# **Python POD API**

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## **PYTHON POD API PROJECT**

## 1.1 PodApi package

## 1.1.1 Subpackages

## 1.1.1.1 PodApi.Commands package

#### **Submodules**

## PodApi.Commands.PodCommands module

class PodApi.Commands.PodCommands.CommandSet

Bases: object

POD\_Commands manages a dictionary containing available commands for a POD device.

#### commands

Dictionary containing the available commands for a POD device. Each entry is formatted as { key(command number) : value([command name, number of argument ASCII bytes, number of return bytes, binary flag ) }.

## Type

dict[int,list[str|tuple[int]|bool]]

**AddCommand**(commandNumber: int, commandName: str, argumentBytes: tuple[int], returnBytes: tuple[int], isBinary: bool, description: str)  $\rightarrow$  bool

Adds a command entry to the current commands dictionary (\_\_commands) if the command does not exist.

#### **Parameters**

- **commandNumber** (*int*) Integer of the command number.
- **commandName** (*str*) String of the command's name.
- **argumentBytes** (tuple[int]) Integer of the number of bytes in the argument.
- returnBytes (tuple[int]) Integer of the number of bytes in the return.
- **isBinary** (*bool*) Boolean flag to mark if the command is binary (True) or standard (False).
- **description** (*str*) String description of the command.

#### Returns

True if the command was successfully added, False if the command could not be added because it already exists.

## **Return type**

bool

#### **ArgumentHexChar**( $cmd: int \mid str$ ) $\rightarrow$ tuple[int] | None

Gets the tuple for the number of hex characters in the argument for a given command.

#### **Parameters**

**cmd** (int | str) – Integer command number or string command name.

#### Returns

Tuple representing the number of bytes in the argument for cmd. If the command could not be found, return None.

#### Return type

tuple[int]|None

## **CommandNumberFromName**(name: str) $\rightarrow$ int | None

Gets the command number from the command dictionary using the command's name.

#### **Parameters**

**name** (str) – String of the command's name.

#### Returns

Integer representing the command number. If the command could not be found, return None.

## Return type

int|None

## **Description**( $cmd: int \mid str$ ) $\rightarrow str \mid None$

Gets the description for a given command.

#### **Parameters**

**cmd** (int | str) – Integer command number or string command name.

#### Returns

String description for the command. If the command could not be found, return None.

## Return type

str|None

#### **DoesCommandExist**( $cmd: int \mid str$ ) $\rightarrow$ bool

Checks if a command exists in the \_\_commands dictionary.

#### **Parameters**

**cmd** (int | str) – Integer command number or string command name.

## Returns

True if the command exists, false otherwise.

#### Return type

bool

## **static GetBasicCommands()** → dict[int, list[str | tuple[int] | bool]]

Creates a dictionary containing the basic POD command set (0,1,2,3,4,5,6,7,8,9,10,11,12).

## Returns

Dictionary containing the available commands for this POD device. Each entry is formatted as

{ key(command number) : value([command name, number of argument ASCII bytes, number of return bytes, binary flag, description) }.

## Return type

dict[int,list[str|tuple[int]|bool|str]]

## $\textbf{GetCommands()} \rightarrow dict[int, list[str \mid tuple[int] \mid bool]]$

Gets the contents of the current command dictionary (\_\_commands).

#### **Returns**

Dictionary containing the available commands for a POD device. Each entry is formatted as { key(command number) : value([command name, number of argument ASCII bytes, number of return bytes, binary flag, description) }.

## Return type

dict[int, list[str|tuple[int]|bool|str]]

## **IsCommandBinary**( $cmd: int \mid str$ ) $\rightarrow$ bool | None

Gets the binary flag for a given command.

#### **Parameters**

**cmd** (int | str) – Integer command number or string command name.

#### Returns

Boolean flag that is True if the command is binary and False if standard. If the command could not be found, return None.

#### Return type

bool|None

## static NoValue() $\rightarrow$ int

Gets value of \_\_NOVALUE.

## Returns

Value of \_\_NOVALUE.

#### Return type

int

#### **RemoveCommand**( $cmd: int \mid str$ ) $\rightarrow$ bool

Removes the entry for a given command in \_\_commands dictionary.

#### **Parameters**

**cmd** (int | str) – Integer command number or string command name.

#### Returns

True if the command was successfully removed, False if the command does not exist.

#### Return type

bool

#### **RestoreBasicCommands()** $\rightarrow$ None

Sets the current commands (\_\_commands) to the basic POD command set.

## **ReturnHexChar**( $cmd: int \mid str$ ) $\rightarrow$ tuple[int] | None

Gets the tuple for the number of hex characters in the return for a given command.

## **Parameters**

**cmd** (int | str) – Integer command number or string command name.

#### Returns

Tuple representing the number of hex characters in the return for cmd. If the command could not be found, return None.

## **Return type**

tuple[int]|None

**Search**(*cmd*: *int* | *str*, *idx*: *int* | *None* = *None*)  $\rightarrow$  str | tuple[int] | bool | None

Searches the \_\_commands dictionary for the command.

#### **Parameters**

- **cmd** (*int* / *str*) Integer command number or string command name.
- idx (int, optional) Index for the desired value in the command information list. Defaults to None.

#### Returns

If an idx was given, this returns the idx value of the command information list if the command was found (None otherwise). If no idx is given, this returns true if the command is found (False otherwise).

## Return type

str|tuple[int]|bool|str|None

```
static U16() \rightarrow int
```

Gets value of U16.

#### Returns

Value of \_\_U16.

## Return type

int

static  $U32() \rightarrow int$ 

Gets value of \_\_U32.

#### Returns

Value of \_\_U32.

## Return type

int

static U8()  $\rightarrow$  int

Gets value of U8.

#### Returns

Value of \_\_U8.

## **Return type**

int

#### \_\_ARGUMENTS: int = 1

Class-level integer representing the index key for the number of bytes in an argument for \_\_commands list values.

## $\__BINARY: int = 3$

Class-level integer representing the index key for the binary flag for \_\_commands list values.

## \_\_DESCRIPTION: int = 4

Class-level integer representing the index key for the description for \_\_commands list values.

## $\_$ NAME: int = 0

Class-level integer representing the index key for the command name for \_\_commands list values.

## $\_\_NOVALUE: int = -1$

Class-level integer used to mark when a list item in \_\_commands means 'no value' or is undefined.

## \_\_RETURNS: int = 2

Class-level integer representing the index key for the number of bytes in the return for \_\_commands list values.

## 

Class-level integer representing the number of hexadecimal characters for an unsigned 16-bit value.

## $_{_{U32:}}$ int = 8

Class-level integer representing the number of hexadecimal characters for an unsigned 32-bit value.

#### \_\_U8: int = 2

Class-level integer representing the number of hexadecimal characters for an unsigned 8-bit value.

#### Module contents

## 1.1.1.2 PodApi.Devices package

## **Subpackages**

## PodApi.Devices.SerialPorts package

#### **Submodules**

## PodApi.Devices.SerialPorts.PortAccess module

## class PodApi.Devices.SerialPorts.PortAccess.FindPorts

Bases: object

```
static ChoosePort(forbidden: list[str] = []) \rightarrow str
```

Systems checks user's Operating System, and chooses ports accordingly.

## **Parameters**

**forbidden** (list[str], optional) – List of port names that the user should not use. This may be because these ports are already in use or that the port is not a POD device. Defaults to [].

#### **Returns**

String name of the port.

#### Return type

str

## $\textbf{static GetAllPortNames()} \rightarrow list[str]$

Finds all the available COM ports on the user's computer and appends them to an accessible list.

#### Returns

List containing the names of available COM ports.

## **Return type**

list[str]

## static GetSelectPortNames( $forbidden: list[str] = []) \rightarrow list[str]$

Gets the names of all available ports.

#### **Parameters**

**forbidden** (list[str], optional) – List of port names that the user should not use. This may be because these ports are already in use or that the port is not a POD device. Defaults to [].

#### **Returns**

List of port names.

#### **Return type**

list[str]

## **static \_ChoosePortLinux**( $forbidden: list[str] = []) \rightarrow str$

User picks Serial port in Linux.

#### **Parameters**

**forbidden** (list[str], optional) – List of port names that the user should not use. This may be because these ports are already in use or that the port is not a POD device. Defaults to [].

#### Returns

String name of the port.

## Return type

st

## $\textbf{static \_ChoosePortWindows}(\textit{forbidden: list[str]} = []) \rightarrow \textit{str}$

User picks COM port in Windows.

## **Parameters**

**forbidden** (list[str], optional) – List of port names that the user should not use. This may be because these ports are already in use or that the port is not a POD device. Defaults to [].

#### Returns

String name of the port.

## Return type

str

## PodApi.Devices.SerialPorts.SerialComm module

```
class PodApi.Devices.SerialPorts.SerialComm.PortIO(port: str | int, baudrate: int = 9600)
```

Bases: object

COM\_io handles serial communication (read/write) using COM ports.

#### \_\_serialInst

Instance-level serial COM port.

## **Type**

Serial

## $CloseSerialPort() \rightarrow None$

Closes the instance serial port if it is open.

#### **Flush()** $\rightarrow$ bool

Reset the input and output serial buffer.

#### Returns

True of the buffers are flushed, False otherwise.

#### Return type

bool

#### **GetPortName()** $\rightarrow$ str | None

Gets the name of the open port.

#### **Returns**

If the serial port is open, it will return a string of the port's name. If the port is closed, it will return None.

## Return type

str|None

## **IsSerialClosed()** $\rightarrow$ bool

Returns False if the serial instance port is open, True otherwise.

#### Returns

True if the COM port is closed, False otherwise.

## **Return type**

bool

## $\textbf{IsSerialOpen()} \rightarrow bool$

Returns True if the serial instance port is open, false otherwise.

## Returns

True if the COM port is open, False otherwise.

## Return type

bool

## **OpenSerialPort**(*port*: $str \mid int, baudrate: int = 9600$ ) $\rightarrow$ None

First, it closes the serial port if it is open. Then, it opens a serial port with a set baud rate.

## **Parameters**

- **port** (*str* / *int*) String of the serial port to be opened.
- baudrate (int, optional) Integer baud rate of the opened serial port. Defaults to 9600.

## **Raises**

**Exception** – Port does not exist.

**Read**( $numBytes: int, timeout\_sec: int | float = 5) \rightarrow bytes | None$ 

Reads a specified number of bytes from the open serial port.

## **Parameters**

- **numBytes** (*int*) Integer number of bytes to read.
- **timeout\_sec** (*int|float*, *optional*) Time in seconds to wait for serial data. Defaults to 5.

## **Raises**

**Exception** – Timeout for serial read.

#### Returns

If the serial port is open, it will return a set number of read bytes. If it is closed, it will return None.

## **Return type**

bytes|None

## **ReadLine()** $\rightarrow$ bytes | None

Reads until a new line is read from the open serial port.

#### Returns

If the serial port is open, it will return a complete read line. If closed, it will return None.

## **Return type**

bytes|None

## **ReadUntil**(eol: bytes) $\rightarrow$ bytes | None

Reads until a set character from the open serial port.

#### **Parameters**

**eol** (*bytes*) – end-of-line character.

#### Returns

If the serial port is open, it will return a read line ending in eol. If closed, it will return None.

## **Return type**

bytes|None

## **SetBaudrate**(baudrate: int) $\rightarrow$ bool

Sets the baud rate of the serial port

## **Parameters**

**baudrate** (*int*) – Baud rate, or signals per second.

#### Returns

True if the baudrate was set, False otherwise.

## Return type

bool

## **Write**(message: bytes) $\rightarrow$ None

Write a set message to the open serial port.

#### **Parameters**

**message** (*bytes*) – byte string containing the message to write.

```
__BuildPortName(port: str \mid int) \rightarrow str
```

Converts the port parameter into the "COM"+<number> format for Windows or "/dev/tty..."+<number> for Linux.

## **Parameters**

port (str / int) - Name of a COM port. Can be an integer or string.

#### Returns

Name of the COM port.

## Return type

str

## **Module contents**

#### **Submodules**

## PodApi.Devices.BasicPodProtocol module

```
class PodApi.Devices.BasicPodProtocol.Pod(port: str | int, baudrate: int = 9600)
```

Bases: object

POD\_Basics handles basic communication with a generic POD device, including reading and writing packets and packet interpretation.

## \_port

Instance-level COM\_io object, which handles the COM port

## **Type**

COM\_io

#### commands

Instance-level POD\_Commands object, which stores information about the commands available to this POD device.

## Type

POD\_Commands

## **static ChoosePort**( $forbidden: list[str] = []) \rightarrow str$

Systems checks user's Operating System, and chooses ports accordingly.

#### **Parameters**

**forbidden** (list[str], optional) – List of port names that are already used. Defaults to [].

#### Returns

String name of the port.

## Return type

str

## $\textbf{FlushPort()} \rightarrow bool$

Reset the input and output serial port buffer.

#### Returns

True of the buffers are flushed, False otherwise.

## Return type

bool

## $\textbf{GetDeviceCommands()} \rightarrow dict[int, list[str \mid tuple[int] \mid bool]]$

Gets the dictionary containing the class instance's available POD commands.

#### **Returns**

Dictionary containing the available commands and their information. Formatted as key(command number): value([command name, number of argument ASCII bytes, number of return bytes, binary flag ])

## Return type

dict[int, list[str|tuple[int]|bool]]

**GetPODpacket** (*cmd*:  $str \mid int, payload$ :  $int \mid bytes \mid tuple[int \mid bytes] \mid None = None) \rightarrow bytes$ 

Builds a POD packet and writes it to a POD device via COM port. If an integer payload is give, the method will convert it into a bytes string of the length expected by the command. If a bytes payload is given, it must be the correct length.

#### **Parameters**

- cmd (str | int) Command number.
- payload (int | bytes | tuple[int | bytes], optional) None when there is no payload. If there is a payload, set to an integer value, bytes string, or tuple. Defaults to None.

#### **Raises**

- Exception POD command does not exist.
- **Exception** POD command requires a payload.

#### Returns

Bytes string of the POD packet.

## Return type

bytes

```
static GetU(u: int) \rightarrow int
```

number of hexadecimal characters for an unsigned u-bit value.

#### **Parameters**

**u** (*int*) – 8, 16, or 32 bits. Enter any other number for NOVALUE.

#### Returns

number of hexadecimal characters for an unsigned u-bit value.

## Return type

int

**ReadPODpacket** (validateChecksum: bool = True, timeout\_sec: int | float = 5)  $\rightarrow$  Packet

Reads a complete POD packet, either in standard or binary format, beginning with STX and ending with ETX. Reads first STX and then starts recursion.

#### **Parameters**

- validateChecksum (bool, optional) Set to True to validate the checksum. Set to False to skip validation. Defaults to True.
- **timeout\_sec** (*int* / *float*, *optional*) Time in seconds to wait for serial data. Defaults to 5.

#### Returns

POD packet beginning with STX and ending with ETX. This may be a standard packet, binary packet, or an unformatted packet (STX+something+ETX).

#### Return type

**Packet** 

## $\textbf{SetBaudrate0fDevice}(\textit{baudrate: int}) \rightarrow bool$

If the port is open, it will change the baud rate to the parameter's value.

#### **Parameters**

**baudrate** (*int*) – Baud rate to set for the open serial port.

## Returns

True if successful at setting the baud rate, false otherwise.

#### Return type

bool

**WritePacket**( $cmd: str \mid int, payload: int \mid bytes \mid tuple[int \mid bytes] \mid None = None) <math>\rightarrow PacketStandard$ Builds a POD packet and writes it to the POD device.

#### **Parameters**

- **cmd** (*str* / *int*) Command number.
- payload (int | bytes | tuple[int | bytes], optional) None when there is no payload. If there is a payload, set to an integer value, bytes string, or tuple. Defaults to None.

#### **Returns**

Packet that was written to the POD device.

#### **Return type**

Packet\_Standard

**WriteRead**(*cmd*:  $str \mid int$ , payload:  $int \mid bytes \mid tuple[int \mid bytes] \mid None = None$ , validateChecksum:  $bool = True) \rightarrow bytes$ 

Writes a command with optional payload to POD device, then reads (once) the device response.

#### **Parameters**

- **cmd** (*str* / *int*) Command number.
- payload (int | bytes | tuple[int|bytes], optional) None when there is no payload. If there is a payload, set to an integer value or a bytes string. Defaults to None.
- **validateChecksum** (*bool*, *optional*) Set to True to validate the checksum. Set to False to skip validation. Defaults to True.

## Returns

Bytes string containing a POD packet beginning with STX and ending with ETX. This may be a standard packet, binary packet, or an unformatted packet (STX+something+ETX).

## Return type

bytes

 $_{\tt ReadPODpacket\_Recursive(\it validateChecksum: bool = True) \rightarrow \it Packet}$ 

Reads the command number. If the command number ends in ETX, the packet is returned. Next, it checks if the command is allowed. Then, it checks if the command is standard or binary and reads accordingly, then returns the packet.

#### **Parameters**

**validateChecksum** (*bool*, *optional*) – Set to True to validate the checksum. Set to False to skip validation. Defaults to True.

## Raises

**Exception** – Cannot read an invalid command.

## Returns

POD packet beginning with STX and ending with ETX. This may be a standard packet, binary packet, or an unformatted packet (STX+something+ETX).

#### Return type

Packet | Packet \_ Standard | Packet \_ Binary Standard

## **\_Read\_Binary**( $prePacket: bytes, validateChecksum: bool = True) <math>\rightarrow PacketBinary$

Reads the remaining part of the variable-length binary packet. It first reads the standard packet (prePacket+payload+checksum+ETX). Then it determines how long the binary packet is from the payload of the standard POD packet and reads that many bytes. It then reads to ETX to get the checksum+ETX.

#### **Parameters**

- **prePacket** (*bytes*) Bytes string containing the beginning of a POD packet: STX (1 byte) + command number (4 bytes)
- validateChecksum (bool, optional) Set to True to validate the checksum. Set to False to skip validation. Defaults to True.

#### **Raises**

**Exception** – An exception is raised if the checksum is invalid (only if validateChecksum=True).

#### Returns

Variable-length binary POD packet.

## Return type

Packet\_BinaryStandard

## **\_Read\_GetCommand**(validateChecksum: bool = True) $\rightarrow$ bytes

Reads one byte at a time up to 4 bytes to get the ASCII-encoded bytes command number. For each byte read, it can (1) start the recursion over if an STX is found, (2) returns if ETX is found, or (3) continue building the command number.

#### **Parameters**

**validateChecksum** (*bool*, *optional*) – Set to True to validate the checksum. Set to False to skip validation. Defaults to True.

## Returns

4 byte long string containing the ASCII-encoded command number.

## Return type

bytes

## **\_Read\_Standard**( $prePacket: bytes, validateChecksum: bool = True) <math>\rightarrow PacketStandard$

Reads the payload, checksum, and ETX. Then it builds the complete standard POD packet in bytes.

## **Parameters**

- **prePacket** (*bytes*) Bytes string containing the beginning of a POD packet: STX (1 byte) + command number (4 bytes).
- validateChecksum (bool, optional) Set to True to validate the checksum. Set to False to skip validation. Defaults to True.

## Raises

**Exception** – An exception is raised if the checksum is invalid (only if validateChecksum=True).

#### Returns

Complete standard POD packet.

#### **Return type**

Packet\_Standard

## **\_Read\_ToETX**(validateChecksum: bool = True) $\rightarrow$ bytes

Reads one byte at a time until an ETX is found. It will restart the recursive read if an STX is found anywhere.

#### **Parameters**

**validateChecksum** (*bool*, *optional*) – Set to True to validate the checksum. Set to False to skip validation. Defaults to True.

#### **Returns**

Bytes string ending with ETX.

## Return type

bytes

## static \_ValidateChecksum(msg: bytes) $\rightarrow$ bool

Validates the checksum of a given POD packet. The checksum is valid if the calculated checksum from the data matches the checksum written in the packet.

#### **Parameters**

**msg** (*bytes*) – Bytes message containing a POD packet: STX (1 bytes) + data (? bytes) + checksum (2 bytes) + ETX (1 byte).

#### Returns

True if the checksum is correct, false otherwise.

## Return type

bool

#### Raises

**Exception** – msg does not begin with STX or end with ETX.

## PodApi.Devices.PodDevice 8206HR module

**class** PodApi.Devices.PodDevice\_8206HR.**Pod8206HR**(port: str | int, preampGain: int, baudrate: int = 9600)

Bases: Pod

POD\_8206HR handles communication using an 8206HR POD device.

#### \_preampGain

Instance-level integer (10 or 100) preamplifier gain.

#### Type

int

**ReadPODpacket**( $validateChecksum: bool = True, timeout\_sec: int | float = 5) <math>\rightarrow Packet$ 

Reads a complete POD packet, either in standard or binary format, beginning with STX and ending with ETX. Reads first STX and then starts recursion.

#### **Parameters**

- validateChecksum (bool, optional) Set to True to validate the checksum. Set to False to skip validation. Defaults to True.
- timeout\_sec (int|float, optional) Time in seconds to wait for serial data. Defaults to 5.

#### **Returns**

POD packet beginning with STX and ending with ETX. This may be a standard packet, binary packet, or an unformatted packet (STX+something+ETX).

## Return type

Packet

**\_Read\_Binary**( $prePacket: bytes, validateChecksum: bool = True) <math>\rightarrow PacketBinary4$ 

After receiving the prePacket, it reads the 8 bytes(TTL+channels) and then reads to ETX (checksum+ETX).

#### **Parameters**

- **prePacket** (*bytes*) Bytes string containing the beginning of a POD packet: STX (1 byte) + command number (4 bytes).
- validateChecksum (bool, optional) Set to True to validate the checksum. Set to False to skip validation. Defaults to True.

#### Raises

**Exception** – Bad checksum for binary POD packet read.

#### **Returns**

Binary4 POD packet.

#### **Return type**

Packet\_Binary4

static \_TranslateTTLbyte\_ASCII(ttlByte: bytes)  $\rightarrow$  dict[str, int]

Separates the bits of each TTL (0-3) from a ASCII encoded byte.

#### **Parameters**

**ttlByte** (*bytes*) – One byte string for the TTL (ASCII encoded).

#### Returns

Dictionary of the TTLs. Values are 1 when input, 0 when output.

#### Return type

dict[str,int]

## PodApi.Devices.PodDevice 8229 module

class PodApi.Devices.PodDevice\_8229.Pod8229(port: str | int, baudrate: int = 19200)

Bases: Pod

POD\_8229 handles communication using an 8229 POD device.

**static BuildSetDayScheduleArgument**( $day: str \mid int, hours: list \mid tuple[bool \mid int], speed: int \mid list \mid tuple[int]) <math>\rightarrow$  tuple[int]

Appends the day of the week code to the front of the encoded hourly schedule. this tuple is formatted to be used as the #141 'SET DAY SCHEDULE' argument.

#### **Parameters**

- **day** (*str | int*) Day of the week. Can be either the name of the day (i.e. Sunday, Monday, etc.) or the 0-6 day code (0 for Sunday increacing to 6 for Saturday).
- hours (list | tuple[bool | int]) Array of 24 items. The value is 1 for motor on and 0 for motor off.
- **speed** (int | list | tuple[int]) Speed of the motor (0-100). This is an integer of all hours are the same speed. If there are multiple speeds, this should be an array of 24 items.

## Returns

\_description\_

## Return type

tuple[int]

#### static CodeDayOfWeek(day: str) $\rightarrow$ int

Converts the day of the week to an integer code understandable by the POD device. The day is determined by the first 1-2 characters of the string, which supports multiple abbreviations for days of the week.

#### **Parameters**

day (str) – Day of the week.

#### Raises

**Exception** – Invalid day of the week.

#### Returns

Code for the day of the week. Values are 0-6, with 0 for Saturday, 1 for Monday, ..., and 6 for Saturday.

## Return type

int

## $static\ CodeDaySchedule(hours:\ list\ |\ tuple[bool\ |\ int],\ speed:\ int\ |\ list\ |\ tuple[int]) ightarrow list[int]$

Bitmasks the day schedule to encode the motor on/off status and the motor speed. Use this for getting the command #141 'SET DAY SCHEDULE' U8x24 argument component.

#### **Parameters**

- hours (list | tuple[bool | int]) Array of 24 items. The value is 1 for motor on and 0 for motor off.
- **speed** (*int* | 1*ist* | tuple[*int*]) Speed of the motor (0-100). This is an integer of all hours are the same speed. If there are multiple speeds, this should be an array of 24 items.

#### Returns

List of 24 integer items. The msb is the motor on/off flag and the remaining 7 bits are the speed.

## Return type

list[int]

static DecodeDayAndSchedule(dayschedule: bytes)

```
static DecodeDayOfWeek(day: int) \rightarrow str
```

Converts the integer code for a day of the week to a human-readable string.

#### **Parameters**

**day** (*int*) – Day of the week code must be 0-6.

#### Returns

Day of the week ('Sunday', 'Monday', etc.).

#### Return type

stı

## $static DecodeDaySchedule(schedule: bytes) \rightarrow dict[str, int | tuple[int]]$

Interprets the return bytes from the command #142 'GET DAY SCHEDULE'.

#### **Parameters**

**schedule** (*bytes*) – 24 byte long bitstring with one U8 per hour in a day.

#### Returns

Dictionary with 'Hour' as a tuple of 24 0/1 values (0 is motor off and 1 is motor on) and 'Speed' as the motor speed (0-100). If the motor speed is the same every hour, 'Speed' will be an integer; otherwise, 'Speed' will be a tuple of 24 items.

#### Return type

dict[str,int|tuple[int]]

## **static DecodeLCDSchedule**(*schedule*: *bytes*) → dict[str, str | list[int]]

Interprets the return bytes from the command #202 'LCD SET DAY SCHEDULE'.

#### **Parameters**

**schedule** (*bytes*) – 4 Byte long bitstring. Byte 3 is weekday, Byte 2 is hours 0-7, Byte 1 is hours 8-15, and byte 0 is hours 16-23.

#### Returns

Dictionary with Day as the day of the week, and Hours containing a list of 24 0/1 values (one for each hour). Each bit represents the motor state in that hour, 1 for on and 0 for off.

## Return type

dict[str,int|list[int]]

#### **static GetCurrentTime()** $\rightarrow$ tuple[int]

Gets a tuple to use as the argument for command #140 SET TIME containing values for the current time.

#### Returns

Tuple of 7 integer values. The format is (Seconds, Minutes, Hours, Day, Month, Year (without century, so 23 for 2023), Weekday (0 for Sunday))

#### Return type

tuple[int]

 $ReadPODpacket(validateChecksum: bool = True, timeout\_sec: int | float = 5) \rightarrow PacketStandard$ 

Reads a complete POD packet, either in standard or binary format, beginning with STX and ending with ETX. Reads first STX and then starts recursion.

#### **Parameters**

- **validateChecksum** (*bool*, *optional*) Set to True to validate the checksum. Set to False to skip validation. Defaults to True.
- timeout\_sec (int | float, optional) Time in seconds to wait for serial data. Defaults to 5.

## Returns

POD packet beginning with STX and ending with ETX. This may be a standard packet, binary packet, or an unformatted packet (STX+something+ETX).

#### Return type

Packet

**WritePacket**( $cmd: str \mid int, payload: int \mid bytes \mid tuple[int \mid bytes] \mid None = None) <math>\rightarrow$  bytes Builds a POD packet and writes it to the POD device.

#### **Parameters**

- cmd (str / int) Command number.
- payload (int | bytes | tuple[int | bytes], optional) None when there is no payload. If there is a payload, set to an integer value, bytes string, or tuple. Defaults to None.

## Returns

Bytes string that was written to the POD device.

## Return type

bytes

## static $\_$ CodeDecimalAsHex $(val: int) \rightarrow int$

Builds an integer that equals the val argument when converted into hexadecimal. All integers are converted to hexadecimal ASCII encoded bytes. Some commands (i.e. 8229 #140) need decimal ASCII encoded bytes; to do this, give the return value of \_CodeDecimalAsHex() as the payload. Example: I want a number that is equal to 16 in hex.  $1*16^1 + 6*16^0 = 22$ . Calling \_CodeDecimalAsHex(16) will return 22.

#### **Parameters**

**val** (*int*) – Unsigned integer number.

#### Returns

integer that equals the val argument when converted into hexadecimal.

## Return type

int

## **static \_Custom140SETTIME**(payload: tuple[int]) $\rightarrow tuple[int]$

Custom function to translate the payload for command #140 SET TIME.

#### **Parameters**

**payload** (tuple[int]) – Default translated payload.

#### Returns

Tuple of times.

#### Return type

tuple[int]

#### static \_DecodeDecimalAsHex(val: int) $\rightarrow$ int

Interprets an integer that was converted to a hexadecimal representation of a decimal value. In other words, this method reverses \_CodeDecimalAsHex().

#### **Parameters**

**val** (*int*) – Unsigned integer that was converted to a hexadecimal representation of a decimal value.

#### **Returns**

Unsigned integer as a true decimal number.

#### Return type

int

## **static \_Validate\_Day**( $day: str \mid int$ ) $\rightarrow$ int

Raises an exception if the day is incorrectly formatted. If the day is given as a string, it will be converted to its integer code.

#### **Parameters**

**day** (str / int) – String day of the week or its repsective integer code.

## Raises

- **Exception** The day integer argument must be 0-6.
- **Exception** The day argument must be a str or int.

#### **Returns**

Integer code representing a day of the week.

## **Return type**

int

## **static** \_**Validate\_Hours**(*hours*: *list* | *tuple*[*bool* | *int*]) → list[bool | int]

Raises an exception if the hours is incorrectly formatted. Converts the hours into a list before returning it.

#### **Parameters**

**hours** (list | tuple[bool | int]) – Array with 24 items with values of 1/0 representing each hour

## **Raises**

- **Exception** The hours argument must be a list or tuple.
- **Exception** The hours argument must have exactly 24 items.
- **Exception** The hours items must be 0 or 1.

#### Returns

List with 24 items for each hour. The values are 1/0.

## **Return type**

list[bool|int]

## **static \_Validate\_Schedule**( $schedule: bytes, size: int) \rightarrow bytes$

Raises an exception if the schedule is incorrectly formatted

#### **Parameters**

- **schedule** (*bytes*) Bytes string containing the day schedule.
- **size** (*int*) Number of U8 bytes.

#### Raises

- **Exception** The schedule must be bytes.
- **Exception** The schedule is the incorrect size

## Returns

Same as the schedule argument.

## Return type

bytes

## **static \_Validate\_Speed**( $speed: int \mid list \mid tuple[int]$ ) $\rightarrow list[int]$

Raises an exception if the speed is incorrectly formatted. If an integer speed is given, it will convert it to a list.

## **Parameters**

**speed** (int | list | tuple[int]) – Motor speed (0-100). This can either be an integer or a tuple/list of 24 speeds.

#### Raises

- **Exception** The speed argument must be an int, list, or tuple.
- **Exception** The speed must be between 0 and 100.
- **Exception** The speed argument must have exactly 24 items as a list/tuple.
- **Exception** The speed must be between 0 and 100 for every list/tuple item.

#### **Returns**

List containing 24 motor speeds.

## Return type

list[int]

## PodApi.Devices.PodDevice 8401HR module

```
class PodApi.Devices.PodDevice_8401HR.Pod8401HR(port: str \mid int, ssGain: tuple \mid list \mid dict[str, int \mid None] = \{'A': None, 'B': None, 'C': None, 'D': None\}, preampGain: <math>tuple \mid list \mid dict[str, int \mid None] = \{'A': None, 'B': None, 'C': None, 'D': None\}, baudrate: int = 9600)
```

Bases: Pod

POD\_8401HR handles communication using an 8401-HR POD device.

#### \_ssGain

Instance-level dictionary storing the second-stage gain for all four channels.

#### **Type**

dict[str,int|None]

## \_preampGain

Instance-level dictionary storing the pramplifier gain for all four channels.

## **Type**

dict[str,int|None]

## static CalculateBiasDAC\_GetDACValue(vout: int | float) $\rightarrow$ int

Calculates the DAC value given the output voltage. Used for 'GET/SET BIAS' commands.

#### **Parameters**

```
vout (int | float) – Output voltage (+/- 2.048 V).
```

#### Returns

Integer of the DAC value (16 bit 2's complement).

## Return type

int

## static CalculateBiasDAC\_GetVout(value: int) $\rightarrow$ float

Calculates the output voltage given the DAC value. Used for 'GET/SET BIAS' commands.

#### **Parameters**

```
value (int) – DAC value (16 bit 2's complement).
```

#### **Returns**

Float of the output bias voltage [V].

## Return type

float

## $static DecodeChannelBitmask(channels: bytes) \rightarrow dict[str, int]$

Converts the channel bitmask byte to a dictionary with each channel value. Use for 'GET INPUT GROUND' command payloads.

## **Parameters**

**channels** (*bytes*) – U8 byte containing the channel configuration.

#### Returns

Dictionary with the channels as keys and values as the state. 0=Grounded and 1=Connected to Preamp.

## Return type

dict[str,int]

#### static DecodeSSConfigBitmask(config: bytes)

Converts the SS configuration byte to a dictionary with the high-pass and gain. Use for 'GET SS CONFIG' command payloads.

#### **Parameters**

**config** (*bytes*) – U8 byte containing the SS configuration. Bit 0 = 0 for 0.5Hz Highpass, 1 for DC Highpass. Bit 1 = 0 for 5x gain, 1 for 1x gain.

## **static DecodeTTLByte**(ttlByte: bytes) $\rightarrow$ dict[str, int]

Converts the TTL bytes argument into a dictionary of integer TTL values.

#### **Parameters**

**ttlByte** (*bytes*) – U8 byte containing the TTL bitmask.

#### Returns

Dictinoary with TTL name keys and integer TTL values.

## Return type

dict[str,int]

## **static DecodeTTLPayload**(payload: bytes) $\rightarrow$ tuple[dict[str, int]]

Decodes a paylaod with the two TTL bytes.

#### **Parameters**

**payload** (*bytes*) – Bytes string of the POD packet payload.

#### Returns

Tuple with two TTL dictionaries.

#### **Return type**

tuple[dict[str, int]]

## $static GetChannelBitmask(a: bool, b: bool, c: bool, d: bool) \rightarrow int$

Gets a bitmask, represented by an unsigned integer, used for 'SET INPUT GROUND' command.

#### **Parameters**

- **a** (*bool*) State for channel A, 0=Grounded and 1=Connected to Preamp.
- **b** (*bool*) State for channel B, 0=Grounded and 1=Connected to Preamp.
- **c** (*boo1*) State for channel C, 0=Grounded and 1=Connected to Preamp.
- **d** (*boo1*) State for channel D, 0=Grounded and 1=Connected to Preamp.

#### Returns

Integer representing a bitmask.

## Return type

int

## $static \ GetChannelMapForPreampDevice(preampName: str) \rightarrow dict[str, str] \mid None$

Get the channel mapping (channel labels for A,B,C,D) for a given device.

#### **Parameters**

**preampName** (*str*) – String for the device/sensor name.

## Returns

Dictionary with keys A,B,C,D with values of the channel names. Returns None if the device name does not exist.

## Return type

dict[str,str]|None

## $static GetSSConfigBitmask(gain: int, highpass: float) \rightarrow int$

Gets a bitmask, represented by an unsigned integer, used for 'SET SS CONFIG' command.

#### **Parameters**

- **gain** (*int*) 1 for 1x gain. else for 5x gain.
- **highpass** (*float*) 0 for DC highpass, else for 0.5Hz highpass.

#### Returns

Integer representing a bitmask.

#### Return type

int

## $\textbf{static GetSupportedPreampDevices()} \rightarrow list[str]$

Gets a list of device/sensor names used for channel mapping.

#### **Returns**

List of string names of all supported sensors.

## Return type

list[str]

**static GetTTLbitmask**(
$$ext0$$
:  $bool = 0$ ,  $ext1$ :  $bool = 0$ ,  $ttl4$ :  $bool = 0$ ,  $ttl3$ :  $bool = 0$ ,  $ttl2$ :  $bool = 0$ ,  $ttl1$ :  $bool = 0$ )  $\rightarrow$  int

Builds an integer, which represents a binary mask, that can be used for TTL command arguments.

#### **Parameters**

- ext0 (bool, optional) boolean bit for ext0. Defaults to 0.
- ext1 (bool, optional) boolean bit for ext1. Defaults to 0.
- ttl4 (bool, optional) boolean bit for ttl4. Defaults to 0.
- ttl3 (bool, optional) boolean bit for ttl3. Defaults to 0.
- ttl2 (bool, optional) boolean bit for ttl2. Defaults to 0.
- ttl1 (bool, optional) boolean bit for ttl1. Defaults to 0.

#### **Returns**

Integer number to be used as a bit mask.

## Return type

int

## $static IsPreampDeviceSupported(name: str) \rightarrow bool$

Checks if the argument exists in channel map for all preamp sensors.

#### **Parameters**

**name** (str) – name of the device

#### Returns

True if the name exists in \_\_CHANNELMAPALL, false otherwise.

## Return type

bool

## **ReadPODpacket**( $validateChecksum: bool = True, timeout\_sec: int | float = 5) <math>\rightarrow Packet$

Reads a complete POD packet, either in standard or binary format, beginning with STX and ending with ETX. Reads first STX and then starts recursion.

## **Parameters**

- validateChecksum (bool, optional) Set to True to validate the checksum. Set to False to skip validation. Defaults to True.
- timeout\_sec (int|float, optional) Time in seconds to wait for serial data. Defaults to 5.

#### Returns

POD packet beginning with STX and ending with ETX. This may be a standard packet, binary packet, or an unformatted packet (STX+something+ETX).

## Return type

**Packet** 

WritePacket(cmd:  $str \mid int$ , payload:  $int \mid bytes \mid tuple[int \mid bytes] \mid None = None$ )  $\rightarrow PacketStandard$ Builds a POD packet and writes it to the POD device.

#### **Parameters**

- cmd (str / int) Command number.
- payload (int | bytes | tuple[int | bytes], optional) None when there is no payload. If there is a payload, set to an integer value, bytes string, or tuple. Defaults to None.

#### Returns

Packet that was written to the POD device.

## Return type

Packet\_Standard

**static** \_FixABCDtype(info: tuple | list | dict, thisIs:  $str = ") \rightarrow dict$ 

Converts the info argument into a dictionary with A, B, C, and D as keys.

## **Parameters**

- **info** (tuple | list | dict) Variable to be converted into a dictionary.
- **thisIs** (*str*, *optional*) Description of the info argument, which is used in Exception statements. Defaults to ''.

## Raises

- Exception The dictionary has improper keys; keys must be ['A','B','C','D'].
- **Exception** The argument must have only four values.
- **Exception** The argument must be a tuple, list, or dict.

#### **Returns**

The info argument converted to a dictionary with A, B, C, and D as keys.

#### Return type

dict

**\_Read\_Binary**(prePacket: bytes, validateChecksum: bool = True)

After receiving the prePacket, it reads the 23 bytes (binary data) and then reads to ETX.

#### **Parameters**

- **prePacket** (*bytes*) Bytes string containing the beginning of a POD packet: STX (1 byte) + command number (4 bytes).
- validateChecksum (bool, optional) Set to True to validate the checksum. Set to False to skip validation. Defaults to True.

#### **Raises**

**Exception** – Bad checksum for binary POD packet read.

## $static _ValidatePreampGain(preampGain: dict) \rightarrow None$

Checks that the preamplifier gain dictionary has proper values (10, 100, or None).

#### **Parameters**

**preampGain** (*dict*) – preamplifier gain dictionary.

#### Raises

**Exception** – EEG/EMG preampGain must be 10 or 100. For biosensors, the preampGain is None.

## static \_ValidateSsGain(ssgain: dict)

Checks that the second stage gain dictionary has proper values (1, 5, or None).

#### **Parameters**

**ssgain** (*dict*) – Second stage gain dictionary.

#### Raises

**Exception** – The ssGain must be 1 or 5; set ssGain to None if no-connect.

```
__CHANNELMAPALL: dict[str, dict[str, str]] = {'8406-2BIO': {'A': 'Bio1', 'B': 'Bio2', 'C': 'NC', 'D': 'NC'}, '8406-BIO': {'A': 'Bio', 'B': 'NC', 'C': 'NC', 'D': 'NC'}, '8406-EEG2BIO': {'A': 'Bio1', 'B': 'EEG1', 'C': 'EMG', 'D': 'Bio2'}, '8406-SE': {'A': 'Bio', 'B': 'EEG1', 'C': 'EMG', 'D': 'EEG2'}, '8406-SE3': {'A': 'Bio', 'B': 'EEG1', 'C': 'EEG3', 'D': 'EEG2'}, '8406-SE31M': {'A': 'EEG1', 'C': 'EEG1', 'C': 'EEG3', 'D': 'EEG2'}, '8406-SE4': {'A': 'EEG4', 'B': 'EEG1', 'C': 'EEG3', 'D': 'EEG2'}, '8406-SL': {'A': 'Bio', 'B': 'EEG1', 'C': 'EMG', 'D': 'EEG2'}, '8407-SE': {'A': 'Bio', 'B': 'EEG1', 'C': 'EMG', 'D': 'EEG2'}, '8407-SE-2BIO': {'A': 'Bio1', 'B': 'Bio2', 'C': 'EMG', 'D': 'EEG2'}, '8407-SE3': {'A': 'Bio', 'B': 'EEG1', 'C': 'EMG', 'D': 'EEG3', 'B': 'EEG1', 'C': 'EMG', 'D': 'EEG2'}, '8407-SL': {'A': 'Bio', 'B': 'EEG1', 'C': 'EMG', 'D': 'EEG2'}, '8407-SL': {'A': 'Bio', 'B': 'EEG1', 'C': 'EMG', 'D': 'EEG2'}, '8407-SL': {'A': 'Bio', 'B': 'EEG1', 'C': 'EMG', 'D': 'EEG2'}, '8407-SL': {'A': 'Bio', 'B': 'EEG1', 'C': 'EMG', 'D': 'EEG2'}, '8407-SL': {'A': 'Bio', 'B': 'EEG1', 'C': 'EMG', 'D': 'EEG2'}, '8407-SL': {'A': 'Bio', 'B': 'EEG1', 'C': 'EMG', 'D': 'EEG2'}, '8407-SL': {'A': 'Bio', 'B': 'EEG1', 'C': 'EMG', 'D': 'EEG2'}, '8407-SL': {'A': 'Bio', 'B': 'EEG1', 'C': 'EMG', 'D': 'EEG2'}, '8407-SL': {'A': 'Bio', 'B': 'EEG1', 'C': 'EMG', 'D': 'EEG2'}, '8407-SL': {'A': 'Bio', 'B': 'EEG1', 'C': 'EMG', 'D': 'EEG2'}, '8407-SL': {'A': 'Bio', 'B': 'EEG1', 'C': 'EMG', 'D': 'EEG2'}}
```

Class-level dictionary containing the channel map for all preamplifier devices.

## PodApi.Devices.PodDevice 8480SC module

```
class PodApi.Devices.PodDevice_8480SC.Pod8480SC(port: str | int, baudrate: int = 9600)
```

Bases: Pod

POD 8480SC handles communication using an 8480-SC POD device.

#### static DecodeStimulusConfigBits(config: int) $\rightarrow$ dict

Converts an integer into 3 values, representing 3 individual bits of the Stimulus Config Bits.

#### **Parameters**

**config** (int) – an integer is passed in, and it represents the Config Flag byte.

#### Returns

Keys as the names of the bits, the values representing values at each bit.

#### Return type

dict

#### static DecodeSyncConfigBits(config: int) $\rightarrow$ dict

Converts an integer into 3 values, representing 3 individual bits of the Sync Config Bits.

#### **Parameters**

**config** (int) – an integer is passed in, and it represents the Sync Config Flag byte.

#### Returns

Keys as the names of the bits, the values representing values at each bit.

#### Return type

dict

## static DecodeTTlConfigBits(config: int) $\rightarrow$ dict

Converts an interger into 3 values, representing 3 individual bits of the TTL Config Bits.

#### **Parameters**

**config** (int) – an integer is passed in, and it represents the TTL Setup Config Flag Byte.

#### Returns

Keys as the names of the bits, the values representing values at each bit.

## Return type

dict

## **ReadPODpacket**( $validateChecksum: bool = True, timeout\_sec: int | float = 5) <math>\rightarrow PacketStandard$

Reads a complete POD packet, either in standard or binary format, beginning with STX and ending with ETX. Reads first STX and then starts recursion.

#### **Parameters**

- validateChecksum (bool, optional) Set to True to validate the checksum. Set to False to skip validation. Defaults to True.
- **timeout\_sec** (*int|float*, *optional*) Time in seconds to wait for serial data. Defaults to 5.

#### **Returns**

POD packet beginning with STX and ending with ETX. This may be a standard packet, binary packet, or an unformatted packet (STX+something+ETX).

## Return type

Packet

## static StimulusConfigBits(optoElec: bool, monoBiphasic: bool, Simul: bool) → int

Incoming inputs are bitmasked into an integer value. This value is later given as part of a payload to command #102 'SET STIMULUS'.

#### **Parameters**

- **optoElec** (*bool*) Bit is Opto/Electrical.
- monoBiphasic (bool) Bit 1 is Monophasic/Biphasic.
- Simul (boo1) Bit 2 is Simultaneous.

#### Returns

which represents the Config flag byte in the Stimulus Command. The return value is the seventh item in the payload for command 'SET STIMULUS'.

## Return type

int

**static SyncConfigBits**( $sync\_level: bool, sync\_idle: bool, signal\_trigger: bool) <math>\rightarrow$  int

Incoming inputs are bitmasked into an integer value. This value is later given as the payload to command #127 'SET SYNC CONFIG'.

#### **Parameters**

- **sync\_level** (*bool*) Bit 0 is Sync Level.
- sync\_idle (bool) Bit 1 is Stimulus Triggering.
- **signal\_trigger** (boo1) Bit 2 is Signal/Trigger.

#### Returns

which represents the Sync Config Bits format value.

## Return type

int

**static TtlConfigBits**( $trigger: bool, stimtrig: bool, input\_sync: bool) <math>\rightarrow$  int

Incoming inputs are bitmasked into an integer value. This value is later given as part of the payload to command #109 'SET TTL SETUP'. This commands accepts 3 items in the payload, and the return value of this function is given as the second item.

#### **Parameters**

- **trigger** (*bool*) Bit 0 is 0 for rising edge, 1 for falling edge.
- **stimtrig** (boo1) Bit 1 is 0 for TTL event notifications, 1 for TTL inputs as triggers.
- **input\_sync** (*boo1*) Bit 7 is 0 for normal TTL operation, 1 for TTL pin operates as a sync output.

#### **Returns**

which represents the TTL Config Bits Format value.

## Return type

int

**WritePacket**( $cmd: str \mid int, payload: int \mid bytes \mid tuple[int \mid bytes] \mid None = None) <math>\rightarrow PacketStandard$ Builds a POD packet and writes it to the POD device.

## **Parameters**

- **cmd** (*str* / *int*) Command number.
- payload (int | bytes | tuple[int | bytes], optional) None when there is no payload. If there is a payload, set to an integer value, bytes string, or tuple. Defaults to None.

## Returns

Packet that was written to the POD device.

## Return type

Packet\_Standard

## $\textbf{static \_Custom108GETTTLSETUP}(\textit{payload: bytes}) \rightarrow tuple[int \mid dict]$

Custom function to translate the TTL setup for command #108 GET TTL SETUP.

## **Parameters**

**payload** (*bytes*) – Bytes string of the POD packet payload.

## Returns

Tuple of the TTL setup.

#### **Return type**

tuple[int|dict]

## **static** \_Custom109SETTTLSETUP(payload: bytes) $\rightarrow$ tuple[int | dict]

Custom function to translate the TTL setup for command #109 SET TTL SETUP.

#### **Parameters**

**payload** (*bytes*) – Bytes string of the POD packet payload.

#### Returns

Tuple of the TTL setup.

#### **Return type**

tuple[int|dict]

 $\begin{array}{l} \textbf{static \_CustomSTIMULUS}(\textit{payload: bytes, defaultPayload: tuple}) \rightarrow \textbf{tuple} \\ \textbf{\_summary\_} \end{array}$ 

#### **Parameters**

- payload (bytes) Bytes string of the POD packet payload.
- **defaultPayload** (*tuple*) Default translated payload.

#### Returns

Tuple of the translated stimulus payload.

## Return type

tuple

## static \_CustomSYNCCONFIG(payload: bytes) $\rightarrow$ dict

Custom function to translate the sync config.

#### **Parameters**

**payload** (*bytes*) – Bytes string of the POD packet payload.

#### **Returns**

Keys as the names of the bits, the values representing values at each bit.

## Return type

dict

#### Module contents

## 1.1.1.3 PodApi.Packets package

## **Submodules**

## PodApi.Packets.Binary module

**class** PodApi.Packets.Binary.**PacketBinary**(pkt: bytes, commandSet | None = None)

Bases: Packet

Container class that stores a standard binary command packet for a POD device. The format is STX (1 byte) + command number (4 bytes) + length of binary (4 bytes) + checksum (2 bytes) + ETX (1 bytes) + binary (LENGTH bytes) + checksum (2 bytes) + ETX (1 bytes)

## binaryLength

Number of bytes of binary data from the packet.

## Type

bytes

## binaryData

Variable length binary datafrom the packet.

## **Type**

bytes

## **BinaryLength()** $\rightarrow$ int

Translate the binary ASCII encoding of the binary data length into a readable integer

#### Returns

Integer of the binary data length.

## Return type

int

## static CheckIfPacketIsValid(msg: bytes)

Raises an Exception if the packet is incorrectly formatted.

#### **Parameters**

**msg** (*bytes*) – Bytes string containing a POD packet. Should begin with STX and end with ETX.

#### Raises

- Exception Packet is too small to be a standard packet.
- Exception A standard binary packet must have an ETX before the binary bytes.

## **GetBinaryData()** $\rightarrow$ bytes

Gets the binary data from a POD packet.

#### **Parameters**

pkt (bytes) – Bytes string containing a POD packet.

## Returns

Bytes string containg binary data.

## Return type

bytes

## static GetBinaryLength(pkt: bytes) $\rightarrow$ bytes

Gets the length, or number of bytes, of the binary data in a POD packet.

## **Parameters**

**pkt** (*bytes*) – Bytes string containing a POD packet.

#### Returns

Bytes string of the length of the binary data.

#### Return type

bytes

## $static GetMinimumLength() \rightarrow int$

Gets the number of bytes in the smallest possible packet; STX (1 byte) + something + ETX (1 byte).

#### Returns

integer representing the minimum length of a binary POD command packet. Format is STX (1 byte) + command number (4 bytes) + length of binary (4 bytes) + checksum (2 bytes) + ETX (1 bytes) + binary (LENGTH bytes) + checksum (2 bytes) + ETX (1 bytes)

## Return type

int

## $\textbf{TranslateAll()} \rightarrow dict[str, Any]$

Builds a dictionary containing all parts of the POD packet in readable values.

#### Returns

Dictionary with the command number, binary packet length, and binary data.

## Return type

dict[str,Any]

## **UnpackAll()** $\rightarrow$ dict[str, bytes]

Builds a dictionary containing all parts of the POD packet in bytes.

#### Returns

Dictionary with the command number, binary packet length, and binary data.

## Return type

dict[str,bytes]

## PodApi.Packets.Binary4 module

```
class PodApi.Packets.Binary4.PacketBinary4(pkt: bytes, preampGain: int, commands: CommandSet |
    None = None)
```

Bases: Packet

Container class that stores a binary4 command packet for a POD device. The format is STX (1 byte) + command (4 bytes) + packet number (1 byte) + TTL (1 byte) + CH0 (2 bytes) + CH1 (2 bytes) + CH2 (2 bytes) + checksum (2 bytes) + ETX (1 byte).

#### \_preampGain

Preamplifier gain. This should be 10 or 100 for an 8206-HR device.

## Type

int

## packetNumber

Packet number for this POD packet.

## **Type**

bytes

ttl

TTL data for this packet.

#### Type

bytes

#### ch0

channel 0 data for this packet.

#### **Type**

bytes

#### ch1

channel 1 data for this packet.

## **Type**

bytes

#### ch2

channel 2 data for this packet.

## **Type**

bytes

## static BinaryBytesToVoltage(value: bytes, preampGain: int) $\rightarrow$ float

Converts a binary bytes value read from POD device and converts it to the real voltage value at the preamplifier input.

#### **Parameters**

**value** (*bytes*) – Bytes string containing voltage measurement.

#### Returns

A number containing the voltage in Volts [V].

## Return type

float

## **Ch**(n: int) $\rightarrow$ float

Translates the binary channel n bytes into a voltage.

#### **Parameters**

**n** (*int*) – Channel number. Should be 0, 1, or 2.

## Raises

**Exception** – Channel does not exist.

#### Returns

Voltage of channel n in Volts.

## Return type

float

## static CheckIfPacketIsValid(msg: bytes)

Raises an Exception if the packet is incorrectly formatted.

#### **Parameters**

**msg** (*bytes*) – Bytes string containing a POD packet. Should begin with STX and end with ETX.

## Raises

**Exception** – Packet the wrong size to be a binary4 packet.

## $\textbf{static GetBinaryLength()} \rightarrow int$

Gets the number of bytes of binary data in a binary4 packet.

#### Returns

Integer representing the number of binary encoded bytes in a binary4 packet.

## Return type

int

## **static GetCh**(n: int, pkt: bytes) $\rightarrow$ bytes

Gets the channel n bytes from a POD packet.

#### **Parameters**

- **n** (int) Channel number. Should be 0, 1, or 2.
- **pkt** (*bytes*) Bytes string containing a POD packet. Should begin with STX and end with ETX.

#### Returns

Bytes string of the channel 0 data.

## Return type

bytes

#### **Returns**

Channel does not exist.

#### Return type

bytes

## static GetMinimumLength() $\rightarrow$ int

Gets the number of bytes in the smallest possible binary4 packet; STX (1 byte) + command (4 bytes) + packet number (1 byte) + TTL (1 byte) + CH0 (2 bytes) + CH1 (2 bytes) + CH2 (2 bytes) + checksum (2 bytes) + ETX (1 byte).

#### Returns

Integer representing the minimum length of a binary4 POD packet.

## Return type

int

## static GetPacketNumber(pkt: bytes) $\rightarrow$ bytes

Gets the packet number in bytes from a POD packet.

## **Parameters**

**pkt** (*bytes*) – Bytes string containing a POD packet. Should begin with STX and end with ETX.

#### **Returns**

Bytes string of the packet number.

#### Return type

bytes

## **static GetTTL**(pkt: bytes) $\rightarrow$ bytes

Gets the TTL bytes from a POD packet

#### **Parameters**

**pkt** (*bytes*) – Bytes string containing a POD packet. Should begin with STX and end with ETX.

## Returns

Bytes string of the TTL data.

## Return type

bytes

## $PacketNumber() \rightarrow int$

Translates the binary packet number into a readable integer.

## Returns

Integer of the packet number.

## Return type

int

## **TranslateAll()** $\rightarrow$ dict[str, Any]

Builds a dictionary containing all parts of the POD packet in readable values.

#### Returns

Dictionary with the command number, packet number, TTL and channels 0, 1, and 2.

#### Return type

dict[str, Any]

## static TranslateBinaryTTLbyte(ttlByte: bytes) $\rightarrow$ dict[str, int]

Separates the bits of each TTL (0-3) from a binary encoded byte.

#### **Parameters**

**ttlByte** (*bytes*) – One byte string for the TTL (binary encoded).

#### Returns

Dictionary of the TTLs. Values are 1 when input, 0 when output.

## Return type

dict[str,int]

## $\textbf{Ttl()} \rightarrow dict[str, int]$

Translates the binary TTL bytes into a dictionary containing each TTL value.

#### Returns

Dictionary with TTL name keys and TTL data as values.

## Return type

dict[str,int]

## **UnpackAll()** $\rightarrow$ dict[str, bytes]

Builds a dictionary containing all parts of the POD packet in bytes.

## Returns

Dictionary with the command number, packet number, TTL and channels 0, 1, and 2.

## Return type

dict[str,bytes]

## PodApi.Packets.Binary5 module

Bases: Packet

Container class that stores a binary5 command packet for a POD device. The format is STX (1 byte) + command (4 bytes) + packet number (1 byte) + status (1 byte) + channels (9 bytes) + AEXT0 (2 bytes) + AEXT1 (2 bytes) + ATTL1 (2 bytes) + ATTL2 (2 bytes) + ATTL2 (2 bytes) + ATTL4 (2 bytes) + checksum (2 bytes) + EXT (1 byte)

## \_ssGain

Dictionary with A, B, C, D keys and second stage gain values (1, 5, or None).

## **Type**

dict[str,int|None]

```
_preampGain
     Dictionary with A, B, C, D keys and preamplifier gain values (10, 100, or None).
         Type
             dict[str,int|None]
packetNumber
     Packet number for this POD packet.
         Type
             bytes
status
     Status for this POD packet.
         Type
             bytes
channels
     channel A, B, C, and D data for this POD packet.
         Type
             bytes
aEXT0
     Analog EXT0 data for this POD packet.
         Type
             bytes
aEXT1
     Analog EXT1 data for this POD packet.
         Type
             bytes
aTTL1
     Analog TTL1 data for this POD packet.
         Type
             bytes
aTTL2
     Analog TTL2 data for this POD packet.
         Type
             bytes
aTTL3
     Analog TTL3 data for this POD packet.
         Type
             bytes
aTTL4
     Analog TTL4 data for this POD packet.
         Type
```

bytes

## **AnalogEXT**(n: int) $\rightarrow$ float

Translates the analog EXT value into a voltage.

#### **Parameters**

**n** (*int*) – Analog EXT number. Should be 0 or 1.

#### Raises

**Exception** – AEXT does not exist.

#### Returns

Analog EXT voltage in volts (V).

## Return type

float

## **AnalogTTL**(n: int) $\rightarrow$ float

Translates the analog TTL value into a voltage.

#### **Parameters**

**n** (*int*) – Analog TTL number. Should be 1, 2, 3, or 4.

#### Raises

**Exception** – ATTL does not exist.

#### Returns

Analog TTL voltage in volts (v).

### Return type

float

## **Channel** (c: str) $\rightarrow$ float

Translates the channel data into a voltage.

## **Parameters**

**c** (str) – Channel character. Should be A, B, C, or D.

#### Raises

**Exception** – Channel does not exist.

#### Returns

Voltage of the channel in volts (V).

## Return type

float

## static CheckIfPacketIsValid(msg: bytes)

Raises an Exception if the packet is incorrectly formatted.

#### **Parameters**

**msg** (*bytes*) – Bytes string containing a POD packet. Should begin with STX and end with ETX.

#### Raises

**Exception** – Packet the wrong size to be a binary5 packet.

## **static GetAnalogEXT**(n: int, pkt: bytes) $\rightarrow$ bytes

Gets the analog EXT from a POD packet.

## **Parameters**

• **n** (*int*) – Analog EXT number. Should be 0 or 1.

• **pkt** (*bytes*) – Bytes string containing a POD packet. Should begin with STX and end with ETX.

#### Raises

**Exception** – AEXT does not exist.

#### Returns

Bytes string of the AEXT.

### Return type

bytes

## **static GetAnalogTTL**(n: int, pkt: bytes) $\rightarrow$ bytes

Gets the analog TTL from a POD packet.

## **Parameters**

- **n** (*int*) Analog TTL number. Should be 1, 2, 3, or 4.
- **pkt** (*bytes*) Bytes string containing a POD packet. Should begin with STX and end with ETX.

#### Raises

**Exception** – ATTL does not exist.

#### Returns

Bytes string of the ATTL.

## Return type

bytes

## static GetBinaryLength() $\rightarrow$ int

Gets the number of bytes of binary data in a binary5 packet.

#### Returns

Integer representing the number of binary encoded bytes in a binary5 packet.

## Return type

int

## static GetChannels(pkt: bytes) $\rightarrow$ bytes

Gets the channel bytes for channels A, B, C, and D together from a POD packet.

## **Parameters**

**pkt** (*bytes*) – Bytes string containing a POD packet. Should begin with STX and end with ETX.

#### Returns

Bytes string of the channels A, B, C, and D together.

## Return type

bytes

## static GetMinimumLength() $\rightarrow$ int

Gets the number of bytes in the smallest possible binary4 packet; STX (1 byte) + command (4 bytes) + packet number (1 byte) + status (1 byte) + channels (9 bytes) + AEXT0 (2 bytes) + AEXT1 (2 bytes) + ATTL1 (2 bytes) + EXT (1 byte)

## Returns

Integer representing the minimum length of a binary5 POD packet.

## Return type

int

## static GetPacketNumber(pkt: bytes) $\rightarrow$ bytes

Gets the packet number in bytes from a POD packet.

#### **Parameters**

**pkt** (*bytes*) – Bytes string containing a POD packet. Should begin with STX and end with ETX.

#### Returns

Bytes string of the packet number.

## Return type

bytes

## **static GetStatus**(pkt: bytes) $\rightarrow$ bytes

Gets the status value in bytes from a POD packet.

#### **Parameters**

**pkt** (bytes) – Bytes string containing a POD packet. Should begin with STX and end with ETX.

#### Returns

Bytes string of the status.

### **Return type**

bytes

#### $PacketNumber() \rightarrow int$

Translates the binary packet number into a readable integer.

## Returns

Integer of the packet number.

## **Return type**

int

### $Status() \rightarrow int$

Translates the binary status value into a readable integer

## Returns

Integer status value.

## Return type

int

## **TranslateAll()** $\rightarrow$ dict[str, Any]

Builds a dictionary containing all parts of the POD packet in readable values.

## Returns

Dictionary with the command number, packet number, status, channels, analog EXT, and analog TTL.

## Return type

dict[str, bytes]

## **UnpackAll()** $\rightarrow$ dict[str, bytes]

Builds a dictionary containing all parts of the POD packet in bytes.

#### Returns

Dictionary with the command number, packet number, status, channels, analog EXT, and analog TTL.

## Return type

dict[str, bytes]

static \_Voltage\_PrimaryChannels( $value: int, ssGain: int \mid None = None, PreampGain: int \mid None = None) <math>\rightarrow$  float

Converts a value to a voltage for a primary channel.

#### **Parameters**

- **value** (*int*) Value to be converted to voltage.
- ssGain (int | None, optional) Second stage gain. Defaults to None.
- **PreampGain** (int | None, optional) Preamplifier gain. Defaults to None.

### Returns

Number of the voltage in volts [V]. Returns value if no gain is given (no-connect).

## **Return type**

float

 $static _Voltage_PrimaryChannels_Biosensor(value: int, ssGain: int) \rightarrow float$ 

Converts a value to a voltage for a biosensor primary channel.

#### **Parameters**

- **value** (*int*) Value to be converted to voltage.
- **ssGain** (*int*) Second stage gain.

### **Returns**

Number of the voltage in volts [V].

## Return type

float

static \_Voltage\_PrimaryChannels\_EEGEMG( $value: int, ssGain: int, PreampGain: int) \rightarrow float$  Converts a value to a voltage for an EEG/EMG primary channel.

## **Parameters**

- **value** (*int*) Value to be converted to voltage.
- **ssGain** (*int*) Second stage gain.
- **PreampGain** (int) Preamplifier gain.

## Returns

Number of the voltage in volts [V].

## **Return type**

float

## $\textbf{static \_Voltage\_SecondaryChannels}(\textit{value: int}) \rightarrow \text{float}$

Converts a value to a voltage for a secondary channel.

### **Parameters**

**value** (*int*) – Value to be converted to voltage.

## Returns

Number of the voltage in volts [V].

## Return type

float

### PodApi.Packets.Packet module

**class** PodApi.Packets.Packet.Packet(pkt: bytes, commands: CommandSet | None = None)

Bases: object

Container class that stores a command packet for a POD device. The format is STX (1 byte) + command number (4 bytes) + data (? bytes) + ETX (1 byte). This class also collection of methods for creating and interpreting POD packets.

## \_commands

Available commands for a POD device.

#### **Type**

POD\_Commands | None

#### rawPacket

Bytes string containing a POD packet. Should begin with STX and end with ETX.

### **Type**

bytes

#### commandNumber

Command number from the Pod packet.

#### **Type**

bytes | None

**static ASCIIbytesToInt\_Split**( $msg: bytes, keepTopBits: int, cutBottomBits: int) <math>\rightarrow$  int

Converts a specific bit range in an ASCII-encoded bytes object to an integer.

#### **Parameters**

- msg (bytes) Bytes message holding binary information to be converted into an integer.
- **keepTopBits** (*int*) Integer position of the msb of desired bit range.
- **cutBottomBits** (*int*) Integer number of lsb to remove.

#### Returns

Integer result from the ASCII-encoded bytes message in a given bit range.

### Return type

int

## **static AsciiBytesToInt**( $msg\_b$ : bytes, signed: bool = False) $\rightarrow$ int

Converts a ASCII-encoded bytes message into an integer. It does this using a base-16 conversion. If the message is signed and the msb is '1', the integer will be converted to it's negative 2's complement.

### **Parameters**

- msg\_b (bytes) Bytes message to be converted to an integer. The bytes must be base-16 or the conversion will fail.
- **signed** (*bool*, *optional*) True if the message is signed, false if unsigned. Defaults to False.

#### Returns

Integer result from the ASCII-encoded byte conversion.

## Return type

int

**static BinaryBytesToInt**( $msg: bytes, byteorder: str = 'big', signed: bool = False) <math>\rightarrow$  int Converts binary-encoded bytes into an integer.

#### **Parameters**

- msg (bytes) Bytes message holding binary information to be converted into an integer.
- **byteorder** (*str*, *optional*) Ordering of bytes. 'big' for big endian and 'little' for little endian. Defaults to 'big'.
- **signed** (*bool*, *optional*) Boolean flag to mark if the msg is signed (True) or unsigned (False). Defaults to False.

#### Returns

Integer result from the binary-encoded bytes message.

## Return type

int

**static BinaryBytesToInt\_Split**( $msg: bytes, keepTopBits: int, cutBottomBits: int, byteorder: <math>str = 'big', signed: bool = False) \rightarrow int$ 

Converts a specific bit range in a binary-encoded bytes object to an integer.

#### **Parameters**

- msg (bytes) Bytes message holding binary information to be converted into an integer.
- **keepTopBits** (*int*) Integer position of the msb of desired bit range.
- **cutBottomBits** (*int*) Integer number of lsb to remove.
- **byteorder** (*str*, *optional*) Ordering of bytes. 'big' for big endian and 'little' for little endian. Defaults to 'big'.
- **signed** (*bool*, *optional*) Boolean flag to mark if the msg is signed (True) or unsigned (False). Defaults to False.

#### **Returns**

Integer result from the binary-encoded bytes message in a given bit range.

#### Return type

int

**static BuildPODpacket\_Standard**(commandNumber: int, payload: bytes | None = None) → bytes
Builds a standard POD packet as bytes: STX (1 byte) + command number (4 bytes) + optional packet (? bytes) + checksum (2 bytes)+ ETX (1 bytes).

#### **Parameters**

- **commandNumber** (*int*) Integer representing the command number. This will be converted into a 4 byte long ASCII-encoded bytes string.
- payload (bytes | None, optional) bytes string containing the payload. Defaults to None.

#### Returns

Bytes string of a complete standard POD packet.

## Return type

bytes

## static CheckIfPacketIsValid(msg: bytes)

Raises an Exception if the packet is incorrectly formatted.

### **Parameters**

**msg** (*bytes*) – Bytes string containing a POD packet. Should begin with STX and end with ETX.

#### Raises

- Exception Packet must begin with STX.
- Exception Packet must end in ETX

#### **static Checksum**(*bytesIn: bytes*) $\rightarrow$ bytes

Calculates the checksum of a given bytes message. This is achieved by summing each byte in the message, inverting, and taking the last byte.

#### **Parameters**

**bytesIn** (*bytes*) – Bytes message containing POD packet data.

#### Returns

Two ASCII-encoded bytes containing the checksum for bytesIn.

## Return type

bytes

## $CommandNumber() \rightarrow int$

Translate the binary ASCII encoding into a readable integer

#### Returns

Integer of the command number.

## Return type

int

## $\textbf{static ETX()} \rightarrow bytes$

Get end-of-transmission (ETX) character in bytes. ETX marks the end byte of a POD Packet.

### Returns

Bytes for ETX(0x03).

## Return type

bytes

## $\textbf{static GetCommandNumber}(\textit{pkt: bytes}) \rightarrow \text{bytes} \mid \text{None}$

Gets the command number bytes from a POD packet.

## **Parameters**

**pkt** (*bytes*) – Bytes string containing a POD packet. Should begin with STX and end with ETX.

### Returns

Bytes string of the command number, if available.

## **Return type**

bytes|None

## static GetMinimumLength() $\rightarrow$ int

Gets the number of bytes in the smallest possible packet; STX (1 byte) + something + ETX (1 byte).

### Returns

integer representing the minimum length of a generic bytes string.

## Return type

int

#### $HasCommandNumber() \rightarrow bool$

Checks if the packet has a command number.

#### Returns

True if the packet has a command number, False otherwise.

### Return type

bool

#### $HasCommands() \rightarrow bool$

Checks if the Packet instance has commands set.

#### Returns

True if the commands have been set, false otherwise.

### Return type

bool

## **static IntToAsciiBytes**(value: int, numChars: int) $\rightarrow$ bytes

Converts an integer value into ASCII-encoded bytes.

First, it converts the integer value into a usable uppercase hexadecimal string. Then it converts the ASCII code for each character into bytes. Lastly, it ensures that the final message is the desired length.

Example: if value=2 and numBytes=4, the returned ASCII will show b'0002', which is '0x30 0x30 0x30 0x32' in bytes. Uses the 2's complement if the val is negative.

#### **Parameters**

- **value** (*int*) Integer value to be converted into ASCII-encoded bytes.
- numChars (int) Number characters to be the length of the ASCII-encoded message.

### **Returns**

Bytes that are ASCII-encoded conversions of the value parameter.

### Return type

bytes

**static PayloadToBytes**(payload:  $int \mid bytes \mid tuple[int \mid bytes]$ , argSizes: tuple[int])  $\rightarrow$  bytes Converts a payload into a bytes string.

## **Parameters**

- payload (int | bytes | tuple[int | bytes]) Integer, bytes, or tuple containing the payload.
- **argSizes** (tuple[int]) Tuple of the argument sizes.

### **Raises**

- Exception Payload requires multiple arguments, use a tuple.
- **Exception** Payload is the wrong size.
- **Exception** Payload has an incorrect number of items.
- Exception Payload has invalid values.
- **Exception** Payload is an invalid type.

## Returns

Bytes string of the payload.

## Return type

bytes

## **static STX()** $\rightarrow$ bytes

Get start-of-transmission (STX) character in bytes. STX marks the starting byte of a POD Packet.

#### Returns

Bytes for STX (0x02).

### Return type

bytes

## **TranslateAll()** $\rightarrow$ dict[str, Any]

Builds a dictionary containing all parts of the POD packet in readable values.

#### Raises

**Exception** – Nothing to translate.

## Returns

Dictionary with the command number.

## **Return type**

dict[str,Any]

## $static TwosComplement(val: int, nbits: int) \rightarrow int$

Gets the 2's complement of the argument value.

#### **Parameters**

- val (int) Value to be complemented.
- **nbits** (*int*) Number of bits in the value.

#### Returns

Integer of the 2's complement for the val.

## Return type

int

## **UnpackAll()** $\rightarrow$ dict[str, bytes]

Builds a dictionary containing all parts of the POD packet in bytes.

### Raises

**Exception** – Nothing to unpack.

#### Returns

Dictionary with the command number.

## **Return type**

dict[str,bytes]

#### PodApi.Packets.Standard module

## class PodApi.Packets.Standard.PacketStandard(pkt: bytes, commands: CommandSet)

Bases: Packet

Container class that stores a standard command packet for a POD device. The format is STX (1 byte) + command number (4 bytes) + optional payload (? bytes) + checksum (2 bytes) + ETX (1 bytes)

### \_customPayload

Optional function to translate the payload.

## Type

Callable[[Any],tuple]|None

## \_customPayloadArgs

Optional arguments for the \_customPayload.

## **Type**

tuple[Any]|None

## payload

Optional payload from the packet.

## **Type**

bytes

## static CheckIfPacketIsValid(msg: bytes)

Raises an Exception if the packet is incorrectly formatted.

#### **Parameters**

**msg** (*bytes*) – Bytes string containing a POD packet. Should begin with STX and end with ETX.

## Raises

**Exception** – Packet is too small to be a standard packet.

### **DefaultPayload()** $\rightarrow$ tuple[int]

Splits the payload up into its components and translates the binary ASCII encoding into a readable integer.

### Returns

Tuple with integer values for each component of the payload.

## Return type

tuple[int]

### static GetMinimumLength() $\rightarrow$ int

Gets the number of bytes in the smallest possible packet.

### Returns

integer representing the minimum length of a standard POD command packet. Format is STX (1 byte) + command number (4 bytes) + optional packet (? bytes) + checksum (2 bytes) + ETX (1 bytes)

#### Return type

int

## **static GetPayload**(pkt: bytes) $\rightarrow$ bytes | None

Gets the payload from a POD packet, if available.

#### **Parameters**

**pkt** (*bytes*) – Bytes string containing a POD packet.

#### Returns

Bytes string of the payload, if available.

## **Return type**

bytes|None

## $HasCustomPayload() \rightarrow bool$

Checks if a custom payload has been set.

### Returns

True if there is a custom payload, False otherwise.

## **Return type**

bool

## $HasPayload() \rightarrow bool$

Checks if this Packet\_Standard instance has a payload.

#### **Returns**

True if there is a payload, false otherwise.

#### **Return type**

bool

## **Payload()** $\rightarrow$ tuple | None

Gets the payload as a readable tuple of values.

#### Returns

Translated payload, if available.

#### Return type

tuple|None

 $\textbf{SetCustomPayload}(\textit{func: Callable[[Any], tuple], args: tuple[Any] | None = None)} \rightarrow \textbf{None}$ 

Sets a custom function with optional arguments to translate the payload.

#### **Parameters**

- **func** (Callable[[Any], tuple]) Function to translate the payload.
- args (tuple[Any], optional) Arguments . Defaults to None.

### **TranslateAll()** $\rightarrow$ dict[str, Any]

Builds a dictionary containing all parts of the POD packet in readable values.

#### Returns

Dictionary with the command number and payload.

## Return type

dict[str,Any]

## **UnpackAll()** $\rightarrow$ dict[str, bytes]

Builds a dictionary containing all parts of the POD packet in bytes.

### Returns

Dictionary with the command number and payload.

## Return type

dict[str,bytes]

## **Module contents**

## 1.1.1.4 PodApi.Parameters package

#### **Submodules**

## PodApi.Parameters.Params8206HR module

```
class PodApi.Parameters.Params8206HR.Params8206HR(port: str, sampleRate: int, preamplifierGain: int,
                                                               lowPass:\ tuple[int],\ checkForValidParams:\ bool =
                                                               True)
     Bases: Params
     Container class that stores parameters for an 8206-HR POD device.
     port
           Name of the COM port.
               Type
                   str
     sampleRate
           Sample rate in 100-2000 Hz range.
               Type
                   int
     preamplifierGain
           Preamplifier gain. Should be 10x or 100x.
               Type
                   int
     lowPass
           Low-pass for EEG/EMG in 11-500 Hz range.
               Type
                   tuple[int]
     EEG1() \rightarrow int
           Gets the filter value of EEG1 in Hz from the low-pass.
                   EEG1 low-pass filter in Hz.
               Return type
                   int
     EEG2() \rightarrow int
           Gets the filter value of EEG2 in Hz from the low-pass.
               Returns
                   EEG2 low-pass filter in Hz.
               Return type
```

int

```
EEG3_EMG() \rightarrow int
```

Gets the filter value of EEG3/EMG in Hz from the low-pass.

#### Returns

EEG3/EMG low-pass filter in Hz.

## **Return type**

int

#### $GetInit() \rightarrow str$

Builds a string that represents the Params\_8206HR constructor with the arguments set to the values of this class instance.

#### Returns

String that represents the Params\_8206HR constructor.

## Return type

str

## **\_CheckParams()** $\rightarrow$ None

Throws an exception if Params\_8206HR instance variable is an invalid value.

#### Raises

- Exception Sample rate must be between 100-2000 Hz.
- **Exception** Preamplidier gain must be 10x or 100x.
- Exception Low-pass EEG/EMG must be between 11-500 Hz.

```
lowPassLabels: tuple[str] = ('EEG1', 'EEG2', 'EEG/EMG')
```

Tuple describing the items in the lowPass.

#### PodApi.Parameters.Params8229 module

```
class PodApi.Parameters.Params8229.Params8229(port: str, systemID: int, motorDirection: bool, motorSpeed: int, randomReverse: bool, mode: int, reverseBaseTime: int | None = None, reverseVarTime: int | None = None, schedule: dict[str, tuple[bool]] | None = None, checkForValidParams: bool = True)
```

Bases: Params

Container class that stores parameters for an 8229 POD device.

## port

Name of the COM port.

## **Type**

str

## systemID

ID of this 8229 POD system. Must be a positive integer.

# Type

int

#### motorDirection

False for clockwise and true for counterclockwise.

## **Type**

bool

## motorSpeed

Motor speed as a percentage 0-100%.

## **Type**

int

#### randomReverse

True to enable random reverse, False otherwise. The random reverse time will be reverseBaseTime + random value in reverseVarTime range.

## **Type**

bool

#### reverseBaseTime

Base time for a random reverse in seconds. Must be a positive integer.

## **Type**

int

#### reverseVarTime

Variable time for a random reverse in seconds. Must be a positive integer.

## **Type**

int

#### mode

System mode; 0 = Manual, 1 = PC Control, and 2 = Internal Schedule.

## Type

int

## schedule

Schedule for a week. The keys are the weekdays (Sunday-Saturday). The values are a tuple of 24 bools that are either 1 for motor on or 0 for motor off

## **Type**

dict[str, tuple[int]]

## $\textbf{static BuildEmptySchedule()} \rightarrow dict[str, tuple[bool]]$

Creates a schedule where the motor is off for all hours of every day.

#### Returns

Dictionary of the empty schedule. The keys are the days of the week. The values are tuples of 24 zeros.

## **Return type**

dict[str, tuple[bool]]

## $GetInit() \rightarrow str$

Builds a string that represents the Params\_8229 constructor with the arguments set to the values of this class instance.

## Returns

String that represents the Params\_Interface constructor.

## Return type

str

```
_CheckParams() \rightarrow None
```

Throws an exception if Params\_8229 instance variable is an invalid value.

#### Raises

- **Exception** The system ID must be a positive integer.
- **Exception** The motor speed must be between 0-100%.
- **Exception** The reverse base time (sec) must be a positive integer.
- **Exception** The reverse variable time (sec) must be a positive integer.
- **Exception** The mode must be 0, 1, or 2.
- **Exception** The schedule must have exactly ('Sunday','Monday','Tuesday', 'Wednesday','Thursday','Friday','Saturday') as keys.
- **Exception** There must be 24 items in the schedule for each day.

```
hoursPerDay: int = 24
```

Integer storing the number of hours in a day.

```
week: tuple[str] = ('Sunday', 'Monday', 'Tuesday', 'Wednesday', 'Thursday',
'Friday', 'Saturday')
```

Tuple containing strings of the 7 days of the week.

## PodApi.Parameters.Params8401HR module

```
class PodApi.Parameters.Params8401HR.Params8401HR(port: str, preampDevice: str, sampleRate: int, muxMode: bool, preampGain: tuple[int], ssGain: tuple[int], highPass: tuple[float], lowPass: tuple[int], bias: tuple[float], dcMode: tuple[str], checkForValidParams: bool = True)
```

Bases: Params

Container class that stores parameters for an 8401-HR POD device.

#### port

Name of the COM port.

**Type** str

#### preampDevice

Name of the mouse/rat preamplifier device.

**Type** str

## sampleRate

Sample rate (2000-20000 Hz).

**Type** int

### muxMode

Using mux mode when True, false otherwise.

Type bool

### preampGain

Preamplifier gain (1, 10, or 100) for all channels.

## **Type**

tuple[int]

### ssGain

Second stage gain (1 or 5) for all channels.

## Type

tuple[int]

## highPass

High-pass filter (0, 0.5, 1, or 10 Hz) for all channels.

## **Type**

tuple[float]

#### **lowPass**

Low-pass filter (21-15000 Hz) for all channels.

## Type

tuple[int]

#### bias

Bias voltage (+/- 2.048 V) for all channels.

## Type

tuple[float]

#### dcMode

DC mode (VBIAS or AGND) for all channels.

## Type

tuple[str]

## $GetInit() \rightarrow str$

Builds a string that represents the Params\_8401HR constructor with the arguments set to the values of this class instance.

### Returns

String that represents the Params\_8401HR constructor.

#### Return type

str

## **\_CheckParams()** $\rightarrow$ None

Throws an exception if Params\_8401HR instance variable is an invalid value.

### Raises

- **Exception** Mouse/rat preamplifier does not exist.
- **Exception** Sample rate must be between 2000-20000 Hz.
- **Exception** EEG/EMG preamplifier gain must be 10x or 100x. For biosensors, the preampGain is None.
- **Exception** The second stage gain must be 1x or 5x; set gain to None if no-connect.
- **Exception** The high-pass filter must be 0.5, 1, or 10 Hz. If the channel is DC, input 0.
- **Exception** The low-pass filter must be between 21-15000 Hz.

```
• Exception – The bias voltage must be +/- 2.048~V.
```

• Exception – The DC mode must be VBIAS or AGND.

```
channelLabels: tuple[str] = ('A', 'B', 'C', 'D')
```

Tuple listing the four channel characters in order.

## PodApi.Parameters.Params8480SC module

```
class PodApi.Parameters.Params8480SC.Params8480SC(port: str, stimulus=tuple[int], preamp=<class
                                                              'int'>, ledCurrent=tuple[int], ttlPullups=<class
                                                              'int'>, estimCurrent=tuple[int], syncConfig=<class
                                                              'int'>, ttlSetup=tuple[int], checkForValidParams:
                                                             bool = True)
     Bases: Params
     Container class that stores parameters for an 8401-HR POD device.
     port
           Name of the COM port.
               Type
                   str
     stimulus
           Stimulus configuration on selected channel.
               Type
                   tuple[int]
     preamp
           Preamp value (0-1023).
               Type
                   int
     ledCurrent
           Led-Current (0-600 mA) for both channels.
               Type
                   tuple[int]
     ttlPUllups
           TTL Pullups disabled for value 0, pullups enabled for values that are non-zero.
               Type
                   int
     estimCurrent
           Estim-Current (0-100 %) for both channels.
               Type
                   tuple[int]
     syncConfig
           Sets Sync-Config byte.
```

**Type** int

### ttlSetup

TTL-Setup for selected channel.

## **Type**

tuple[int]

## $GetInit() \rightarrow str$

Builds a string that represents the Params\_8480SC constructor with the arguments set to the values of this class instance.

#### **Returns**

String that represents the Params\_8480SC constructor.

## Return type

str

## $\_$ CheckParams() $\rightarrow$ None

Throws an exception if Params\_8206HR member variable is an invalid value.

#### **Raises**

- **Exception** The preamp must be between 0-1023.
- **Exception** Led-Curent must be between 0-600.
- **Exception** Estim-Current must be between 0-100.

## $\textbf{estimCurrent\_CHO()} \rightarrow \text{int}$

Gets the estimCurrent value for Channel 0.

#### Returns

Channel 0 estimCurrent in percentage.

## **Return type**

int

## $\textbf{estimCurrent\_CH1()} \rightarrow int$

Gets the estimCurrent value for Channel 1.

## **Returns**

Channel 1 estimCurrent in percentage.

## Return type

int

## $\textbf{ledCurrent\_CHO()} \rightarrow \text{int}$

Gets the ledCurrent value for Channel 0.

### **Returns**

Channel 0 ledCurrent in mA.

## Return type

int

#### $ledCurrent\_CH1() \rightarrow int$

Gets the ledCurrent value for Channel 1.

## Returns

Channel 1 ledCurrent in mA.

## Return type

int

## PodApi.Parameters.ParamsBasic module

## class PodApi.Parameters.ParamsBasic.Params(port: str, checkForValidParams: bool = True)

Bases: object

Interface for a container class that stores parameters for a POD device.

### port

Name of the COM port.

## Type

str

### $GetInit() \rightarrow str$

Builds a string that represents the Params\_Interface constructor with the arguments set to the values of this class instance.

## Returns

String that represents the Params\_Interface constructor.

## Return type

str

## **\_CheckParams()** $\rightarrow$ None

Throws an exception if Params\_Interface instance variable is an invalid value.

#### Raises

**Exception** – The port name must begin with COM.

## **static** \_**FixTypeInTuple**(*arr: tuple, itemType: type*) → tuple['type']

Retypes each item of the arr arguemnt to itemType.

### **Parameters**

- **arr** (*tuple*) Tuple of items to be re-typed.
- **itemType** (*type*) Type to be casted to each tuple item.

## Returns

Tuple with values of all itemType types.

#### Return type

tuple[type]

## **Module contents**

## 1.1.2 Module contents

# 1.2 Setup package

## 1.2.1 Subpackages

## 1.2.1.1 Setup.Inputs package

## **Submodules**

## Setup.Inputs.GetUserInput module

## class Setup.Inputs.GetUserInput.UserInput

Bases: object

UserInput contains several methods for getting user input for POD device setup.

## **static AskForBool**(prompt: str) $\rightarrow$ bool

Asks user for bool type input.

#### **Parameters**

**prompt** (*str*) – Statement requesting input from the user.

#### Returns

Boolean type input from user.

### Return type

bool

## static AskForFloat(prompt: str) $\rightarrow$ float

Asks user for float type input.

## **Parameters**

prompt (str) - Statement requesting input from the user.

#### Returns

Float type input from user.

## **Return type**

float

**static AskForFloatInList**( $prompt: str, goodInputs: list, badInputMessage: str | None = None) <math>\rightarrow$  float Asks the user for a float that exists in the list of valid options.

## **Parameters**

- **prompt** (*str*) Statement requesting input from the user.
- **goodInputs** (*list*) List of valid input options.
- badInputMessage (str | None, optional) Error message to be printed if invalid input is given. Defaults to None.

### Returns

User's choice from the options list as a float.

## Return type

float

**static AskForFloatInRange**(prompt: str, minimum: float, maximum: float, thisIs: str = 'Input', unit:  $str = '') \rightarrow float$ 

Asks the user for an float value that falls in a given range.

#### **Parameters**

- **prompt** (*str*) Statement requesting input from the user.
- minimum (float) Minimum value of range.
- maximum (float) Maximum value of range.
- **thisIs** (*str*, *optional*) Description of the input/what is being asked for. Used when printing the error message. Defaults to 'Input'.

• **unit** (*str*, *optional*) – Unit of the requested value. Use when printing the error message. Defaults to ".

#### Returns

Float value given by the user that falls in the given range.

## Return type

float

```
static AskForInput(prompt: str, append: str = ': ') \rightarrow str
```

Asks user for input given a prompt. Will append a colon ':' to the end of prompt by default

#### **Parameters**

- **prompt** (str) Statement requesting input from the user
- append (str, optional) Appended to the end of the prompt. Defaults to ': '.

#### **Returns**

String of the user input

## Return type

str

## **static AskForInt**(prompt: str) $\rightarrow$ int

Asks user for int type input.

#### **Parameters**

**prompt** (*str*) – Statement requesting input from the user.

#### Returns

Integer type input from user.

## Return type

int

**static AskForIntInList**( $prompt: str, goodInputs: list, badInputMessage: str | None = None) <math>\rightarrow$  int Asks the user for an integer that exists in the list of valid options.

### **Parameters**

- **prompt** (str) Statement requesting input from the user
- **goodInputs** (*list*) List of valid input options.
- badInputMessage (str / None, optional) Error message to be printed if invalid input is given. Defaults to None.

#### **Returns**

User's choice from the options list as an integer.

## **Return type**

int

 $\textbf{static AskForIntInRange}(\textit{prompt: str, minimum: int, maximum: int, thisIs: str = 'Input', unit: str = '') \rightarrow int \\$ 

Asks the user for an integer value that falls in a given range.

#### **Parameters**

- **prompt** (*str*) Statement requesting input from the user.
- **minimum** (*int*) Minimum value of range.
- maximum (int) Maximum value of range.

- **thisIs** (*str*, *optional*) Description of the input/what is being asked for. Used when printing the error message. Defaults to 'Input'.
- **unit** (*str*, *optional*) Unit of the requested value. Use when printing the error message. Defaults to ".

## Returns

Integer value given by the user that falls in the given range.

#### Return type

int

**static AskForStrInList**( $prompt: str, goodInputs: list, badInputMessage: <math>str \mid None = None$ )  $\rightarrow$  str Asks the user for a string that exists in the list of valid options.

#### **Parameters**

- **prompt** (*str*) Statement requesting input from the user.
- **goodInputs** (*list*) List of valid input options
- badInputMessage (str / None, optional) Error message to be printed if invalid input is given. Defaults to None.

#### Returns

User's choice from the options list as a string.

## Return type

sti

**static AskForType**(typecast: function, prompt: str)  $\rightarrow$  int | float | str

Ask user for input of a specific data type. If invalid input is given, an error message will print and the user will be prompted again.

### **Parameters**

- **typecast** (*function*) Datatype to cast the user input (ex. \_CastInt, \_CastFloat, \_CastStr)
- **prompt** (str) Statement requesting input from the user

#### Returns

Input from user as the requested type.

## Return type

int|float|str

**static AskForTypeInList**( $typecast: function, prompt: str, goodInputs: list, badInputMessage: str | None = None) <math>\rightarrow$  int | float | str

Asks the user for a value of a given type that exists in the list of valid options. If invalid input is given, an error message will print and the user will be prompted again.

## **Parameters**

- **typecast** (*function*) Datatype to cast the user input (ex. \_CastInt, \_CastFloat, \_CastStr).
- **prompt** (*str*) Statement requesting input from the user.
- **goodInputs** (*1ist*) List of valid input options.
- badInputMessage (str | None, optional) Error message to be printed if invalid input is given. Defaults to None.

#### Returns

User's choice from the goodInputs list as the given datatype.

## Return type

int|float|str

**static AskForTypeInRange**(*typecast: function, prompt: str, minimum: int* | *float, maximum: int* | *float, thisIs: str* = 'Input', *unit: str* = '')  $\rightarrow$  int | float

Asks user for a numerical value that falls between two numbers. If invalid input is given, an error message will print and the user will be prompted again.

#### **Parameters**

- **typecast** (*function*) Datatype to cast the user input (ex. \_CastInt, \_CastFloat, \_CastStr).
- **prompt** (*str*) Statement requesting input from the user.
- minimum (int | float) Minimum value of range.
- maximum (int / float) Maximum value of range.
- **thisIs** (*str*, *optional*) Description of the input/what is being asked for. Used when printing the error message. Defaults to 'Input'.
- **unit** (*str*, *optional*) Unit of the requested value. Use when printing the error message. Defaults to ".

#### Returns

Numerical value given by the user that falls in the given range.

#### Return type

int|float

**static AskYN**(*question:* str, *append:* str = '(y/n): ')  $\rightarrow$  bool

Asks the user a yes or no question. If invalid input is given, an error message will print and the user will be prompted again.

#### **Parameters**

- **question** (*str*) Statement requesting input from the user.
- append (str, optional) Appended to the end of the question. Defaults to '(y/n): '.

## Returns

True for yes, false for no.

## Return type

bool

#### **static CastFloat**(value) $\rightarrow$ float

Casts the argument as an float.

## **Parameters**

value – Value to type casted.

## Returns

Value type casted as a float.

#### Return type

float

```
static CastInt(value) \rightarrow int
```

Casts the argument as an integer.

#### **Parameters**

**value** – Value to type casted.

#### **Returns**

Value type casted as an integer.

#### **Return type**

int

## $static CastStr(value) \rightarrow str$

Casts the argument as an string.

#### **Parameters**

value - Value to type casted.

#### **Returns**

Value type casted as a string.

## Return type

str

 $\textbf{static CheckFileExt}(\textit{f: str, flsExt: bool} = \textit{True}, \textit{goodExt: list[str]} = [\textit{'.txt'}], \textit{printErr: bool} = \textit{True}) \rightarrow bool$ 

Checks if a file name has a valid extension.

#### **Parameters**

- $\mathbf{f}(str)$  file name or extension
- **fIsExt** (*bool*, *optional*) Boolean flag that is true if f is an extension, false otherwise. Defaults to True.
- **goodExt** (list[str], optional) List of valid file extensions. Defaults to ['.txt',].
- printErr (bool, optional) Boolean flag that, when true, will print an error statement. Defaults to True.

#### **Returns**

True if extension is in goodExt list, False otherwise.

## Return type

bool

```
static GetFileName(goodExt: list[str] = ['.txt']) \rightarrow str
```

Asks the user for a filename. :param goodExt: List of valid file extensions. Defaults to ['.txt']. :type goodExt: list[str], optional

### Returns

String of the file name and extension.

## Return type

str

 $\textbf{static GetFilePath}(prompt: str \mid None = None, goodExt: list[str] = ['.txt']) \rightarrow str$ 

Asks the user for a file path and file name.

#### **Parameters**

• **prompt** (*str* / *None*, *optional*) – Text to print to the user before requesting the path. Defaults to None.

```
• goodExt (list[str], optional) – List of valid file extensions. Defaults to ['.txt']. Returns
```

File path and name.

## Return type

str

## **Module contents**

## 1.2.1.2 Setup.SetupOneDevice package

#### **Submodules**

## Setup.SetupOneDevice.Setup\_8206HR module

```
class Setup.SetupOneDevice.Setup_8206HR.Setup_8206HR
```

Bases: Setup\_Interface

Setup\_8206HR provides the setup functions for an 8206-HR POD device.

 $static GetDeviceName() \rightarrow str$ 

Returns the name of the 8206-HR POD device.

#### Returns

8206-HR.

#### Return type

str

 $StopStream() \rightarrow None$ 

Write a command to stop streaming data to all POD devices.

```
static \_ChoosePreampGain() \rightarrow int
```

Asks user for the preamplifier gain of their POD device.

## Returns

Integer 10 or 100 for the preamplifier gain.

## Return type

int

**\_ConnectPODdevice**(deviceNum: int, deviceParams: Params8206HR) → bool

Creates a POD\_8206HR object and write the setup parameters to it.

#### **Parameters**

- **deviceNum** (*int*) Integer of the device's number.
- **deviceParams** (*Params\_8206HR*) Device's parameters.

## Returns

True if connection was successful, false otherwise.

## Return type

bool

### \_GetPODdeviceParameterTable() → Texttable

Builds a table containing the parameters for all POD devices.

### Returns

Texttable containing all parameters.

## **Return type**

Texttable

### \_GetParam\_onePODdevice( $forbiddenNames: list[str] = []) \rightarrow Params8206HR$

Asks the user to input all the device parameters.

#### **Parameters**

**forbiddenNames** (list[str]) – List of port names already used by other devices.

### Returns

Dictionary of device parameters.

## Return type

dict[str,(str|int|dict[str,int])]

## **\_OpenSaveFile\_EDF**( $fname: str, devNum: int) \rightarrow EdfWriter$

Opens EDF file and write header.

#### **Parameters**

- **fname** (*str*) String filename.
- **devNum** (*int*) Integer device number.

#### Returns

Opened file.

## **Return type**

EdfWriter

## **\_OpenSaveFile\_TXT**(fname: str) $\rightarrow$ IOBase

Opens a text file and writes the column names. Writes the current date/time at the top of the txt file.

### **Parameters**

**fname** (str) – String filename.

## Returns

Opened file.

#### Return type

**IOBase** 

## \_PHYSICAL\_BOUND\_uV: int = 2046

Class-level integer representing the max/-min physical value in uV. Used for EDF files.

## **\_StreamThreading()** $\rightarrow$ dict[int, threading.Thread]

Opens a save file, then creates a thread for each device to stream and write data from.

#### Returns

Dictionary with keys as the device number and values as the started Thread.

## Return type

dict[int,Thread]

## **\_StreamUntilStop**(pod: Pod8206HR, $file: IOBase \mid EdfWriter$ , $sampleRate: int) \rightarrow None$

Streams data from a POD device and saves data to file. Stops looking when a stop stream command is read. Calculates average time difference across multiple packets to collect a continuous time series data.

#### **Parameters**

- pod (POD\_8206HR) POD device to read from.
- file (IOBase | EdfWriter) open file.
- sampleRate (int) Integer sample rate in Hz.

static \_WriteDataToFile\_EDF(file: EdfWriter, data: list[numpy.ndarray])

Writes data to an open EDF file.

#### **Parameters**

- **file** (*EdfWriter*) opened EDF file.
- data (list[np.ndarray]) List of 3 items, one for each channel.

static \_WriteDataToFile\_TXT(file: IOBase, data: list[numpy.ndarray], t: ndarray)

Writes data to an open text file.

## **Parameters**

- **file** (*IOBase*) opened write file.
- data (list[np.ndarray]) List of 3 items, one for each channel.
- t (np.ndarray) list with the time stamps (in seconds).

## Setup.SetupOneDevice.Setup 8229 module

```
class Setup.SetupOneDevice.Setup_8229.Setup_8229
```

Bases: Setup\_Interface

Setup\_8229 provides the setup functions for an 8229 POD device.

## \_streamMode

True when the user wants to stream data from an 8229 POD device, False otherwise.

## **Type**

bool

## $\textbf{static GetDeviceName()} \rightarrow str$

Returns the name of the POD device.

#### Returns

8229.

## **Return type**

str

## $\textbf{static GetSupportedFileExtensions()} \rightarrow list[str]$

Returns a list containing valid file extensions.

#### Returns

List of string file extensions.

## Return type

list[str]

## $\textbf{StopStream()} \rightarrow None$

Update the state flag to signal to stop streaming data.

**\_ConnectPODdevice**( $deviceNum: int, deviceParams: Params8229) <math>\rightarrow$  bool

Creates a 8229 POD device object and write the setup parameters to it.

#### **Parameters**

- **deviceNum** (*int*) Integer of the device's number.
- **deviceParams** (*Params\_8229*) Device parameters.

#### Returns

True if connection was successful, false otherwise.

## **Return type**

bool

## $\_GetPODdeviceParameterTable() \rightarrow Texttable$

Builds a table containing the parameters for all POD devices.

#### **Returns**

Table containing all parameters.

## Return type

Texttable

## **\_GetParam\_onePODdevice**( $forbiddenNames: list[str] = []) \rightarrow Params8229$

Asks the user to input all the device parameters.

#### **Parameters**

**forbiddenNames** (*list[str]*, *optional*) – List of port names already used by other devices. Defaults to [].

#### **Returns**

Device parameters.

## Return type

Params\_8229

## **static** \_GetScheduleForWeek() → dict[str, tuple[int]]

Asks the user to input if the motor is on/off for each hour of each day of the week.

## Returns

Dictionary with the schedule. The keys are the days of the week (Sunday, Monday,  $\dots$ ). The values are a tuple of 24 items for each hour; the items are 1 if the motor is on or 0 if the motor is off

## **Return type**

dict[str, tuple[int]]

## **\_OpenSaveFile\_EDF**(fname: str, devNum: int)

EDF files are not supported for 8229 POD devices. Overwrites the parent's method, which would open an EDF file and write the header.

#### **Parameters**

- **fname** (*str*) String filename. Not used.
- **devNum** (*int*) Integer device number. Not used.

### Raises

**Exception** – EDF filetype is not supported for 8229 POD devices.

### **\_OpenSaveFile\_TXT**(fname: str) $\rightarrow$ IOBase

Opens a text file and writes the column names. Writes the current date/time at the top of the txt file.

### **Parameters**

**fname** (str) – String filename.

#### **Returns**

Opened file.

#### Return type

**IOBase** 

## **\_StreamThreading()** $\rightarrow$ dict[int, threading.Thread]

Opens a save file, then creates a thread for each device to stream and write data from.

#### Returns

Dictionary with keys as the device number and values as the started Thread.

## Return type

dict[int,Thread]

## **\_StreamUntilStop**( $pod: Pod8229, file: IOBase) \rightarrow None$

Saves a log of all packets recieved from the 8229 POD device until the user decides to stop streaming.

#### **Parameters**

- pod (POD\_8229) POD device to read from.
- **file** (*IOBase*) Opened text file to save data to.

## Setup.SetupOneDevice.Setup 8401HR module

## class Setup.SetupOneDevice.Setup\_8401HR.Setup\_8401HR

Bases: Setup\_Interface

Setup\_8401HR provides the setup functions for an 8206-HR POD device. REQUIRES FIRMWARE 1.0.2 OR HIGHER.

## $\textbf{static GetDeviceName}() \rightarrow str$

returns the name of the 8401-HR POD device.

#### Returns

8401-HR.

#### Return type

str

## $StopStream() \rightarrow None$

Write a command to stop streaming data to all POD devices.

## $static \_CodeDCmode(dcMode: str) \rightarrow int$

gets the integer payload to use for 'SET DC MODE' commands given the mode.

#### **Parameters**

**dcMode** (str) – DC mode VBIAS or AGND.

## Raises

**Exception** – DC Mode value is not supported.

#### Returns

Integer code representing the DC mode.

## Return type

int

## static $\_CodeHighpass(highpass: float) \rightarrow int$

Gets the integer payload to use for 'SET HIGHPASS' given a highpass value.

#### **Parameters**

highpass (float) – Highpass value in Hz.

#### Raises

**Exception** – High-pass value is not supported.

#### Returns

Integer code representing the highpass value.

## Return type

int

### \_ConnectPODdevice(deviceNum: int, deviceParams: Params8401HR) → bool

Creates a POD\_8206HR object and write the setup parameters to it.

#### **Parameters**

- **deviceNum** (*int*) Integer of the device's number.
- **deviceParams** (*Params\_8401HR*) Device parameters.

## Returns

True if connection was successful, false otherwise.

## Return type

bool

## $\verb|_GetPODdeviceParameterTable()| \rightarrow Text table$

Builds a table containing the parameters for all POD devices.

#### **Returns**

Texttable containing all parameters.

## Return type

Texttable

## **\_GetParam\_onePODdevice**( $forbiddenNames: list[str] = []) \rightarrow Params8401HR$

Asks the user to input all the device parameters.

#### **Parameters**

**forbiddenNames** (list[str]) – List of port names already used by other devices.

### **Returns**

Device parameters.

## **Return type**

Params\_8401HR

## $\_GetPreampDeviceName() \rightarrow str$

Asks the user to select a mouse/rat preamplifier.

#### Returns

String of the chosen preamplifier.

## Return type

str

**\_NiceABCDtableText**( $abcdValues: list[int | str | None], channelMap: dict[str, str]) <math>\rightarrow$  str

Builds a string that formats the channel values to be input into the parameter table.

### **Parameters**

- abcdValueDict (dict[str,int | str | None]) Dictionary with ABCD keys.
- **channelMap** (dict[str, str]) Maps the ABCD channels to the sensor's channel name.

#### Returns

String with "channel name: value newline..." for each channel.

### Return type

str

**\_OpenSaveFile\_EDF**( $fname: str, devNum: int) \rightarrow EdfWriter$ 

Opens EDF file and write header.

#### **Parameters**

- **fname** (*str*) String filename.
- **devNum** (*int*) Integer device number.

#### Returns

Opened file.

## **Return type**

EdfWriter

**\_OpenSaveFile\_TXT**(fname: str)  $\rightarrow$  IOBase

Opens a text file and writes the column names. Writes the current date/time at the top of the txt file.

## **Parameters**

**fname** (str) – String filename.

## Returns

Opened file.

#### Return type

**IOBase** 

## \_PHYSICAL\_BOUND\_uV: int = 2046

Class-level integer representing the max/-min physical value in uV. Used for EDF files.

```
static \_SetBias(channelName: str) \rightarrow float
```

Asks the user for the bias voltage in V (+/-2.048V).

#### **Parameters**

**channelName** (str) – Name of the channel.

## Returns

A float for thebias voltage in V.

## Return type

float

**static**  $\_$ **SetDCMode**(channelName: str)  $\rightarrow$  str

Asks the user for the DC mode (VBIAS or AGND).

## **Parameters**

**channelName** (str) – Name of the channel.

#### Returns

String for the DC mode.

## **Return type**

str

\_SetForMappedChannels(message: str, channelMap: dict[str, str], func: function) → tuple[int | None] Asks the user to input values for all channels (excluding no-connects).

#### **Parameters**

- **message** (*str*) Message to ask the user.
- **channelMap** (*dict[str,str]*) Maps the ABCD channels to the sensor's channel name.
- **func** (*function*) a function that asks the user for an input. takes one string parameter and returns one value.

#### **Returns**

Tuple with user inputs for values for the ABCD channels

## Return type

tuple[int|None]

## $static \_SetHighpass(channelName: str) \rightarrow float | None$

Asks the user for the high-pass in Hz (0.5,1,10Hz, or DC).

#### **Parameters**

**channelName** (str) – Name of the channel.

#### Returns

A float for the high-pass frequency in Hz, or None if DC.

## Return type

float|None

## $static \_SetLowpass(channelName: str) \rightarrow int \mid None$

Asks the user for the low-pass in Hz (21-15000Hz).

### **Parameters**

**channelName** (str) – Name of the channel.

#### Returns

An integer for the low-pass frequency in Hz.

#### Return type

int|None

## $static _SetPreampGain(channelName: str) \rightarrow int | None$

Asks the user for the preamplifier gain.

### **Parameters**

**channelName** (str) – Name of the channel.

#### **Returns**

An integer for the gain, or None if no gain.

## **Return type**

int|None

## $static _SetSSGain(channelName: str) \rightarrow int$

Asks the user for the second stage gain.

#### **Parameters**

**channelName** (str) – Name of the channel.

#### Returns

An integer for the gain.

## **Return type**

int

### **\_StreamThreading()** → dict[int, threading.Thread]

Opens a save file, then creates a thread for each device to stream and write data from.

#### Returns

Dictionary with keys as the device number and values as the started Thread.

### Return type

dict[int,Thread]

**\_StreamUntilStop**( $pod: Pod8401HR, file: IOBase | EdfWriter, sampleRate: int, devNum: int) <math>\rightarrow$  None

Streams data from a POD device and saves data to file. Stops looking when a stop stream command is read. Calculates average time difference across multiple packets to collect a continuous time series data.

#### **Parameters**

- pod (POD\_8206HR) POD device to read from.
- **file** (*IOBase* / *EdfWriter*) open file.
- sampleRate (int) Integer sample rate in Hz.

static \_WriteDataToFile\_EDF(file: EdfWriter, data: list[numpy.ndarray])

Writes data to an open EDF file.

#### **Parameters**

- **file** (*EdfWriter*) opened EDF file.
- **data** (*list* [*np.ndarray*]) List with one item for each channel.

static \_WriteDataToFile\_TXT(file: IOBase, data: list[numpy.ndarray], t: ndarray)

Writes data to an open text file.

### **Parameters**

- **file** (*IOBase*) opened write file.
- data (list[np.ndarray]) List with one item for each channel.
- t (np.ndarray) list with the time stamps (in seconds).

## Setup.SetupOneDevice.Setup 8480SC module

## class Setup.SetupOneDevice.Setup\_8480SC.Setup\_8480SC

Bases: Setup\_Interface

Setup\_8480SC provides the setup functions for an 8480-SC POD device.

## \_streamMode

Set to True when the user wants to start streaming data from an 8480 POD device, False otherwise.

### **Type**

bool

#### static GetDeviceName() $\rightarrow$ str

Returns the name of the POD device.

#### Returns

String of \_NAME.

## **Return type**

str

#### static GetSupportedFileExtensions() $\rightarrow$ list[str]

Returns a list containing valid file extensions.

#### **Returns**

List of string file extensions.

### Return type

list[str]

## $StopStream() \rightarrow None$

Update the state flag to signal to stop streaming data.

## $\textbf{static \_ChoosePeriod()} \rightarrow tuple[int]$

Asks the user an input value for Stimulus Period, which is then seperated into Period\_ms and Period\_us. Seperation is required because the 'SET STIMULUS' requires 7 items in payload, and the second and third items is the Period\_ms and Period\_us.

#### Returns

Formatted period into millisecs and microsecs.

## Return type

tuple[int]

## $\textbf{static \_ChooseRepeat()} \rightarrow int$

Asks the user to input a value for the number of stimulus pulses to perform.

#### **Returns**

representing repeat count for command 'SET STIMULUS'.

#### **Return type**

int

## $\textbf{static \_ChooseStimulusConfig()} \rightarrow int$

Asks the user to input values for Config format of Stimulus

#### Returns

Formatted Stimulus Config value.

#### Return type

(int)

## $\textbf{static \_ChooseSyncConfig()} \rightarrow int$

Asks the user to input values for Sync Config bits.

#### **Returns**

Value calculated from the input bits, this value would be given as payload.

### Return type

int

### **static** \_ChooseWidth() → tuple[int]

Asks the user an input value for Stimulus width, which is then seperated into width\_ms and width\_us. Seperation is required because the 'SET STIMULUS' requires 7 items in payload, and the fourth and fifth items is the width\_ms and width\_us.

#### Returns

Formatted given width into millisecs and microsecs

## Return type

tuple[int]

**\_ConnectPODdevice**( $deviceNum: int, deviceParams: Params8480SC) <math>\rightarrow$  bool

Creates a POD\_8206HR object and write the setup parameters to it.

#### **Parameters**

- **deviceNum** (*int*) Integer of the device's number.
- **deviceParams** (*Params\_8480SC*) Device parameters.

#### **Returns**

True if connection was successful, false otherwise.

## Return type

bool

## $\_GetPODdeviceParameterTable() \rightarrow Texttable$

Builds a table containing the parameters for all POD devices.

#### Returns

Texttable containing all parameters.

## **Return type**

Texttable

## $\_$ GetParam $\_$ onePODdevice( $forbiddenNames: list[str] = []) <math>\rightarrow Params8480SC$

Asks the user to input all the device parameters.

### **Parameters**

**forbiddenNames** (list[str]) – List of port names already used by other devices.

## Returns

Device parameters.

## Return type

Params\_8480SC

#### **\_OpenSaveFile\_EDF**(fname: str, devNum: int)

EDF files are not supported for 8480 POD devices. Overwrites the parent's method, which would open an EDF file and write the header.

#### **Parameters**

- **fname** (str) String filename. Not used.
- **devNum** (*int*) Integer device number. Not used.

## Raises

**Exception** – EDF filetype is not supported for 8480 POD devices.

## **\_OpenSaveFile\_TXT**(fname: str) $\rightarrow$ IOBase

Opens a text file and writes the column names. Writes the current date/time at the top of the txt file.

#### **Parameters**

**fname** (str) – String filename.

#### Returns

Opened file.

#### Return type

**IOBase** 

## **\_StreamThreading()** → dict[int, threading.Thread]

Opens a save file, then creates a thread for each device to stream and write data from.

#### Returns

Dictionary with keys as the device number and values as the started Thread.

### Return type

dict[int,Thread]

### **\_StreamUntilStop**( $pod: Pod8480SC, file: IOBase) \rightarrow None$

Saves a log of all packets recieved from the 8480 POD device until the user decides to stop streaming.

#### **Parameters**

- pod (POD\_8480) POD device to read from.
- **file** (*IOBase*) Opened text file to save data to.

## static $_{\mathtt{TtlSetup}}() \rightarrow \mathrm{int}$

Asks the user to input values for Config format values of TTL Setup.

#### Returns

Formatted TTL Setup config value.

## Setup.SetupOneDevice.Setup\_PodInterface module

## class Setup.SetupOneDevice.Setup\_PodInterface.Setup\_Interface

Bases: object

Setup\_Interface provides the basic interface of required methods for subclasses to implement. SetupPodDevices.py is designed to handle any of these children.

## \_podDevices

Instance-level dictionary of pod device objects. MUST have keys as device number.

### **Type**

dict[int,POD\_Basics]

## \_podParametersDict

Instance-level dictionary of device information. MUST have keys as device number.

## Type

dict[int,Params\_Interface]

#### \_saveFileName

Instance-level string filename: <path>/file.ext. The device name and number will be appended to the filename.

## Type

str

#### **AddPODdevice()** $\rightarrow$ None

Asks the user for the parameters for the new device. A new device number is generated.

# **AreDeviceParamsValid**(paramDict: None | dict[int, PodApi.Parameters.ParamsBasic.Params])

Checks if the parameters dictionary is valid.

# **Parameters**

paramDict (None | dict[int,Params\_Interface]) - Dictionary of parameters for all POD devices.

#### Raises

- **Exception** Parameters must be contained in a dictionary.
- **Exception** Device keys must be integer type.
- **Exception** Device parameters must be dictionary type.
- **Exception** Device parameters dictionary is empty.

# $\textbf{ConnectAllPODdevices()} \rightarrow bool$

Connects all setup POD devices.

#### Returns

True if all devices are successfully connected, false otherwise.

# Return type

bool

# $DisplayPODdeviceParameters() \rightarrow None$

Display all the pod device parameters in a table.

# $static GetDeviceName() \rightarrow str$

returns the name of the POD device.

#### **Returns**

GENERIC.

## Return type

str

## $GetPODparametersInit() \rightarrow str$

Gets a dictionary whose keys are the device number and the value is the device parameters dict. :returns: String representation of a dictionary of POD device parameters. The keys are the device number. :rtype: str

# ${\tt GetSaveFileName}() \rightarrow {\rm str}$

Gets the path and filename where streaming data is saved to.

#### Returns

String of the save file name and path (\_saveFileName).

# Return type

str

# $\textbf{static GetSupportedFileExtensions()} \rightarrow list[str]$

Returns a list containing valid file extensions.

#### Returns

List of string file extensions.

# Return type

list[str]

#### $PrintSaveFile() \rightarrow None$

Prints the file path and name that data is saved to. Note that the device name and number will be appended to the end of the filename.

## **SetupFileName**( $fileName: str \mid None = None) \rightarrow None$

Gets the file path and name to save streaming data to. Note that the device name and number will be appended to the end of the filename.

#### **Parameters**

 ${f fileName}~(str~/~None,~optional)$  — Name and path of the file, if known. Defaults to None.

# $\label{eq:podParametersDict: dict[int, PodApi.Parameters.ParamsBasic.Params] | None = None) \rightarrow None$

Sets the parameters for the POD devices.

#### **Parameters**

podParametersDict (dict[int,Params\_Interface] | None, optional) - dictionary of the device parameters for all devices. Defaults to None.

# $StopStream() \rightarrow None$

Write a command to stop streaming data to all POD devices.

# **Stream()** $\rightarrow$ dict[int, threading.Thread]

Tests that all devices are connected then starts streaming data.

#### Raises

**Exception** – Test connection failed.

#### Returns

Dictionary with integer device number keys and Thread values.

# **Return type**

dict[int,Thread]

## $ValidateParams() \rightarrow None$

Displays a table of the parameters of all devices, then asks the user if everything is correct. The user can then edit the parameters of a device.

#### **\_BuildFileName**(devNum: int) $\rightarrow$ str

Appends the device name and number to the end of the file name.

# **Parameters**

**devNum** (*int*) – Integer of the device number.

# Returns

String file name.

#### Return type

str

# **static** $\_$ ChoosePort( $forbidden: list[str] = []) <math>\rightarrow str$

Systems checks user's Operating System, and chooses ports accordingly.

#### **Parameters**

**forbidden** (list[str], optional) – List of port names that are already used. Defaults to [].

## Returns

String name of the port.

# Return type

str

# **\_ConnectPODdevice**( $deviceNum: int, deviceParams: Params) \rightarrow bool$

Creates a POD device object and write the setup parameters to it.

# **Parameters**

- **deviceNum** (*int*) Integer of the device's number.
- **deviceParams** (*Params\_Interface*) Device parameters.

#### Returns

True if connection was successful, false otherwise.

# Return type

bool

# **\_DisconnectAllPODdevices()** $\rightarrow$ None

Disconnects all POD devices by deleted all POD obejcts.

## **\_EditParams()** $\rightarrow$ None

Asks the user which device to edit, and then asks them to re-input the device parameters.

## **\_GetForbiddenNames**( $exclude: str \mid None = None$ ) $\rightarrow$ list[str]

Generates a list of port names used by the active pod devices. There is an option to exclude an additional name from the list.

#### **Parameters**

 ${f exclude}$  (str | None, optional) — String port name to exclude from the returned list. Defaults to None.

### Returns

List of string names of ports in use.

# **Return type**

list[str]

# **\_GetPODdeviceParameterTable()** → Texttable

Builds a table containing the parameters for all POD devices.

## Returns

Table containing all parameters.

### Return type

Texttable

# **\_GetParam\_allPODdevices()** $\rightarrow$ dict[int, *PodApi.Parameters.ParamsBasic.Params*]

First gets the number of POD devices, then asks the user for the information for each device.

#### Returns

Dictionary with device numbers for keys and parameters for values.

## Return type

dict[int,Params\_Interface]

# $\verb|_GetParam_onePODdevice| (forbiddenNames: list[str] = []) \rightarrow Params$

Asks the user to input all the device parameters.

# **Parameters**

**forbiddenNames** (list[str]) – List of port names already used by other devices. Defaults to [].

#### Returns

Device parameters.

# **Return type**

Params\_Interface

# $\textbf{static \_GetTimeHeader\_forTXT()} \rightarrow str$

Builds a string containing the current date and time to be written to the text file header.

# Returns

String containing the date and time. Each line begins with '#' and ends with a newline.

# **Return type**

str

# **\_OpenSaveFile**(devNum: int) $\rightarrow$ IOBase | EdfWriter

Opens a save file for a given device.

# **Parameters**

**devNum** (int) – Integer of the device number.

#### Returns

Opened file. IOBase for a text file, or EdfWriter for EDF file.

# **Return type**

IOBase | EdfWriter

# **\_OpenSaveFile\_EDF**( $fname: str, devNum: int) \rightarrow EdfWriter$

Opens EDF file and write header.

#### **Parameters**

- **fname** (str) String filename.
- **devNum** (*int*) Integer device number.

# Returns

Opened file.

# Return type

EdfWriter

#### **\_OpenSaveFile\_TXT**(fname: str) $\rightarrow$ IOBase

Opens a text file and writes the column names. Writes the current date/time at the top of the txt file.

### **Parameters**

**fname** (str) – String filename.

### **Returns**

Opened file.

## Return type

**IOBase** 

## static \_PrintDeviceNumber(num: int) $\rightarrow$ None

Prints a title with the device number.

#### **Parameters**

**num** (*int*) – Integer of the device number.

# $\_RemoveDevice() \rightarrow None$

Asks the user for a device number to remove, then deletes that device. This will only remove a device if there are more than one options.

# **\_SelectDeviceFromDict**(action: str) $\rightarrow$ int

Asks the user to select a valid device number. The input must be an integer number of an existing device.

#### **Parameters**

**action** (*str*) – Description of the action to be performed on the device.

## Returns

Integer for the device number.

#### Return type

int

## static \_SetNumberOfDevices(name: str) $\rightarrow$ int

Asks the user for how many devices they want to setup.

### **Parameters**

**name** (*str*) – Name of the POD device type.

#### **Returns**

Integer number of POD devices desired by the user.

# Return type

int

# **\_StreamThreading()** $\rightarrow$ dict[int, threading.Thread]

Opens a save file, then creates a thread for each device to stream and write data from.

#### Returns

Dictionary with keys as the device number and values as the started Thread.

# Return type

dict[int,Thread]

# static \_TestDeviceConnection(pod: Pod) $\rightarrow bool$

Tests if a POD device can be read from or written. Sends a PING command.

#### **Parameters**

**pod** (*POD\_Basics*) – POD device to read to and write from.

#### Returns

True for successful connection, false otherwise.

# Return type

bool

# $\verb|_TestDeviceConnection_All()| \rightarrow bool$

Tests the connection of all setup POD devices.

## Returns

True when all devices are successfully connected, false otherwise

# Return type

bool

# **static** $\_$ **uV**(voltage: float | int) $\rightarrow$ float

Converts volts to microVolts, rounded to 6 decimal places.

# **Parameters**

voltage (float | int) - number of volts.

## Returns

voltage in of uV.

# Return type

float

# **Module contents**

# 1.2.2 Submodules

# 1.2.3 Setup.Setup PodDevices module

Bases: object

Setup\_PodDevices allows a user to set up and stream from any number of POD devices. The streamed data is saved to a file.

REOUIRES FIRMWARE 1.0.2 OR HIGHER.

# \_Setup\_PodDevices

Dictionary containing the Setup\_Interface subclasses for each POD device.

## Type

dict[str,dict[int,Params\_Interface]

#### \_options

Dictionary listing the different options for the user to complete.

# **Type**

dict[int,str]

## **GetOptions()** $\rightarrow$ dict[int, str]

Gets the dictionary of setup options.

### Returns

Dictionary listing the different options for the user to complete (\_options).

# Return type

dict[int,str]

# ${\tt GetPODparametersInit()} ightarrow { m str}$

Sets up each POD device type. Used in initialization. :returns: String representing a dictionary of all POD devices initialization. The keys are the device name and the entries are the initialization dictionaries. :rtype: str

## $GetSaveFileNames() \rightarrow str$

**Run**()  $\rightarrow$  None

Prints the options and askes the user what to do. Loops until 'Quit' is chosen.

 $\label{eq:continuous_problem} \textbf{SetupPODparameters}(podParametersDict:\ dict[str,\ dict[int,\ PodApi.Parameters.ParamsBasic.Params] \mid None]) \rightarrow None$ 

Sets up each POD device type. Used in initialization.

#### **Parameters**

 $\label{lem:podParametersDict} \begin{subarray}{l} \textbf{Mone} \end{subarray} - \textbf{Dictionary of all POD devices initialization}. The keys are the device name and the entries are the initialization dictionaries. \end{subarray}$ 

# **SetupSaveFile**( $saveFileDict: dict[str, str] \mid None = None) \rightarrow None$

Gets the path/file name from the user and stores it. Used in initialization.

#### **Parameters**

**saveFile** (dict[str,str/None] / None, optional) – String of the save file, which includes the directory path, filename, and file extension. Defaults to None.

#### **\_AskOption()** $\rightarrow$ int

Asks user which option to do.

#### Returns

Integer number representing an option key.

# Return type

int

#### **\_AskToStopStream()** $\rightarrow$ None

Asks user to press enter to stop streaming. The program will then prompt all POD devices to end stream.

## static \_AskUserForDevices()

Asks the user what POD devices they want to use.

# **\_CheckForValidParams**( $podParametersDict: dict[str, None | dict]) <math>\rightarrow$ bool

Checks if the parameters are correctly formatted.

## **Parameters**

podParametersDict (dict[str,None | dict]) - Dictionary with keys as the device names and values as None or the respective parameter dictionary.

#### Raises

- **Exception** Parameters must be dictionary type.
- **Exception** Parameters dictionary is empty.
- **Exception** Invalid device name in paramater dictionary.

# Returns

True if the parameters are correctly formatted.

#### Return type

bool

# $\texttt{\_ConnectNewDevice}() \rightarrow None$

Asks the user for the POD device type, then it sets up that device.

# **\_DoOption**(choice: int) $\rightarrow$ None

Performs the methods associated with the user selected option.

# **Parameters**

**choice** (int) – Integer number representing an option key.

## **\_EditCheckConnect()** $\rightarrow$ None

Displays the POD devices parameters, asks the user to edit the device, and then reconnects the device for each POD device type.

#### **\_EditSaveFilePath()** $\rightarrow$ None

Asks the user for the POD device type, then asks the user for a new file name and path, then sets the value to the POD devices.

# **\_GetChosenDeviceType**(question: str) $\rightarrow$ str

Asks the user which type of POD device they want.

#### **Parameters**

**question** (str) – Question to ask the user.

#### **Returns**

String of the user input (may be invalid POD device type).

## Return type

str

# **\_GetParams**( $podParametersDict: None \mid dict[str, None]$ ) $\rightarrow$ dict[str, dict | None]

If no parameters are give, this asks user which types of POD devices they want to use. Then it checks if the parameters are valid.

#### **Parameters**

**podParametersDict** (*None* / *dict[str,None]*) – Dictionary of all POD devices initialization. The keys are the device name and the entries are the initialization dictionaries.

#### Returns

Dictionary whose keys are the POD device name, and value the setup dictionary.

# Return type

dict[str,dict|None]

#### \_PrintInitCode() → None

Prints code that can be used to initialize and run SetupPodDevices with the current parameters.

# **\_PrintOptions()** $\rightarrow$ None

Prints options available for user.

#### $_{\mathbf{Reconnect}}() \rightarrow bool$

Reconnects all POD devices.

# Returns

Bool that is true if all devices were successfully connected. False otherwise.

# Return type

bool

#### **\_RemoveDevice()** $\rightarrow$ None

Displays the POD devices parameters, asks the user which device ro remove, and then deletes that POD device.

# $\_$ Set $\_$ Setup $\_$ PodDevices $(podParametersDict: dict[str, dict | None]) <math>\rightarrow$ None

Sets the \_Setup\_PodDevices varaible to have keys as the POD device name and values as the setup class.

#### **Parameters**

**podParametersDict** (dict[str,dict | None]) — Dictionary with keys as the device names and values as None or the respective parameter dictionary.

# $\_$ ShowCurrentSettings() $\rightarrow$ None

Displays the POD device settings for all devices, and then prints the save file name.

# $_{ extbf{Stream}}$ () o float

Streams data from all POD devices and prints the execution time.

#### Returns

Float of the execution time in seconds.

# **Return type**

float

# $\texttt{\_StreamAllDevices()} \rightarrow \text{None}$

Streams data from all the devices. User is asked to click enter to stop streaming. Data is saved to file. Uses threading.

# **static \_TimeFunc**(func: function) $\rightarrow$ float

Runs a function and gets the calculated execultion time.

#### **Parameters**

**func** (function) – Function/method name.

# Returns

Float of the execution time in seconds rounded to 3 decimal places.

# **Return type**

float

# 1.2.4 Module contents

1.2. Setup package

# CHAPTER

# TWO

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