📄 HOW TO RUN THE PROJECT (FULL GUIDE)

Edge YOLO – Real-Time Surveillance With Weapon + Fire Detection

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✅ 1. System Requirements

Component	Requirement
OS	Windows 10/11
Python	**3.10.x** (⚠ YOLOv8 & Torch do not support Python 3.12/3.13)
RAM	4GB (minimum), 8GB recommended
Camera	USB Webcam or Laptop Camera

✅ 2. Create the Project Folder

Create the main folder anywhere on your PC:

```
EdgeYOLO_Project/
│
├── backend/
│   ├── app.py
│   ├── camera.py
│   ├── detector.py
│   ├── config.json
│   ├── logs/
│   ├── models/
│   │   └── best.pt   ← (your trained or downloaded YOLO model)
│
└── frontend/
    ├── index.html
    ├── app.js
    └── css/
```

└── styles.css

✅ 3. Create Python Virtual Environment (VERY IMPORTANT)

Open CMD inside project:

cd EdgeYOLO_Project

py -3.10 -m venv venv310

Activate the environment:

venv310\Scripts\activate

You should see:

(venv310) C:\Users\...\EdgeYOLO_Project>

✅ 4. Install Required Python Packages

Inside the **activated venv**, run:

cd backend

pip install ultralytics==8.2.0

pip install opencv-python

pip install flask

pip install numpy==1.26.4

⚠ IMPORTANT
numpy==2.x WILL BREAK on Windows when using Torch.
So use 1.26.4.

✅ 5. Add Your Trained Model

Place your best.pt inside:

EdgeYOLO_Project/backend/models/best.pt

This model must include classes:

- fire

- smoke
- knife
- gun
- pistol
- rifle (optional)
- grenade (optional)

✅ 6. Start the Backend Server

From inside backend folder:

(venv310) python app.py

You will see:

Running on http://127.0.0.1:8000

✅ 7. Open the Frontend UI

Open this file in your browser:

EdgeYOLO_Project/frontend/index.html

It will show:

✓ Live Camera Feed

✓ Bounding boxes for objects

✓ Alarm if weapons/fire detected

✓ Detections JSON updated live

✅ 8. Alarm Behavior (Important)

The alarm triggers ONLY when:

- the model detects **knives/guns/fire**
- persisting across **2+ frames** (to avoid false alarms)
- confidence ≥ 0.45

- outside cooldown window (5 seconds)

You will get:

- 🔔 **Windows beep sound**
- Logged event in backend/logs/events.log
- Alarm message shown in /detections

✅ 9. Testing the System

Use real objects OR printed images:

- Show a knife (real or photo)
- Show a gun photo from mobile screen
- Show fire from YouTube video
- Show smoke images

The system should detect and alarm with **high accuracy**.

✅ 10. Stopping the Server

Just press:

CTRL + C

To deactivate virtual env:

deactivate