Prepared by: Saeid

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Drone's OFFBOARD with Position Control

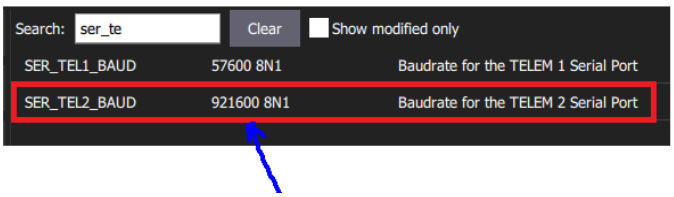
Topic: *'mavros/setpoint_position/local'*

Test Report:
VMware : Ubuntu 18.04.5
ROS Version: melodic
Protocol: Mavros
Flight Controller: Pixhawk4
Flight Firmware: PX4 v1.12.0
Baudrate: 921600
Note: Laptop is connected to Pixhawk'TELEM2 via USB-to-Serial
Note: There is no RC in my setup so that RC receiver is not connected to the Pixhawk.

Process:

Step#1: QGround control setting:

- Baudrate setting and enable TELEM2



Step#2: Connection:

```
roslaunch mavros px4.launch fcu_url:=/dev/ttyUSB0:921600
```

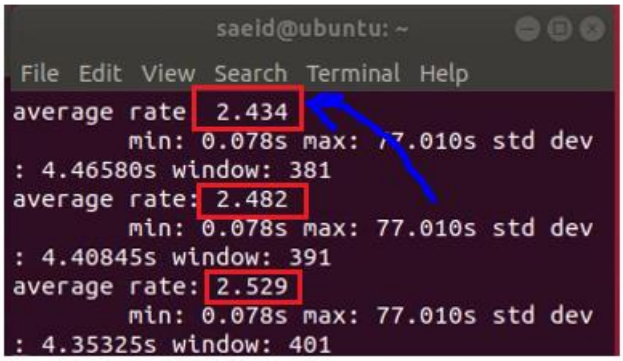
The Mavlink connection is established:

Step#3: Send the set points:

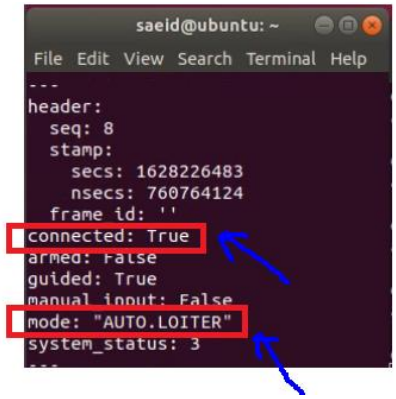
Send the setpoint in seperate thread

```
def send_pos(self):

    rate = rospy.Rate(10)  # 10Hz
    self.pos.header = Header()
    self.pos.header.frame_id = "1"
```

```
while not rospy.is_shutdown():
    self.pos.header.stamp = rospy.Time.now()
    self.pos_setpoint_pub.publish(self.pos)

    try:
        rate.sleep()
    except rospy.ROSInterruptException:
        pass
```



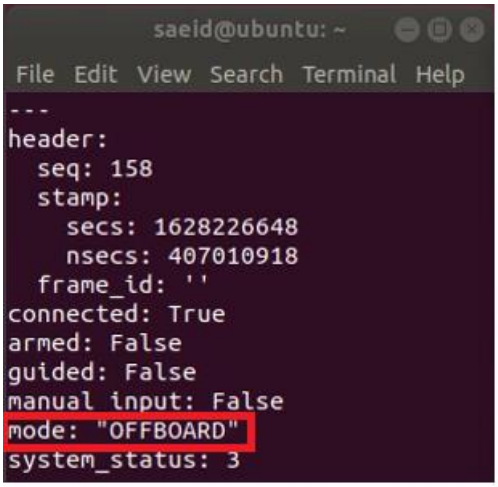
Note: **Initial drone mode is "AUTO.LOITER"**



Step#4: Change the drone mode to OFFBOARD mode:

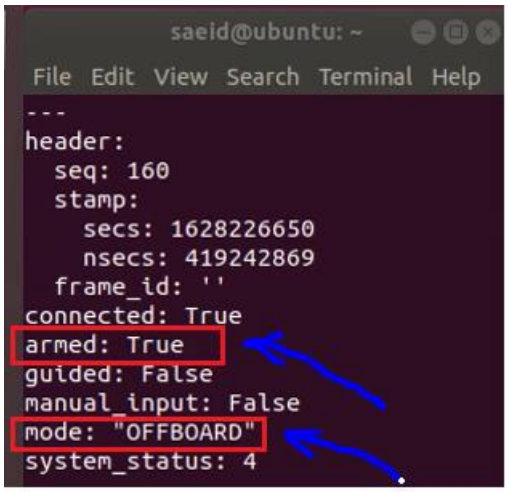
```
def setOffboardMode(self):
    rospy.wait_for_service('mavros/set_mode')
    try:
```

```
            flightModeService = rospy.ServiceProxy('mavros/set_mode',
mavros_msgs.srv.SetMode)
            flightModeService(custom_mode='OFFBOARD')
        except rospy.ServiceException, e:
            print "service set_mode call failed: %s. Offboard Mode could
not be set."%e
```



Step#4: Arm the drone :

```
    def setArm(self):
        rospy.wait_for_service('mavros/cmd/arming')
        try:
            armService = rospy.ServiceProxy('mavros/cmd/arming',
mavros_msgs.srv.CommandBool)
            armService(True)
        except rospy.ServiceException as e:
            print ("Service arming call failed: %s"%e)
```



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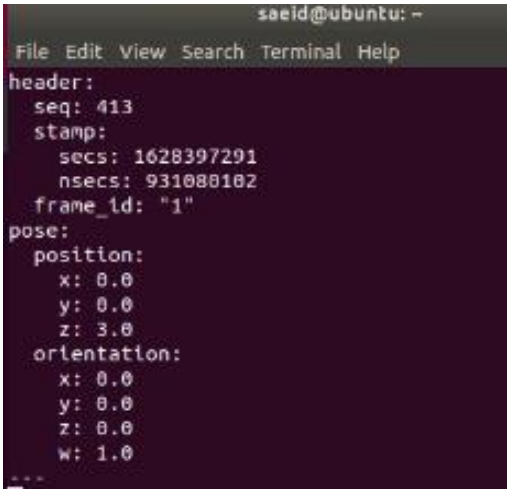
Step#4: update and Send a new setpoints :

```
self.pos.pose.position.x= 0
self.pos.pose.position.y= 1
self.pos.pose.position.z= 3
```



Information*:* Log Analysis using Flight Review:

https://logs.px4.io/plot_app?log=a29f7df0-adc9-4f7f-8396-01a444951d24

Logged Messages

#	Time	Level	Message
0	0:01:10	INFO	[commander] Armed by external command
1	0:01:10	INFO	[logger] Start file log (type: full)
2	0:01:10	INFO	[logger] [logger] /fs/microsd/log/2021-08-06/05_17_18.ulg
3	0:01:10	INFO	[logger] Opened full log file: /fs/microsd/log/2021-08-06/05_17_18.ulg
4	0:01:12	INFO	[commander] Takeoff detected
5	0:01:13	WARNING	[ekf2] primary EKF changed 3 (timeout) -> 0
6	0:01:58	WARNING	[commander] Failsafe enabled: no RC and no offboard
7	0:01:58	INFO	[commander] Failsafe mode activated

Expectation:

- Drone has to take-off and mover to 2 meter above of the ground.

Problem:

- Drone doesn’t take-off

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Code:

```
#!/usr/bin/env python

# ____________________ include Libraries ____________________

import rospy
from geometry_msgs.msg import PoseStamped, Quaternion
from mavros_msgs.srv import CommandBool, CommandTOL, SetMode
from mavros_msgs.msg import *
from std_msgs.msg import Header
from threading import Thread
from tf.transformations import quaternion_from_euler
import math
import time

#_____________________________________________________________

class MavrosOffboardPosctlTest():

    def __init__(self):

        print("class")
        self.setUp()


    def setUp(self):
        self.pos = PoseStamped()
        self.pos_setpoint_pub =
rospy.Publisher('mavros/setpoint_position/local', PoseStamped,
queue_size=1)

        #send setpoint in seperate thread to better prevent failsafe
        self.pos_thread = Thread(target=self.send_pos, args=())
        self.pos_thread.daemon = True
        self.pos_thread.start()


    def send_pos(self):
        rate = rospy.Rate(10)  # 10Hz
        self.pos.header = Header()
        self.pos.header.frame_id = "1"

        while not rospy.is_shutdown():
            self.pos.header.stamp = rospy.Time.now()
```

```
            self.pos_setpoint_pub.publish(self.pos)
            #print('Topic: mavros/setpoint_position/local')

            try:
                rate.sleep()
            except rospy.ROSInterruptException:
                pass

    def setTakeoff(self):
        rospy.wait_for_service('mavros/cmd/takeoff')
        try:
            takeoffService = rospy.ServiceProxy('mavros/cmd/takeoff',
mavros_msgs.srv.CommandTOL)
            takeoffService(altitude = 3)
        except rospy.ServiceException as e:
            print ("Service takeoff call failed: %s"%e)

    def setland(self):
        rospy.wait_for_service('mavros/cmd/land')
        try:
            takeoffService = rospy.ServiceProxy('mavros/cmd/land',
mavros_msgs.srv.CommandTOL)
            takeoffService(altitude = 3)
        except rospy.ServiceException as e:
            print ("Service takeoff call failed: %s"%e)

    def setArm(self):
        rospy.wait_for_service('mavros/cmd/arming')
        try:
            armService = rospy.ServiceProxy('mavros/cmd/arming',
mavros_msgs.srv.CommandBool)
            armService(True)
        except rospy.ServiceException as e:
            print ("Service arming call failed: %s"%e)

    def setDisarm(self):
        rospy.wait_for_service('mavros/cmd/arming')
        try:
            armService = rospy.ServiceProxy('mavros/cmd/arming',
mavros_msgs.srv.CommandBool)
            armService(False)
        except rospy.ServiceException as e:
            print ("Service disarming call failed: %s"%e)

    def setOffboardMode(self):
        rospy.wait_for_service('mavros/set_mode')
        try:
            flightModeService = rospy.ServiceProxy('mavros/set_mode',
mavros_msgs.srv.SetMode)
            flightModeService(custom_mode='OFFBOARD')
        except rospy.ServiceException, e:
            print "service set_mode call failed: %s. Offboard Mode could
not be set."%e



    def testPosctl(self,x,y,z,yaw):
```

```
        self.pos.pose.position.x= x
        self.pos.pose.position.y= y
        self.pos.pose.position.z= z
        yaw_degree = yaw #----- North
        yaw_radians = math.radians(yaw_degree)
        print(yaw)
        quaternion = quaternion_from_euler(0,0,yaw_radians)
        self.pos.pose.orientation = Quaternion(*quaternion)


def main():

    print("\r\n ------------- Start the Program --------------\r\n")
    rospy.init_node('Positionctl_node', anonymous=True)
    node = MavrosOffboardPosctlTest()

    time.sleep(2)
    node.setOffboardMode()      # activate OFFBOARD mode
    rospy.loginfo("Activated OFFBOARD MODE is Done..")

    time.sleep(2)
    node.setArm()
    rospy.loginfo("ARM Drone is Done..")


    time.sleep(2)
    node.testPosctl(0,0,3,0)
    rospy.loginfo("x=0 , y=0 , z=1 , yaw=0")

    time.sleep(10)
    rospy.loginfo("LANDING ... ")

    node.setland()
    time.sleep(2)

    rospy.loginfo("DISARM ... ")

    node.setDisarm()


    while True:
        time.sleep(1)
       # rospy.spin()



if __name__ == '__main__':

    main()
```