



Pixel Lock™ and NPU Lock™ Autopilot Integration

Intelligent Visual Tracking for Autonomous UAV Control

TURN ANY UAV INTO A VISUAL PURSUIT PLATFORM

Pixel Lock™ is a lightweight, deterministic image-tracking solution that transforms standard UAV platforms into assisted autonomous tracking systems — without requiring AI object recognition or expensive hardware redesigns. Designed for seamless integration with Betaflight and PX4, **NPU Lock™** after the pixel is locked we enable real-time AI based target pursuit using NPU model I correlation which turns to a strong object tracking lock.

OPERATOR-CENTRIC USER INTERFACE

Smart Cursor System

State	Color	Function
Standby	Orange	Manual targeting
Engaged	Blue	Autopilot active

Engaged

- Joystick-controlled targeting
- Dynamic ROI adjustment
- Minimal visual clutter
- Real-time engagement feedback

Stabilized Horizon Overlay

- Live pitch & roll visualization
- IMU alignment confirmation
- Low-profile tactical display
- Non-intrusive flight awareness

BUILT IN ONE SMALL SIZE IMAGING MODULE

High Performance LWIR and CMOS



- Features: LWIR 640-9
- Detector: 640x480 12 μm
- Spectrum: LWIR 8 μm – 14 μm
- Interfaces: CMOS, USB 3.2, LVDS
- Frame Rate: Up to 60 Hz
- Size: 21 x 21 x 19 mm
- Weight: 24 g

Edge Detection & Object Bounding



- Pixel Tracking Firmware
- MAVLink Command Extensions
- Betaflight Assisted Mode
- PX4 Assisted Flight Mode
- OSD Overlay System
- Zoom Persistence Logic
- Flight & Bench Validation

SIMPLE. RESPONSIVE. RELIABLE.

Pixel Lock™ delivers autonomous visual pursuit capability through deterministic image tracking and intelligent flight-controller integration — preserving operator authority while dramatically enhancing targeting performance.

KEY CAPABILITIES

Pixel-Based Target Lock

- Operator-selectable ROI (Region of Interest)
- Real-time frame-to-frame pixel tracking
- Adaptive tracking window scaling
- Dynamic correction generation

Assisted Flight Control

- Autopilot-driven roll & pitch correction
- Smooth transition between manual and assisted modes
- Immediate manual override restoration
- Closed-loop MAVLink command architecture

Seamless MAVLink Integration

- Bidirectional UART MAVLink communication
- Compatible with:
 - Betaflight
 - PX4
- Uses existing FC telemetry and IMU data
- No new sensor architecture required

Lightweight Processing Philosophy

- Deterministic behavior
- Low latency
- Reliable response
- Embedded efficiency

Edge Detection & Object Bounding

- Edge detection
- Contour grouping
- Passive object segmentation
- Lightweight bounding boxes

PERFORMANCE TARGETS

System Objectives

- <100 ms control loop latency
- Real-time stabilized tracking
- Adaptive ROI persistence during Zoom
- Automatic fail-safe disengagement
- Smooth authority arbitration

Fail-Safe Logic

- MAVLink connection loss
- IMU instability detected
- Pixel tracking confidence degraded
- Operator override initiated

Scalable Deployment

- ISR drones
- Tactical FPV systems
- Autonomous surveillance
- Visual pursuit applications
- Lightweight UAS platforms