Optical Flow + IMU Module

First Generation

Prepared by David Qiu
on behalf of FRUITION CO., LTD.

Last revision: January 18th, 2019

Contents

富臨通
Fruition

1 Product Overview

1.1 General Description

Fruition has now released a new low-cost, high-performance, low-latency planar positioning sensor of optical flowmeter and positioning module. This module integrates an optical flow tracking sensor, triaxial accelerometer and gyroscope and one low-power microprocessor.

It can provide positioning information output on surfaces of various materials, such as tiles, floors, or blankets. Its output is based on the initial displacement calculated via an internal sensor fusion algorithm relative to local geographic 3D coordinate bearing data, including the principal axes pitch, roll, and yaw. The module can also output all sensors' raw data simultaneously.

1.2 Applications

- Provide orientation information for indoor service robots, such as robot vacuums.
- Provide positioning information for portable smart toys.

1.3 Features

- Optical tracking and positioning sensor.
- Adaptable to almost all different indoor surface materials.
- Adaptable to high velocities, useful in applications utilizing the module for atheltic applications.
- Small heading sensor, based on MEMS.
- Integrated high-precision six-axis gyroscope.
- Stable and accurate sensor fusion algorithm used to calculate the device's displacement.
- Able to output positioning, orientation, and other information simultaneously.

- Extremely high stability against ambient temperature and external vibration.
- UART interface with high baud rate and data output frequency.
- Low host configuration requirements.
- Low power consumption.

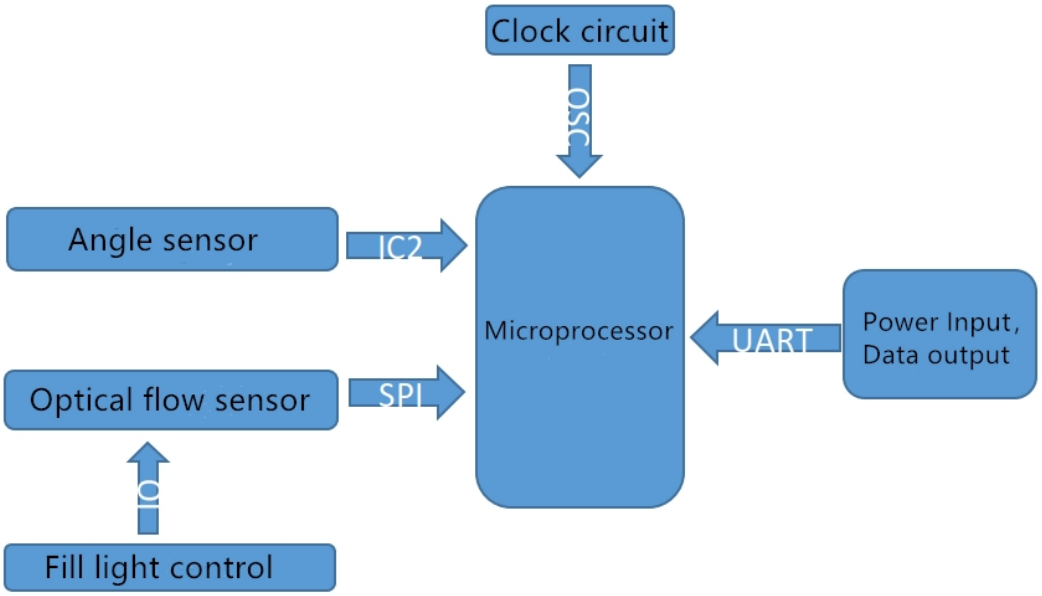

Figure 1.1: Data flow diagram for the optical flow/IMU module.

富臨通
Fruition

2 Detailed Specifications

2.1 Operating Conditions

Table 2.1: The working conditions of the optical flow/IMU module.

Parameter	Symbol	Condition	Rate	Unit
Voltage”	VCC	–	3.3V/0.15V (+/-)	V
Temperature”	TA	–	-20–50	°C

Table 2.2: The maximum range of operation conditions of the optical flow/IMU module.

Parameter	Symbol	condition	Rate	Unit
Supply Voltage	VDD		0–3.8	V
Static Protection	ESD	HBM	2	KV
Storage Temperature	Tstg		-40–+125	°C

2.2 Module I/O

UART configuration is as follows.

- Baud rate: 115200
- 8 bit data length
- Parity NONE
- 1 bit stop bit.
- Output frequency is 50 Hz.

Table 2.3: The function of the I/O pins on the optical flow/IMU module.

Pin	Name	I/O	Function
1	3.3V	Input	Power（3.3V DC）
2	TX	Input	UART send data
3	RX	Output	UART receive data
4	GND	–	Ground
5	RST	–	System reset

Table 2.4: Data packet format definition on the optical flow/IMU module.

Output data	Byte	Explanation
Headers	1-2	0xFFFD
Pitch	7-8	True Angle times 100 in degrees.
Roll	9-10	True Angle times 100 in degrees.
Yaw	11-12	True Angle times 100 in degrees.
Z angular velocity (GyroZ)	13-14	True Angle times 100 in degrees/second. (Range ± 1000 dps)
	15	
Motion	16	
IQ	17-18	
Temperature	27	True temperature minus 30 and multiplied by 2.
Checksum	28	

2.3 Hardware Specifications

Table 2.5: Detailed hardware specifications of the optical flow/IMU module.

Specification	Value
Dimension	15.24mm x 17.78mm x 3.1mm
Displacement Resolution	1 mm
Pitch Resolution	0.01°(MAX.)
Roll Resolution	0.01°(MAX.)
Yaw Resolution	0.01°(MAX.)
Pitch Range	±90°
Roll Range	±90°
Yaw Range	±180°
With LASER light source error	1
With LED light error	3
Course angle error	20°/hr (MAX.)
Angular rate error	±900°/sec (MAX.)
Angular rate movement error	±0.01°/sec (MAX.)
Output frequency	100Hz
Power	17.5mA (at 3.3V)
Input voltage	3.3 V DC
Working temperature	-20 –70°C
Storage temperature	-40 –85°C

3 Legal

SHENZHEN FRUITION CO., LTD. shall not be liable, under any circumstances, for any special, indirect, incidental, consequential, or contingent damages for any reason, whether or not the buyer has been advised of the possibility of such damage.