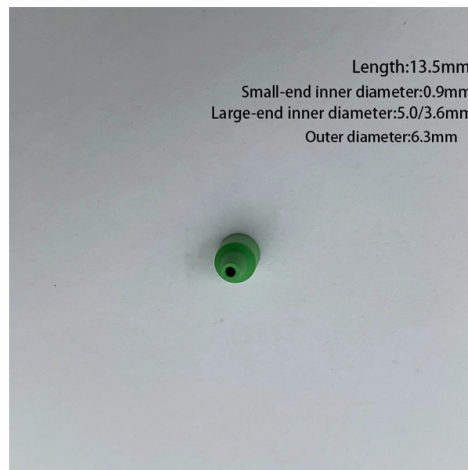


Optical Flow Module PID



AI Overview

PID control in optical flow modules stabilizes drone position by adjusting motor outputs based on velocity and position data from the optical flow sensor. Overview of Optical Flow in Drones Optical flow sensors use a downward-facing camera to detect ground texture and movement, often combined with a distance sensor (LiDAR or sonar) to estimate altitude and velocity. These sensors are particularly useful in GNSS-denied environments, such as indoors or under dense canopy, where GPS signals are unreliable. The sensor outputs are processed by the flight controller to provide velocity and position estimates, which are then fed into the drone's control loops.

Role of PID with Optical Flow PID controllers are used to stabilize the drone's position and velocity by continuously adjusting motor speeds based on the error between the desired setpoint and the measured state from the optical flow sensor:

- Proportional (P):** Corrects the error proportionally to the difference between the desired and measured position or velocity.
- Integral (I):** Compensates for accumulated errors over time, helping to correct drift caused by sensor bias or environmental factors.
- Derivative (D):** Reacts to the rate of change of the error, damping oscillations and improving stability.

When an optical flow sensor is used, the PID loop typically operates on horizontal velocity (X and Y axes) and sometimes altitude (Z axis) if combined with a rangefinder. The sensor provides flow measurements (OF.flowX, OF.flowY) that are converted into velocity estimates, which the PID controller uses to maintain position hold or smooth movement.

Tuning Considerations

- Sensor Accuracy:** Optical flow sensors can be sensitive to lighting, surface texture, and altitude. PID gains may need adjustment depending on the environment.
- Altitude Dependency:** The effectiveness of optical flow decreases with height. Some flight controllers scale PID gains based on altitude to maintain stability.
- Integration with EKF:** In ArduPilot or PX4, the Extended Kalman Filter (EKF) fuses op...

Article Content

Optical Flow Sensor Testing and Setup — Copter documentation

The full parameter list is below assuming the pilot will engage the calibration using RC input 8 (a 2-position switch) and switch between GPS and Optical flow using RC input 9 (a 3-position switch)

PMW3901 Optical Flow Sensor Breakout

This fancy optical flow sensor detects motion of surfaces in front of it, from ~80mm to infinity! It's great for DIY drone builds, and it's compatible with our new Breakout

PMW3901 Optical Flow Sensor Breakout

Connecting to your Raspberry Pi If you're not using our Breakout Garden HAT with SPI, then this is how to connect your Optical Flow Sensor Breakout up to your Raspberry Pi.

Optical Flow Sensors (landingpage) — Copter documentation

These are camera modules that use ground texture and visible features to determine aircraft ground velocity. Select the links below for information on the available sensors.

Estimating optical flow: A comprehensive review of the state of the art

Notably, the state-of-the-art performance achieved by VideoFLows (Shi et al., 2023) is attributed to its utilization of a TRi-frame Optical Flow module (TROF), a technique that jointly

MicoAir Optical Flow Ranging Sensor Integrated With

The MicoAir Optical Flow Ranging Sensor integrates cutting-edge technology for drone positioning and laser ranging. Featuring the MTF-01 module, it delivers

Deep recurrent optical flow learning for particle image velocimetry ...

Particle image velocimetry is a non-intrusive, optical method that adds buoyant particles (tracer particles) to the flow, in which they adopt the velocity of the surrounding fluid.

2026.6 Release Notes | Betaflight

Welcome to Betaflight 2026.6! This release lays the first foundations for autonomous flight -- a brand-new Flight Plan tab and the underlying autopilot, both currently simulation-only and intended to

Electronic Circuits and Projects: PMW3901 Optical Flow Sensor with ...

PMW3901 Optical Flow Sensor with ESP32 - Position Hold for Drones The PMW3901 is an optical flow sensor often used in drones and robotics to detect motion relative to the ground. It

PX4-Autopilot/docs/en/sensor/optical_flow.md at main

Optical Flow uses a downward facing camera and a downward facing distance sensor for velocity estimation. It can be used to determine speed when navigating without GNSS — in buildings,

Optical flow

Optical flow or optic flow is the pattern of apparent motion of objects, surfaces, and edges in a visual scene caused by the relative motion between an observer and a scene. Optical flow can also

Optical Flow | PX4 Guide (main)

Optical Flow uses a downward facing camera and a downward facing distance sensor for velocity estimation. It can be used to determine speed when navigating without GNSS — in buildings,

Optical Flow Sensors (landingpage) — Copter documentation

Optical Flow Sensors (landingpage) Copter, Plane and Rover support Optical Flow Sensors. These are camera modules that use ground texture and visible features to determine aircraft ground velocity.

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.

Holybro H-Flow (Optical Flow and Distance Sensor Module)

With the Holybro H-Flow optical flow and distance sensor module on board, you get a plug-and-play navigation solution that blends technical precision with proven reliability – exactly what professional

ADNS-3080 Optical Flow Sensor Module Horizontal Movement

Amazon : EC Buying ADNS-3080 Optical Flow Sensor Module Horizontal Movement Detector APM2.52 APM2.6 Optical Flow Detector Module Board : Electronics
Description: The ADNS-3080 is

SPI breakout module with near optical flow for

Breakout navigation module compatible with Raspberry Pi and Arduino, ideal for surface detection and ground tracking of a vacuum cleaner robot for example

Raspberry Pi

Connecting to your Raspberry Pi If you're not using our Breakout Garden HAT with SPI, then this is how to connect your Optical Flow Sensor Breakout up to your Raspberry Pi.

Contact Us

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