Composition of the Optical Flow Sensor Module



Overview

Rather than conventional sensing methods, the thermostat uses an optical flow sensor called an ADBM-A350 from Avago.

Key Takeaways

Optical flow sensor modules are vision-based devices that estimate motion and velocity using a downward-facing camera and distance sensor, enabling navigation and stabilization in GPS-denied environments.

Overview

Optical flow sensors detect motion by analyzing changes in visual patterns between sequential image frames. They are widely used in drones and UAVs to provide position hold, altitude stabilization, precision landing, and obstacle avoidance, especially when GPS signals are unreliable or unavailable. These modules typically combine a camera, distance sensor (often LiDAR), and an IMU to deliver high-frequency positional updates for flight controllers.

Key Components

Optical Flow Sensor: Captures image frames and measures displacement to estimate velocity. Examples include PixArt PAA3905 and PAW3902 sensors. Distance Sensor: Measures altitude or distance to surfaces, commonly using LiDAR for accuracy and robustness.

IM

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U (Inertial Measurement Unit): Provides orientation and acceleration data to complement optical flow measurements.

Onboard LE

D: Some modules include infrared LEDs to enhance visibility in low-light conditions.

Examples of Modules

Holybro H-

Flow: Combines a PixArt PAA3905 optical flow sensor, Broadcom AFBR-S50LV85D distance sensor, and InvenSense ICM-42688-P 6-axis IMU. It uses DroneCAN protocol for high-speed communication and features a Pixhawk-standard CAN connector.

AR

K Flow: Integrates a PAW3902 optical flow sensor, Broadcom AFBR-S50LV85D distance sensor, and Invensense ICM-42688-P IMU.

The ARK Flow M

R variant is designed for mid-range applications with a PixArt PAA3905 sensor and a 50-meter distance sensor. MTF-01 (MicoAir Tech): Offers a customizable protocol for developers, configurable via MicoAssistant software, and connects to flight controllers through serial ports like Telem2 on Pixhawk.

Integration and Usage

Optical flow modules can connect to flight controllers via MAVLink, I2C, or CAN bus. The optical flow camera publishes OPTICAL_FLOW_RAD messages, while the distance sensor publishes DISTANCE_SENSOR messages, which are then fused by estimators like EKF2 for navigation. Proper calibration of sensor offsets relative to the vehicle center is essential for accurate motion estimation.

Applications

Indoor or GPS-denied navigation: Enables drones to maintain stable flight in buildings, tunnels, or urban canyons. Precision landing and terrain following: Ensures controlled descent and accurate positioning relative to the ground. Obstacle detection and avoidance: Uses motion data and visual cues to maintain safe flight paths.

Optical flow sensor modules are essential for autonomous systems requiring reliable motion estimation and stabilization in environments where GPS is unavailable or unreliable. Their compact, all-in-one designs simplify installation and integration with modern flight controllers.

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Article Content

Optical Flow Sensors

Rather than conventional sensing methods, the thermostat uses an optical flow sensor called an ADBM-A350 from Avago. The ADBM-A350, which is marketed as a “Finger Sensor,” is a more familiar

Characterisation of Low-cost Optical Flow Sensors

Abstract This paper presents the development and characterisation of a low-cost optical sensor module, to be used for localisation. The modules contain CMOS sensors found in optical mice with modified

Optical Flow | PX4 Guide (main)

This document covers the hardware design and implementation of optical flow sensors in the Pixhawk ecosystem, specifically focusing on the PX4 Flow sensor module.

Optical Flow | PX4 Guide (main)

It combines a PixArt PAA3905 optical flow sensor, a Broadcom AFBR-S50LV85D distance sensor, and an InvenSense ICM-42688-P 6-axis IMU. An all-in-one design that simplifies installation, with an

Interfacing PMW3901 Optical Flow Sensor With ESP32

Learn how the PMW3901 optical flow sensor tracks motion without GPS. Explore its features, specifications, and how to interface it with ESP32 for accurate position tracking.

PMW3901-Based Flow Sensors | PX4 Guide (main)

The Hex HereFlow PMW3901 Optical Flow Sensor is a tiny board containing the PMW3901 flow module, VL53L1X distance sensor, and an IMU (used to

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In this work, we present PX4FLOW, an ARM Cortex M4 based sensor system that performs optical flow processing at 250 frames per second at a subsampled resolution of 64x64 pixels using a CMOS

Optical Flow Sensors — Components That Enhance Smart Camera ...

These specs influence how well a camera can track subjects, stabilize footage, or predict movement patterns. Many modern sensors integrate motion vector processors, enhancing real-time

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The following content was provided by Scott A. Dulchavsky, M.D., Ph.D., and is maintained by the ISS Research Integration Office.

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ARK Flow Open Source Optical Flow and Distance Sensor

ARK Flow Open Source Optical Flow and Distance Sensor The ARK Flow Open Source Optical Flow and Distance Sensor is an open source optical flow sensor

ADNS-3080 Optical Flow Sensor Module

ADNS-3080 optical flow sensor module is easy to use with Arduino boards. Although it is small with 30x30 pixel resolution, it still provides a frame update rate from

Optical Flow in a Smart Sensor Based on Hybrid Analog-Digital ...

The purpose of this study is to develop a motion sensor (delivering optical flow estimations) using a platform that includes the sensor itself, focal plane processing resources, and co

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Cheerson CX-OF Optical Flow — Copter documentation

Cheerson CX-OF Optical Flow The Cheerson CX-OF optical flow sensor is a lightweight and low cost optical flow sensor which can be used to improve horizontal position control especially in GPS

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