LIDAR CLI User Manual - 2.0.0

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[1]All commands referenced in this manual were tested using an Ubuntu 18.04.5 LTS version.

Contents

1 Running licli

1.1 First steps

If it's the first time we run licli it would ask us to introduce a password. This password is defined in the configuration file of the lidar server software. In case that it's not the first time and jwt secret has changed we can have some errors like **"The Token's Signature resulted invalid when verified using the Algorithm"**. If it's the case remove *˜/.cache/lidar/token* and try again.

1.2 Cheat sheet

1.2.1 Taking data

1. Startup everything
   ¿ licli operation --startup

   Open/Close only the container doors
   ¿ licli motors doors –open
   ¿ licli motors doors –close

2. Remove the black plastic cap from the liquid light guide at the focus

3. Move telescope to max. zenith
   ¿ licli operation telescope –to-max-zenith

   Go to another zenith angle
   ¿ licli operation telescope –go-zenith=XX (XX=zenith angle in deg)

4. Check for airplanes at: `https://www.flightradar24.com/41.52,2.07/11`

5. Set the laser power
   ¿ licli llc laser –power=XX (X= percent of laser power, from 0 to 100)

6. Shoot the laser
   ¿ licli llc laser –fire

7. Take data (remember that the laser must be firing to take data)
   ¿ licli operation acq –shots=500 –disc=1:2:1:8

8. Pause the laser
   ¿ licli llc laser –pause

9. Shutdown everything
   ¿ licli operation –shutdown

1.3 Examples

Open doors: **./licli motors doors --open**

Get converted sensors values: **./licli llc sensors**

Make 4 shots with disc level 2: **./licli operation acq --shots=4 --disc=2:2:2:2**. Output data will be in *~/.local/share/lidar-cli*.

1.4 Start up

To start up the system in the standard way execute the "startup" command of 2.6.

If for some reason this fails we can do it manually with the next commands:

- **./licli motors doors --open**
- **./licli motors telescope --sz=600**
- **./licli operation ll --micro-init**
- **./licli motors petals --open**
- **./licli llc laser --init**
- **./licli llc laser --power=5**

1.5 Data acquisition

When an acquisition is made the server stores the data in the licel format and returns an ID, this file can be afterwards downloaded using that identifier. For example to make an acquisition with discriminator levels 1,2,1 and 10 and 100 shots:
./licli operation acq --shots=100 --disc=1:2:1:10 (this will return the file ID, 1234 for example) **./licli operation acq --download=1234 --disc=1:2:1:10**

1.6 Shutdown

To shutdown the system in the standard way execute the "shutdown" command (section 2.6 briefly describes what it does).

1.7 Warm up

The command for the warm up is described in section 2.6.

1.8 Connect to internal network

There are two switches. One of them is used for all the devices that are accessible from outside the container, the other contains all devices connected to the internal network. To access this network connect a laptop with an ethernet cable to this internal switch with 255.255.255.0 as the mask and an IP equal or below 192.168.127.230. Inside this local network the server is at 192.168.127.253.

2 Commands reference

2.1 LLC

This command contains all the commands related with the low level control board.

2.1.1 Arms

Synopsis

licli llc arms [OPTION]

Description

Command to control and monitor laser arm.

Options

--check-node=N Check communication with node N (N must be either "1" or "2")

--emergency-stop Execute emergency stop

--get-pos Get arm current position

--go=X:Y Go to current position. Argument must follow the format X:Y (eg: 1000:10000)

--init Initialize arm

--set-speed=axis:speed Set speed. Argument must follow the format Axis:speed.

2.1.2 DAC

Synopsis

licli llc dac [OPTION]

Description

Command for controlling DAC voltages.

Options

--set-voltage=idx:voltage Set DAC voltage. **idx** is the index of the desired DAC. Voltage is in mV. Setting a voltage of 1000 mV will produce a reading of 1 Volt, but note that the final voltage which will be multiplied by 1000 Volts by the PMT.

2.1.3 Drivers

Synopsis

licli llc drivers [OPTION]

Description

Get information about the drivers.

Options

--status Get a list of drivers status

2.1.4 Hotwind

Synopsis

licli llc hotwind [OPTION]

Description

Hotwind control.

Options

--**error** Set error ¿?

--**lock** Lock

--**unlock** Unlock

2.1.5 Laser

Synopsis

licli llc laser [OPTION]

Description

Laser control.

Options

--**fire** Fire the laser

--**fire-single** Fire a single shot

--**get-temp** Get laser temperature.

--**get-counter** Get shots counter.

--**init** Initialize laser

--**pause** Pause the laser

--**power** Set power in %

--**power-us** Set power in microseconds.

--**stop** Stop the laser.

2.1.6 Relays

Synopsis

licli llc relays [OPTION]

Description

Commands to switch on/off relays.

Options

    --status Get relays status

    --hotwind-off Disable hotwind

    --hotwind-on Enable hotwind. When the temperature reaches the target it will be stopped.

    --laser-on Enable laser

    --laser-off Disable laser

    --licel-on Enable laser

    --licel-off Disable laser

2.1.7   Sensors

Synopsis

    licli llc sensors [OPTION]

Description

    Commands to get sensor information from low level control board. There are other sensors that this command doesn't read, for example the temperature of the head of the laser.
If no option is specified it will print values in human readable form.

Options

    --raw Get raw sensor values

2.2   Motors

2.2.1   Doors

Synopsis

    licli motors doors [OPTION]

Description

    Commands to control motor doors

Options

    --close Close doors.

    --open Open doors

    --stop Stop doors.

    --status Print current status of the doors (OPEN, CLOSE or INTERSTATE if it's something in the middle)

2.2.2 Petals

Synopsis

licli motors petals [OPTION]

Description

Commands to control petals doors.

Options

    --close Close petals.

    --open Open petals

    --stop Stop petals.

    --status Print current status of the petals (CLOSED or UNKNOWN if there is something else)

2.2.3 Telescope

Synopsis

licli motors telescope [OPTION]

Description

Commands to control telescope motors.

Options

    --ga Get current azimuth position

    --gz Get current zenith position.

    --sa Go to the given azimuth encoder position (an unsigned integer)

    --sz Go to the given zenith encoder position (an unsigned integer)

    --get-parking-position Reads firmware parking position

    --set-parking-position Writes parking position to firmware

2.3 Monitoring

Monitoring commands

2.3.1 Sensors

Synopsis

licli monitoring sensors [OPTION]

Description

Monitoring of sensors.

Options

> **--humidity** Show readings of humidity values
>
> **--env-temperature** Show readings of environment temperatures
>
> **--last-value** (can be used in combination): Show the last value reading

2.3.2 Motors

Synopsis

> **licli monitoring motors**

Description

Monitoring of the motor monitoring board. It can show encoders position or a bitmap of the current status.

2.4 Config

Synopsis

> **licli monitoring config [OPTION]**

Description

Config related operations.

Options

> **--get** Returns current configuration of the server.
>
> **--check** Check client configuration. If no errors are found it will print *Configuration OK*.

2.5 Trace

Description

Command for debugging purposes

2.6 Operation

Synopsis

> **licli operation [OPTION]**

Description

Unless other commands, operation commands (2.6) are complex commands. Those complex commands can be macros (ie: a couple of commands executed sequentially) or control functions which makes use of the other functions.

Options

    --startup Prepare the laser to shoot. Open the doors, power on all subsystems and move telescope to a good position (ie:above tilt).

    --startup-without-ramp Same as before but without ramping up DACs voltage.

    --shutdown Power off all subsystems, close petals, move the telescope to parking position and close the doors.

    --warmup Start warm up. Enable hotwind and wait until it gets to the target temperature.

2.6.1 Acquisition

Synopsis

    licli operation acq [OPTION]

Description

    The acquired data is first stored in the server in licel file format. The server will return a file ID so we can download that file at anytime. Files are also downloaded automatically so we don't need to download it manually.

Options

    --disc=A:B.. Discriminator levels. Always required. It's an array of discriminators levels separated by a ":". First value corresponds to the first discriminator and so.

    --download=N Download licel file. Argument is the ID (unsigned integer) of the licel file we want to download.

    --shots=N Acquire a given number of shots. Argument is an unsigned integer greater than 1.

    --start Start acquisition manually

    --stop Stop acquisition

    --analog-data Save a file with all analog values using space character as separator.

    --analog-combined Save a file with normalized analog values.

    --raw-analog Save lsw and msw arrays in raw format.

    --raw-squared Save squared data in raw format.

2.6.2 Telescope

Synopsis

    licli operation telescope [OPTION]

Description

    Telescope motors operations.

Options

    --get-azimuth Get azimuth position

    --go-azimuth-parking Go to azimuth parking position

    --go-parking Go to parking position

    --go-zenith-parking Go zenith parking position

    --go-zenith=N Go to zenith inclination in degrees

    --start-test Execute telescope tests (move azmiuth and zenith to their maximum, minimum and parking position).

    --stop Stop any telescope movement

    --to-max-azimuth Go to maximum azimuth

    --to-max-zenith Go to maximum zenith

    --to-min-azimuth Go to minimum azimuth

2.6.3 Low level

Synopsis

    licli operation ll [OPTION]

Description

    Low level operations.

Options

    --arm-align Move arm to alignment position (first it must be initialized)

    --arm-init Initialize arm

    --laser-init Initialize laser (first it must be powered-on)

    --laser-power-off Power off laser

    --laser-power-on Power on laser

    --laser-fire Fire the laser

    --micro-init Micro initialization sequence. Prepare laser, arm and rump up all DACs.

    --micro-shutdown Micro shutdown sequence. Power off laser hotwind and ramp down DACs

    --ramp-down Ramp down all DACs

    --ramp-single Modify voltage of a single DAC. Argument must follow the format idx:voltage.

    --ramp-up Ramp up all DACs (defaults to 150)

3 Configuration

    Configuration files can be found on *~/.config/lidar/client/*. After modifying configuration files execute **licli config --check** to ensure there are not syntax mistakes.

- acquisition.properties: This config file is mandatory. It have four fields named wavelength_ch_N where N goes from 1 to 4. This specifies the wavelength for each channel.

- micro_init_sequence.properties: Is used to defines arm alignment position, PMT voltages and temperature threshold.

  Example:

  ```
  temperature_threshold = 123

  # PMT 355, Licel channel 1
  pmt_dac_vlts_0 = 600
  # PMT 607, Licel channel ??
  pmt_dac_vlts_1 = 1500
  # PMT 532, Licel channel 3
  pmt_dac_vlts_2 = 600
  # PMT 387, Licel channel 2
  pmt_dac_vlts_3 = 1500
  # near range
  pmt_dac_vlts_4 = 1500
  # not used
  pmt_dac_vlts_5 = 1500

  allignment_arm_X = 1610000
  allignment_arm_Y = 960000
  ```

- networking.properties: Can be used to specify address and TCP port of the server. By default it connects to **lidar.ifae.es**.
  Example:

  ```
  address=lidar.ifae.es
  port=81
  ```

3.1   Environment variables

- LIDAR_INSECURE: By default licli uses tls encryption. If this variable is set to true licli won't use any encryption method. Note that the server must also allow plain text connections.

- LIDAR_VERBOSITY: Increase verbosity level. Valid levels are 1,2,3, and 4.

4   Troubleshooting

In case of unknown problems, increase verbosity level to gather more information. To do this define *LIDAR_VERBOSITY* environment variable with an integer in the range of [1, 4], then execute licli again.

4.1   The Token's Signature resulted invalid...

Once we introduce the correct password a token is generated and save in our machine. This token allows us to execute new commands without having to introduce the password each time. Next time we execute a command the token (which is an encrypted message) will be sent to the server, validated and, if valid, it will execute our command. However, our local token may be invalid for multiple reasons (e.g: server password changed). The fix should be straightforward; remove *˜/.cache/lidar/token* and try again. This way a new (valid) token will be generated.

4.2 This method is not safe/read-only

This means that the keylock is on which means that only those commands that don't produce side effects are allowed (ie: read-only commands) for example to read the status, etc. To fix it someone have to go physically and switch off the keylock.
Note: **enabling the keylock doesn't kill current running commands**

4.3 Connection problems

Execute **ping lidar.ifae.es** and see if there is an answer. The server may take up to 10 minutes to be completely operational, if after this time the the server doesn't answer ping requests, power off and on the lidar.

If the server is responding to ping requests, try to check if lidar service is also running. To do it check if port 81 is open (you can use a command like **nc -vz lidar.ifae.es 81** to check it). If it isn't, power off and on the lidar.

4.4 Where is X,Y,Z file/directory

This program follow the XDG Base Directory specification. The full specification may be found on `https://standards.freedesktop.org/basedir-spec/basedir-spec-latest.html`

In short

- *~/.config/lidar*: Were config files are stored. See section 3.

- *~/.local/share/lidar*: Data directory. Licel, raw files and all related lidar output is stored here.

- *~/.cache/lidar*: Cache dir. Only the token is stored there.