTF, DAMP, TEST, LOCK, OPTICALIGN).

- Many optional arguments to allow refining operations by level ('M0', 'R0', etc) or channel/dof ('L'/'T'/'V'/etc, 'F1'/'F2'/etc).

- Many additional features envisaged.

Usage

- Can be used in a Guardian script, by passing in the ezca object that Guardian will have already defined:

  import sustools; etmy = Sus(ezca)

  etmy.dampOutputSwitch('ON', levels=['M0','R0'])

- Can be used in a vanilla Python script, by passing an optic name:

  import sustools; etmy = Sus('ETMY')

  etmy.dampOutputSwitch('ON', levels=['M0','R0'])

- Can be used from the command line (needs chmod +x):

  ./sustools.py dampOutputSwitch –oETMy -1 –lM0 –lR0

Environment

- The following or similar will be added to cdscfg soon – hot-wire for now.
- Add to PATH:
  - » /opt/rtcds/userapps/release/guardian/python – where the guardian script lives.
  - » /opt/rtcds/userapps/release/sus/common/guardian - where sustools.py lives (also do chmod +x sustools.py).
- Add to PYTHONPATH:
  - » /opt/rtcds/userapps/release/sus/common/guardian - where sustools.py lives.
  - » /opt/rtcds/userapps/release/guardian/python/lib – where the guardian.epics module lives.
- Install the networkx module – used by other parts of Guardian.

Typical set of methods for a filter block type

- dampOutputSwitch(enable, levels=[], dofs=[], verbose=False)
- dampInputSwitch(enable, levels=[], dofs=[], verbose=False)
- dampGainSet(value, levels=[], dofs=[], verbose=False)
- dampOffsetSet(value, levels=[], dofs=[], verbose=False)
- dampOffsetSwitch(enable, levels=[], dofs=[], verbose=False)
- dampRampSet(self, value, levels=[], dofs=[], verbose=False)
- dampFilterSwitch(filters, enable, levels=[], dofs=[], verbose=False)

- Could possibly be a more Pythonesque convention, but functional.
- Need to add support for matrix blocks, reading.

susData

- Big data structure using nested dictionaries.
- Incorporates all data from G1100968-v2, T1000618-v3
- Makes it easy to error check, iterate.
- Need to add magnet signs, DRIVEALIGN, other matrices, odds and ends.

```python
susData = {
'QUAD' : {
    'master' : 'MASTERSWITCH',
    'isi' : isi6,
    'cart2eul' : 'CART2EUL',
    'eul2cart' : 'EUL2CART',
    'offload' : 'OFFLOAD',
    'levels' : {
        'M0' : {
            'osemConfig' : {
                'names' : bscToplevelOsemNames,
                'type' : 'BOSEM',
                'magnet' : (10,10,'NdFeB',1.694),
                'driver' : qtop,
                'dofNames' : sixDofNames,
                'sensalign' : 'SENSALIGN',
                'inf' : osemBsc,
                '2eul' : 'OSEM2EUL',
                'eul2' : 'EUL2OSEM',
                'outf' : coilBsc
            },
            'olConfig' : None,
            'esdConfig' : None,
            'isc' : None,
            'damp' : damp6,
            'lock' : lock3,
            'test' : test6,
            'align' : align2,
            'watchdog' : 'WD'
        },
```

Issues

- The ezca module doesn't actually work reliably from h1guardian0.

- Multiple requests in a batch tend to time out on about the second or third, with a connection failure message.

- It does work from operator1, operator3.

- Dave Barker suspects the difference is the lack of an EPICS gateway machine between h1guardian0 and the front ends.

- The theory is that the added delay is helping with some sort of race condition or overload.

- Cyrus is planning tests with a packet logger to diagnose.