INS Interface

Version 1.0

This file is a part of Firmament Autopilot project

Input Bus

IMU_Bus Interface (500Hz)

Type	Name	Unit	Comments
uint32	timestamp_ms	ms	timestamp in ms
float	gyr_x_radPs_B	rad/s	roll rate
float	gyr_y_radPs_B	rad/s	pitch rate
float	gyr_z_radPs_B	rad/s	yaw rate
float	acc_x_mPs2_B	m/s2	acceleration of x in body frame
float	acc_y_mPs2_B	m/s2	acceleration of y in body frame
float	acc_z_mPs2_B	m/s2	acceleration of z in body frame

Mag_Bus Interface (100Hz)

Type	Name	Unit	Comments
uint32	timestamp_ms	ms	timestamp in ms
float	mag_x_ga_B	gauss	magnetic field of x in body frame
float	mag_y_ga_B	gauss	magnetic field of y in body frame
float	mag_z_ga_B	gauss	magnetic field of z in body frame

Baro_Bus Interface (100Hz)

Type	Name	Unit	Comments
uint32	timestamp_ms	ms	timestamp in ms
float	pressure_pa	pa	static air pressure in pa
float	temp_deg	degree	temperature in degree

uBlox_PVT_Bus Interface (10Hz)

Type	Name	Unit	Comments
uint32	timestamp_ms	ms	timestamp in ms
uint32	iTOW	ms	GPS time of week
uint16	year	year	Year(UTC)
uint8	month	month	Month
uint8	day	day	Day of month
uint8	hour	hour	Hour of day
uint8	min	minute	Minute of hour
uint8	sec	second	Seconds of minute
uint8	valid	-	Valid flags
uint32	tAcc	ns	TIme accurancy estimate
int32	nano	ns	Fraction of second
uint8	fixType	-	GNSSfox Type
uint8	flags	-	Fix status flags
uint8	reserved1	-	Reserved
uint8	numSV	-	Number of available satelites
int32	lon	1e7 deg	Lontitude
int32	lat	1e7 deg	Latitude
int32	height	mm	Height above Elipsoid
int32	hMSL	mm	Height above mean sea level
uint32	hAcc	mm	Horizontal accurancy
uint32	vAcc	mm	Vertical accurancy
int32	velN	mm/s	NED north velocity
int32	velE	mm/s	NED east velocity
int32	velD	mm/s	NED down velocity
int32	gSpeed	mm/s	Ground speed
int32	headMot	1e5 deg	Heading of motion
uint32	sAcc	mm/s	Speed accurancy
uint32	headAcc	1e5 deg	Heading accurancy
uint16	pDOP	1e2 deg	Position DOP
uint16	reserved2	-	Reserved

Sonar_Bus Interface(TO BE ADDED)

OpticalFlow_Bus Interface(TO BE ADDED)

Output Bus

INS_Out_Bus Interface (500Hz)

Type	Name	Unit	Comments
uint32	timestamp	ms	timestamp of INS output
single	phi	rad	roll angle
single	theta	rad	pitch angle
single	psi	rad	yaw angle
single[4]	quat	-	attitude quaternion
single	p	rad/s	roll rate
single	q	rad/s	pitch rate
single	r	rad/s	yaw rate
single	ax	m/s^2	specific force in x
single	ay	m/s^2	specific force in y
single	az	m/s^2	specific force in z
single	vn	m/s	WGS84 north velocity
single	ve	m/s	WGS84 east velocity
single	vd	m/s	WGS84 down velocity
double	lon	deg	WGS84 longitude
double	lat	deg	WGS84 latitude
double	alt	m	WGS84 altitude
single	x_R	m	Relative position of x
single	y_R	m	Relative position of y
single	h_R	m	Relative position of height
single	h_AGL	m	Height above ground level
uint32	flag	-	INS output flag, refer to below definition
uint32	status	-	INS sensor status, refer to below definition

flag

bit	Comments
0	INS ready
1	standstill
2	attitude valid
3	heading valid
4	velocity valid
5	WGS84 position valid
6	relative position x,y valid
7	relative height valid
8	height above ground level valid
9-31	reserved

status

bit	Comments
0	IMU1 available
1	IMU2 available
2	magnetometer available
3	barometer available
4	GPS available
5	sonar available
6	optical flow available
7-31	reserved