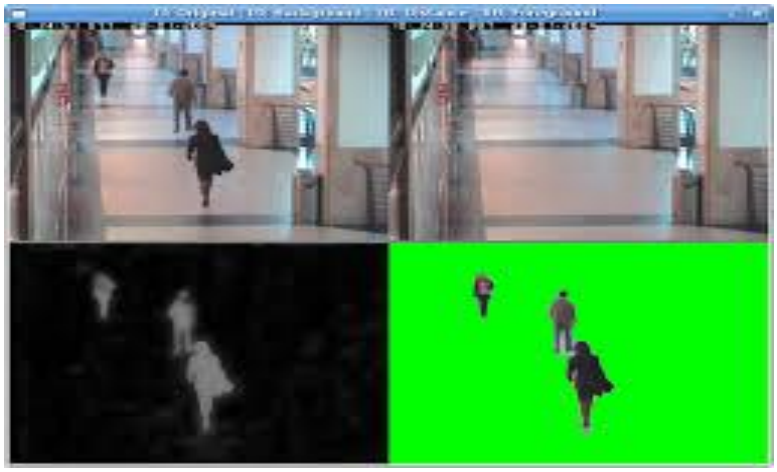
Real-Time Background Subtraction System for Video Surveillance

1. Project Overview: The Real-Time Background Subtraction System for Video Surveillance aims to detect moving objects in a video stream by subtracting the static background from each frame. Leveraging computer vision techniques and OpenCV libraries, the system will identify foreground objects, such as people, vehicles, or animals, for surveillance and security applications. The project will contribute to various scenarios, including intrusion detection, traffic monitoring, and crowd analysis.



2. **Project Components:**

- **Background Modeling:** Develop algorithms to model the static background from a video sequence and update it over time to adapt to changes.
- **Foreground Segmentation:** Implement foreground segmentation algorithms to identify moving objects by subtracting the background from each frame.

- **Object Detection:** Detect and localize foreground objects within the video frames using contour analysis, blob detection, or other object detection techniques.
- **User Interface:** Design a graphical user interface (GUI) to visualize real-time video feeds, segmented foreground objects, and detected events.

3**. Technology Stack:**

- **Programming Language:** Python for algorithm development and implementation.
- **Computer Vision Library:** OpenCV for real-time image processing tasks and background subtraction.
- **Development Environment:** Jupyter Notebook or any Python IDE for coding and experimentation.

4. Requirements:

- Develop a Real-Time Background Subtraction System using **at least 5 digital image processing techniques** such as background modeling, foreground segmentation, and object detection.
- Implement a user-friendly interface to visualize real-time video feeds, segmented foreground objects, and detected events.
- Prepare a comprehensive group report documenting the project's objectives, methodologies, implementation details, and evaluation results.
- Conduct a demonstration of the Background Subtraction System in class, showcasing its capabilities and real-time performance.

5. Evaluation Criteria:

Accuracy: Measure the accuracy of foreground segmentation algorithms in correctly identifying moving objects while minimizing false positives and negatives.

Robustness: Evaluate the system's robustness in handling variations in lighting conditions, background clutter, and object occlusions.

Real-Time Performance: Assess the system's performance in terms of processing speed and frame rates for real-time background subtraction and object detection.

User Interface: Evaluate the usability and effectiveness of the graphical user interface for displaying real-time video feeds and segmented foreground objects.