



ACROPOLIS
Enlightening Wisdom



AITR ACM
Student Chapter



प्रयोग 2.0

ATTEMPT <> INNOVATE <> SUCCEED

MARKTINE
Accelerate Digital Success

PRESENTS

PROBLEM STATEMENT

The Winner of the problem statement will be exclusively announced by Marketine team.

Scope of Work

If you have 3 cameras at different locations but want their counting data to be consolidated into a single, accurate count in real-time, the system needs to be designed carefully to ensure synchronization, accuracy, and reconciliation of data from all cameras.

Key Requirements

1. Synchronized Counting:

- All 3 cameras should capture and process data simultaneously.
- The system should reconcile counts from all cameras to avoid double-counting or missing bottles.

2. Centralized Dashboard:

- A single dashboard should display the total count (aggregated from all cameras) along with individual camera counts for transparency.

3. Accuracy:

- Use AI algorithms to ensure accurate detection and counting, even if bottles are partially visible or overlapping.
- Implement logic to handle discrepancies between camera counts.

4. Real-Time Updates:

- The system should update the dashboard in real-time as bottles are loaded or moved.

System Design

1. Camera Setup

- Positioning: Place the 3 cameras at strategic locations to cover the entire loading area without blind spots.
- Field of View: Ensure each camera's field of view overlaps slightly with the others to avoid missing bottles.
- Calibration: Calibrate the cameras to ensure they are aligned and synchronized.

2. AI-Powered Object Detection

Use AI models to detect and count bottles in each camera's feed.

Train the model to handle:

- Overlapping bottles.
- Partial visibility of bottles.
- Different lighting conditions.

System Design

3. Data Aggregation and Reconciliation

Central Server: Use a central server or edge computing device to aggregate data from all 3 cameras.

Reconciliation Logic:

- Assign a unique identifier to each bottle detected (e.g., based on position, size, or color).
- Compare data from all cameras to ensure the same bottle is not counted multiple times.
- Use overlapping fields of view to cross-verify counts.

4. Dashboard Display

Total Count: Display the consolidated count from all cameras.

Camera-Wise Counts: Show individual counts from each camera for transparency.

System Design

Discrepancy Alerts: Highlight discrepancies between camera counts for manual verification.

Real-Time Updates: Update the dashboard in real-time as bottles are loaded or moved.

5. Log Creation

Automatically generate logs for each loading event, including:

- Timestamp.
- Total count (aggregated from all cameras).
- Individual camera counts.
- Discrepancies (if any).
- Forklift ID or operator details.

WORKFLOW

1. Bottles are Loaded:

- Bottles are placed on the forklift or loading area.
- All 3 cameras capture images simultaneously.

2. AI Processing:

- Each camera's feed is processed by the AI model to detect and count bottles.
- Data from all cameras is sent to the central server.

3. Data Reconciliation:

- The central server reconciles the counts from all cameras.
- Unique identifiers are used to ensure no bottle is counted more than once.

4. Dashboard Update:

- The dashboard displays the total count and individual camera counts.
- Operators can verify the counts in real-time.

5. Log Generation:

- A log is created for each loading event and stored in the database.

Challenges and Solutions

1. Double-Counting:

- Use unique identifiers for each bottle and cross-verify data from overlapping camera views.

2. Blind Spots:

- Ensure cameras are positioned to cover the entire loading area with overlapping fields of view.

3. Discrepancies:

- Implement logic to flag discrepancies and allow manual verification.

4. Real-Time Processing:

- Use edge computing or high-performance GPUs to process data in real-time.