PixHawk Offboard Mode Workflow

Startup Procedure
1. Power up UAV and RC controller.
2. Lock UAV using safety switch (if not locked at powerup).
3. Engage manual kill on RC controller.
4. Connect to QGroundControl over radio telemetry..
5. Connect & power up ODroid (or equivalent).
6. Start off-board control program on ODroid.
7. Switch UAV to "offboard" mode. If mode switch fails, check step 4~6.
8. Unlock UAV using safety switch.
9. Make sure ready to go, then release manual kill on RC controller. Propellers should spin now.
10. Startup procedure completed.

Shutdown Procedure
1. Engage manual kill on RC controller. Propellers should stop.
2. Lock UAV using safety switch.
3. Switch to other desired modes.
4. Shutdown procedure completed. Can safely stop and modify ODroid program now.

ODroid Offboard Control Program

Prerequisite

ROS, libeigen3-dev, ros-version-tf

Pkgs

Currently the following pkgs have been created. There are other unused pkgs in the program, which are not listed here.

Pkgs	Description
mavlink_message	Handles communication with UAV using mavlink.
att_controller	Controls the attitude of UAV
pos_controller	Position loop controller of UAV

Pkg: mavlink_message

Node(s):

    mavlink_message

Usage:

```
rosrun mavlink_message mavlink_message -d PORT -b BAUD
```

Explain:

    `-b PORT`: serial port to UAV

    `-d BAUD`: serial port baud rate. Should be 921600

Example:

```
rosrun mavlink_message mavlink_message -d /dev/ttyUSB0 -b
921600
```

Message Monitored:

The "mavlink_message" node monitors the following MAVLink messages from UAV, and publish them in ROS, for local use by other nodes, such as "att_controller".

MAVLink Msg Monitored	Local Publication
HIGHRES_IMU	/mavlink/imu_raw
ATTITUDE	/mavlink/att_onboard
GPS_RAW_INT	/mavlink/gps_raw
RC_CHANNELS_RAW	/mavlink/rc_chans
SERVO_OUTPUT_RAW	/mavlink/servo_output
HEARTBEAT	/mavlink/uav_mode
SYS_STATUS	NA

Message Transmitted:

The "mavlink-message" node can transmit the following MAVLink messages to UAV. If a node (e.g "att_controller") wish to initiate the transmission of a msg, it should publish to the respective "Target Topic".

MAVLink Msg Transmitted	Target Topic
SET_ATTITUDE_TARGET	/mavlink/set_att
SET_ACTUATOR_CONTROL_TARGET	/mavlink/actuator_control

Pkg: att_controller

Node(s):

1. att_controller
2. actuator_test

Descriptions:

Node	Description
att_controller	Controls the attitude of UAV
actuator_test	Test pix4 all pass-through mixer & test the effect of `SET_ACTUATOR_CONTROL_TARGET`

Files:

File Name	Description
actuator_control_main.cpp	Node "att_controller" main loop + control functions
actuator_map.cpp	Custom actuator map functions
actuator_map.h	Actuator map header file
actuator_test.cpp	Node "actuator_test" main loop

Known Problems:

1. PixHawk main out 4 does not respond to SET_ACTUATOR_CONTROL_TARGET, while all other main out ports respond accordingly.