carreralib

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Contents

This module provides a Python interface to Carrera® DIGITAL 124/132 slotcar systems connected via a serial (cable) connection.

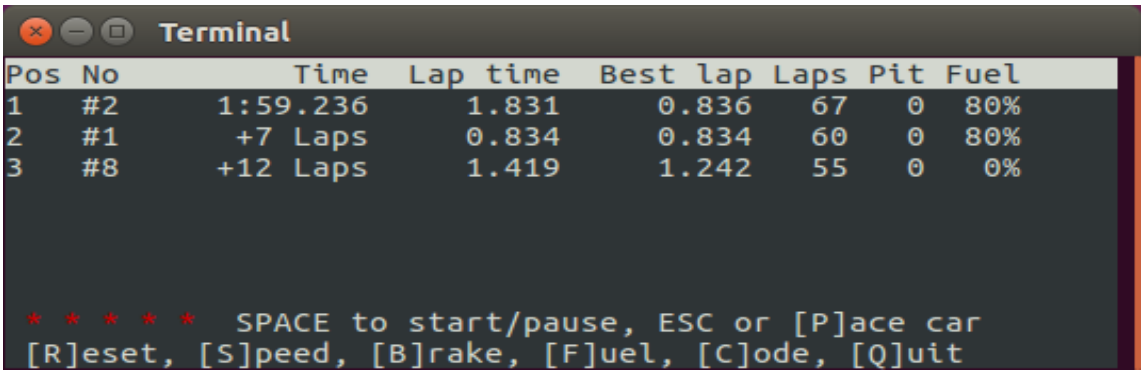
```
>>> from carreralib import ControlUnit
>>> cu = ControlUnit('/dev/ttyUSB0')
>>> cu.version()
'5337'
>>> cu.poll()
Status(fuel=(14, 14, 14, 14, 14, 14, 0, 0), start=0, mode=6,
       pit=(False, False, False, False, False, False, False, False),
       display=8)
>>> cu.start()
>>> cu.poll()
Status(fuel=(14, 14, 14, 14, 14, 14, 0, 0), start=1, mode=6,
       pit=(False, False, False, False, False, False, False, False),
       display=8)
>>> cu.start()
>>> cu.poll()
Timer(address=1, timestamp=105295, sector=1)
>>> cu.poll()
Timer(address=0, timestamp=105410, sector=1)
```

CHAPTER 1

Demo RMS

For demonstration purposes, the *carreralib* module can be used from the command line to run a simple curses-based race management system (RMS):

```
python -m carreralib /dev/ttyUSB0
```



Within the RMS, use the space key to start or pause a race, `R` to reset a race, and `Q` to quit.

When called without a device name or path, this will list command line options and the serial or Bluetooth devices that a Control Unit may be connected to, e.g. on Linux:

```
$ python -m carreralib
usage: python -m carreralib [-h] [-l LOGFILE] [-t TIMEOUT] [-v] [DEVICE]

positional arguments:
  DEVICE                the Control Unit device, e.g. a serial port or MAC address

options:
  -h, --help            show this help message and exit
  -l LOGFILE, --logfile LOGFILE
                        where to write log messages
  -t TIMEOUT, --timeout TIMEOUT
```

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```
                        maximum time in seconds to wait for Control Unit
  -v, --verbose         write more log messages

devices:
  /dev/ttyUSB0        USB-Serial Controller
```

On Windows, this will show the respective COM port:

```
devices:
  COM3                Prolific USB-to-Serial Comm Port (COM3)
```

If a Carrera AppConnect® Bluetooth device is found, this will show the Bluetooth MAC address of the device instead:

```
devices:
  C6:34:FA:1D:1D:5D   Control_Unit
```

So instead of `/dev/ttyUSB0`, specify the respective COM port on Windows, or the Bluetooth MAC address (e.g. `C6:34:FA:1D:1D:5D`) when using Carrera AppConnect®.

CHAPTER 2

Control Unit Firmware

To show the current firmware version of your Control Unit, use:

```
python -m carreralib.fw /dev/ttyUSB0
```

Note: Trying to update the firmware of your Control Unit is a potentially dangerous operation that may wreck your hardware. Use at your own risk!

To upgrade (or downgrade) your Control Unit's firmware, given an ASCII firmware file, use:

```
python -m carreralib.fw /dev/ttyUSB0 digital_blackbox_NF_V337.HMF
```

Note: Control Unit firmware are the intellectual property of Carrera Toys GmbH, and are only provided by the copyright holders. Please do *not* ask for firmware files here!

CHAPTER 3

API

The *ControlUnit* class encapsulates a connection to a Carrera® DIGITAL 124/132 Control Unit (CU) and provides all the features needed to implement a custom race management system (RMS).

Note that *ControlUnit* uses zero-based controller addresses, so `0` corresponds to controller #1, `6` is the address the autonomous car, and `7` the address of the pace car.

class carreralib.**ControlUnit**(*device*, ***kwargs*)

Interface to a Carrera Digital 124/132 Control Unit.

device should name a serial port, e.g. `/dev/ttyUSB0` on GNU/Linux or `COM3` on Windows. Additional keyword arguments will be passed to the underlying `Connection` object.

BRAKE_BUTTON_ID = 6

The Control Unit's BRAKE button ID.

CODE_BUTTON_ID = 8

The Control Unit's CODE button ID.

FUEL_BUTTON_ID = 7

The Control Unit's FUEL button ID.

PACE_CAR_ESC_BUTTON_ID = 1

The Control Unit's PACE CAR/ESC button ID.

SPEED_BUTTON_ID = 5

The Control Unit's SPEED button ID.

START_ENTER_BUTTON_ID = 2

The Control Unit's START/ENTER button ID.

class Status

Response type returned if no timer events are pending.

This is a `collections.namedtuple` subclass with the following read-only attributes:

Attribute	Index	Value
`fuel`	0	Eight-item list of fuel levels (0..15)
`start`	1	Start light indicator (0..9)
`mode`	2	4-bit mode bit mask
`pit`	3	8-bit pit lane bit mask
`display`	4	Number of drivers to display (6 or 8)

FUEL_MODE = 1
Mode bit mask indicating fule mode is enabled.

LAP_COUNTER_MODE = 8
Mode bit mask indicating a lap counter is connected.

PIT_LANE_MODE = 4
Mode bit mask indicating a pit lane adapter is connected.

REAL_MODE = 2
Mode bit mask indicating real fuel mode is enabled.

class Timer
Response type for timer events.

This is a `collections.namedtuple` subclass with the following read-only attributes:

Attribute	Index	Value
`address`	0	Controller address (0..7)
`timestamp`	1	32-bit time stamp in milleseconds
`sector`	2	Sector (1 for start/finish, 2 or 3 for times reported by Check Lanes)

close()
Close the connection to the CU.

clrpos()
Clear/reset the Position Tower display.

fwu_start()
Initiate a CU firmware update.

fwu_write(*data*)
Write CU firmware update data.

ignore(*mask*)
Ignore the controllers represented by bitmask *mask*.

poll()
Poll the CU for pending messages.

The returned value will be an instance of either *ControlUnit.Timer* or *ControlUnit.Status*, depending on whether any timer events are pending.

press(*button_id*)
Simulate pressing the CU button with the given ID.

request(*buf*, *maxlength=None*)
Send a message to the CU and wait for a response.

reset()
Reset the CU timer.

setbrake(*address*, *value*)
Set the brake value for controller *address*.

setfuel(*address*, *value*)
Set the fuel value for controller *address*.

setlap(*value*)
Set the current lap displayed by the Position Tower.

setlap_hi(*value*)
Set the high nibble of the current lap.

setlap_lo(*value*)
Set the low nibble of the current lap.

setpos(*address*, *position*)
Set the controller's position displayed by the Position Tower.

setspeed(*address*, *value*)
Set the speed value for controller address.

start()
Initiate the CU start sequence.

version()
Retrieve the CU version as a string.

CHAPTER 4

Connection Module

This module is mostly of interest to developers who want to create their own connection implementation, for example to use a Bluetooth implementation.

exception carreralib.connection.**BufferTooShort**
Raised when the supplied buffer is too small a message.

class carreralib.connection.**Connection**(*device*, ***kwargs*)
Base class for connections to a Carrera digital slotcar system.

close()
Close the connection.

max_fwu_block_size = None
Maximum number of bytes in one firmware update frame.

recv(*maxlength=None*)
Return a complete message of byte data sent from the other end of the connection as a bytes object.

send(*buf*, *offset=0*, *size=None*)
Send byte data rom an object supporting the buffer interface as a complete message.

exception carreralib.connection.**ConnectionError**
The base class of all connection exceptions.

exception carreralib.connection.**TimeoutError**
Raised when a timeout expires.

carreralib.connection.**open**(*device*, ***kwargs*)
Open a connection to the given device.

carreralib.connection.**scan**()
Search for potential devices.

CHAPTER 5

Protocol Module

This module provides utility functions for dealing with the Carrera® DIGITAL 124/132 protocol.

`carreralib.protocol.`**`pack`**(*fmt*, **args*)
Return a bytes object containing the arguments packed according to the format string *fmt*.

Similar to `struct.pack()`, this function performs conversion between Python values and binary protocol data. Format strings may contain the following characters:

Format	Python type	Value
`B`	`int`	unsigned byte
`c`	`bytes` of length 1	a single ASCII character
`C`	no value	check sum
`I`	`int`	32-bit unsigned integer
`r`	`int`	"raw" unsigned byte (BLE only)
`s`	`bytes`	ASCII string
`x`	no value	padding/ignored
`Y`	`int`	nibble or *nybble*

As with `struct.pack()`, a format character may be preceded by an integral count. For the `s` format character, the count is interpreted as the length of the bytes. For the `C` format character, the count is interpreted as an *offset* in the generated buffer from which the checksum should be calculated. For the other format characters, the count is simply interpreted as a repeat count.

`carreralib.protocol.`**`unpack`**(*fmt*, *buf*)
Unpack from the buffer *buf* according to the format string *fmt*.

`carreralib.protocol.`**`chksum`**(*buf*, *offset=0*, *size=None*)
Compute the protocol checksum for the buffer *buf*.

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