Documentation - Intelligent Multi-Source Video Analytics Platform

System Requirements

Ubuntu Packages:

```
sudo apt update && sudo apt install -y \
  python3-pip \
  python3-gi \
  gir1.2-gst-rtsp-server-1.0 \
  gstreamer1.0-tools \
  gstreamer1.0-plugins-{base,good,bad,ugly} \
  mosquitto \
  mosquitto-clients
```

Python Dependencies:

Install via requirements.txt:

```
pip install -r requirements.txt
```

Minimum Python version: Python 3.9+

System Components

- GStreamer Ingestion: Captures webcam input using v4l2src, decoded via appsink.
- YOLOv5 Detector: Applies AI-based analytics on live video frames.
- RTSP Server: Streams annotated video through a GStreamer pipeline.
- REST API Server (Flask): Controls stream lifecycle and serves MJPEG dashboard.
- HTML Dashboard: Web UI for monitoring and stream control.
- MQTT Integration (Optional): Publishes detection results for subscribed clients.

Running the System

1. Launch the server:

```
python3 main_server.py
```

2. Access dashboard:

http://localhost:8000/dashboard

3. Start a stream (API):

```
curl -X POST http://localhost:8000/stream/start \
    -H "Content-Type: application/json" \
    -d '{"id": "cam_hp", "url": 0}'
```

System Architecture & Data Flow