Controller Area Network SDK API *for* Python on CANPico

canislabs.com
CTO blog kentindell.github.io
CANIS AUTOMOTIVE LABS

CAN class

Starting controller

```
c = CAN(profile=CAN.CAN_BITRATE_500K_75,
        id_filters=None,
        hard_reset=False,
        brp=None,
        tseg1=10,
        tseg2=3,
        sjw=2,
        recv_errors=False,
        mode=CAN.NORMAL,
        tx_open_drain=True,
        reject_remote=True,
        rx_callback_fn=None,
        recv_overflows=False)
```

Note
- `id_filters` is a {integer: `CANIDFilter`} dictionary
- If `brp` is defined then profile is overridden
- `rx_callback_fn` is a Python function called from the ISR with the received `CANFrame`
- Set `tx_open_drain=True` if `CANHack` used

Sending frames

```
c.send_frame(frame, fifo=False)
c.send_frames([frame], fifo=False)
c.recv_tx_events(limit=CAN.CAN_TX_EVENT_FIFO_SIZE,
                 as_bytes=False)
```

Returns
- list of `CANFrame` instances sent, `CANOverflow`
- or `bytes`

```
c.recv_tx_events_pending()
```

Bit rates

```
CAN_BITRATE_500K_75
CAN_BITRATE_250K_75
CAN_BITRATE_125K_75
CAN_BITRATE_1M_75
CAN_BITRATE_500K_50
CAN_BITRATE_250K_50
CAN_BITRATE_125K_50
CAN_BITRATE_1M_50
CAN_BITRATE_2M_50
CAN_BITRATE_4M_90
CAN_BITRATE_2_5M_75
CAN_BITRATE_2M_80
CAN_BITRATE_500K_875
CAN_BITRATE_250K_875
CAN_BITRATE_125K_875
CAN_BITRATE_1M_875
CAN.CAN_BITRATE_CUSTOM
```

Modes

```
CAN_MODE_NORMAL
CAN_MODE_LISTEN_ONLY
CAN_MODE_ACK_ONLY
CAN_MODE_OFFLINE
```

Triggers

```
c.set_trigger(on_error=False,
              on_canid=None,
              as_bytes=None,
              on_tx=False,
              on_rx=True)
```

Note
- `as_bytes` is None or type `bytes`
- `on_can_id` is None or `CANID` (`as_bytes` overrides)

```
c.clear_trigger()
c.pulse_trigger()
```

Time

```
c.get_time()
c.get_time_hz()
```

Receiving frames

```
c.recv(limit=CAN.CAN_RX_FIFO_SIZE,
       as_bytes=False)
```

Returns
- list of `CANFrame`, `CANError`, `CANOverflow`
- or `bytes`

```
c.recv_pending()
```

Status

```
c.get_status()
```

Returns 4-tuple of (*bus off*, *error passive*, *TEC*, *REC*)

CANFrame class

Making

```
frame = CANFrame(can_id,
                 data=None,
                 remote=False,
                 tag=0,
                 dlc=None)
```

Note
- `can_id` is a `CANID`
- `data` is of type `bytes`
- `tag` is an integer
- DLC defaults to length of `data` if `dlc` not set

```
CANFrame.from_bytes(bytes)
```

Note returns a list of `CANFrame`

Reading

```
frame.get_data()
frame.get_dlc()
frame.get_tag()
frame.get_timestamp()
```

Note returns `None` if not sent or received yet

```
frame.get_index()
```

Note returns index of acceptance ID filter

```
frame.is_remote()
frame.is_extended()
frame.get_arbitration_id()
frame.get_canid()
```

Note returns `CANID`

Printing

```
>>> f = CANFrame(CANID(0x123), data=b'hello')
>>> print(f)
CANFrame(CANID(id=S123), dlc=5, data=68656c6c6f)
```

S = 11-bit CAN ID, E = 29-bit CAN ID

* = 0 byte payload, R = remote frame

CANHack class

Creating

```
ch = CANHack(bit_rate=500)
```

Note `bit_rate` can be 500, 250 or 125

Frames

```
ch.set_frame(can_id=0x7ff,
             remote=False,
             extended=False,
             data=None,
             set_dlc=False,
             dlc=0
             second=False
             no_ack=False)
```

Note
- DLC set by default from `data` length
- `data` is 0..8 `bytes`
- `second` sets the Janus attack alternative value

```
ch.print_frame()
ch.send_frame(timeout=50000000,
              second=False,
              retries=0,
              repeat=1)
```

Bus Off and Error Passive attacks

```
ch.error_attack(repeat=2,
                timeout=50000000)
```

Note Attacks the frame set with `set_frame()`

Freeze Doom Loop attack

```
ch.freeze_doom_loop_attack(repeat=2,
                           timeout=50000000)
```

Note Attacks the frame set with `set_frame()`

Double Receive attack

```
ch.double_receive_attack(repeat=2,
                         timeout=50000000)
```

Note Attacks the frame set with `set_frame()`

Diagnostics

```
ch.set_can_tx(recessive=False)
```

Returns `True` if RX is recessive

```
ch.send_square_wave()
```

Note Sends a square wave on TX for 160 bit times

```
ch.loopback()
```

Note Waits for falling edge then transmits on TX what is read on RX for 160 bit times

Janus attack

```
ch.send_janus_frame(sync_time=50,
                    split_time=155,
                    timeout=50000000,
                    retries=0)
```

Note
- `split time` default is 62.5% (bit time is 249)
- `sync_time` default is 20%
- `timeout` default is about 17 seconds

Spoof attacks

```
ch.spoof_frame(timeout=50000000,
               overwrite=False,
               sync_time=0,
               split_time=0,
               second=False,
               retries=0,
               loopback_offset=93)
```

Note
- if `second` is `True` then will spoof using a Janus frame
- if `overwrite` is `True` then sends an error passive spoof
- `loopback_offset` only used if `overwrite` is `True`

CANIDFilter class

Making

```
filter = CANID(filter_str=None)
```

Note `filter_str` is 11 or 29 '1', '0' or 'X' characters

CANError class

Reading

```
error.get_timestamp()
error.is_crc_error()
error.is_stuff_error()
error.is_form_error()
error.is_ack_error()
error.is_bit1_error()
error.is_bit0_error()
error.is_bus_off()
```

CANID class

Making

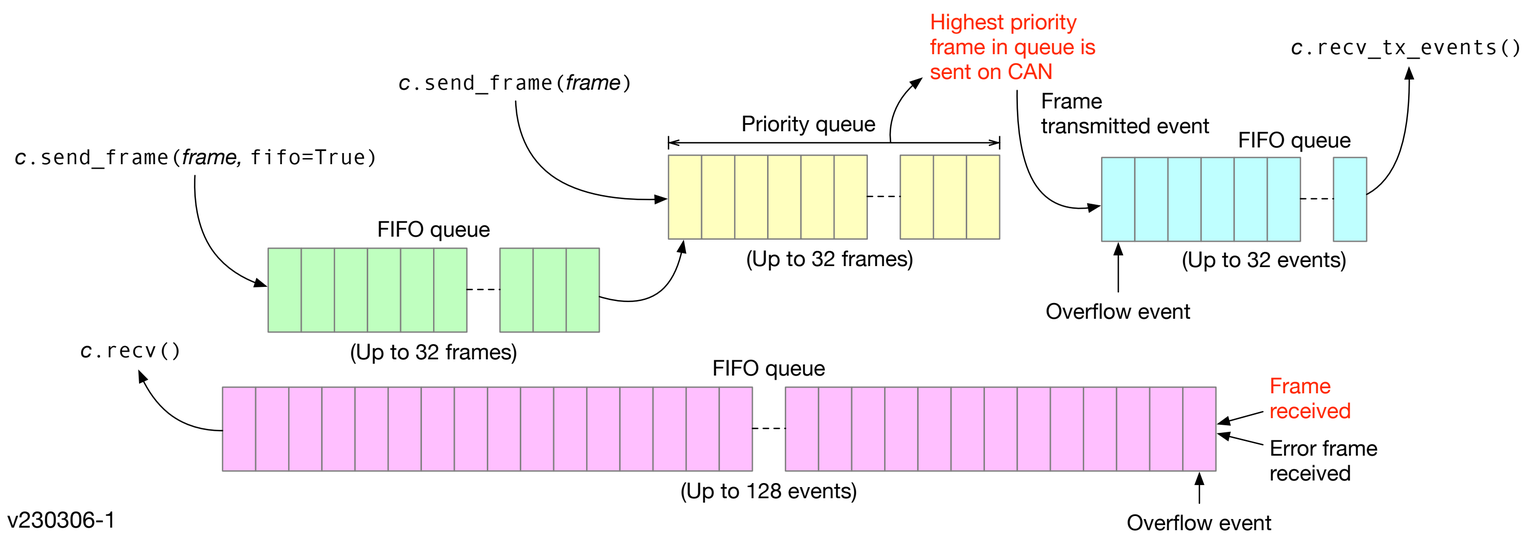
```
id = CANID(arbitration_id, extended=False)
```

Reading

```
id.is_extended()
id.get_arbitration_id()
id.get_id_filter()
```

Returns a `CANIDFilter` matching the ID

Queues



CANOverflow class

Reading

```
overflow.get_timestamp()
overflow.get_frame_cnt()
overflow.get_error_cnt()
```

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