



优象光流模块接入 PX4 开源飞控的使用教程

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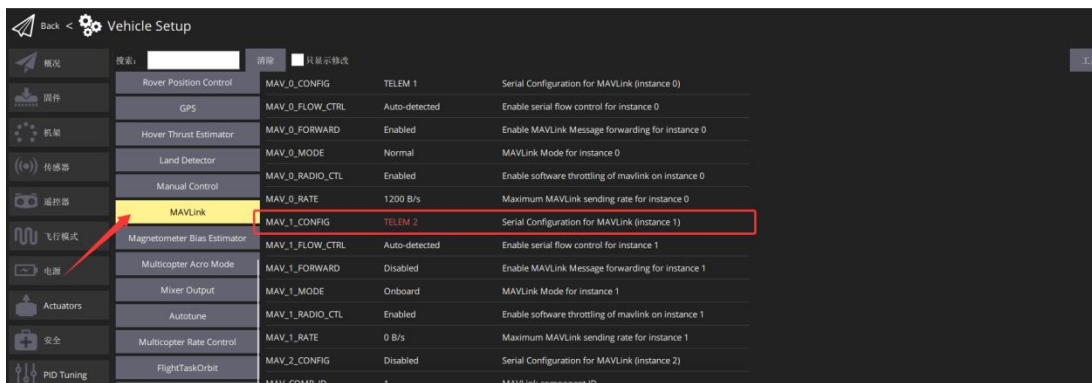
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1 地面站配置

首先连接完飞控后，将飞控通过 USB 接入电脑，打开 QGroundControl 地面站软件，配置和修改飞控的相关参数。本例程使用的 PX4 固件版本为 1.15.4，飞控为 Pixhawk 6C。

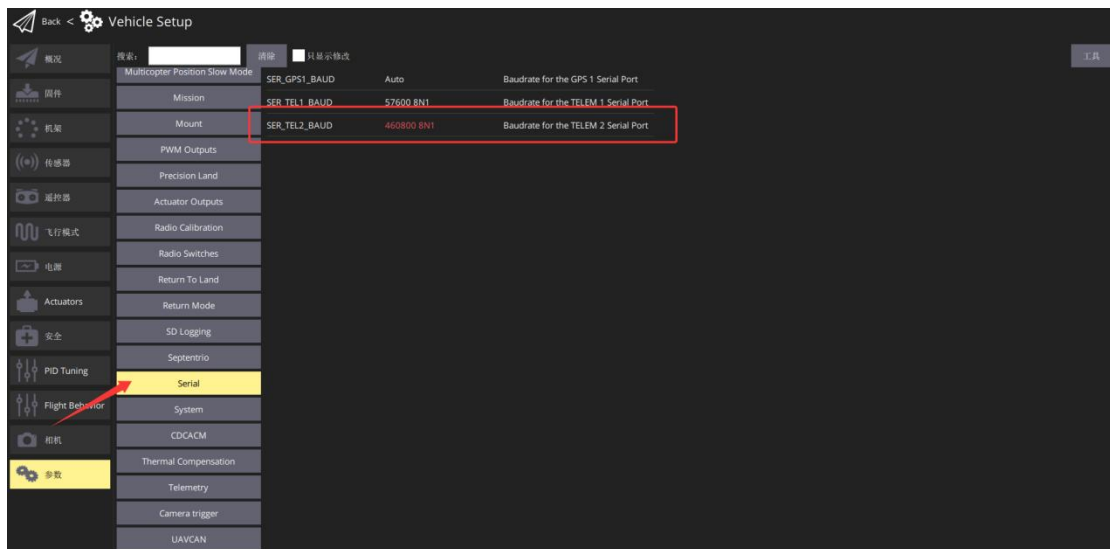
1.1 配置 MAVLink 参数

找到 **MAV_1_CONFIG** 这个参数，将其设置为 **TELEM2**（视具体使用的接口而定，本例程使用 TELEM2 端口进行硬件连接）



1.2 配置 Serial 参数

配置串口波特率 **SER_TEL2_BAUD**（与上一步配置的端口一致）为 **460800**，不同模块设置对应的波特率



1.3 配置 EKF2 参数

- ① 设置 **EKF2_HGT_REF** 参数为 **Barometric pressure**，将高度数据来源设置为气压计

固件	Battery Calibration	EKF2_GPS_P_NOISE	0.50 m	Measurement noise for GNSS position
机架	Commander	EKF2_GPS_V_GATE	5.0 SD	Gate size for GNSS velocity fusion
传感器	EKF2	EKF2_GPS_V_NOISE	0.30 m/s	Measurement noise for GNSS velocity
遥控器	Failure Detector	EKF2_GRAV_NOISE	1.00 g0	Accelerometer measurement noise for gravity based observations
飞行模式	FW Performance	EKF2_GSF_TAS	15.0 m/s	Default value of true airspeed used in EKF-GSF AHRS calculation
电源	Geofence	EKF2_GYR_B_LIM	0.150 rad/s	Gyro bias learning limit
Actuators	GPS	EKF2_GYR_NOISE	0.001000 rad/s ²	Process noise for IMU rate gyro bias prediction
	Sensors	EKF2_HDG_GATE	2.6 SD	Gate size for heading fusion
	Manual Control	EKF2_HEAD_NOISE	17.19 deg	Measurement noise for magnetometer heading fusion
安全	MAVLink	EKF2_HGT_REF	Barometric pressure	Determines the reference source of height data used by the EKF
	Mixer Output	EKF2_IMU_CTRL	7	IMU control
	Mission	EKF2_IMU_POS_X	0.000 m	X position of IMU in body frame
		EKF2_IMU_POS_Y	0.000 m	Y position of IMU in body frame

② 设置 EKF2_OF_CTRL 为 Enabled，启用光流辅助功能

概况	Vehicle Setup	EKF2_MAG_NOISE	0.050 gauss	Measurement noise for magnetometer 3-axis fusion
固件	Camera Control	EKF2_MAG_TYPE	Automatic	Type of magnetometer fusion
机架	Geometry	EKF2_MCOEF	0.15 1/s	Propeller momentum drag coefficient for multi-rotor wind estimation
传感器	Commander	EKF2_MIN_RNG	0.10 m	Expected range finder reading when on ground
遥控器	Multicopter Position Control	EKF2_MULTIMU	3	Multi-EKF IMUs
飞行模式	QShot	EKF2_NOAID_NOISE	10.0 m	Measurement noise for non-aiding position hold
电源	EKF2	EKF2_NOAID_TOUT	5000000 us	Maximum inertial dead-reckoning time
Actuators	Events	EKF2_OF_CTRL	Enabled	Optical flow aiding
	Failure Detector	EKF2_OF_DELAY	20.0 ms	Optical flow measurement delay relative to IMU measurements
	Follow target	EKF2_OF_GATE	3.0 SD	Gate size for optical flow fusion
		EKF2_OF_N_MAX	0.50 rad/s	Optical flow maximum noise

③ 设置为 EKF2_RNG_CTRL 为 Enabled，启用测距辅助功能

概况	Vehicle Setup	EKF2_REQ_HDRIFT	0.10 m/s	Maximum horizontal drift speed to use GPS
固件	Battery Calibration	EKF2_REQ_NSATS	6	Required satellite count to use GPS
机架	Commander	EKF2_REQ_PDOP	2.5	Maximum PDOP to use GPS
传感器	Failure Detector	EKF2_REQ_SACC	0.50 m/s	Required speed accuracy to use GPS
遥控器	FW Performance	EKF2_REQ_VDRIFT	0.20 m/s	Maximum vertical drift speed to use GPS
飞行模式	Geofence	EKF2_RNG_A_HMAX	5.000 m	Maximum height above ground allowed for conditional range aid mode
电源	GPS	EKF2_RNG_A_VMAX	1.000 m/s	Maximum horizontal velocity allowed for conditional range aid mode
Actuators	Sensors	EKF2_RNG_CTRL	Enabled	Range sensor height aiding
	Manual Control	EKF2_RNG_DELAY	5.0 ms	Range finder measurement delay relative to IMU measurements
安全	MAVLink	EKF2_RNG_FOG	3.0 m	Maximum distance at which the range finder could detect fog (m)
	Mixer Output	EKF2_RNG_GATE	5.0 SD	Gate size for range finder fusion
		EKF2_RNG_K_GATE	1.000 SD	Gate size used for range finder kinematic consistency check

1.4 其他参数

EKF2_OF_POS_X、EKF2_OF_POS_Y 和 EKF2_OF_POS_Z 可用于设置光流相对于飞行器重心的偏移量。

Actuators	Manual Control	EKF2_RNG_FOG	3.0 m	Maximum distance at which the range finder could detect fog (m)
	MAVLink	EKF2_RNG_GATE	5.0 SD	Gate size for range finder fusion
安全	Mixer Output	EKF2_RNG_K_GATE	1.000 SD	Gate size used for range finder kinematic consistency check
	Mission	EKF2_RNG_NOISE	0.10 m	Measurement noise for range finder fusion
	Multicopter Position Control	EKF2_RNG_PITCH	0.000 deg	Range sensor pitch offset
	Precision Land	EKF2_RNG_POS_X	0.000 m	X position of range finder origin in body frame
	Actuator Outputs	EKF2_RNG_POS_Y	0.000 m	Y position of range finder origin in body frame
	PWM Outputs	EKF2_RNG_POS_Z	0.000 m	Z position of range finder origin in body frame
	Radio Calibration	EKF2_RNG_QLTY_T	1.000 s	Minimum range validity period
		EKF2_RNG_SFE	0.050 m/m	Range finder range dependent noise scaler

1.5 查看数据

可通过 OPTICAL_FLOW_RAD 查看光流数据，勾选 `integrated_x` 和 `integrated_xgyro` 以及 `integrated_y` 和 `integrated_ygyro` 查看光流安装是否正确，当 `integrated_x` 和 `integrated_xgyro` 的数据波形未重合时，可通过参数 `SENS_FLOW_ROT` 设置传感器对应的旋转角度，或通过模块自带的上位机设置对应的机头方向，使波形完全重合即可。

