LIRC Python Package

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This is a python package that allows you to interact with the daemon in the Linux Infrared Remote Control package. By interacting with this daemon, it allows you to programmatically send IR signals from a computer.

This package is for emitting IR signals, but it does not support listening to IR codes. If you'd like to monitor the IR signals you recieve on Linux, which has built-in support in the kernel for recieving IR signals, you can try using python-evdev. They have a tutorial on reading the events.

More information on the lircd daemon, socket interface, reply packet format, etc. can be found at https://www.lirc.org/html/lircd.html

CHAPTER 1

Installation

This package is hosted on PyPI and can be installed through pip.

```
$ pip install lirc
```

However since this is a wrapper around the LIRC daemon, it is expected that LIRC is installed and setup on the given system as well.

More information on that can be found in the installation portion of the full documentation.

CHAPTER 2

Quick Start

2.1 Using the Client

```
import lirc

client = lirc.Client()

print(client.version())
>>> '0.10.1'
```

To use this package, we instantiate a `Client`. By initializing it with no arguments, the `Client` will attempt to connect to the lirc daemon with the default connection parameters for your operating system.

These defaults depend on your operating system and can be looked up in the full documentation if you need different parameters.

However, if you've instantiated the `Client` without any arguments, you don't get any errors, and you recieve a response from the `version()` command, you are connected to the daemon. Most people should not need to change the default parameters.

2.2 Customizing the Client

As previously stated, we can customize these defaults if needed.

```
import socket
import lirc

client = lirc.Client(
  connection=lirc.LircdConnection(
    address="/var/run/lirc/lircd",
    socket=socket.socket(socket.AF_UNIX, socket.SOCK_STREAM),
    timeout = 5.0
```

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```
    )
)
```

For the client in the example above, we set it up using the defaults for a Linux machine. While this example illustrates what is customizable, it is not a practical example since you could call `Client()` with no arguments if you're on Linux and achieve the same outcome.

See Overriding LIRC Defaults on Initialization for more information.

2.3 Sending IR

```
import lirc

client = lirc.Client()
client.send_once("my-remote-name", "KEY_POWER")

# Go to channel "33"
client.send_once("my-remote-name", "KEY_3", repeat_count=1)
```

With sending IR, we can use the *send_once* method and optionally, send multiple by using the *repeat_count* keyword argument.

2.4 Handling Errors

```
import lirc

client = lirc.Client()

try:
    client.send_once('some-remote', 'key_power')
except lirc.exceptions.LircdCommandFailureError as error:
    print('Unable to send the power key!')
    print(error)  # Error has more info on what lircd sent back.
```

If the command was not successful, a `LircdCommandFailureError` exception will be thrown.

CHAPTER 3

Further Documentation

More information on how to setup the system installed LIRC, how to use this python library, and a full API specification can be found at https://lirc.readthedocs.io/

CHAPTER 4

Site Documentation

4.1 Installing the LIRC Python & System Package

Since this package is merely a wrapper around the LIRC daemon, it is expected that LIRC is installed and setup on the given system as well to be able to use the python package.

4.1.1 Python Package

This package is hosted on PyPI and can be installed through pip.

```
$ pip install lirc
```

4.1.2 System LIRC Package

While LIRC was originally created for Linux, there are ports of LIRC to macOS and Windows which this python package is compatibile with.

Linux:

- It is highly likely that the package manager on your system already has LIRC packaged up and ready to be installed for you. e.g. `sudo apt install lirc` on Ubuntu.
- If not, you may have to compile and install it manually, but I would avoid that if possible.

Windows:

- WinLIRC is a port for Windows. It works a bit differently since it is just a collection of files in a folder that you run. More information on setting up WinLIRC can be found at configuring the system LIRC.

macOS:

- There is a port on MacPorts with it's source code on GitHub. However, it doesn't appear to be maintained any longer and is not the latest LIRC version. You can still install it using `port install lirc` or build the package from source using the instructions on the README of the GitHub repository.

4.2 Hardware Setup

This package will work as long as you have a lirc daemon running. You can use the `version()` method on the `Client` and see what version of the lirc daemon is running. However, in order to do anything useful (such as sending IR codes), you'll need to have an IR emitter or transciever hooked up to your computer and recognized by lirc.

4.3 Configuring System LIRC

Once you have your IR emitter or transciever hooked up to your computer, you'll want to configure the system installed LIRC to ensure it works for emitting IR.

You'll also want to ensure you have a configuration file for the remote control that you want to emulate when emitting IR since whatever you're sending IR to will likely only understand IR codes from certain remotes.

This process will be different depending on the operating system you are using. Below are instructions for Linux, Windows, and macOS. See the LIRC configuration guide for more information. However, WinLIRC will be a bit different and you should read their own resources if you are on Windows as well.

4.3.1 Linux

LIRC configuration is typically in `/etc/lirc/`. The two things you'll have to figure out on your own is the `lirc_options.conf` file and adding your remote configuration file as these are dependent on the hardware you use for your setup. However, I can give general recommendations or what I typically do.

For `lirc_options.conf`, the only change I make is to change the driver from `devinput` to `default`. Devinput works fine for receiving IR, but it will not allow you to emit IR. This driver is dependent on your hardware, but LIRC just works with most devices on this driver nowadays.

For the remote configuration file, if you're using a common remote control, you may be able to find it in the LIRC remote control database. Otherwise, you'll have to create it yourself. This can be done with LIRC's IR record utility. However, I've had much better luck using a RedRat3-II and RedRat's IR Signal Database for creating the remote configuration file. The RedRat3-II is now discontinued, although its driver's are still available, but you could look into the RedRatX or see if you can find a RedRat3-II used. Place this generated remote configuration file in your `/etc/lirc/lircd.conf.d` folder.

Iguanaworks IR Transciever Note

If you're using an Iguanaworks IR Transciever, you may find the discussion below useful. Basically, the device should just work on the default driver.

- https://github.com/iguanaworks/iguanair/issues/39

4.3.2 Windows

You'll want to make sure you install WinLIRC at http://winlirc.sourceforge.net/. This is the LIRC port for Windows which corresponds with version 0.9.0 of LIRC. Past that, you can run the WinLIRC executable file and select the "Input Plugin" for your device. Then, you can select the remote configuration and click OK. You should now be able to select your remote and send key codes. As long as the program is running in the background (it minimizes to the tray), this package will be able to connect to it.

4.3.3 macOS

On macOS, the paths are almost the same as the Linux ones, just prefixed with `/opt/local/`. Therefore, the LIRC configuration is typically at `/opt/local/etc/lirc/` and the lircd socket is at `/opt/local/var/run/lirc/lircd`.

Refer to the Linux section for the rest of the configuration as they are almost the same besides the `/opt/local/` prefix. However, on macOS, there is also no `default` driver like there is on Linux. You'll have to figure out what devices will work and what driver it needs so you can input that into `lirc_options.conf`.

4.3.4 Example Remote Configuration File

The following is an example of a remote configuration file that would be placed inside of the `lircd.conf.d/` folder. This is for a KENMORE_253-79081, remote taken from the LIRC remote database.

```
# Please make this file available to others
# by sending it to <lirc@bartelmus.de>
#
# this config file was automatically generated
# using lirc-0.9.0-pre1(default) on Sun Sep  7 00:53:46 2014
#
# contributed by Steven Shamlian
#
# brand: Kenmore
# model no. of remote control: Unknown
# devices being controlled by this remote: Kenmore 253.79081
#
# Kernel revision: 3.12.26+
# Driver/device option: --driver default --device /dev/lirc0
# Capture device:  Vishay TSOP6238 to Raspberry Pi GPIO pin 23
# Kernel modules: lirc_rpi
# Type of device controlled: Air Conditioner
# Devices controlled: Kenmore 253.79081
#
# Remote Layout:
#
# /------------------------\
# |KEY_POWER       KEY_TIME|
# |                        |
# |KEY_VOLUMEUP      KEY_UP|
# |        KEY_PLAY        |
# |KEY_VOLUMEDOWN  KEY_DOWN|
# |        KEY_SAVE        |
# |KEY_SHUFFLE    KEY_SLEEP|
# |        KEY_PAUSE       |
# \------------------------/
# VOLUME keys are for fan speed
# PLAY starts air conditioner
# PAUSE makes unit fan-only
# SAVE is Energy Saver mode
# SHUFFLE is for Automatic Fan

begin remote

  name  KENMORE_253-79081
  bits           16
```

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```
  flags SPACE_ENC|CONST_LENGTH
  eps            30
  aeps          100

  header       9159  4455
  one           639  1615
  zero          639   486
  ptrail        637
  repeat       9103  2199
  pre_data_bits   16
  pre_data       0x10AF
  gap          108066
  toggle_bit_mask 0x0

      begin codes
          KEY_POWER               0x8877
          KEY_TIME                0x609F
          KEY_VOLUMEUP            0x807F
          KEY_VOLUMEDOWN          0x20DF
          KEY_PLAY                0x906F
          KEY_UP                  0x708F
          KEY_DOWN                0xB04F
          KEY_SAVE                0x40BF
          KEY_SHUFFLE             0xF00F
          KEY_SLEEP               0x00FF
          KEY_PAUSE               0xE01F
      end codes

end remote
```

4.3.5 Example LIRC Options Configuration File

This is a `lirc_options.conf` file, taken from `/etc/lirc/lirc_options.conf` on a Linux machine, to get a feel for the configuration options offered.

```
# These are the default options to lircd, if installed as
# /etc/lirc/lirc_options.conf. See the lircd(8) and lircmd(8)
# manpages for info on the different options.
#
# Some tools including mode2 and irw uses values such as
# driver, device, plugindir and loglevel as fallback values
# in not defined elsewhere.

[lircd]
nodaemon        = False
driver          = default
device          = auto
output          = /var/run/lirc/lircd
pidfile         = /var/run/lirc/lircd.pid
plugindir       = /usr/lib/lirc/plugins
permission      = 666
allow-simulate  = No
repeat-max      = 600
#effective-user =
#listen         = [address:]port
```

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```
#connect         = host[:port]
#loglevel        = 6
#release         = true
#release_suffix = _EVUP
#logfile         = ...
#driver-options = ...

[lircmd]
uinput           = False
nodaemon         = False

# [modinit]
# code = /usr/sbin/modprobe lirc_serial
# code1 = /usr/bin/setfacl -m g:lirc:rw /dev/uinput
# code2 = ...


# [lircd-uinput]
# add-release-events = False
# release-timeout    = 200
# release-suffix     = _EVUP
```

4.4 Usage

Once you've installed the `lirc` python package, there will be a number of things you can now import from it to get started.

```
from lirc import Client, LircdConnection
```

The most relevant of these is `Client`, since this is the main class you will be using. `LircdConnection` is the object that is used to configure the connection to LIRC when you initialize the `Client`.

If you want to catch any of the exceptions, those are all under `lirc.exceptions`.

```
from lirc.exceptions import (
  LircError,
  LircdSocketError,
  LircdConnectionError,
  LircdInvalidReplyPacketError,
  LircdCommandFailureError,
  UnsupportedOperatingSystemError
)
```

4.4.1 Initializing the Client

```
import lirc

client = lirc.Client()

print(client.version())
>>> '0.10.1'
```

To use this package, we instantiate a `Client`. By initializing it with no arguments, the `Client` will attempt to connect to the lirc daemon with the default connection parameters for your operating system.

However, if you've instantiated the `Client` without any arguments, you don't get any errors, and you recieve a response from the `version()` command, you are connected to the daemon. Most people should not need to change the default parameters.

Overriding LIRC Defaults on Initialization

However, what if we the defaults don't work for us or we have a more complex setup?

Let's say we're on Windows and we want to connect over TCP to a remote LIRC server on another Windows machine. So we've passed in an `address` to override the default so it doesn't look for the daemon on the localhost. `socket` and `timeout` are passed in just to show that we can, these are already the defaults on Windows.

```
import socket
from lirc import Client, LircdConnection

client = Client(
  connection=LircdConnection(
    address=("10.16.30.2", 8765),
    socket=socket.socket(socket.AF_INET, socket.SOCK_STREAM),
    timeout=5.0
  )
)
```

The `Client` takes in one optional keyword argument: connection. This connection must be a `LircdConnection`. This connection, if not specified manually, will have default values to connecting to lircd for the operating system you are using.

The `address` specifies how to reach the lircd daemon. On Windows, we pass a `(hostname, port)` tuple since we connect over TCP such as `('localhost', 8765)`. However on Linux and macOS, we pass in the path to the socket on the filesystem as a string.

The `socket` is the connection type. On Linux/macOS, it will default to a UNIX domain socket connection. On Windows, `socket.socket(socket.AF_INET, socket.SOCK_STREAM)` is used for a connection over TCP.

Lastly, `timeout` specifies the amount of time to wait when reading from the socket for a response.

LIRC Initialization Defaults per Operating System

From the options we may pass into the `LircdConnection`, `address` and `socket` will change depending on the operating system you are using. The `timeout` always defaults to 5.0 (seconds).

On Linux, this will attempt to connect to the lircd socket at `/var/run/lirc/lircd` and create a socket using `AF_UNIX` and `SOCK_STREAM`.

On macOS, it will be almost identical to Linux except that all the paths will be prefixed by `/opt/local/` so the connection to the lircd socket will instead be at `/opt/local/var/run/lirc/lircd`. The socket that is created will be the same.

However if we are on Windows, we can't use unix domain sockets. Instead, WinLIRC uses TCP to communicate with the lirc daemon. So instead of a string for the address, it defaults to a tuple of `("localhost", 8765)`, which is the default connection parameters for WinLIRC. The first part contains the address whereas the second is the port. Furthermore, the socket that is created uses `AF_INET` and `SOCK_STREAM` instead so we can connect over TCP.

4.4.2 Sending IR Codes

In order to send IR signals with our remote, one option we have is that we can use the `send_once` method on the `lirc.Client`.

```
import lirc

client = lirc.Client()
client.send_once('our-remote-name', 'key-in-the-remote-file')
```

Using the `send_once()` method is quite simple. For any method, such as this one, that takes in a remote and a key, the parameters are always in that order with the remote name first and then the key name. Because the `send_once` method does not get any meaningful data back from lircd, there is no return value from it. Instead, as is the case for most methods here that don't have a meaningful return value, a `lirc.exceptions.LircdCommandFailureError` is raised if the command we sent failed.

Furthermore, we can also send the key in rapid succession. This is useful if we, say, want to go to channel 33.

```
import lirc

client = lirc.Client()
client.send_once('our-remote-name', 'key_3', repeat_count=1)
```

We can also send IR codes using `send_start` and `send_stop`. `send_start` works in a similar manner to `send_once`. The difference is that with `send_start`, IR codes are continually sent until a `send_stop` call.

```
import time
import lirc

client = lirc.Client()
client.send_start('our-remote-name', 'key_right')
time.sleep(5)
client.send_stop()
```

In this example, we see that we can start sending our 'key_right' signal for 5 seconds and then call `send_stop` to stop that. Notice that we didn't pass any arguments to `send_stop`. This is because by default, the `Client` will keep track of the last remote name and remote key that was used with `send_start`. Optionally, we could of made it explicit.

```
client.send_stop('our-remote-name', 'key_right')
```

This allows you to have multiple ‘‘send_start‘‘s running at the same time, since you can explicitly pass in which remote and key to stop.

4.5 API Specification

class lirc.**Client**(*connection: lirc.connection.lircd_connection.LircdConnection = None*)

Bases: `object`

Communicate with the lircd daemon.

__init__(*connection: lirc.connection.lircd_connection.LircdConnection = None*) → None

Initialize the client by connecting to the lircd socket.

Parameters

- **connection** – The connection to lircd. Created with defaults

- **on the operating system if one is not provided.** (*depending*) –

Raises

- `TypeError` – If connection is not an instance of LircdConnection.
- `LircdConnectionError` – If the socket cannot connect to the address.

close() → None
Close the connection to the socket.

driver_option(*key: str*, *value: str*) → None
Set driver-specific option named key to given value.

Parameters

- **key** – The key to set for the driver.
- **value** – The value for the key to set.

Raises `LircdCommandFailure` – If the command fails.

list_remote_keys(*remote: str*) → List[str]
List all the keys for a specific remote.

Parameters **remote** – The remote to list the keys of.

Raises `LircdCommandFailure` – If the command fails.

Returns The list of keys from the remote.

list_remotes() → List[str]
List all the remotes that lirc has in its `/etc/lirc/lircd.conf.d` folder.

Raises `LircdCommandFailure` – If the command fails.

Returns The list of all remotes.

send_once(*remote: str*, *key: str*, *repeat_count: int = 0*) → None
Send an lircd SEND_ONCE command.

Parameters

- **key** – The name of the key to send.
- **remote** – The remote to use keys from.
- **repeat_count** – The number of times to repeat this key. If this is set to 1, that means this key will be sent twice (repeated once).

Changed in version 2.0.0: The repeat_count parameter has been changed to have a default value of 0 instead of 1. This ensures send_once only sends 1 IR signal instead of sending 1 and then repeating it (therefore, 2 signals).

Raises `LircdCommandFailure` – If the command fails.

send_start(*remote: str*, *key: str*) → None
Send an lircd SEND_START command.

This will repeat the given key until send_stop is called.

Parameters

- **remote** – The remote to use keys from.
- **key** – The name of the key to start sending.

Raises `LircdCommandFailure` – If the command fails.

send_stop(*remote: str = ''*, *key: str = ''*) → None
Send an lircd SEND_STOP command.

The remote and key default to the remote and key last used with `send_start` if they are not specified, since the most likely use case is sending a `send_start` and then a `send_stop`.

Parameters

- **remote** – The remote to stop.
- **key** – The key to stop sending.

Raises `LircdCommandFailure` – If the command fails.

set_transmitters(*transmitters: Union[int, List[int]]*) → None
Set the active transmitters.

Example

import lirc

client = lirc.Client()

client.set_transmitters(1)

client.set_transmitters([1,3,5])

Parameters **transmitters** – The transmitters to set active.

Raises `LircdCommandFailure` – If the command fails.

simulate(*remote: str*, *key: str*, *repeat_count: int = 1*, *keycode: int = 0*) → None
Simulate an IR event.

The `--allow-simulate` command line option to lircd must be active for this command not to fail.

Lircd Format: <code> <repeat count> <button name> <remote control name>

Example: 0000000000f40bf0 00 KEY_UP ANIMAX

Parameters

- **remote** – The remote to simulate key presses from.
- **key** – The key on the remote to simulate.
- **repeat_count** – The number of times to repeat the simulated key press.
- **keycode** – lircd(8) describes this option as a 16 hexadecimal digit number encoding of the IR signal. However, it says it is depreciated and should be ignored.

Raises `LircdCommandFailure` – If the command fails.

start_logging(*path: Union[str, pathlib.Path]*) → None
Send a lircd SET_INPUTLOG command which sets the path to log all lircd received data to.

Parameters **path** – The path to start logging lircd recieved data to.

Raises `LircdCommandFailure` – If the command fails.

stop_logging() → None
Stop logging to the inputlog path from start_logging.

Raises `LircdCommandFailure` – If the command fails.

version() → str
Retrieve the version of LIRC

Raises LircdCommandFailure – If the command fails.

Returns The version of LIRC being used.

class lirc.**LircdConnection**(*address: Union[str, tuple] = None*, *socket: socket.socket = None*, *timeout: float = 5.0*)
Bases: lirc.connection.abstract_connection.AbstractConnection

__init__(*address: Union[str, tuple] = None*, *socket: socket.socket = None*, *timeout: float = 5.0*)
Initialize the LircdConnection. This sets up state we'll need, but it does not connect to that socket. To connect, we can call connect() after initialization.

Parameters

- **address** – The address to the socket. Defaults to different values depending on the host operating system. On Linux, it defaults to /var/run/lirc/lircd. On Windows, a tuple of ("localhost", 8765). And on Darwin (macOS), /opt/local/var/run/lirc/lircd.
- **socket** – The socket to use to connect to lircd. The default socket is determined using the host operating system. For Linux and Darwin, a unix domain socket connection is used i.e. socket.socket(socket.AF_UNIX, socket.SOCK_STREAM). However on Windows, a TCP socket is used i.e. socket.socket(socket.AF_INET, socket.SOCK_STREAM).
- **timeout** – The amount of time to wait for data from the socket before we timeout.

address
Retrieve the address that this lircd connection is connected to.

Returns The current address being used.

close()
Closes the socket connection.

connect()
Connect to the socket at the address both specified on init.

Raises LircdConnectionError – If the address is invalid or lircd is not running.

readline() → str
Read a line of data from the lircd socket.

We read 4096 bytes at a time as the buffer size. Therefore after data is read from the socket, all the lines are stored in a buffer if there is more than 1 and subsequent calls grab a line that stored in that buffer until it is empty. Then, another call to the socket would be made.

Raises

- TimeoutError – If we are not able to grab data from the socket in a specified amount of time (the initial timeout time on initialization).
- LircdSocketError – If some other error happened when trying to read from the socket.

Returns A line from the lircd socket.

send(*data: str*)
Send a commend to the lircd socket connection.

Parameters **data** – The data to send to the lircd socket.

Raises `TypeError` – if data is not a string.

4.6 Changelog

All notable changes to this project will be documented in this file.

The format is based on Keep a Changelog, and this project adheres to Semantic Versioning.

4.6.1 2.0.0 - 2021-04-18

Fixed

- POTENTIAL BREAKING CHANGE: The `Client`'s `send_once` method was sending an IR code twice by default. This is because the `repeat_count` keyword argument was set to 1 instead of 0, causing it to send the initial IR code and repeat it once. This now defaults to 0.
- The `Darwin` connection to lircd was set to default to `/opt/run/var/run/lirc/lircd` when it should have been `/opt/local/var/run/lirc/lircd`. This is unlikely to have an impact since the previous default directory was incorrect.

4.6.2 1.0.1 - 2020-12-26

Fixed

- PyPI is complaining that v1.0.0 is already taken, since it was a release that was deleted from a previous mistake.

4.6.3 1.0.0 - 2020-12-26

Added

- `DefaultConnection.address` and `DefaultConnection.socket` may raises an `UnsupportedOperatingSystemError` if the operating system you're on is not MacOS, Linux, or Windows.

Changed

- `lirc.Client` raises a `TypeError` instead of a `ValueError` now if a `connection` is passed in that is not an instance of `LircdConnection`.
- `send` on `lirc.Client` is now called `send_once`.
- `start_repeat` on `lirc.Client` is now called `send_start`.
- `stop_repeat` on `lirc.Client` is now called `send_stop`.

Removed

- `socket` property from `LircdConnection`.

Fixed

- The `remote` and `key` optional arguments to the `lirc.Client`'s `stop_repeat` method were not overriding the last sent remote and key.

4.6.4 0.2.0 - 2020-12-13

Added

- `LircdConnection` to handle configuring the connection on `Client`.

Changed

- `Lirc` is now named `Client`.
- `Client` now takes in a `connection` as the optional argument to configure it's connection. That `connection` must be a `LircdConnection` class if you would like to customize the connection. The `LircdConnection` takes in an `address`, `socket`, and `timeout` with optional keyword arguments. Anything not specified with use the defaults for that operating system.

Removed

- `DEFAULT_SOCKET_PATH` constant on `Client`. It no longer makes sense with cross-platform support.
- `ENCODING` constant on `Client`.
- `socket_path` and `socket_timeout` on the `Lirc` constructor.

4.6.5 0.1.0 - 2020-07-13

- Initial Release

4.7 Contributor Covenant Code of Conduct

4.7.1 Our Pledge

In the interest of fostering an open and welcoming environment, we as contributors and maintainers pledge to making participation in our project and our community a harassment-free experience for everyone, regardless of age, body size, disability, ethnicity, sex characteristics, gender identity and expression, level of experience, education, socio-economic status, nationality, personal appearance, race, religion, or sexual identity and orientation.

4.7.2 Our Standards

Examples of behavior that contributes to creating a positive environment include:

- Using welcoming and inclusive language
- Being respectful of differing viewpoints and experiences
- Gracefully accepting constructive criticism
- Focusing on what is best for the community
- Showing empathy towards other community members

Examples of unacceptable behavior by participants include:

- The use of sexualized language or imagery and unwelcome sexual attention or advances
- Trolling, insulting/derogatory comments, and personal or political attacks
- Public or private harassment
- Publishing others' private information, such as a physical or electronic address, without explicit permission

- Other conduct which could reasonably be considered inappropriate in a professional setting

4.7.3 Our Responsibilities

Project maintainers are responsible for clarifying the standards of acceptable behavior and are expected to take appropriate and fair corrective action in response to any instances of unacceptable behavior.

Project maintainers have the right and responsibility to remove, edit, or reject comments, commits, code, wiki edits, issues, and other contributions that are not aligned to this Code of Conduct, or to ban temporarily or permanently any contributor for other behaviors that they deem inappropriate, threatening, offensive, or harmful.

4.7.4 Scope

This Code of Conduct applies both within project spaces and in public spaces when an individual is representing the project or its community. Examples of representing a project or community include using an official project e-mail address, posting via an official social media account, or acting as an appointed representative at an online or offline event. Representation of a project may be further defined and clarified by project maintainers.

4.7.5 Enforcement

Instances of abusive, harassing, or otherwise unacceptable behavior may be reported by contacting the project team at eugenetriguba@gmail.com. All complaints will be reviewed and investigated and will result in a response that is deemed necessary and appropriate to the circumstances. The project team is obligated to maintain confidentiality with regard to the reporter of an incident. Further details of specific enforcement policies may be posted separately.

Project maintainers who do not follow or enforce the Code of Conduct in good faith may face temporary or permanent repercussions as determined by other members of the project's leadership.

4.7.6 Attribution

This Code of Conduct is adapted from the Contributor Covenant, version 1.4, available at https://www.contributor-covenant.org/version/1/4/code-of-conduct.html

For answers to common questions about this code of conduct, see https://www.contributor-covenant.org/faq

4.8 MIT License

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OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

4.9 Contributing Guidelines

Thank you for your interest! If you find a bug, want to suggest an improvement, or any other change, please open a issue first. This ensures your time is not wasted if you were planning on creating a pull request, but the changes suggested do not work for this project.

4.9.1 General Guidelines

Commit history:

- Try to keep a clean commit history so it is easier to see your changes. Keep functional changes and refactorings in separate commits.

Commit messages:

- Have a short one line summary of your change followed by as many paragraphs of explanation as you need. This is the place to clarify any subtleties you have in your implementation, document other approaches you tried that didn't end up working, any limitations on your implementation, etc. The most important part here is to describe why you made the change you did, not simply what the change you made is.

Changelog:

- Please ensure to update the changelog by adding a new bullet under an Added, Changed, Deprecated, Removed, Fixed, or Security section headers under the Unreleased version. If any of those sections are not present, feel free to add the one you need. See Keep a Changelog if you need guidance on what makes a good entry since this project follows those principles.

Tests:

- Ensure the tests pass: `poetry run task test` to run all tests.
- For any significant code changes, there must be tests to accompany them. All unit tests are written with `pytest`.

Code Format:

- There is a pre-commit pipeline to ensure a standard code format. Make sure to install the pre-commit hooks before making any commits with `pre-commit install`.

CI Pipeline:

- There is a CI pipeline that is run using Github Actions on commits to master, dev, and on pull requests. This pipeline must pass for your changes to be accepted.

4.9.2 Getting Up & Running

This project uses Poetry for the build system and dependency management. To get started, you will want that installed on your system.

Once you've installed `Poetry`, you can install the dependencies, this package, and go into the virtual environment.

```
$ poetry install
$ poetry shell
```

From inside the virtual environment, we can work with the package and easily run the tasks for this project such as `task test` and `task lint` that are in the `pyproject.toml` file.

CHAPTER 5

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