R-testbench

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User Guide

R-testbench is a toolkit written in Python that allows the user to create a software remote test bench to control an actual electronic test bench remotely. It relies on the VISA protocol. The implementation is built on top of PyVISA.

CHAPTER 1

Installation

Get the last version by cloning the repository:

```
$ git clone https://github.com/Arkh42/rtestbench
$ pip install -r rtestbench/requirements.txt
```

CHAPTER 2

Quick start

R-testbench is provided under the `rtestbench` Python package. So, the first step consists in importing rtestbench.

Then, you must instantiate the manager, provided by the `RTestBenchManager` class.

Afterwards, you can attach any tool to the virtual test bench to start the remote control. You set up your virtual test bench as you set up an actual bench, depending on your application.

Finally, you close the test bench to stop your application properly.

That's it!

The quick start code example follows here below:

```
import rtestbench

testbench = rtestbench.RTestBenchManager()
# or, alternatively
testbench = rtestbench.Manager()

instrument = testbench.attach_tool("instrument address here")

# *** your code here ***

testbench.close()
```

CHAPTER 3

OS supported by R-testbench

R-testbench is a cross-platform python package. However, not every distribution of every OS can be tested.

3.1 Existing compatibility tests

Currently, existing tests are:

- alpha tester;
- GitHub, an automated workflow for continuous integration with GitHub actions;
- Travis, an automated workflow for continuous integration with Travis CI.

3.2 Exhaustive list of supported OS

Here follows an exhaustive table of the OS and specific distribution that have been tested.

Distributions	Versions	Tests
Windows 10	N/A	alpha tester
Windows Server	2019	CI (GitHub)
Linux Ubuntu	18.04	CI (GitHub)
	16.04	CI (GitHub, Travis)
macOS	10.15	CI (GitHub)

CHAPTER 4

Compatible Python versions

Currently, R-testbench is compatible with Python 3.6, 3.7 and 3.8.

CHAPTER 5

Devices implemented in R-testbench

R-testbench performs automatic instrument recognition. Of course, the commands corresponding to the specific model of instrument must be implemented in the package.

5.1 What if my instrument is not implemented

Don't worry, a generic Tool object is instantiated by the package so that you can send command and query data by passing the SCPI commands corresponding to your instrument. Once your script is working, you have two solutions:

1. extend R-testbench your-self by creating the object corresponding to your instrument (see *Contributing to R-testbench*);
2. send your script to a maintainer so that we do not have to start from scratch.

5.2 List of instruments implemented

5.2.1 By manufacturers

Keysight Technologies

- B298x series of electrometers
  - B2981A
  - B2983A
  - B2985A
  - B2987A

5.2.2 By families of instruments

Electrometers

- Keysight B298x series
  - B2981A
  - B2983A
  - B2985A
  - B2987A

CHAPTER 6

Contributing to R-testbench

Thank you for investing your time in the R-testbench project!

To make the evolution and the history easier to read and to understand, the project follows some rules. Please read them carefully before contributing.

6.1 Commit messages

The first rule is *keep it as short and simple as possible*.

Summarize the main objective of the commit in one line. If a longer description is necessary, leave a blanck between the summary line and the description. Synthesize! You may explain the solution to fix an issue, a specific reason to provide a feature that was not available before, and so on.

6.1.1 Types of commits

Commits can be made for different goals, e.g., organizing the repository or fix a bug. To enhance the readability of the commit messages, they are organized in several categories.

All commit summary line should start if one of the keyword listed in the table below, sorted alphabetically.

KEYWORD	Description	Required information
CHANGE	Modifies an existing feature.	Reason for the change.
DOC	Modifies the documentation.	Part of the documentation that is created or updated.
FIX	Fixes a bug or an opened issue.	Reference to issue, if any. Idea/concept/solution used to fix it.
NEW	Adds a new feature.	Description of the proposed feature.
REPO	Organizes the repository.	Category of organization concerned by the commit.

6.1.2 Template for commit message

A typical commit message is:

```
KEYWORD one-word goal: summary.

Long description
(if necessary).
```

6.1.3 Examples

A one-line commit for adding a license:

```
REPO license: OSL v3.0
```

CHAPTER 7

Journals related to R-testbench

R-testbench is an open source tool for remote instrumentation. If you are interested in this topics, you can find below a list the authors' publications, as well as related scientific journals.

7.1 Authors' publications

Currently, the authors of R-testbench published one journal article related to the software.

A. Quenon, E. Daubie, V. Moeyaert, and F. Dualibe, "R-testbench: a Journey in Open Source Programming for Remote Instrumentation with Python," Sensors and Transducers, vol. 245, no. 6, pp. 90–98, Oct. 2020.

The corresponding BibTeX entry is:

```
@article{quenon_r-testbench_2020-2,
        title = {R-testbench: a {Journey} in {Open} {Source} {Programming} for
↪{Remote} {Instrumentation} with {Python}},
        volume = {245},
        copyright = {All rights reserved},
        issn = {1726-5479},
        language = {english},
        number = {6},
        journal = {Sensors and Transducers},
        author = {Quenon, Alexandre and Daubie, Evelyne and Moeyaert, Véronique and␣
↪Dualibe, Fortunato},
        month = oct,
        year = {2020},
        pages = {90--98}
}
```

The corresponding BibLaTeX entry is:

```
@article{quenon_r-testbench_2020-2,
        title = {R-testbench: a Journey in Open Source Programming for Remote␣
↪Instrumentation with Python},
```

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```
        volume = {245},
        rights = {All rights reserved},
        issn = {1726-5479},
        shorttitle = {R-testbench},
        pages = {90--98},
        number = {6},
        journaltitle = {Sensors and Transducers},
        author = {Quenon, Alexandre and Daubie, Evelyne and Moeyaert, Véronique and␣
↪Dualibe, Fortunato},
        date = {2020-10-30}
}
```

7.2 List of related journals

The journals related to software for instrumentation and automation are:

- Sensors & Transducers (ISSN: 2306-8515, e-ISSN 1726-5479, URL: https://sensorsportal.com/HTML/DIGEST/New_Digest.htm)

CHAPTER 8

Conferences related to R-testbench

R-testbench is an open source tool for remote instrumentation. If you are interested in this topics, you can find below a list the authors' publications, as well as related conferences.

8.1 Authors' publications

Currently, the authors of R-testbench published one conference article related to the software.

A. Quenon, E. Daubie, V. Moeyaert, and F. C. Dualibe, "R-testbench: a Python library for instruments remote control and electronic test bench automation," in Sensors and Electronic Instrumentation Advances: Proceedings of the 6th International Conference on Sensors and Electronic Instrumentation Advances (SEIA' 2020) and the 2nd IFSA Frequency & Time Conference (IFTC' 2020), Porto, Portugal, Sep. 2020, pp. 47–50.

The corresponding BibTeX entry is:

```
@inproceedings{quenon_r-testbench_2020,
    author = {Quenon, Alexandre and Daubie, Evelyne and Moeyaert, Véronique and␣
↪Dualibe, Fortunato Carlos},
    title = {R-testbench: a {Python} library for instruments remote control and␣
↪electronic test bench automation},
    address = {Porto, Portugal},
    booktitle = {Sensors and {Electronic} {Instrumentation} {Advances}: {Proceedings}␣
↪of the 6th {International} {Conference} on {Sensors} and {Electronic}
↪{Instrumentation} {Advances} ({SEIA}' 2020) and the 2nd {IFSA} {Frequency} \& {Time}
↪ {Conference} ({IFTC}' 2020)},
    isbn = {978-84-09-23483-7},
    pages = {47--50},
    publisher = {IFSA},
    month = sep,
    year = {2020}
}
```

The corresponding BibLaTeX entry is:

```
@inproceedings{quenon_r-testbench_2020,
    author = {Quenon, Alexandre and Daubie, Evelyne and Moeyaert, Véronique and␣
↪Dualibe, Fortunato Carlos},
    title = {R-testbench: a Python library for instruments remote control and␣
↪electronic test bench automation},
    eventtitle = {Sixth International Conference on Sensors and Electronic␣
↪Instrumentation Advances ({SEIA}' 2020)},
    location = {Porto, Portugal},
    booktitle = {Sensors and Electronic Instrumentation Advances: Proceedings of the␣
↪6th International Conference on Sensors and Electronic Instrumentation Advances (
↪{SEIA}' 2020) and the 2nd {IFSA} Frequency \& Time Conference ({IFTC}' 2020)},
    isbn = {978-84-09-23483-7},
    pages = {47--50},
    publisher = {{IFSA}},
    date = {2020-09-23}
}
```

8.2 List of related conferences

The conferences related to software for instrumentation and automation are:

- International Conference on Sensors and Electronic Instrumentation Advances (SEIA)