

AI FPV DRONE DELIVERY SYSTEM

• Autonomous Flight • Sensor Integration • AI-Assisted Payload Delivery

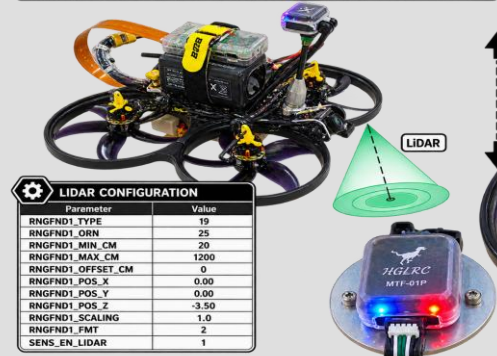
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PROJECT GOAL

- The goal of the project was to transform an FPV drone into an experimental platform for autonomous and AI-assisted payload delivery.
- The system combines ArduPilot-based flight control, LiDAR, Optical Flow, GPS, a Raspberry Pi Zero 2 W, an AI camera and a servo-based payload mechanism.

ALTITUDE HOLD (ArduPilot)

The internal barometer was not sufficient for stable altitude hold. LIDAR MTF-01P was installed and calibrated.



POSITION HOLD (ArduPilot)

LIDAR + Optical Flow sensor (MTF-01P) was integrated and configured for Position Hold. The drone maintains its horizontal position automatically using optical flow and LIDAR.



Note: LIDAR + Optical Flow is used indoors or in environments where GPS is unreliable. GPS is used mainly for navigation and mission planning.

OFFLINE DEVELOPMENT ENVIRONMENT



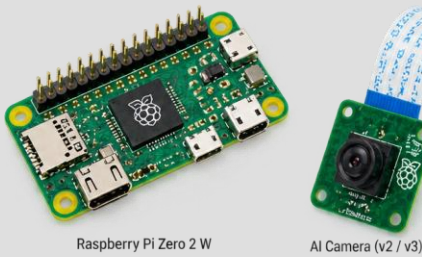
HARDWARE

- Raspberry Pi Zero 2 W
- Raspberry Pi AI Camera Module
- microSD card (Raspberry Pi OS Lite)

OFFLINE DEVELOPMENT

- No Internet connection
- Local development & testing
- AI for object detection (OpenCV)

RASPBERRY PI & AI CAMERA



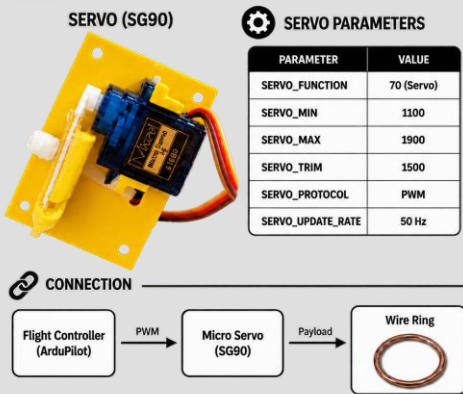
KEY PARAMETERS

PARAMETER	VALUE
RPI_MODEL	Raspberry Pi Zero 2 W
OS	Raspberry Pi OS (Lite)
PYTHON_VERSION	3.11
OPENCV_VERSION	4.8.0
CAMERA_TYPE	Raspberry Pi AI Camera (v2 / v3)
RESOLUTION	1280 x 720
FPS	30
INTERFACE	CSI
MAVSDK_ENABLED	Yes
CAMERA_INPUT	libcamera
IMAGE_PROCESSING	OpenCV (object detection)
STORAGE	microSD (32 GB)

SOFTWARE & PROCESSING

- Camera initialized with libcamera.
- Image processing using OpenCV.
- Object detection & tracking for payload delivery.
- MAVSDK used for communication with ArduPilot.

PAYLOAD DELIVERY - SERVO



PAYLOAD CHANGE

Problem with Kevin (string payload):

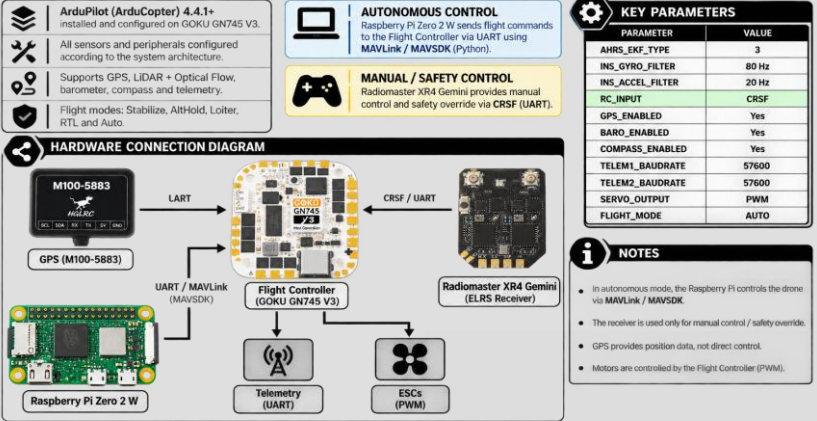
- Too light and fragile.
- The string poses a risk to the drone, as it can get tangled in the propellers.

Solution:

We replaced Kevin with a small wire ring as payload (safer and more reliable).



AUTOPILOT & FLIGHT CONTROL



Challenges & Solutions

- Raspberry Pi connection → network/configuration setup
- Flight Controller replacement → ArduPilot reconfiguration
- Board orientation → adapted mounting/orientation
- Motor configuration → DShot600 & motor order
- LiDAR integration → mounting & calibration

Final Results

- Stable flight control with ArduPilot
- Altitude Hold using LiDAR
- Position Hold using Optical Flow
- Servo-based payload release successfully tested
- Raspberry Pi controls the drone in flight.

Documentation



SCAN FOR DOCUMENTATION