

Tello Approaches

Pedro Arias

Drone Wrapper: Dependencias

cv_bridge	converts between ROS Image messages and OpenCV images.
geometry_msgs	msgs for common geometric primitives such as points, vectors and poses.
mavros_msgs	messages for MAVROS.
rospy	Python client library for ROS.
sensor_msgs	msgs for commonly used sensors: cameras and scanning laser rangefinders.
tf	keep track of multiple coordinate frames over time.
gazebo_ros	provides ROS plugins that offer message and service publishers for interfacing with Gazebo through ROS.
mavros	MAVLink extendable communication node for ROS with proxy for GCS.

Tello - Alternativas

Python

- [TelloPy](#)
- [pytello](#)

ROS

- [tello_driver](#) (python)
- [tello_ros](#) (c++)

The Tello communicates with its controller via Wifi on a default port number 8889 using UDP messages.

Tello General UDP Packet Structure

Byte(s)	Content	Comments
0	Header	Always 0xCC
1-2	Packet Size	13-bit total packet size
3	CRC-8	CRC from Header to Packet Size
4	Packet Type Info	Bits are: F T TYP SUB - See below
5-6	Message ID	Little-endian - See below
7-8	Sequence No.	Little-endian - Either 0 for some types, or ascending for others
9...	Payload	Optional, varies by Packet Type
End-1, End	CRC16	CRC from Header to end of Payload

Fuente: [TelloPilots](#)

¡Tello no usa MAVROS!

Y DroneWrapper sí..



Tello Status

[MAVROS](#)

BatteryLow	bool	EastSpeed	int16	ImuState	bool
BatteryLower	bool	ElectricalMachineryState	int16	LightStrength	int8
BatteryPercentage	int8	FactoryMode	bool	NorthSpeed	int16
BatteryState	bool	FlyMode	int8	OutageRecording	bool
CameraState	int8	FlyTime	int16	PowerState	bool
DownVisualState	bool	FrontIn	bool	PressureState	bool
DroneBatteryLeft	int16	FrontLSC	bool	SmartVideoExitMode	int16
DroneFlyTimeLeft	int16	FrontOut	bool	TemperatureHigh	bool
DroneHover	bool	GravityState	bool	ThrowFlyTimer	int8
EmOpen	bool	VerticalSpeed	int16	WindState	bool
Flying	bool	Height	int16	VideoBitRate	int
OnGround	bool	ImuCalibrationState	int8	Wifi (Strenght, Disturb) ...	

sensor_msgs/BatteryState

mavros_msgs/State

mavros_msgs/ExtendedState

geometry_msgs/PoseStamped

geometry_msgs/TwistStamped

Tello Status

MAVROS

BatteryLow	bool	EastSpeed	int16	ImuState	bool
BatteryLower	bool	ElectricalMachineryState	int16	LightStrength	int8
BatteryPercentage	int8	FactoryMode	bool	NorthSpeed	int16
BatteryState	bool	FlyMode	int8	OutageRecording	bool
CameraState	int8	FlyTime	int16	PowerState	bool
DownVisualState	bool	FrontIn	bool	PressureState	bool
DroneBatteryLeft	int16	FrontLSC	bool	SmartVideoExitMode	int16
DroneFlyTimeLeft	int16	FrontOut	bool	TemperatureHigh	bool
DroneHover	bool	GravityState	bool	ThrowFlyTimer	int8
EmOpen	bool	VerticalSpeed	int16	WindState	bool
Flying	bool	Height	int16	VideoBitRate	int
OnGround	bool	ImuCalibrationState	int8	Wifi (Strenght, Disturb)	

sensor_msgs/BatteryState

mavros_msgs/State

mavros_msgs/ExtendedState

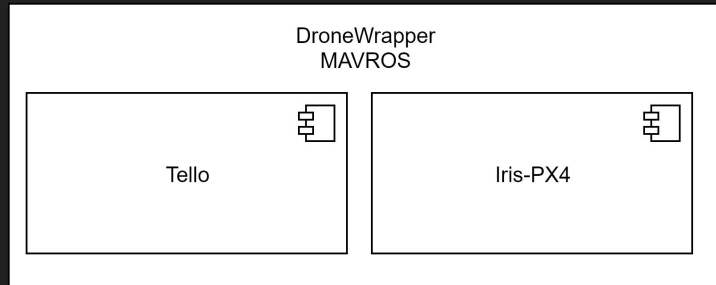
geometry_msgs/PoseStamped

geometry_msgs/TwistStamped

Arquitectura

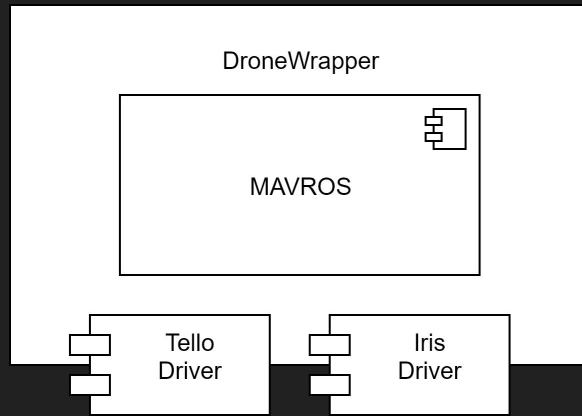
Tello Wrapper

- Wrappers en paralelo
- Más sencillo, reutilizar pkgs



Tello Driver

- Drivers-traductores a mavros
- Escalable



Tello no sigue el estándar MAVROS, forzar a que lo siga?

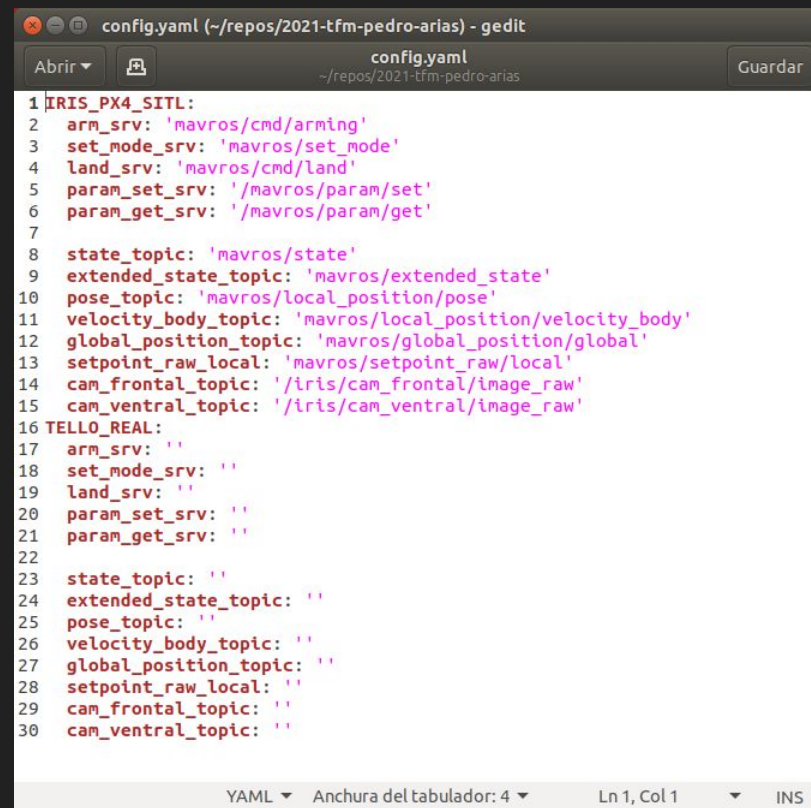
Arquitectura II

Wrapper Parametrizable

- Un único wrapper hueco
- Topics y servicios se obtienen al inicio
- Fichero de config YAML → ros params

- ¿Tipo de msgs?
- ¿Abandono MAVROS?
- Topics vs Servs (takeoff...)

```
<rosparam command="load" file="model.yaml" />
```



```
1 IRIS_PX4_SITL:
2   arm_srv: 'mavros/cmd/arming'
3   set_mode_srv: 'mavros/set_mode'
4   land_srv: 'mavros/cmd/land'
5   param_set_srv: '/mavros/param/set'
6   param_get_srv: '/mavros/param/get'
7
8   state_topic: 'mavros/state'
9   extended_state_topic: 'mavros/extended_state'
10  pose_topic: 'mavros/local_position/pose'
11  velocity_body_topic: 'mavros/local_position/velocity_body'
12  global_position_topic: 'mavros/global_position/global'
13  setpoint_raw_local: 'mavros/setpoint_raw/local'
14  cam_frontal_topic: '/iris/cam_frontal/image_raw'
15  cam_ventral_topic: '/iris/cam_ventral/image_raw'
16 TELLO_REAL:
17   arm_srv: ''
18   set_mode_srv: ''
19   land_srv: ''
20   param_set_srv: ''
21   param_get_srv: ''
22
23   state_topic: ''
24   extended_state_topic: ''
25   pose_topic: ''
26   velocity_body_topic: ''
27   global_position_topic: ''
28   setpoint_raw_local: ''
29   cam_frontal_topic: ''
30   cam_ventral_topic: ''
```

Services

mavros/cmd/arming
mavros/set_mode
mavros/cmd/land
mavros/param/set
mavros/param/get

Topics
subs

mavros/state
mavros/extended_state
mavros/local_position/pose
mavros/local_position/velocity_body
mavros/global_position/global

/iris/cam_frontal/image_raw
/iris/cam_ventral/image_raw

Topics
pubs

drone_wrapper/extended_state
drone_wrapper/local_position/pose
drone_wrapper/local_position/velocity_body
drone_wrapper/cam_frontal/image_raw
drone_wrapper/cam_ventral/image_raw

mavros/setpoint_raw/local



Drone
Wrapper



API

drone.get_position()
drone.get_velocity()
drone.get_yaw_rate()
drone.get_orientation()
drone.get_roll()
drone.get_pitch()
drone.get_yaw()
drone.get_landed_state()

drone.set_cmd_pos(x, y, z, yaw)
drone.set_cmd_vel(vx, vy, vz, yaw_rate)
drone.set_cmd_mix(vx, vy, z, yaw_rate)

drone.takeoff(height)
drone.land()

drone.param_get(param)
drone.param_set(param, value)

drone.get_frontal_image()
drone.get_ventral_image()

Services

mavros/cmd/arming
mavros/set_mode
mavros/cmd/land
mavros/param/set
mavros/param/get

mavros_msgs/CommandBool
mavros_msgs/CommandHome
mavros_msgs/CommandTOL
mavros_msgs/ParamSet
mavros_msgs/ParamGet



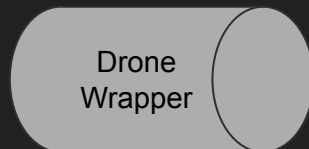
Topics
subs

mavros/state
mavros/extended_state
mavros/local_position/pose
mavros/local_position/velocity_body
mavros/global_position/global

/iris/cam_frontal/image_raw
/iris/cam_ventral/image_raw

mavros_msgs/State
mavros_msgs/ExtendedState
geometry_msgs/PoseStamped
geometry_msgs/TwistStamped
sensor_msgs/NavSatFix

sensor_msgs/Image
sensor_msgs/Image



API

RQT

Topics
pubs

mavros/setpoint_raw/local

mavros_msgs/PositionTarget

